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LOWER MISSISSIPPI REGION COMPREHENSIVE STUDY. APPENDIX H. IRRIG--ETC(U)
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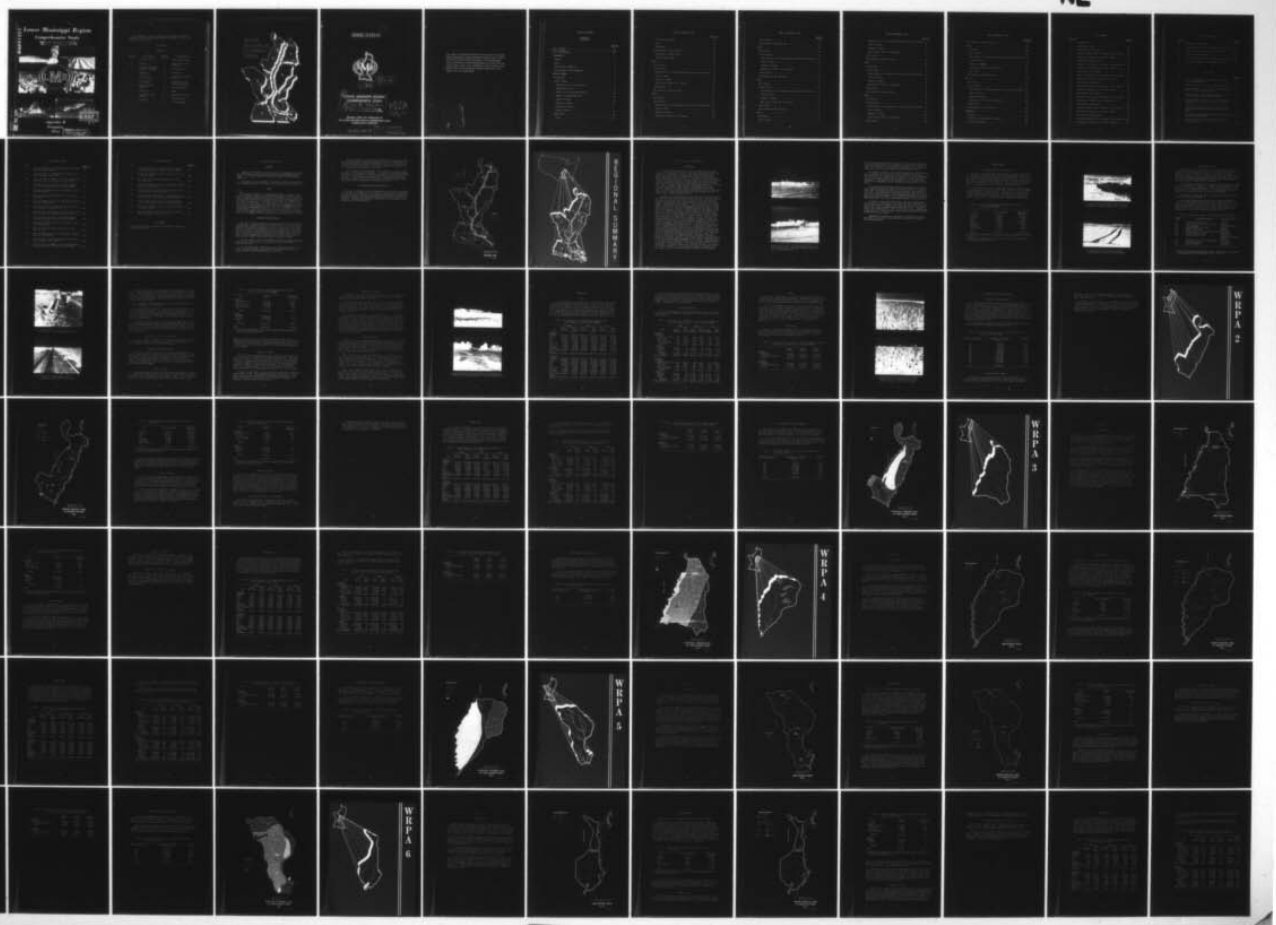
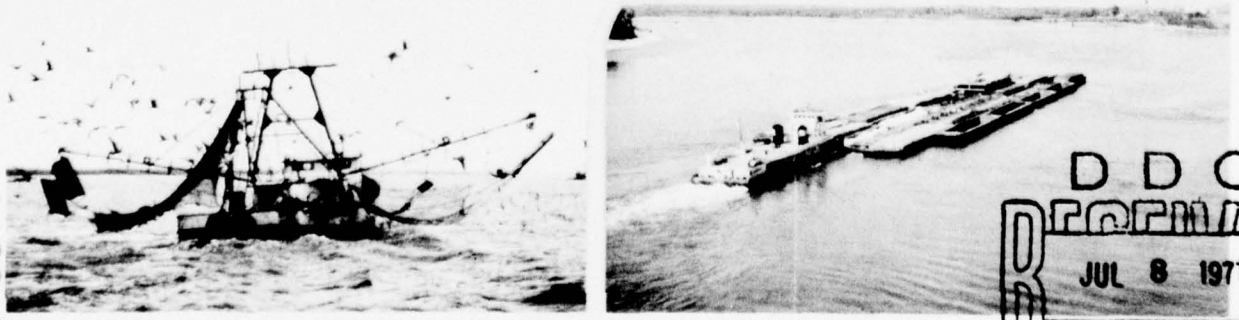


Lower Mississippi Region Comprehensive Study



Appendix H
Irrigation
1974

This appendix is one of a series of 22 documents comprising the complete Lower Mississippi Region Comprehensive Study. A list of the documents is shown below.

Main Report

Appendixes

Appendix	Description	Appendix	Description
A	History of Study	K	M and I Water Supply
B	Economics	L	Water Quality and Pollution
C	Regional Climatology Hydrology & Geology	M	Health Aspects
D	Inventory of Facilities	N	Recreation
E	Flood Problems	O	Coastal and Estuarine Resources
F	Land Resources	P	Archeological and Historical Resources
G	Related Mineral Resources	Q	Fish and Wildlife
H	Irrigation	R	Power
I	Agricultural Land Drainage	S	Sediment and Erosion
J	Navigation	T	Plan Formulation
		U	The Environment


WATER
RESOURCES
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IRRIGATION

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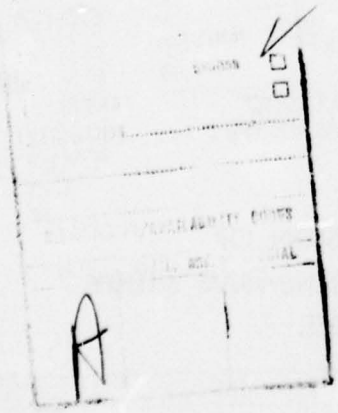
LOWER MISSISSIPPI REGION COMPREHENSIVE STUDY.

Appendix H. Irrigation.

ORIGINAL CONTAINS COLOR PLATES: ALL DDC REPRODUCTIONS WILL BE IN BLACK AND WHITE.

PREPARED UNDER THE SUPERVISION OF
THE LOWER MISSISSIPPI REGION COMPREHENSIVE STUDY
COORDINATING COMMITTEE

This report was prepared at field level by the Lower Mississippi Region Comprehensive Study Coordinating Committee and is subject to review by interested Federal agencies at the departmental level, by Governors of the affected States, and by the Water Resources Council prior to its transmittal to the President of the United States for his review and ultimate transmittal to the Congress for its consideration.



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PHOTOGRAPHS

All photographs in this appendix were furnished by USDA, Soil Conservation Service.

INTRODUCTION

PURPOSE

Appendix H, Irrigation, is one of a series of appendixes presenting data and information for the Lower Mississippi Region Comprehensive Study. It is a brief report of the efforts of many state and federal agencies.

The purpose of this appendix is to quantify current use and future water withdrawal needs for irrigation and certain other agricultural uses.

SCOPE

The appendix identifies the extent and location of land and crops presently being irrigated, the extent and location of the kinds and number of livestock and poultry presently in the region, and the amount and seasonal distribution of water presently being used for irrigation and for livestock and poultry. The extent and location of potentially irrigable lands are identified. Also determined are the extent and location of crops for future irrigation for National Income ~~(Program A)~~ and Regional Development ~~(Program B)~~ objectives. The kinds and numbers of livestock and poultry and their future water needs are projected for these same objectives. Rural domestic water use is not discussed in this appendix but is included in Appendix K, Municipal and Industrial Water Supply.

PRESENTATION OF MATERIAL

The Lower Mississippi Region has been divided into 10 Water Resource Planning Areas, commonly referred to as WRPA's and are shown in figure 1. This appendix presents information for nine of these areas. The tenth, WRPA 1, is within the Mississippi River levee system or to the top bank of the river where no levee exists and it was assumed that no irrigation and very little livestock and poultry water use would occur within this area. Data and information is presented in a regional summary and for each of the nine WRPA's under four general headings as follows:

(1) The Setting - A brief description of the region and some of the major features with respect to irrigation, livestock and poultry, and their use of water.

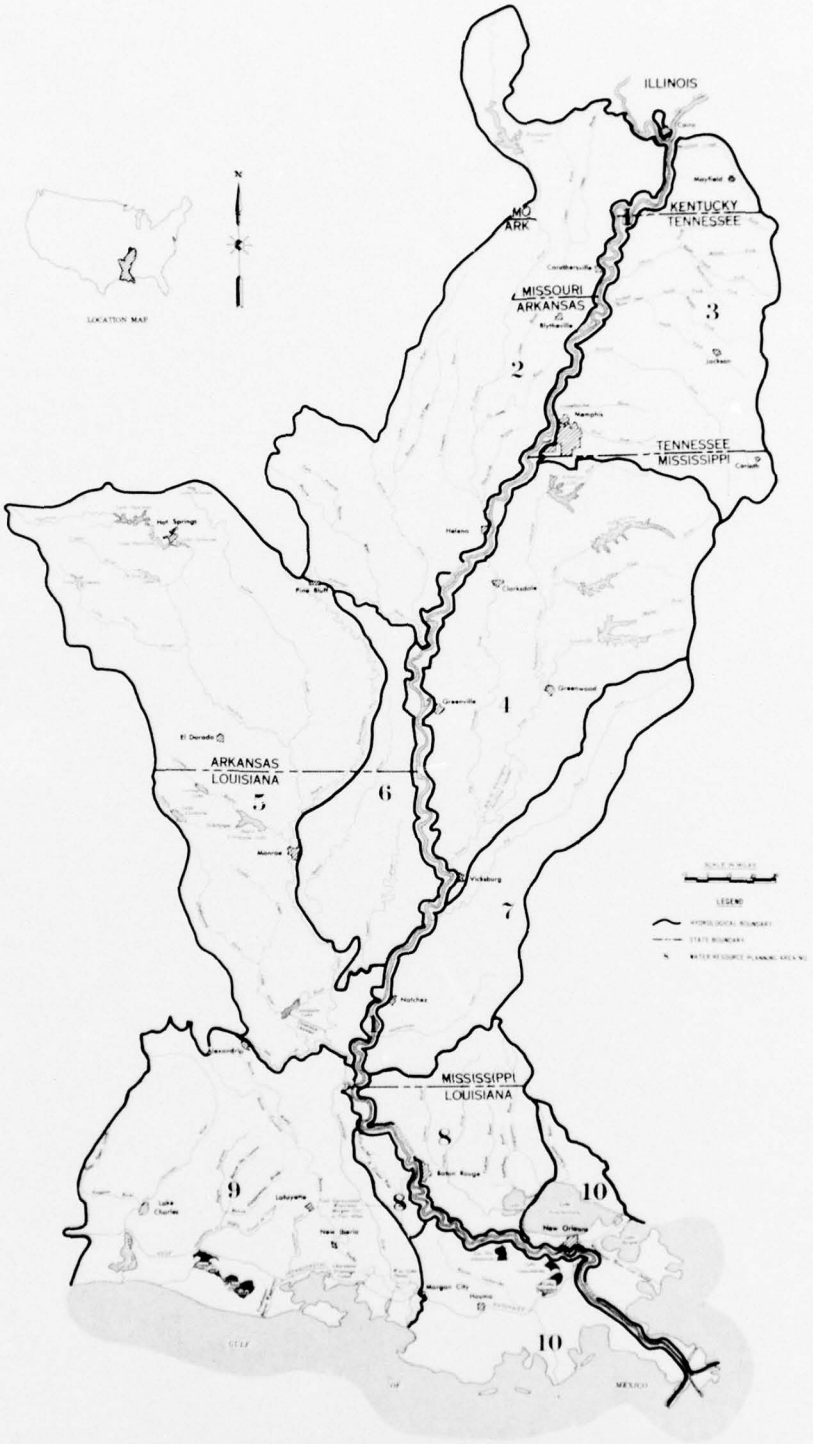
(2) Present Status - The characteristics and distribution of irrigation and livestock and poultry, their present water use, economic values, and the seasonal distribution of water use.

(3) Future Needs - Projection of irrigated acres by crops and locations and projections of kinds and numbers of livestock and poultry for the National Income and Regional Development objectives. The needs and seasonal distribution of water to meet the projected irrigation and livestock and poultry requirements is presented.

(4) Potential for Meeting Needs - The potentially irrigable lands and their distribution are identified. The sources of water, both ground and surface, are presented to establish a supply of water against a need for water. The potentially irrigable land is presented to establish a supply of irrigable lands against a need for irrigated production under the National Income and Regional Development objectives.

RELATIONSHIP TO OTHER APPENDIXES

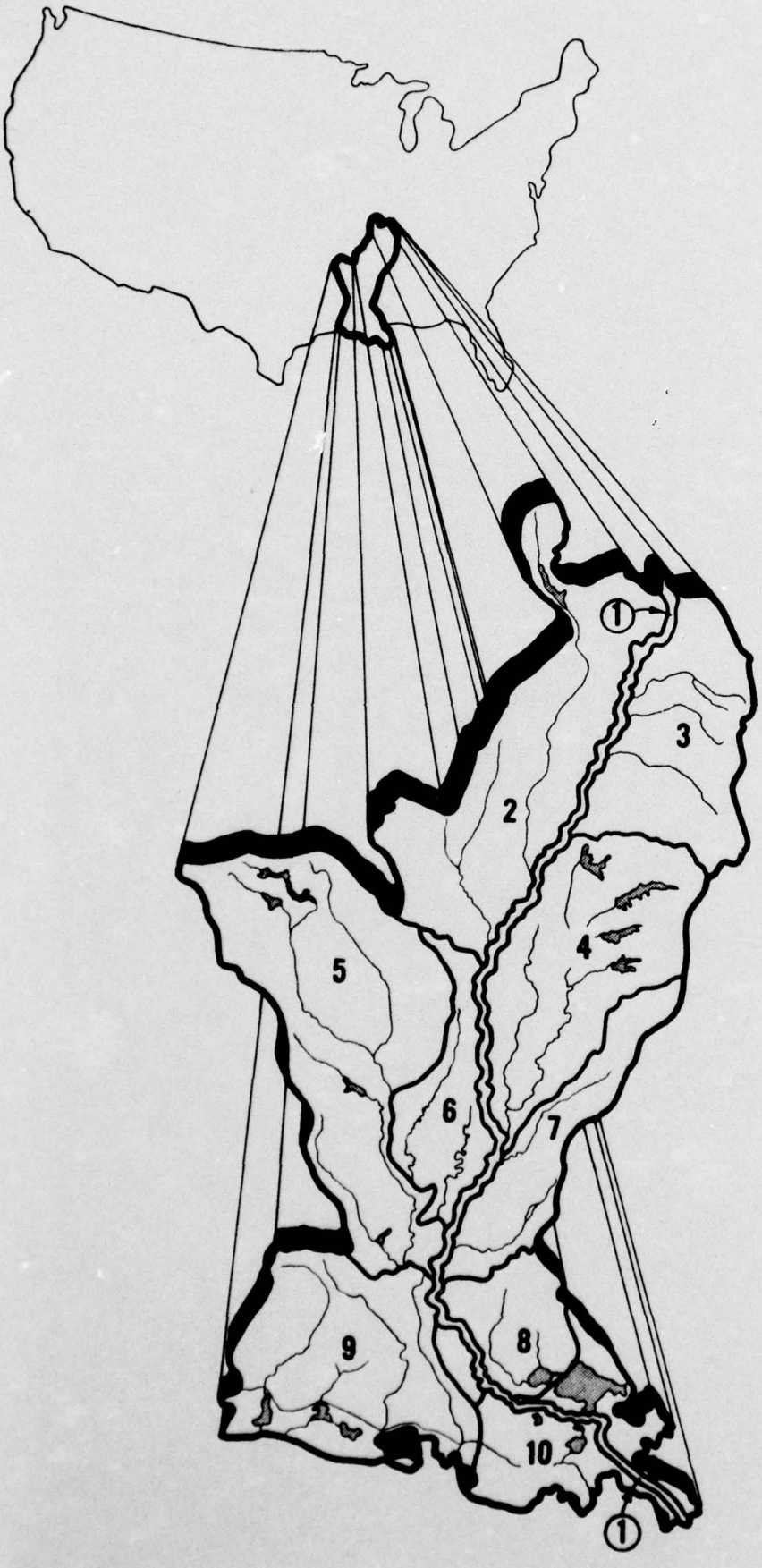
The various appendixes in this comprehensive basin study are related through the use of common data and information making them interdependent. Specifically, this appendix received inputs from Economics; Regional Climatology, Hydrology, and Geology; Water Quality and Pollution; and Land Resources. Outputs were provided to Land Resources, Water Quality and Pollution, and Plan Formulation.



LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

REGIONAL MAP

FIGURE 1



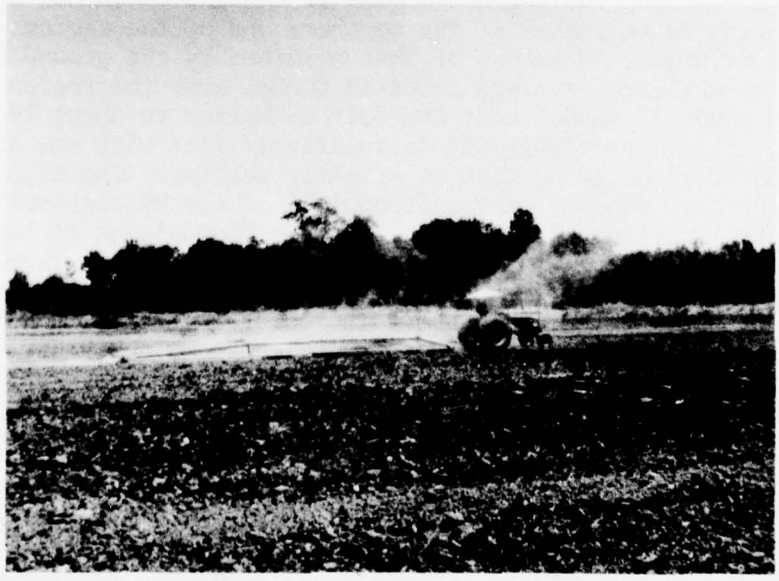
REGIONAL SUMMARY

REGIONAL SUMMARY

THE SETTING

The Lower Mississippi Region, an area of about 102,403 square miles of 65.5 million acres, lies in the south central portion of the contiguous United States. The area lies along both sides of the Mississippi River, below the confluence of the Mississippi and Ohio Rivers, down to the Gulf of Mexico. A small portion of Illinois near Cairo, the western portions of Kentucky, Tennessee, and Mississippi, the southeast portion of Missouri, a major portion of Arkansas (eastern), and a major portion of Louisiana (all except extreme northwest) make up this region. The Mississippi River has a drainage area of over 1,200,000 square miles which includes contribution from the Ohio, Missouri, Tennessee, Arkansas, White, and Red Rivers, plus several other minor rivers. However, the Red River does not presently directly contribute flows to the Mississippi River.

The Lower Mississippi Region is likely the most water-rich region of the nation since the Mississippi River serves as an overflow pipe for the water from several other regions, because of the relative high rainfall and resultant high surface runoffs, and because of the large volumes of underground water supplies. Annual precipitation averages about 51 inches over the region ranging from about 64 inches near the Gulf of Mexico to 44 inches at the northern end of the region. Annual runoffs of rainfall, in excess of that absorbed by the ground or otherwise lost or utilized, average about 18 inches over the region and range from about 32 inches near the Gulf of Mexico to about 14 inches near Cairo, Ill. The topography is relatively flat with the alluvial bottoms and prairies being flat to slightly rolling. The alluvial bottoms generally consist of the floodplain of the Mississippi River in the central portion of the region and the floodplains of the major tributary streams. The prairies consist of smaller areas in east central and southwestern Arkansas and in northeastern Louisiana and an area in southwestern Louisiana above the coastal marsh. Most of the irrigation in the region is in the alluvial bottoms and prairies since these areas have been the most extensively developed for agricultural uses with high concentrations of rice and other crops. The topography of the coastal plains is gently rolling to rolling. These areas generally consist of the southwestern part of Arkansas, the western portion of Louisiana, and an area in western Tennessee and north central Mississippi along the eastern boundary of the region. The topography of the loess areas (commonly believed to be soils of windblown deposits) is rolling to greatly rolling. These areas generally consist of an upland area in northeast Arkansas and southeast Missouri locally known as "Crowley's Ridge," all of the western portion of Kentucky within the region, most of the western portion of Tennessee, the "bluff"



Land leveling (above) and land smoothing (below) are used in many areas of the region for more efficient use of irrigation waters.

hills of Mississippi adjacent to and east of the alluvial floodplain of the Mississippi River, and a portion of southeast Louisiana. The extent of irrigation in the coastal plain and loess areas is minor in comparison to its use in the alluvial bottom and prairie areas.

The amount of rainfall, its seasonal distribution, and the growing season influence the need for and use of irrigation in the Lower Mississippi Region. Irrigation is essential to the successful production of rice and most truck crops but otherwise is not a definite requirement for crop production in the region. It is therefore used primarily as a management practice during the drought periods that do occur.

Livestock and poultry numbers have been increasing in the region since about 1959 due to the conversion of other land uses to pasture and to the better marketing and processing resources now available in the region. The production of livestock and poultry and their products is an important segment of the agricultural economy of the region. Marketing receipts from these sources totaled $373 million in 1970 or about 15 percent of the total farm income receipts of $2,493 million.

Irrigation in the region from 1900 to 1949 was confined almost exclusively to the production of rice with less than 5 percent of the area irrigated used to produce crops other than rice. Significant increases in acreage irrigated occurred from 1949 to 1954. Slight increases have continued since 1954. At present, the area irrigated for production of rice in the region is only slightly more than 41 percent of the total area irrigated.

Approximately 31 percent of the region's potentially available water supply is presently being used for irrigation and for use by livestock and poultry.

PRESENT STATUS

Characteristics of Irrigated Areas

A total of 2.4 million acres are presently irrigated in the region. This represents about 4 percent of the total agricultural land area of 57.9 million acres and 6 percent of the total potentially irrigable acreage of 40.9 million acres. The major irrigated crops are rice, soybeans, and cotton. The location and extent of presently irrigated lands are shown in WRPA summaries of this appendix. The irrigated acres and the present irrigation water use, by crops, are presented in table 1.

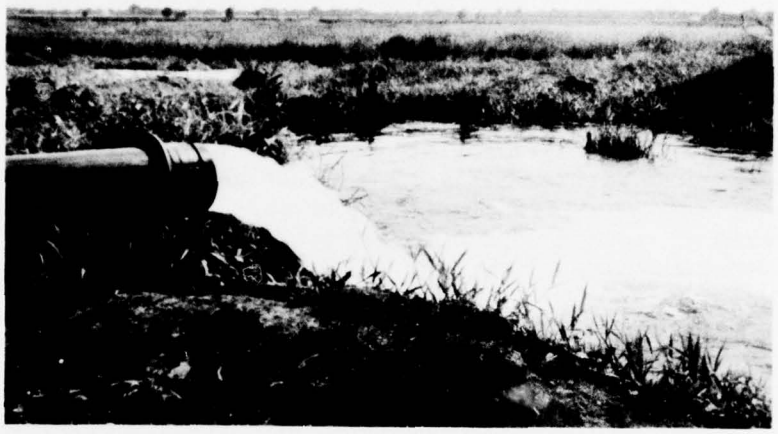
All portions of the region, except WRPA 1 that was assumed to have no irrigated land, have some irrigated land. However, two of the WRPA's contain the majority of the presently irrigated lands. These are the northeast Arkansas-southeast Missouri area (WRPA 2) and the southwest Louisiana area (WRPA 9). Both have a large amount of irrigated rice acreage. WRPA 2 also has a large amount of irrigated soybean acreage.

Table 1 - Acres of irrigated land and water use by crops, 1970, REGIONAL SUMMARY

Crop	Acres Irrigated	Water Use 1/ (Acre Feet)
Soybeans	983,900	1,472,200
Cotton	267,400	401,000
Corn	40,200	73,200
Rice	990,100	3,262,700
Hay Crops	16,800	40,800
Pasture	6,900	17,500
Vegetables	5,200	3,900
Miscellaneous	83,300	136,400
Total	2,393,800	5,407,700 2/

1/ Withdrawals essential for rice and vegetables, supplemental for other crops.

2/ Ground water withdrawals 70 percent of total, surface water withdrawals 30 percent of total.



Ground water supplies about 70 percent of the total water used for irrigation in the region.

A typical field of rice being irrigated in the region at an early stage of growth.

Land Resource Areas

The United States is classified into 20 Land Resource Regions. 1/ Each region retains as much similarity as possible in agricultural relationships. Four Land Resource Regions are included in the Lower Mississippi Region. These are: Atlantic and Gulf Coast Lowlands, Forest and Truck Crop Region, South Atlantic and Gulf Slope Cash Crop, Forest and Livestock Region, Mississippi Delta Cotton and Feed Grains Region, and Central General Farming and Forest Region.

The 20 regions are divided into 156 major land resource areas (LRA's). They are delineated with emphasis on combinations of intensities of problems in soil and water conservation. They are characterized by particular patterns or combinations of soils (including slope and erosion), climate, water resources, land use, and types of farming.

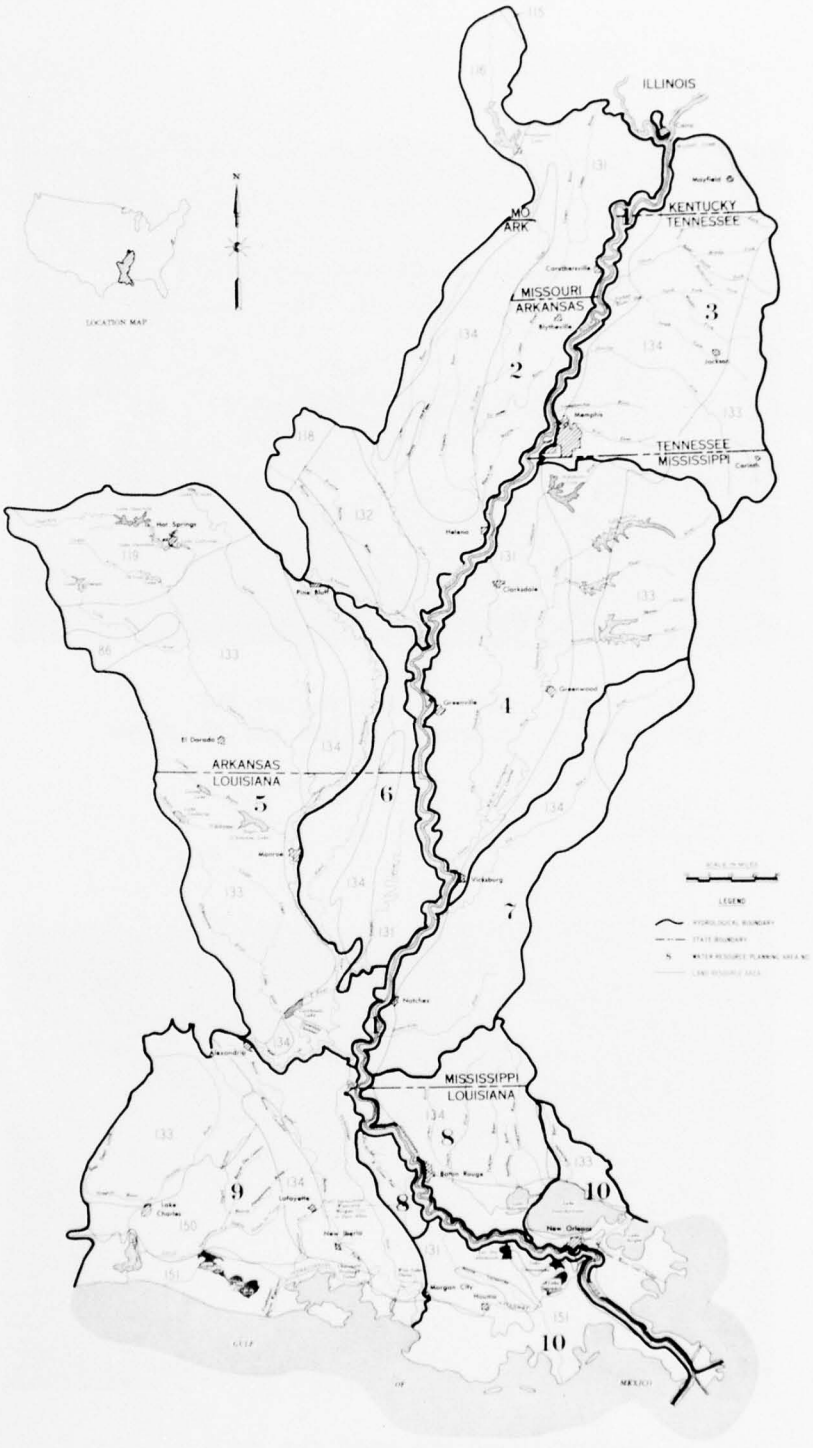
Eleven major land resource areas are found in the study area and are shown in table 2 and figure 2.

The Eastern Arkansas Prairie (LRA 132), the Gulf Coast Prairie (LRA 150), and the Southern Mississippi Valley Alluvium (LRA 131) Land Resource Areas provide a large majority of the land on which rice is grown and irrigated in the region. The large acreage of irrigated soybeans in WRPA 2 is associated with the Eastern Arkansas Prairie and Southern Mississippi Valley Alluvium Land Resource Areas.

Table 2 - Land resource areas of the Lower Mississippi Region

LRA No.	General Definition	General Location
86	Texas Blackland Prairie	Arkansas
115	Central Miss. Valley Wooded Slopes	Missouri
116	Ozark Highlands	Arkansas-Missouri
118	Arkansas Valley and Ridges	Arkansas
119	Ouachita Mountains	Arkansas
131	Southern Miss. Valley Alluvium (Delta)	All States
132	Eastern Arkansas Prairie	Arkansas
133	Southern Coastal Plain	Mississippi, Tennessee, Louisiana, Arkansas
134	Southern Miss. Valley Silty Uplands	All States
150	Gulf Coast Prairie	Louisiana
151	Gulf Coast Marsh	Louisiana

1/ Atlas of River Basins of the United States, United States Department of Agriculture, Soil Conservation Service, June 1970.



LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

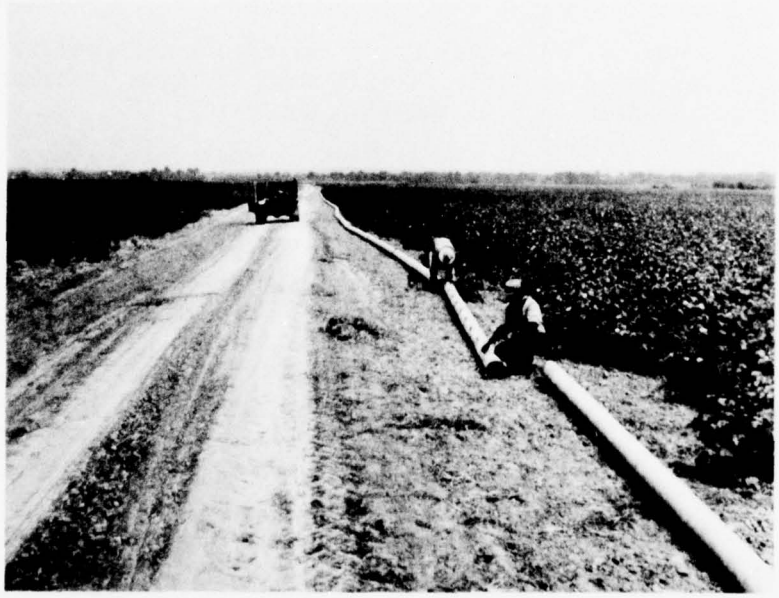
LAND RESOURCE AREAS

FIGURE 2

Some cotton lands in the region are irrigated by systems similar to the above.

Siphon tubes are used for much furrow irrigation in the region.

Underground pipe is used in some cases as part of the on-farm distribution system.



Gated pipe is also used for furrow irrigation in some areas of the region.

In the remaining WRPA's (excluding WRPA 1) the Southern Mississippi Valley Alluvium Land Resource Area provides the majority of the irrigated lands. Crops irrigated are rice, cotton, soybeans, corn, hay, pastures, vegetables, and miscellaneous. Significant acreages are also irrigated in the Southern Coastal Plains and the Southern Mississippi Valley Silty Uplands Land Resource Areas.

More detailed information about the region's land resource areas is given in Appendix F, Land Resources.

The development of irrigation in the region has been mostly by individual landowners and operators. In certain areas, private water companies have been developed to supply irrigation water to groups of landowners and operators. There have been a few government (local, State, or Federal) developments for the supply of irrigation water to groups of landowners and operators.

Irrigation of crops (except rice and some truck crops) and pastures is a production management practice to obtain supplemental water for crop production. Most of the irrigation within this context occurs on farms where a higher than average level of management exists, and its use will tend to vary from farm to farm and from year to year as conditions favoring irrigation vary.

Water Use of Livestock And Poultry

The kinds, number, and water use of livestock and poultry summarized for the region is shown in table 3, with more detailed information of this same type shown in each of the WRPA summaries.

Summary of Present Water Use

The total present use of water for irrigation and livestock and poultry in the region is 5,463,230 acre feet per year. Irrigation water use amounts to 5,407,700 acre feet (table 1) or almost 99 percent of the total while livestock and poultry use amounts to 55,530 acre feet (table 3) or slightly more than 1 percent of the total. As previously explained, rural domestic water use is discussed in Appendix K, Municipal and Industrial Water Supply.

Sources of Water

Ground water supplies about 70 percent of the water used for irrigation and livestock and poultry in the region with the remaining 30 percent being supplied by surface water sources (tables 1 and 3). For irrigation only, this same 70 percent ground water and 30 percent surface water

Table 3 - Kinds and number of livestock and poultry and their water use, 1970, REGIONAL SUMMARY

Kind	Number	Water Use (Acre Feet)
LIVESTOCK		
Cattle and Calves	3,860,500	43,250
Milk Cows	294,300	6,592
Hogs and Pigs	1,204,400	4,047
Sheep and Lambs	162,500	365
Subtotal	5,521,700	54,254
POULTRY		
Chickens	14,510,100	650
Broilers	89,530,600	616
Turkeys	52,000	10
Subtotal	104,092,700	1,276
TOTAL	109,614,400	55,530 1/

1/ Ground water withdrawals, 40 percent of total, surface water withdrawals, 60 percent of total.

applies region-wide while for livestock and poultry about 40 percent is ground water and 60 percent is surface water region-wide. More detailed information on the percentages of ground water and surface water used for irrigation and livestock and poultry is given in the WRPA summaries of this appendix.

Adequacy of Supply

There has been no widespread shortage of water to the present time in the region for irrigation and livestock and poultry use. There have been some shortages in the developed supplies but these have been local in nature. Solutions to the shortages have in most cases been worked out with few problems. The ground water tables have been lowered considerably in some areas where intensive pumpage for irrigation has occurred, especially in WRPA's 2, 6, and 9. During dry years surface water sources may be less than adequate in WRPA's 2, 3, 4, 5, 6, and 9.

There is a large supply of water within the region that is undeveloped for beneficial use. This undeveloped supply is in both the surface water sources (stream and storage) and the underground sources. Additional information on water supplies in the region is contained in Appendix C, Regional Hydrology and Geology.

Application of Water

The method of application varies with the crop to be irrigated, the slope of the land, the infiltration rate of soils irrigated, and the amount of land preparation for irrigation.

Rice irrigation throughout the region consists entirely of gravity and flood-type irrigation. The water, in most cases, is pumped either from the ground or surface sources into flumes or canals and onto the higher field contour, or directly from the source onto the higher field contour. Gravity then provides the means of transporting the water to the lower contours.

The application of water for crops other than rice is accomplished by gravity flows from gated pipe, siphon tubes, contours, and flooding or sprinkler systems. Where the land is not too sloping and where such practices as land leveling have been accomplished, gravity systems work well. Where the land is sloping or where there are high and low spots in the field, sprinkler systems work well. Sprinkler systems also work well any place that gravity flow works well except on soils with very low water intake rates. The system by which irrigation water is applied to crops other than rice depends more on the farm operator's desires than most any other factor.

Quality of Water

Ground water in the region has historically been recognized as being of excellent quality for irrigation and livestock and poultry use. Some problems have been noted in recent years, however, with the occurrence of high sodium chloride content in ground waters of WRPA's 4 and 5 and high sulphate content in WRPA's 2, 3, and 5. Also, the high pumpage in WRPA's 9 and 10 has caused lateral movement of localized saltwater zones into the freshwater areas of the aquifer.

Most streams in the region have good natural water quality for irrigation and livestock and poultry use. Many streams in the region, however, contain calcium bicarbonate waters. Sodium chloride waters are common, particularly during low flow conditions, in WRPA 5 and in the coastal zone rivers of WRPA 9. The principal natural pollutants of turbidity, color, algae, and dead organic material are assumed to occur in streams in all areas of the region at one time or another.

None of the problems in the quality of the region's ground or surface waters are considered acute enough at the present time to prevent their use for irrigation and for livestock and poultry. Isolated exceptions to this general rule are noted, however, at some few points in the region. More detailed information on the quality of waters in the region is contained in Appendix L, Water Quality and Pollution.

Sprinkler irrigation systems are the most commonly used in the region in applying water to row crops and pastures.

FUTURE NEEDS

Land

Land requirements to meet future food and fiber needs in the region are discussed in Appendix F, Land Resources. As previously explained, irrigation is essential to the successful production of rice and most truck crops but otherwise is not a definite requirement for crop production in the region. It is expected to continue to be used in the future as a management practice for efficient production when drought periods occur. The acres expected to be irrigated, by crops, and the water use for future time periods for both Programs A and B are shown in table 4.

Table 4 - Projected acres of irrigated land and water use by crops, Programs A and B, REGIONAL SUMMARY

Crop	1980		2000		2020	
	Acres Irrigated	Water Use (Ac.Ft.)	Acres Irrigated	Water Use (Ac.Ft.)	Acres Irrigated	Water Use (Ac.Ft.)
PROGRAM A						
Soybeans	1,242,124	1,858,388	1,396,512	2,091,199	1,475,374	2,212,196
Cotton	229,523	344,512	226,623	340,176	222,661	334,252
Corn	21,779	39,258	27,366	49,329	29,798	53,700
Rice	840,516	2,771,376	901,354	2,971,973	975,476	3,216,367
Hay	26,197	63,960	24,899	60,762	32,736	79,881
Sugarcane	1,172	2,696	1,239	2,850	1,264	2,907
Pasture	42,547	106,356	43,242	107,823	43,913	109,510
Vegetables	71,783	57,023	91,726	73,810	111,766	90,666
Miscellaneous	94,174	154,481	103,494	169,810	109,595	179,995
TOTAL-PROGRAM A	2,569,815	5,398,050	2,816,455	5,867,732	3,002,583	6,279,474
PROGRAM B						
Soybeans	1,296,626	1,939,372	1,529,422	2,289,200	1,705,030	2,554,058
Cotton	239,310	359,003	274,677	411,662	290,562	435,099
Corn	22,856	41,200	34,480	62,169	40,002	72,089
Rice	840,516	2,771,376	968,333	3,192,821	1,047,552	3,454,017
Hay	27,506	67,156	30,694	74,899	43,976	107,303
Sugarcane	1,231	2,831	1,531	3,521	1,696	3,901
Pasture	44,604	111,493	48,420	120,797	53,384	132,977
Vegetables	73,849	58,552	162,635	121,420	263,291	193,432
Miscellaneous	99,691	163,616	119,256	195,648	135,549	222,596
TOTAL-PROGRAM B	2,646,189	5,514,599	3,169,448	6,472,137	3,581,042	7,175,472

Acres of land to be irrigated in the future will likely be greater than those indicated because of the desire of farmers to stabilize year-to-year variation in moisture availability and income. Thus, the future development of irrigation in this region will be influenced more by the farmers' desire to minimize risk than the absolute need to produce the region's requirements of food and fiber.

Livestock And Poultry

The kinds and numbers of livestock and poultry in the region and their water use, for future time periods, for both Programs A and B are shown in table 5.

Table 5 - Projected kinds and numbers of livestock and poultry and their water use, Programs A and B, REGIONAL SUMMARY

Kind	1980		2000		2020	
	Number (1,000)	Water Use (Ac.Ft.)	Number (1,000)	Water Use (Ac.Ft.)	Number (1,000)	Water Use (Ac.Ft.)
PROGRAM A						
Livestock						
Cattle and calves	4,917	55,082	6,618	74,148	8,889	99,580
Milk cows	270	6,055	334	7,473	407	9,127
Hogs and pigs	1,437	4,831	1,795	6,034	2,331	7,835
Sheep and lambs	125	279	147	329	180	404
Subtotal	6,749	66,247	8,894	87,984	11,807	116,946
Poultry						
Chickens	15,941	712	20,405	916	25,848	1,158
Broilers	124,869	859	174,352	1,199	234,078	1,611
Turkeys	69	11	98	11	132	13
Subtotal	140,879	1,582	194,855	2,126	260,058	2,782
TOTAL-PROGRAM A	147,628	67,829	203,749	90,110	271,865	119,728
PROGRAM B						
Livestock						
Cattle and calves	4,917	55,082	7,100	79,540	9,545	106,934
Milk cows	270	6,055	358	8,129	437	9,802
Hogs and pigs	1,437	4,831	1,928	6,482	2,503	8,410
Sheep and lambs	125	279	158	352	194	433
Subtotal	6,749	66,247	9,544	94,503	12,679	125,579
Poultry						
Chickens	15,941	712	21,920	982	27,757	1,242
Broilers	124,869	859	187,296	1,288	251,372	1,729
Turkeys	69	11	105	11	141	13
Subtotal	140,878	1,582	209,321	2,281	279,270	2,984
TOTAL-PROGRAM B	147,628	67,829	218,865	96,784	291,949	128,563

Water

The rate of future water use per acre irrigated was projected to remain the same as under present conditions. Therefore, the major change in the future water requirement for irrigation would be the number of acres to be irrigated and the crops to be grown on the irrigated lands.

The rate of consumption of water by each of the kinds of livestock and poultry is projected to remain the same in the future as under present conditions. Therefore, future water requirements for livestock and poultry will depend on the number and kinds of livestock and poultry projected for future time periods. The projected water use for irrigation and for use by livestock and poultry is presented in tables 4 and 5. Total water use needs for irrigation and for livestock and poultry, for future time periods, for both Programs A and B are summarized in table 6.

Other Needs

There is a need for more research on the best water application time, especially where water is being used as a supplement to nature. There is a need for better long-range forecasting and also a need for development of more efficient irrigation systems.

Table 6 - Projected water use needs for irrigation and for livestock and poultry, Programs A and B, REGIONAL SUMMARY

	1980 (Ac.Ft.)	2000 (Ac.Ft.)	2020 (Ac.Ft.)
PROGRAM A			
Irrigation	5,398,050	5,867,732	6,279,474
Livestock and poultry	67,829	90,110	119,728
Total	5,465,879	5,957,842	6,399,202
PROGRAM B			
Irrigation	5,514,599	6,472,137	7,175,472
Livestock and poultry	67,829	96,784	128,563
Total	5,582,428	6,568,921	7,304,035

The proper use of irrigation waters results in high yields as illustrated in the above pictures of mature rice and cotton crops.

THE POTENTIAL TO MEET THE NEEDS

Potentially Irrigable Lands

The potentially irrigable lands are those lands or soils with favorable characteristics, such as soil texture, topography, water-holding capacity, and suitability for growing crops, which make them suitable for irrigation. Soils in the Land Capability Classes I, II, III, and IV are considered as potentially irrigable soils. These are the soils on which it is recommended that crops be grown. However, there will be situations where irrigation would not be practiced on some of these soils and where irrigation could be practiced on some of the soils omitted. Additional information on capability classification of soils is contained in Appendix F, Land Resources.

The potentially irrigable soils by land resource areas and the percentage of the total for each LRA are shown in table 7.

Table 7 - Potentially irrigable soils by land resource areas by percent, REGIONAL SUMMARY

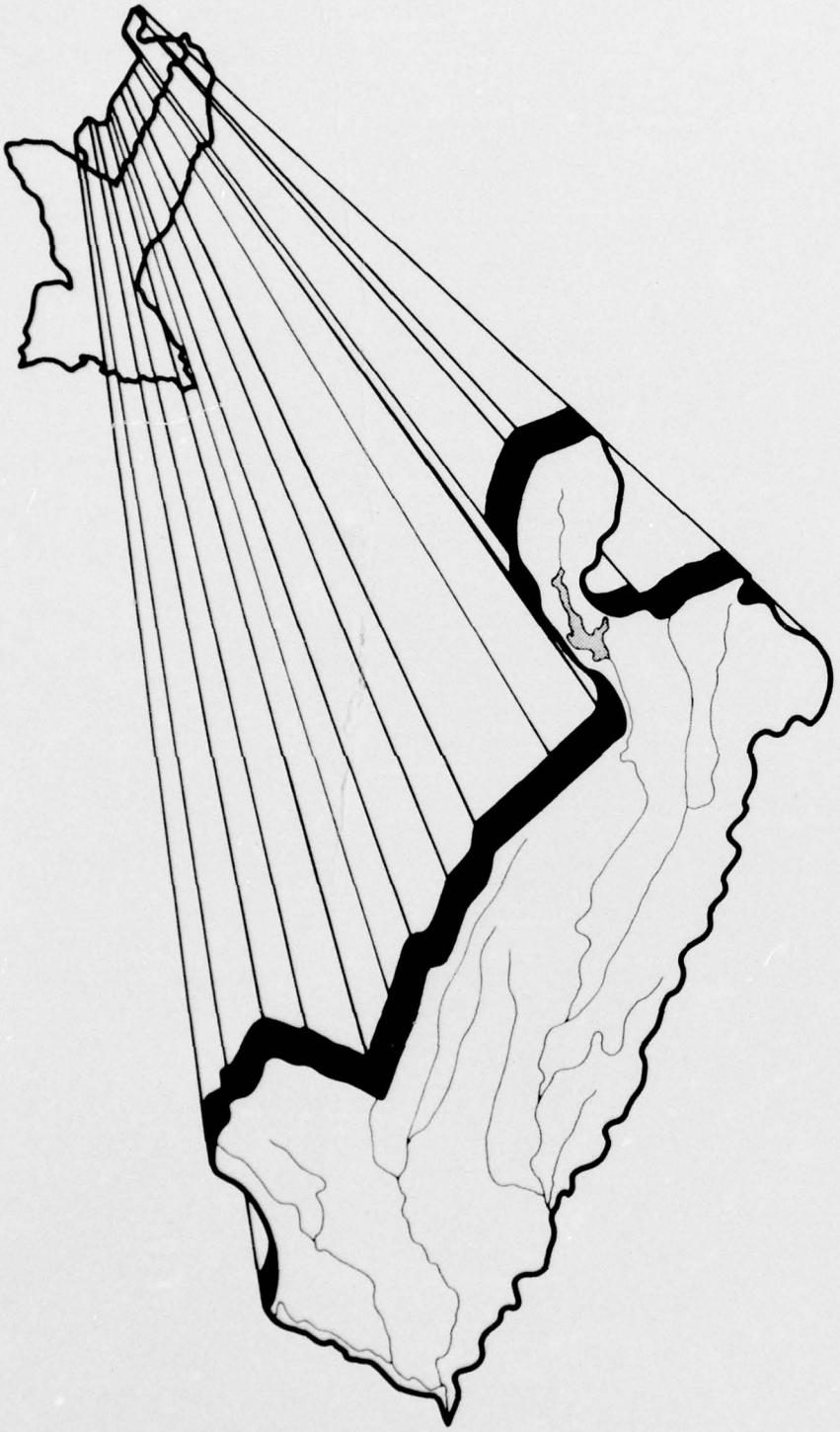
Land Resource Area	Potentially Irrigable (Acres)	Percent
86	109,000	0.27
115	48,700	0.12
116	349,100	0.85
118	250,800	0.61
119	614,800	1.50
131	15,741,900	38.49
132	851,800	2.08
133	9,172,900	22.43
134	12,092,400	29.56
150	1,560,900	3.82
151	111,300	0.27
Total	40,903,600	100.00

Potential Water Supply

The Lower Mississippi Region can be considered water-rich. It receives abundant rainfall that replenishes ground water and its many interior streams and lakes and it also has vast untapped groundwater

reserves. There is also tremendous inflow to the region from the Mississippi River and from tributary streams such as the Arkansas, White, and Red Rivers.

Potential sources of water are: (1) stream flow, (2) above ground storage impoundments, (3) ground water, (4) intra-region transfer, and (5) inter-region transfer. The total potential water resources of the region available for all uses, including irrigation and for livestock and poultry, are discussed in Appendix C, Regional Climatology, Hydrology and Geology.



WRPA 2

W R P A 2

THE SETTING

WRPA 2 is located in the northwest portion of the region. It lies in parts of two states, southeast Missouri and northeast Arkansas. This WRPA contains about 10.5 million acres of land and 0.2 million acres of water area for a total of 10.7 million acres or about 16,700 square miles.

The climate is mild with an average annual temperature of around 60 degrees. The average length of growing season is about 210 days, ranging from less than 180 to 225 from north to south. The normal annual precipitation is about 48 inches, ranging from below 44 inches to 52 inches from north to south.

The topography of the area is varied, ranging from flat Southern Mississippi Valley Alluvium to the very rolling Ozark Highlands. The majority of the lands are flat to slightly rolling. The alluvial lands have been highly developed for agricultural uses.

The varying soils from seven of the region's 11 major land resource areas are found in this WRPA. These LRA's for WRPA 2 are shown in figure 3. Almost 90 percent of the agricultural lands in WRPA 2 is in Land Capability Classes I to IV and is suitable for the growing of crops or for pastures, trees, or wildlife plantings. The remaining 10 percent is in Land Capability Classes V to VIII and is not suitable for the growing of crops.

PRESENT STATUS

Characteristics of Irrigated Areas And Livestock And Poultry

The currently irrigated area in WRPA 2 totals about 1,418,000 acres with about 358,000 acres of rice and 812,000 acres of soybeans irrigated. These totals rank WRPA 2 first in the region in overall irrigation and in acreage of soybeans irrigated and second in the region in acreage of rice irrigated. Most of the irrigation is related to two of the major land resource areas. These are LRA 132, Eastern Arkansas Prairie, and LRA 131, Southern Mississippi Valley Alluvium. The soils of the Eastern Arkansas Prairie and the clayey soils of the Southern Mississippi Valley Alluvium are well suited for rice and for rice-soybean rotations. The loamy soils of the Southern Mississippi Valley Alluvium are well suited for cotton, soybeans, and other crops grown in the area. The present acres of irrigation by crop distribution and the present irrigation water use are shown in table 8. The present irrigated lands by counties in WRPA 2 are shown in figure 4.

LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

LAND RESOURCE AREAS

WRPA 2

FIGURE 3

LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

PRESENT IRRIGATED LANDS BY COUNTIES IN ACRES

WRPA 2

FIGURE 4

Table 8 - Acres of irrigated land and water use by crops, 1970, WRPA 2

Crop	Acres Irrigated	Water Use (Ac.Ft.)
Soybeans	812,370	1,202,308
Cotton	137,523	204,909
Corn	36,371	66,559
Rice	357,566	1,179,968
Hay Crops	16,846	40,767
Vegetables	1,610	1,369
Miscellaneous	55,542	89,978
Total	1,417,828	2,785,858 1/

1/ Ground water withdrawals 85 percent of total, surface water withdrawals 15 percent of total.

The livestock of the WRPA consists mostly of beef cattle, with hogs ranking second, and dairy cows and sheep ranking third and fourth respectively. The poultry consists mostly of broiler chicken production, with laying chickens second and turkeys third. The present kinds and numbers of livestock and poultry and their water use are shown in table 9.

Source of Water

Most of this WRPA's irrigated acres (1,418,000) are watered by private systems, which currently withdraw about 2,786,000 acre feet. This is equivalent to about 2,487 mgd. for the entire year. During the peak use period, it is estimated that about 12,100 mgd. will be required. An estimated 85 percent of the water used for irrigation comes from ground water sources and 15 percent comes from surface water sources.

Practically all of the presently estimated 5,900 acre feet (5.2 mgd.) used by the livestock and poultry in this WRPA is supplied by private sources. An estimated 37 percent is supplied from ground water sources and 63 percent from surface water sources. Of the total present water used for irrigation and livestock and poultry (2,792,000 acre feet or 2,493 mgd.), 85 percent is estimated to be supplied from ground water sources and 15 percent from surface water sources.

Table 9 - Kinds and number of livestock and poultry and their water use, 1970, WRPA 2

Kind	Number	Water Use (Ac.Ft.)
LIVESTOCK		
Cattle and Calves	421,400	4,721
Milk Cows	17,800	399
Hogs and Pigs	191,400	643
Sheep and Lambs	6,100	14
Subtotal	636,700	5,777
POULTRY		
Chickens	2,406,600	108
Broilers	3,315,800	23
Turkeys	17,700	1
Subtotal	5,740,100	132
TOTAL	6,376,800	5,909 1/

1/ Ground water withdrawals 37 percent of total, surface water withdrawals 63 percent of total.

Adequacy of Supply

The sources of supply have usually been adequate to supply irrigation needs. In some cases, such as the Eastern Arkansas Prairie Land Resource Area, the drawdown resulting in the ground water sources has been more than desirable. This has required additional power for pumpage and in some cases the installation of additional wells or changes in equipment at existing wells. The surface water sources in some cases have been less than adequate at times. This has occurred in the past during extreme drought periods in both the prairies and alluvium areas. There appears to be a plentiful supply of water in this WRPA, however, with some problems in distribution of the water users.

Application of Water For Irrigation

Most of the irrigation water is applied by some sort of gravity system. For rice irrigation this is normally gravity-flood type. For other crops it is normally flume-siphon tube or gated pipe type. Gravity-flood type is used on some hay crops.

Sprinkler systems account for almost all of the remaining irrigation and are probably more widely used than gravity systems because of their adaption to more varied topography. The preparation of the land for irrigation is not nearly as demanding or precise for sprinkler type irrigation as for gravity type irrigation.

FUTURE NEEDS

Crops, with the exception of rice, can be produced in this WRPA without irrigation. The total projected acreage of rice was considered as being irrigated since irrigation is a necessity for rice production. The projected acreage of truck crops was also considered as irrigated because of the high losses that would occur if sufficient moisture was not present for growth. The remainder of the crops, pasture, and hay to be irrigated was projected from past trends. The acres expected to be irrigated, by crops, and the water use for future time periods for both Programs A and B are shown in table 10.

Table 10 - Projected acres of irrigated land and water use by crops, Programs A and B, WRPA 2

Crop	1980		2000		2020	
	Acres Irrigated	Water Use (Ac.Ft.)	Acres Irrigated	Water Use (Ac.Ft.)	Acres Irrigated	Water Use (Ac.Ft.)
PROGRAM A						
Soybeans	1,015,785	1,503,362	1,122,486	1,661,279	1,161,551	1,719,095
Cotton	112,573	167,734	111,017	165,415	109,154	162,639
Corn	18,797	34,399	23,620	43,225	25,684	47,002
Rice	288,814	953,086	309,918	1,022,729	335,273	1,106,401
Hay	18,075	43,742	17,411	42,135	23,218	56,188
Pasture	2,960	7,163	3,000	7,260	3,050	7,381
Vegetables	15,640	13,294	20,440	17,374	25,240	21,454
Miscellaneous	63,807	103,367	69,308	112,279	71,334	115,561
TOTAL-PROGRAM A	1,536,451	2,826,147	1,677,200	3,071,696	1,754,504	3,235,721
PROGRAM B						
Soybeans	1,066,574	1,578,530	1,233,316	1,825,308	1,360,725	2,013,873
Cotton	118,202	176,121	137,307	204,587	146,865	218,829
Corn	19,726	36,099	29,849	54,624	34,478	63,095
Rice	288,814	953,086	332,975	1,098,818	360,042	1,188,138
Hay	18,979	45,929	21,510	52,054	31,166	75,422
Pasture	3,108	7,521	3,450	8,349	3,813	9,227
Vegetables	15,640	13,294	25,000	21,250	40,000	34,000
Miscellaneous	66,997	108,535	78,821	127,690	86,921	140,812
TOTAL-PROGRAM B	1,598,040	2,919,115	1,862,228	3,392,680	2,064,010	3,743,396

The kinds and numbers of livestock and poultry in this WRPA and their water use, for future time periods, for both Programs A and B are shown in table 11.

The total water use needs for irrigation and for livestock and poultry, for future time periods, for both Programs A and B are summarized in table 12.

Table 11 - Projected kinds and numbers of livestock and poultry and their water uses, Programs A and B, WRPA 2

Kind	1980 Number	1980 Water Use (Ac.Ft.)	2000 Number	2000 Water Use (Ac.Ft.)	2020 Number	2020 Water Use (Ac.Ft.)
PROGRAM A						
Livestock						
Cattle & calves	536,653	6,012	722,392	8,093	970,155	10,869
Milk cows	16,348	366	20,176	452	24,641	552
Hogs & pigs	218,388	734	285,252	959	370,295	1,245
Sheep & lambs	4,682	10	5,505	12	6,774	15
Subtotal	776,071	7,122	1,033,325	9,516	1,371,865	12,681
Poultry						
Chickens	2,643,891	118	3,384,402	152	4,287,117	192
Broilers	4,624,546	32	6,457,189	44	8,669,159	60
Turkeys	23,630	2	33,211	2	44,845	3
Subtotal	7,292,067	152	9,874,802	198	13,001,121	255
TOTAL-PROGRAM A	8,068,138	7,274	10,908,127	9,714	14,372,986	12,936
PROGRAM B						
Livestock						
Cattle & calves	536,653	6,012	766,022	8,582	1,041,830	11,672
Milk cows	16,348	366	21,674	486	26,461	593
Hogs & pigs	218,388	734	306,429	1,030	397,652	1,336
Sheep & lambs	4,682	10	5,914	13	7,270	16
Subtotal	776,071	7,122	1,100,039	10,111	1,473,213	13,617
Poultry						
Chickens	2,643,891	118	3,635,660	163	4,602,849	206
Broilers	4,624,546	32	6,936,571	48	9,309,636	64
Turkeys	23,630	2	35,677	2	48,158	3
Subtotal	7,292,067	152	10,607,908	213	13,960,643	273
TOTAL-PROGRAM B	8,068,138	7,274	11,707,947	10,324	15,433,856	13,890

Table 12 - Projected water use needs for irrigation and for livestock and poultry, Programs A and B, WRPA 2

	1980 (Ac.Ft.)	2000 (Ac.Ft.)	2020 (Ac.Ft.)
PROGRAM A			
Irrigation	2,826,147	3,071,696	3,235,721
Livestock and poultry	7,274	9,714	12,936
Total	2,833,421	3,081,410	3,248,657
PROGRAM B			
Irrigation	2,919,115	3,392,680	3,743,396
Livestock and poultry	7,274	10,324	13,890
Total	2,926,389	3,403,004	3,757,286

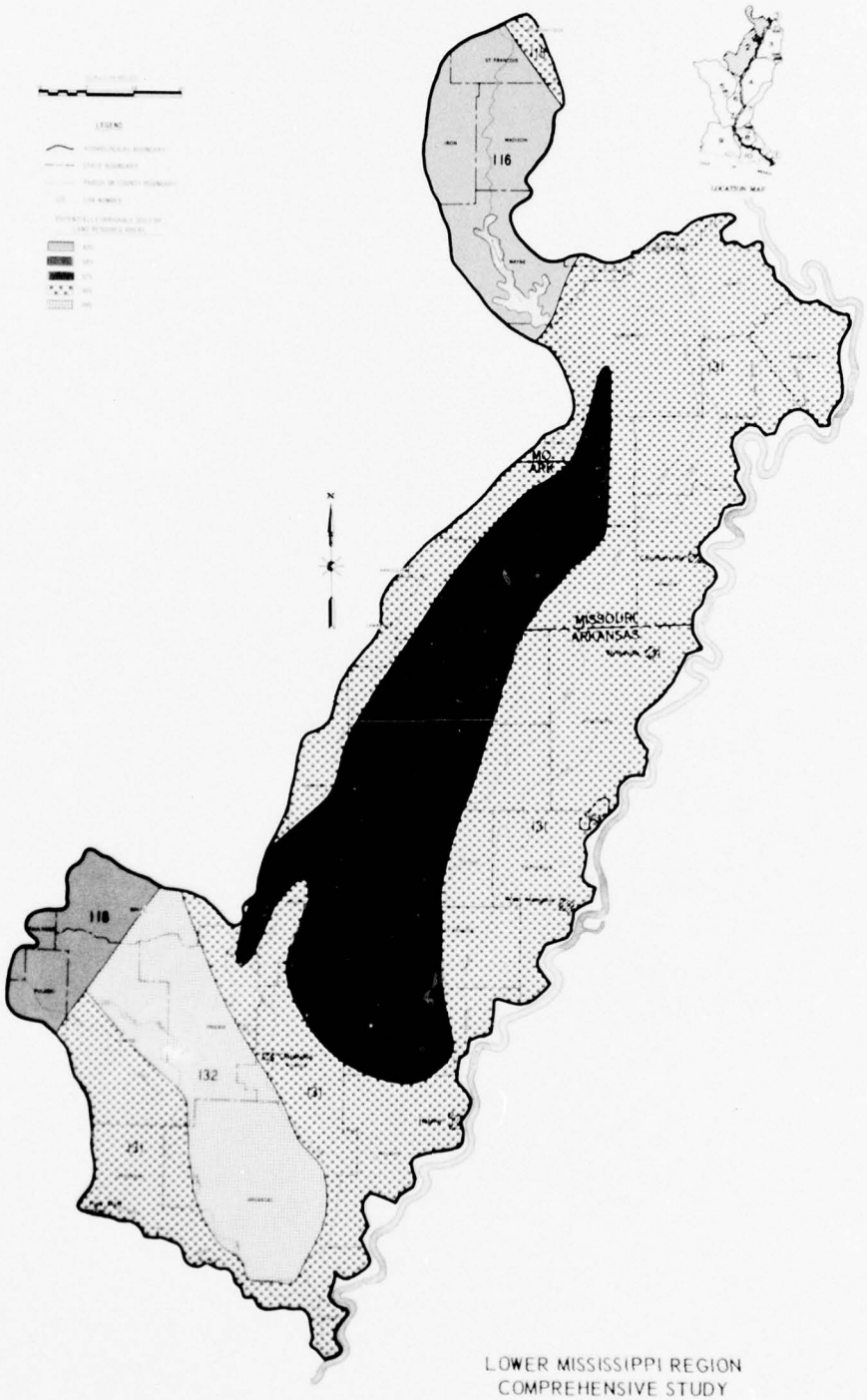
THE POTENTIAL TO MEET THE NEEDS

The potentially available water supply that could be used to meet the needs for irrigation and for use of livestock and poultry in this WRPA are generally considered adequate. The problems associated with the distribution of water users, however, are expected to continue.

There are about 8,824,400 acres of potentially irrigable land (Land Capability Classes I-IV) in WRPA 2. These soils by land resource areas and the percentage of the total for each LRA are shown in table 13. The potentially irrigable soils by LRA's are shown on figure 5.

Table 13 - Potentially irrigable soils by land resource areas by percent, WRPA 2

Land Resource Area	Potentially Irrigable (Acres)	Percent
115	48,700	0.55
116	349,100	3.96
118	250,800	2.84
131	5,672,000	64.28
132	851,800	9.65
133	15,500	0.18
134	1,636,500	18.54
Total	8,824,400	100.00

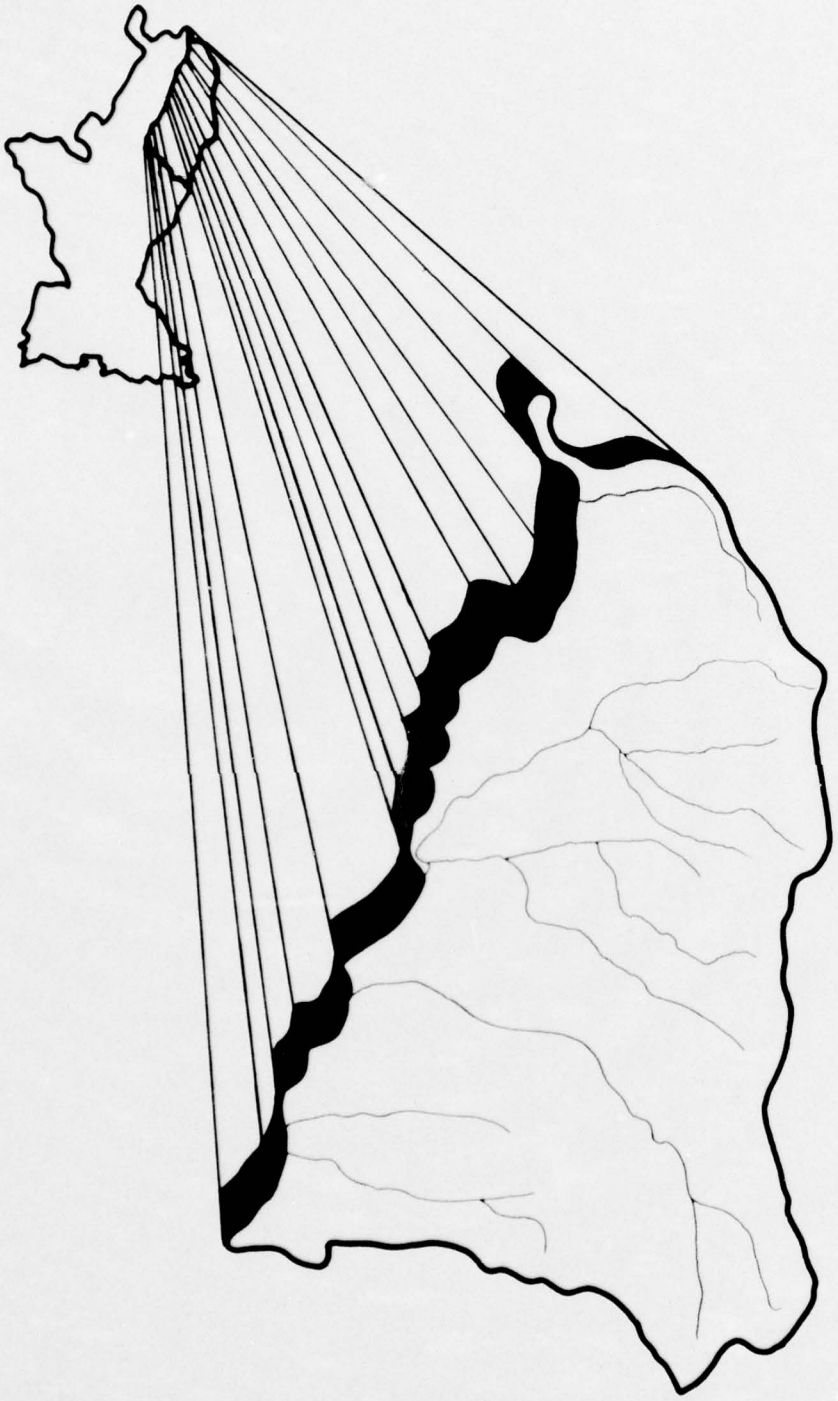


LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

POTENTIALLY IRRIGABLE SOILS BY LAND RESOURCE AREAS

WRPA 2

FIGURE 5



WRPA 3

W R P A 3

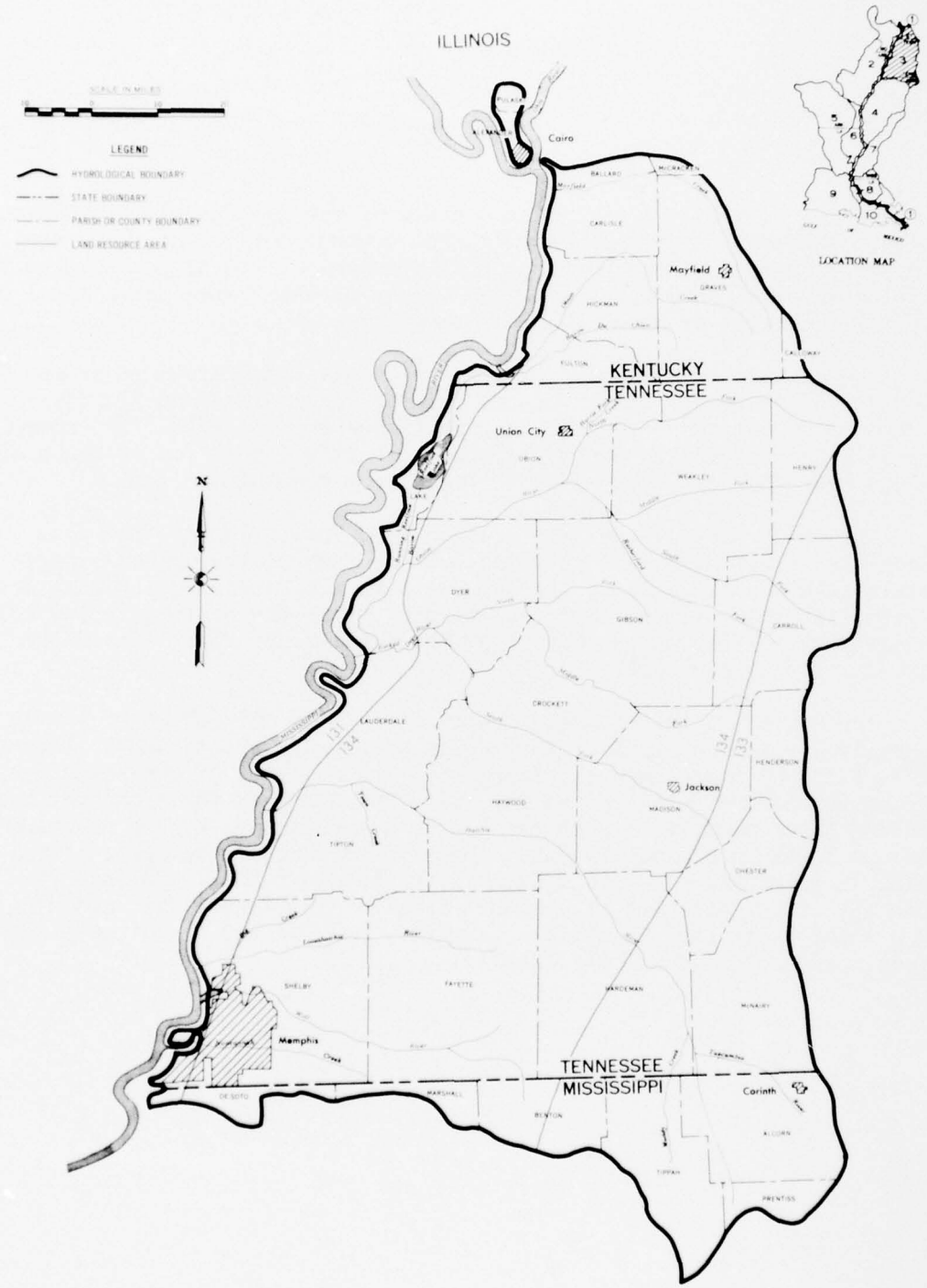
THE SETTING

WRPA 3 lies in the northeast portion of the region. It is located in the southwest corner of Kentucky, the western portion of Tennessee, and the extreme northern portion of Mississippi. It contains about 6.7 million acres of land and 0.1 million acres of water area for a total of 6.8 million acres or about 10,653 square miles.

The climate is mild with an average annual temperature of around 61 degrees. The average length of the growing season is about 210 days without much variance from the average throughout the WRPA. The normal annual precipitation is about 51 inches, ranging from a low of about 48 inches near the northern end to 52 inches for most of the area.

The topography of the area is fairly uniform, ranging from flat along the stream bottoms to rolling hills. Some of the uplands, particularly the western half of the WRPA next to the Mississippi River, are fairly flat and well suited for cultivated crops and pastures. The hills become more rolling as you move from the Mississippi River toward the eastern edge of the WRPA.

The soils are fairly uniform with soils from only three of the 11 major land resource areas of the region occurring in this WRPA. These LRA's for WRPA 3 are shown in figure 6. The majority of the soils are in the Southern Mississippi Valley Silty Uplands with the remainder being divided about equally between the Southern Mississippi Valley Alluvium and the Southern Coastal Plains. About 70 percent of the agricultural lands in this WRPA is in Land Capability Classes I to IV and is suitable for crops, pastures, trees, or wildlife plantings. The remaining 30 percent is in Land Capability Classes V to VIII and is suitable for trees, pastures, and wildlife habitat.



LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

LAND RESOURCE AREAS

WRPA 3

FIGURE 6

PRESENT STATUS

Characteristics of Irrigated Areas and Livestock and Poultry

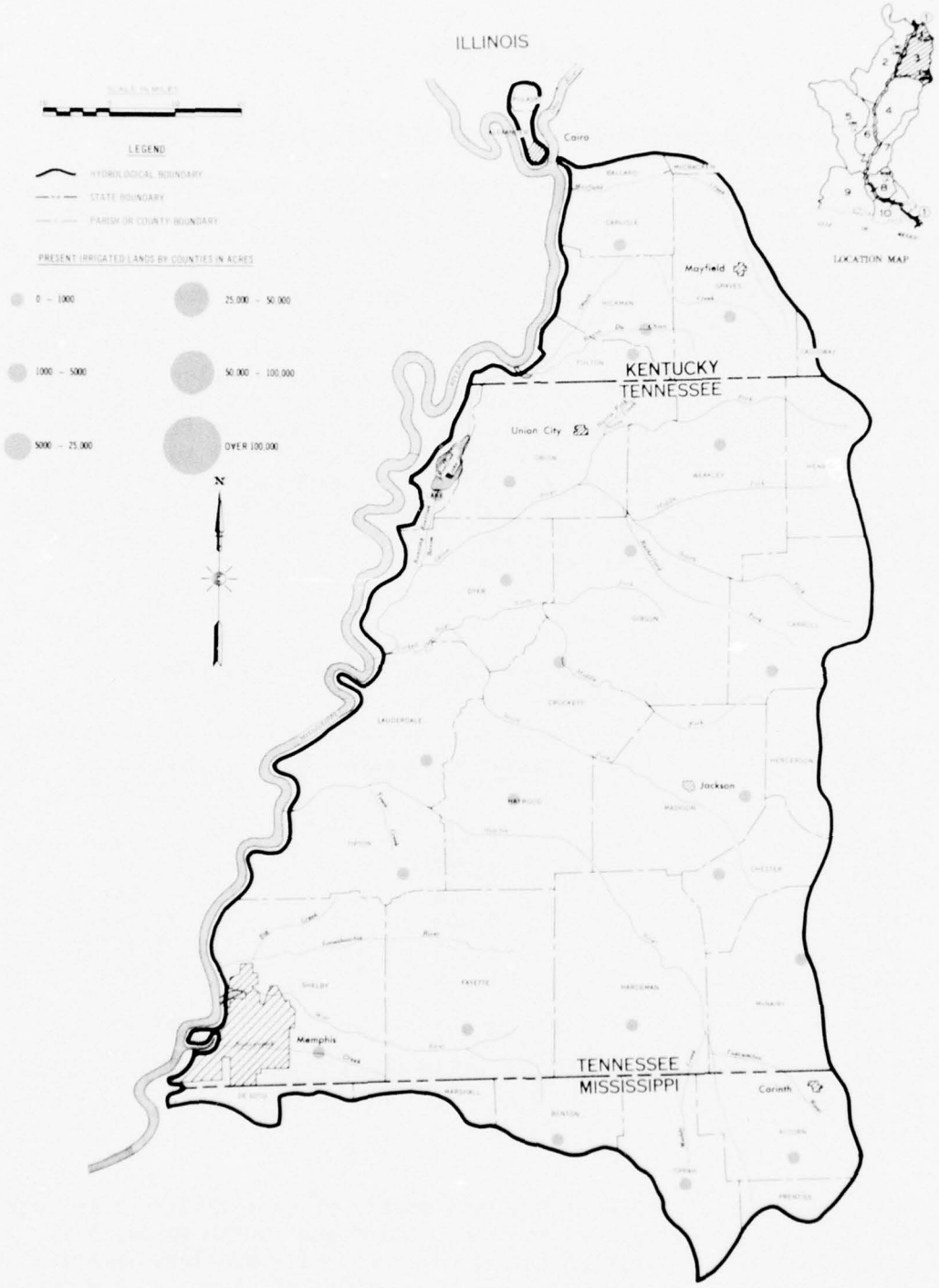
The currently irrigated area in WRPA 3 totals about 14,800 acres with about 7,000 acres of rice, 2,100 acres of soybeans, 2,200 acres of cotton, and 1,700 acres of truck crops being the major crops irrigated. These totals rank WRPA 3 sixth in the region in overall irrigation and also sixth in acreage of rice irrigated. The irrigated areas are scattered throughout the WRPA but mostly in the Southern Mississippi Valley Alluvium and the Southern Mississippi Valley Silty Uplands Land Resource Areas. The heavier soils of the Southern Mississippi Valley Alluvium are well suited for rice and for rice-soybean rotations. The lighter soils of the Southern Mississippi Valley Alluvium and the flatter soils of the Southern Mississippi Valley Silty Uplands are well suited for cotton, soybeans, truck crops, and other crops grown in the area. The present acres of irrigation by crop distribution and the present irrigation water use are shown in table 14. The present irrigated lands by counties in WRPA 3 are shown in figure 7.

Table 14 - Acres of irrigated land and water use by crops, 1970, WRPA 3

Crop	Acres Irrigated	Water Use (Ac.Ft.)
Soybeans	2,146	2,554
Cotton	2,217	2,660
Corn	566	843
Rice	7,008	23,056
Vegetables	1,667	1,417
Miscellaneous	1,159	1,669
Total	14,763	32,199 1/

1/ Ground water withdrawals 15 percent of total, surface water withdrawals 85 percent of total.

The livestock of the WRPA consists mostly of beef cattle, with hogs ranking second, and dairy cows and sheep third and fourth respectively. The poultry consists mostly of laying chickens, with broilers second and turkeys third. The present kinds and numbers of livestock and poultry and their water use are shown in table 15.



LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

PRESENT IRRIGATED LANDS BY COUNTIES IN ACRES

WRPA 3

FIGURE 7

Table 15 - Kinds and number of livestock and poultry and their water use, 1970, WRPA 3

Kind	Number	Water Use (Ac.Ft.)
LIVESTOCK		
Cattle and Calves	597,800	6,697
Milk Cows	53,800	1,205
Hogs and Pigs	388,600	1,306
Sheep and Lambs	15,900	36
Subtotal	1,056,100	9,244
POULTRY		
Chickens	1,626,600	73
Broilers	1,278,100	9
Turkeys	3,100	1
Subtotal	2,907,800	83
TOTAL	3,963,900	9,327 1/

1/ Ground water withdrawals 24 percent of total, surface water withdrawals 76 percent of total.

Source of Water

Most of this WRPA's irrigated acres (14,800) are watered by private systems which currently withdraw about 32,200 acre feet. This is equivalent to about 29 mgd. for the entire year. During the peak use period, it is estimated that about 147 mgd. would be required. An estimated 15 percent of the water used for irrigation comes from ground water sources and 85 percent comes from surface sources.

Practically all of the presently estimated 9,300 acre feet (8 mgd.) used by livestock and poultry in this WRPA is supplied by private sources. An estimated 24 percent is supplied from ground water sources and 76 percent from surface water sources. Of the total present water used for irrigation and livestock and poultry (41,500 acre feet or 37 mgd.), 17 percent is estimated to be supplied from ground water sources and 83 percent from surface water sources.

Adequacy of Supply

The sources of supply have usually been adequate to supply irrigation needs. The surface water sources in some cases have been less than adequate at times. This has occurred in the past during extreme drought periods. There appears to be a plentiful supply of water in this WRPA, however, but some problems may develop in areas of high urbanization and industrialization where there would be greater competition for water.

Application of Water for Irrigation

The gravity system of irrigation is used for the rice irrigated in this WRPA. This is usually flumes and contour dikes. Sprinkler systems and gravity systems such as flume-siphon tube or gated pipe type are used for most of the remaining crops. The use of gravity systems requires far more land preparation than does the sprinkler system. The sprinkler system of irrigation is more adapted to the less smooth upland or bottomland topography.

FUTURE NEEDS

Crops, with the exception of rice, can be produced in this WRPA without irrigation. The total projected acreage of rice was considered as being irrigated since irrigation is a necessity for rice production. The projected acreage of truck crops was also considered as irrigated because of the high losses that would occur if sufficient moisture was not present for growth. The remainder of the crops, pasture, and hay to be irrigated was projected from past trends. The acres expected to be irrigated, by crops, and the water use for future time periods for both Programs A and B are shown in table 16.

Table 16 - Projected acres of irrigated land and water use by crops, Programs A and B, WRPA 3

Crop	1980		2000		2020	
	Acres Irrigated	Water Use (Ac.Ft.)	Acres Irrigated	Water Use (Ac.Ft.)	Acres Irrigated	Water Use (Ac.Ft.)
PROGRAM A						
Soybeans	2,544	3,027	2,858	3,401	3,046	3,625
Cotton	1,561	1,873	1,540	1,848	1,510	1,812
Corn	1,485	2,213	1,866	2,780	2,068	3,081
Rice	8,828	29,044	9,465	31,140	10,239	33,686
Hay	2,107	5,183	1,920	4,723	3,105	7,638
Pasture	3,850	9,471	4,310	10,603	4,750	11,685
Vegetables	34,079	28,967	48,435	41,170	62,791	53,372
Miscellaneous	1,085	1,562	1,190	1,714	1,247	1,796
TOTAL-PROGRAM A	55,539	81,340	71,584	97,379	88,756	116,695
PROGRAM B						
Soybeans	2,671	3,178	3,531	4,202	4,089	4,866
Cotton	1,639	1,967	1,900	2,280	2,024	2,429
Corn	1,559	2,323	2,305	3,434	2,776	4,136
Rice	8,828	29,044	10,168	33,453	10,995	36,173
Hay	2,212	5,442	2,372	5,835	4,169	10,256
Pasture	4,043	9,946	4,957	12,194	5,938	14,607
Vegetables	34,079	28,967	48,435	41,170	62,791	53,372
Miscellaneous	1,150	1,656	1,470	2,117	1,674	2,411
TOTAL-PROGRAM B	56,181	82,523	75,138	104,685	94,456	128,250

The kinds and numbers of livestock and poultry in this WRPA and their water use, for future time periods, for both Programs A and B are shown in table 17.

The total water use needs for irrigation and for livestock and poultry, for future time periods, for both Programs A and B are summarized in table 18.

Table 17 - Projected kinds and numbers of livestock and poultry and their water uses, Programs A and B, WRPA 3

Kind	1980		2000		2020	
	Number	Water Use (Ac.Ft.)	Number	Water Use (Ac.Ft.)	Number	Water Use (Ac.Ft.)
PROGRAM A						
Livestock						
Cattle & calves	761,358	8,530	1,024,868	11,482	1,376,375	15,420
Milk cows	49,410	1,107	60,982	1,366	74,475	1,669
Hogs & pigs	443,527	1,491	579,323	1,947	752,038	2,528
Sheep & lambs	12,203	27	14,348	32	17,657	40
Subtotal	1,266,498	11,155	1,679,521	14,827	2,220,545	19,657
Poultry						
Chickens	1,786,983	80	2,287,488	103	2,897,625	130
Broilers	1,782,566	12	2,488,972	17	3,341,592	23
Turkeys	4,139	1	5,817	1	7,854	1
Subtotal	3,573,688	93	4,782,277	121	6,247,071	154
TOTAL-PROGRAM A	4,840,186	11,248	6,461,798	14,948	8,467,616	19,811
PROGRAM B						
Livestock						
Cattle & calves	761,358	8,530	1,100,954	12,334	1,478,062	16,559
Milk cows	49,410	1,107	65,509	1,468	79,977	1,792
Hogs & pigs	443,527	1,491	622,332	2,092	807,599	2,714
Sheep & lambs	12,203	27	15,413	35	18,961	42
Subtotal	1,266,498	11,155	1,804,208	15,929	2,384,599	21,107
Poultry						
Chickens	1,786,983	80	2,457,311	110	3,111,702	139
Broilers	1,782,566	12	2,673,753	18	3,588,469	25
Turkeys	4,139	1	6,249	1	8,434	1
Subtotal	3,573,688	93	5,137,315	129	6,708,605	165
TOTAL-PROGRAM B	4,840,186	11,248	6,941,523	16,058	9,093,204	21,272

Table 18 - Projected water use needs for irrigation and for livestock and poultry, Programs A and B, WRPA 3

	1980 (Ac.Ft.)	2000 (Ac.Ft.)	2020 (Ac.Ft.)
PROGRAM A			
Irrigation	81,340	97,379	116,695
Livestock and poultry	11,248	14,948	19,811
Total	92,588	112,327	136,506
PROGRAM B			
Irrigation	82,523	104,685	128,250
Livestock and poultry	11,248	16,058	21,272
Total	93,771	120,743	149,522

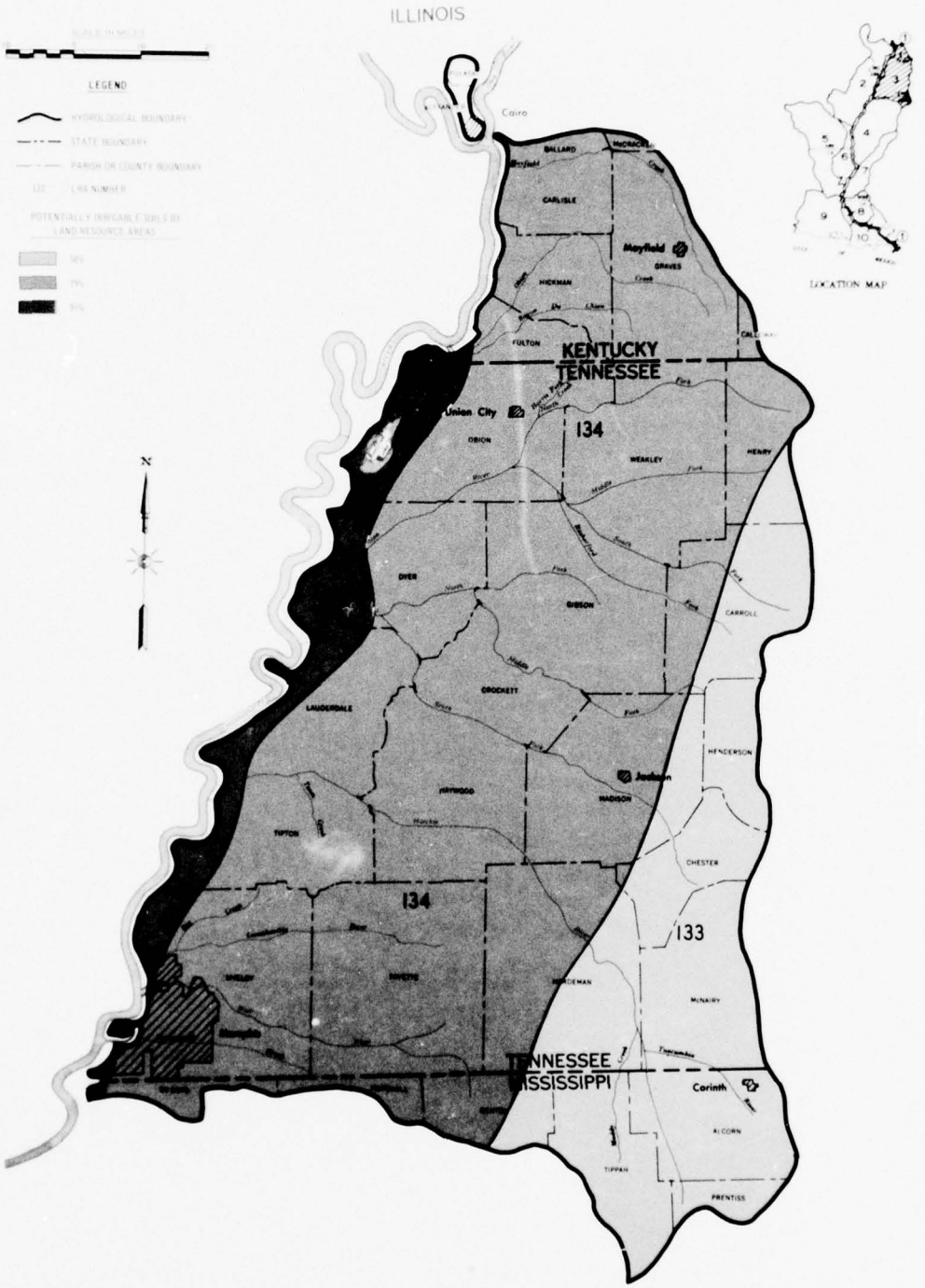
THE POTENTIAL TO MEET THE NEEDS

The potentially available water supply that could be used to meet the needs for irrigation and for use of livestock and poultry in this WRPA are generally considered adequate. The problems associated with the greater competition for water in areas of high urbanization and industrialization are expected to increase in proportion to future population increases.

There are about 4,801,900 acres of potentially irrigable land (Land Capability Classes I-IV) in WRPA 3. These soils by land resource areas and the percentage of the total for each LRA are shown in table 19. The potentially irrigable soils by LRA's are shown on figure 8.

Table 19 - Potentially irrigable soils by land resource areas by percent, WRPA 3

Land Resource Area	Potentially Irrigable (Acres)	Percent
131	476,900	9.93
133	761,300	15.85
134	3,563,700	74.22
Total	4,801,900	100.00

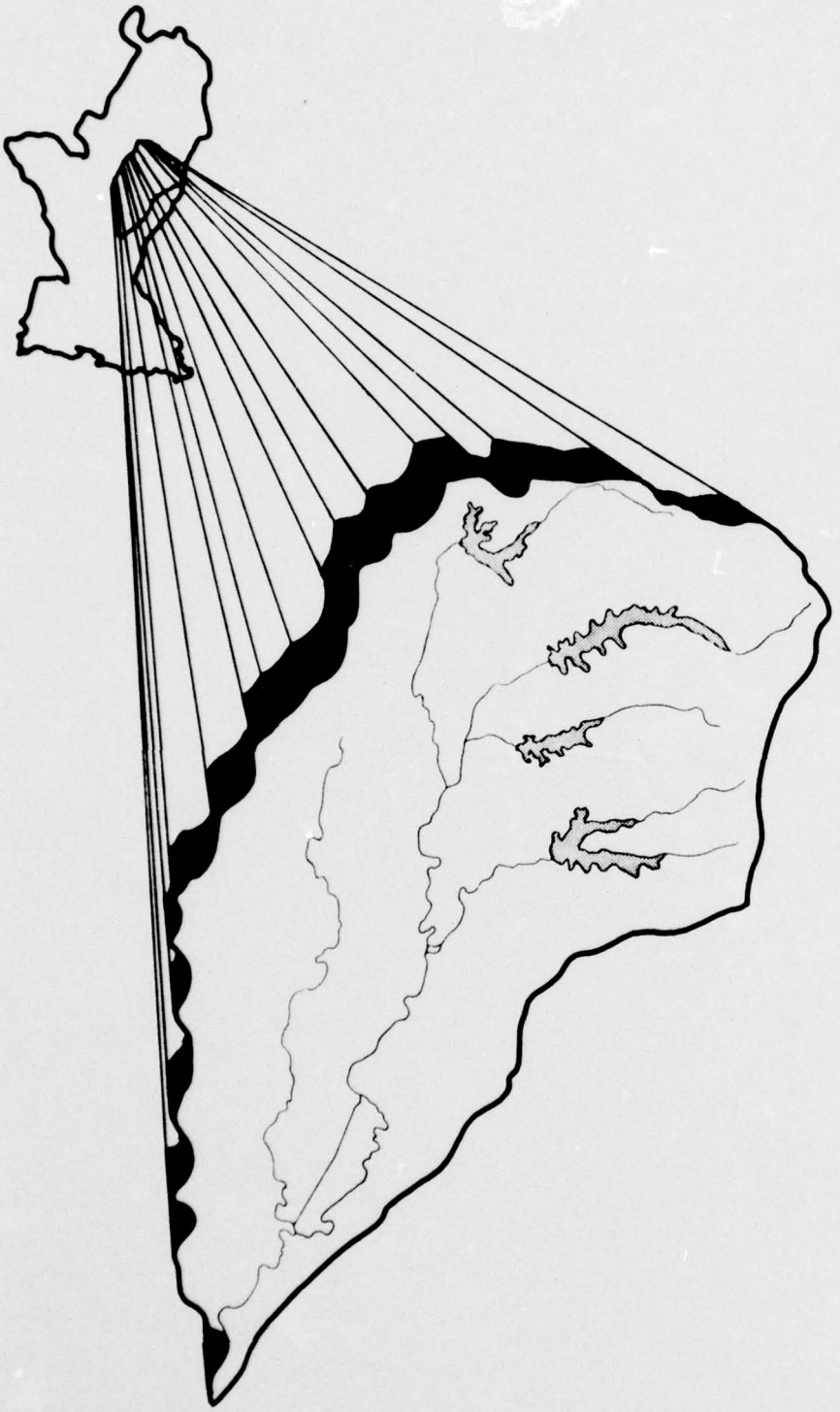


LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

POTENTIALLY IRRIGABLE SOILS BY LAND RESOURCE AREAS

WRPA 3

FIGURE 8



WRPA 4

W R P A 4

THE SETTING

WRPA 4 is located on the east side of the Mississippi River in Northwest and north central Mississippi. This WRPA contains about 8.3 million acres of land and 0.2 million acres of water area for a total of 8.5 million acres or about 13,355 square miles.

The climate is mild with an average annual temperature of around 64 degrees. The average length of growing season is about 225 to 230 days, ranging from about 215 to 240 from north to southwest. The normal annual precipitation is about 52 inches with little variance within the WRPA.

The topography of the area is varied, ranging from the flat Southern Mississippi Valley Alluvium to the very rolling bluff hills of the Southern Mississippi Valley Silty Uplands. The Southern Coastal Plains area on the eastern side of the WRPA is gently rolling to rolling topography. The alluvial lands and the bottomlands of the upland area have been highly developed for agricultural uses.

Soils from three of the region's 11 major land resource areas are found in this WRPA. These LRA's for WRPA 4 are shown in figure 9. About 72 percent of the agricultural lands in WRPA 4 is in Land Capability Classes I to IV and is suitable for the growing of crops or for pastures, trees, or wildlife plantings. The remaining 28 percent is in Land Capability Classes V to VIII and is not suitable for the growing of crops, but is suitable for pastures, trees, or wildlife habitat.

LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

LAND RESOURCE AREAS

WRPA 4

FIGURE 9

PRESENT STATUS

Characteristics of Irrigated Areas and Livestock and Poultry

The currently irrigated area in WRPA 4 totals about 157,200 acres with about 51,700 acres of rice, 68,000 acres of cotton, and 29,000 acres of soybeans irrigated. These totals rank WRPA 4 fourth in the region in overall irrigation and third in acreage of rice irrigated. Most of the irrigation is related to the Southern Mississippi Valley Alluvium Resource Area. The clayey soils of this LRA are well suited for rice and for rice-soybean rotations. The loamy soils are well suited for cotton, soybeans, and other crops grown in the area. The soils of the Southern Mississippi Valley Silty Uplands and the Southern Coastal Plains are suitable for all locally grown crops where topography will allow. The present acres of irrigation by crop distribution and the present irrigation water use are shown in table 20. The present irrigated lands by counties in WRPA 4 are shown in figure 10.

Table 20 - Acres of irrigated land and water use by crops, 1970, WRPA 4

Crop	Acres Irrigated	Water Use (Ac.Ft.)
Soybeans	28,980	43,760
Cotton	67,986	97,220
Corn	1,737	3,161
Rice	51,655	171,495
Pasture	6,020	15,351
Vegetables	845	541
Total	157,223	331,528 1/

1/ Ground water withdrawals 58 percent of total, surface water withdrawals 42 percent of total.

The livestock of the WRPA consists mostly of beef cattle, with hogs ranking second, and dairy cows and sheep ranking third and fourth respectively. The poultry consists mostly of broiler chicken production, with laying chickens second and turkeys third. The present kinds and numbers of livestock and poultry and their water use are shown in table 21.

LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

PRESENT IRRIGATED LANDS BY COUNTIES IN ACRES

WRPA 4

FIGURE 10

Table 21 - Kinds and number of livestock and poultry and their water use, 1970, WRPA 4

Kind	Number	Water Use (Ac.Ft.)
LIVESTOCK		
Cattle and Calves	695,300	7,790
Milk Cows	46,100	1,033
Hogs and Pigs	181,600	610
Sheep and Lambs	14,200	32
Subtotal	937,200	9,465
POULTRY		
Chickens	2,091,900	94
Broilers	5,929,500	41
Turkeys	5,900	1
Subtotal	8,027,300	136
TOTAL	8,964,500	9,601 1/

1/ Ground water withdrawals 40 percent of total, surface water withdrawals 60 percent of total.

Source of Water

Most of this WRPA's irrigated acres (157,200) are watered by private irrigation systems which currently withdraw about 331,500 acre feet. This is equivalent to about 297 mgd. for the entire year. During the peak use period it is estimated that about 1,393 mgd. will be required. An estimated 58 percent of the water used for irrigation comes from ground water sources and 42 percent is supplied from surface sources.

Practically all of the presently estimated 9,600 acre feet (9 mgd.) used by the livestock and poultry in this WRPA is supplied by private sources. An estimated 40 percent is supplied from ground water sources and 60 percent from surface water sources. Of the total present water used for irrigation and livestock and poultry (341,100 acre feet or 306 mgd.), 57 percent is estimated to be supplied from ground water sources and 43 percent from surface water sources.

Adequacy of Supply

The sources of supply have usually been adequate to supply irrigation needs. The surface water sources, especially in drought periods or over development of source, have been less than adequate at times throughout the WRPA. This has occurred in the past during extreme drought periods. There appears to be a plentiful supply of water in this WRPA, however, with some problems in distribution of the water users.

Application of Water for Irrigation

Most of the irrigation water is applied by some sort of gravity system. For rice irrigation this is normally gravity-flood type. For other crops it is normally flume-siphon tube or gated pipe type. Gravity-flood type is used on some pastures.

Sprinkler systems account for almost all of the remaining irrigation and are probably more widely used than gravity systems because of their adaption to more varied topography. The preparation of the land for irrigation is not nearly as demanding or precise for sprinkler type irrigation as for gravity type irrigation.

FUTURE NEEDS

Crops, with the exception of rice, can be produced in this WRPA without irrigation. The total projected acreage of rice was considered as being irrigated since irrigation is a necessity for rice production. The projected acreage of truck crops was also considered as irrigated because of the high losses that would occur if sufficient moisture was not present for growth. The remainder of the crops, pasture, and hay to be irrigated was projected from past trends. The acres expected to be irrigated, by crops, and the water use for future time periods for both Programs A and B are shown in table 22.

Table 22 - Projected acres of irrigated land and water use by crops, Programs A and B, WRPA 4

Crop	1980		2000		2020	
	Acres Irrigated	Water Use (Ac.Ft.)	Acres Irrigated	Water Use (Ac.Ft.)	Acres Irrigated	Water Use (Ac.Ft.)
PROGRAM A						
Soybeans	38,417	58,010	43,428	65,576	45,934	69,360
Cotton	60,622	86,689	59,873	85,618	58,731	84,000
Corn	658	1,198	825	1,502	900	1,638
Rice	76,501	253,983	82,010	272,273	88,716	294,537
Hay	1,805	4,603	1,615	4,118	2,150	5,483
Pasture	6,020	15,351	6,020	15,351	6,020	15,351
Vegetables	3,373	2,159	2,993	1,916	2,613	1,672
TOTAL-PROGRAM A	187,396	421,993	196,764	446,354	205,064	472,041
PROGRAM B						
Soybeans	40,338	60,910	49,312	74,461	54,569	82,399
Cotton	63,653	91,024	73,894	105,668	79,014	112,990
Corn	691	1,258	1,022	1,860	1,208	2,199
Rice	76,501	253,983	88,096	292,479	95,272	316,303
Hay	1,895	4,832	1,995	5,087	2,886	7,359
Pasture	6,321	16,119	6,923	17,653	7,525	19,189
Vegetables	3,373	2,159	30,000	19,200	65,000	41,600
TOTAL-PROGRAM B	192,772	430,285	251,242	516,408	305,474	582,039

The kinds and numbers of livestock and poultry in this WRPA and their water use, for future time periods, for both Programs A and B are shown in table 23.

The total water use needs for irrigation and for livestock and poultry, for future time periods, for both Programs A and B are summarized in table 24.

Table 23 - Projected kinds and numbers of livestock and poultry and their water uses, Programs A and B, WRPA 4

Kind	1980 Number	1980 Water Use (Ac.Ft.)	2000 Number	2000 Water Use (Ac.Ft.)	2020 Number	2020 Water Use (Ac.Ft.)
PROGRAM A						
Livestock						
Cattle & calves	885,534	9,921	1,192,022	13,354	1,600,859	17,935
Milk cows	42,338	949	52,254	1,171	63,816	1,430
Hogs & pigs	270,242	908	270,693	910	351,396	1,181
Sheep & lambs	10,899	24	12,814	29	15,769	35
Subtotal	1,209,013	11,802	1,527,783	15,464	2,031,840	20,581
Poultry						
Chickens	2,298,161	103	2,941,839	132	3,726,511	167
Broilers	8,269,874	57	11,547,108	79	15,502,678	107
Turkeys	7,877	1	11,070	1	14,948	1
Subtotal	10,575,912	161	14,500,017	212	19,244,137	275
TOTAL-PROGRAM A	11,784,925	11,963	16,027,800	15,676	21,275,977	20,856
PROGRAM B						
Livestock						
Cattle & calves	885,534	9,921	1,280,518	14,346	1,719,130	19,260
Milk cows	42,338	949	56,133	1,258	68,531	1,536
Hogs & pigs	270,242	908	290,789	977	377,357	1,268
Sheep & lambs	10,899	24	13,765	31	16,934	38
Subtotal	1,209,013	11,802	1,641,205	16,612	2,181,752	22,102
Poultry						
Chickens	2,298,161	103	3,160,241	142	4,001,826	179
Broilers	8,269,874	57	12,404,365	85	16,648,016	115
Turkeys	7,877	1	11,892	1	16,052	1
Subtotal	10,575,912	161	15,576,498	228	20,665,894	295
TOTAL-PROGRAM B	11,784,925	11,963	17,217,703	16,840	22,847,846	22,397

Table 24 - Projected water use needs for irrigation and for livestock and poultry, Programs A and B, WRPA 4

	1980 (Ac.Ft.)	2000 (Ac.Ft.)	2020 (Ac.Ft.)
PROGRAM A			
Irrigation	421,993	446,354	472,041
Livestock and poultry	11,963	15,676	20,856
Total	433,956	462,030	492,897
PROGRAM B			
Irrigation	430,285	516,408	582,039
Livestock and poultry	11,963	16,840	22,397
Total	442,248	533,248	604,436

THE POTENTIAL TO MEET THE NEEDS

The potentially available water supply that could be used to meet the needs for irrigation and for use of livestock and poultry in this WRPA are generally considered adequate. The problems associated with the distribution of water users, however, are expected to continue.

There are about 5,529,000 acres of potentially irrigable land (Land Capability Classes I-IV) in WRPA 4. These soils by land resource areas and the percentage of the total for each LRA are shown in table 25. The potentially irrigable soils by LRA's are shown in figure 11.

Table 25 - Potentially irrigable soils by land resource areas by percent, WRPA 4

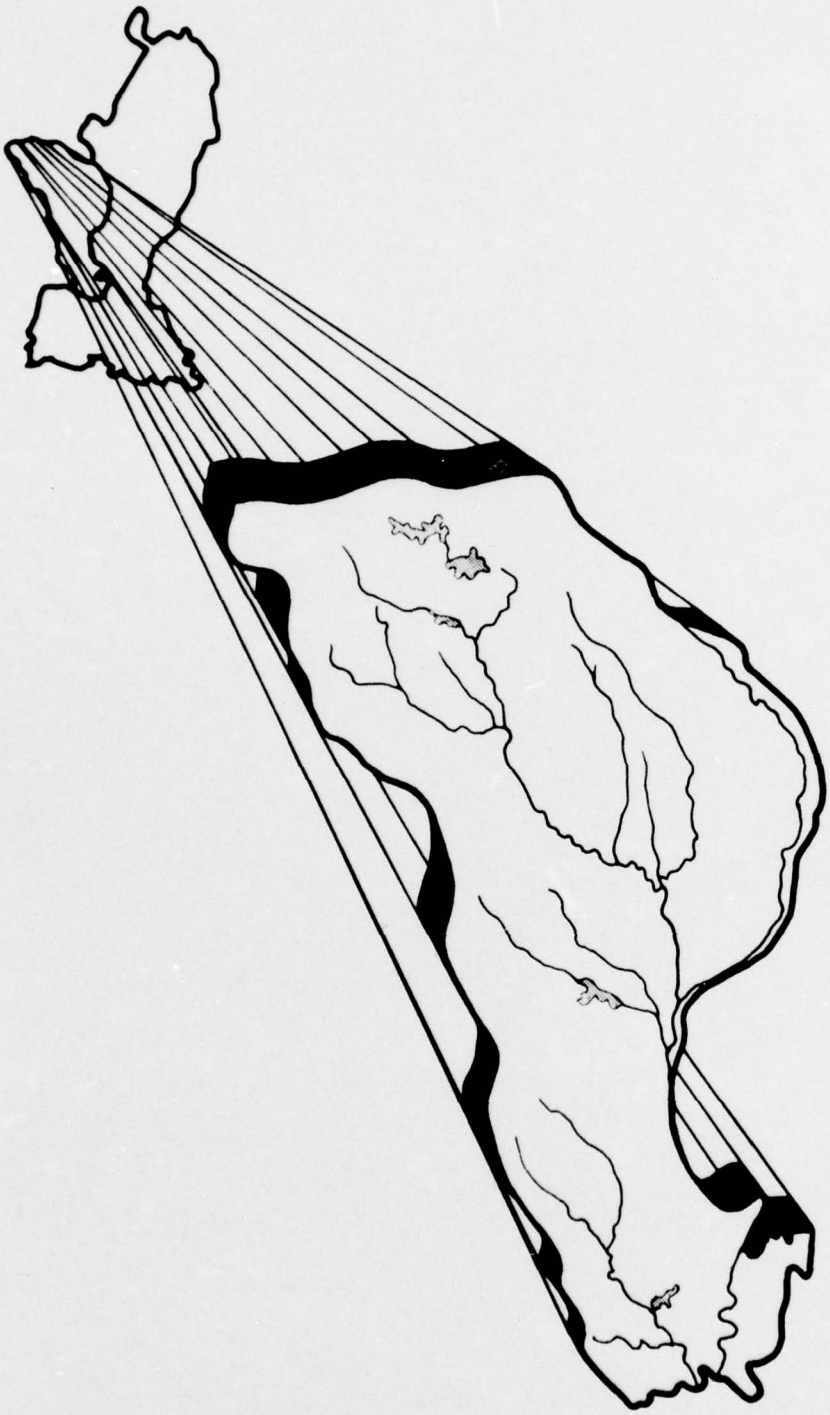
Land Resource Area	Potentially Irrigable (Acres)	Percent
131	3,781,300	68.39
133	663,200	12.00
134	1,084,400	19.61
Total	5,528,900	100.00

LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

POTENTIALLY IRRIGABLE SOILS BY LAND RESOURCE AREAS

WRPA 4

FIGURE 11



WRPA 5

W R P A 5

THE SETTING

WRPA 5 is located in the west central portion of the region. It lies in parts of two states, south central Arkansas and north central Louisiana. This WRPA contains about 12.8 million acres of land and 0.3 million acres of water area for a total of 13.1 million acres or about 20,413 square miles. It has the largest area of all WRPA's within the region.

The climate is mild with an average annual temperature of around 65 degrees, with a low average annual of about 62 degrees in the Ouachita Mountain area, and a high average annual of about 67.5 degrees at the southern end of the WRPA. The average length of growing season is about 230 days, ranging from less than 210 days in the Ouachita Mountain area to more than 240 days at the Arkansas-Louisiana line. The normal annual precipitation is about 53 inches, ranging from about 60 inches at the southern end and about 56 inches in the northern Ouachita Mountain area to about 52 inches over most of the central areas.

The topography of the area is very varied, ranging from the flat river bottomlands to the Ouachita Mountains. The majority of the topography is made up of rolling Coastal Plain Hills. The alluvium lands and some of the bottomlands of the upland areas have been highly developed for agricultural uses.

Varying soils from five of the region's 11 major land resource areas are found in this WRPA. These LRA's for WRPA 5 are shown in figure 12. About 68 percent of the agricultural lands in WRPA 5 is in Land Capability Classes I to IV and is suitable for the growing of crops or for pastures, trees, or wildlife plantings. The remaining 32 percent is in Land Capability Classes V to VIII and is not suitable for the growing of crops.

LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

LAND RESOURCE AREAS

WRPA 5

FIGURE 12

PRESENT STATUS

Characteristics of Irrigated Areas and Livestock and Poultry

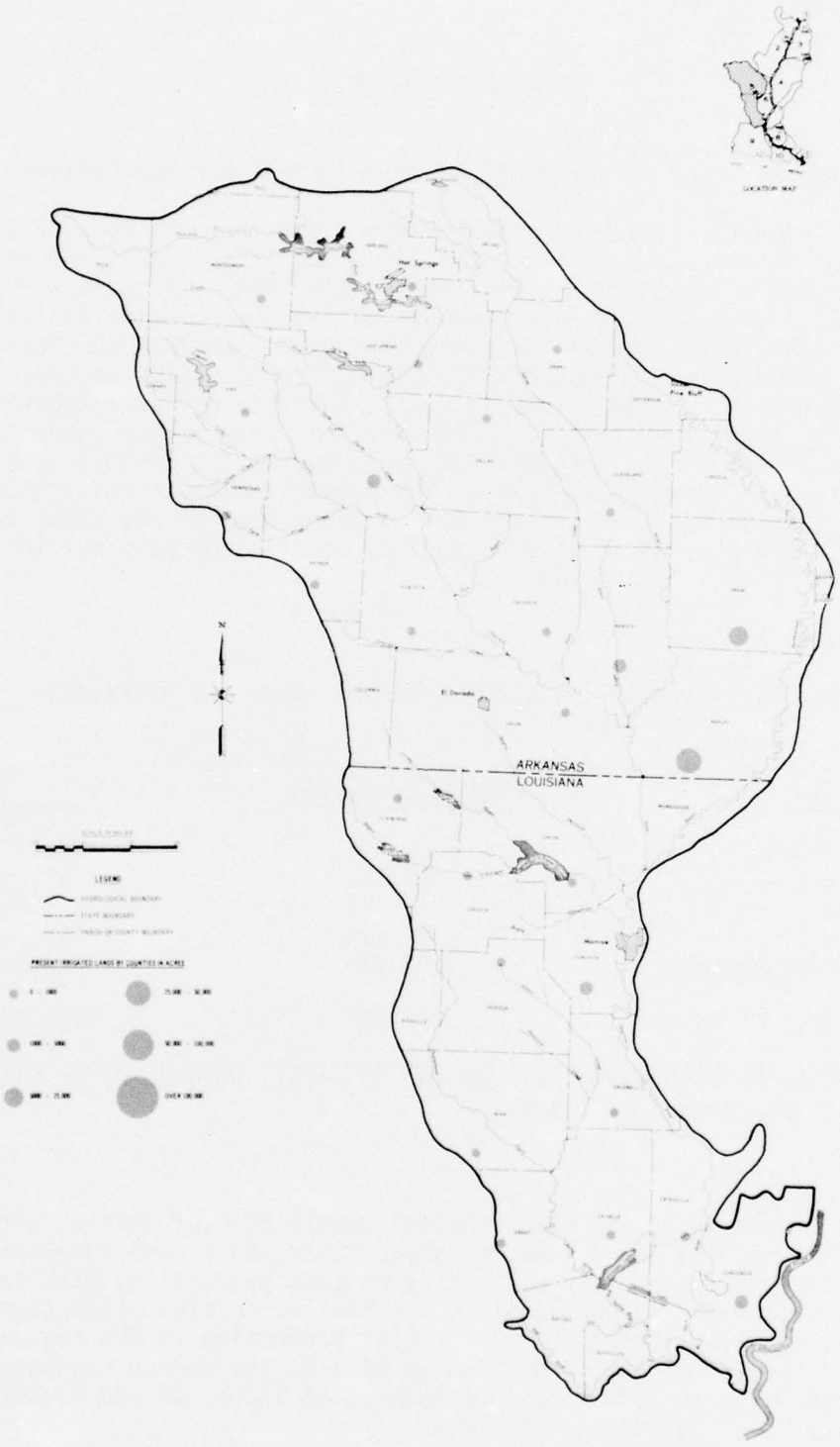
The currently irrigated area in WRPA 5 totals about 212,600 acres with about 43,000 acres of rice, 119,000 acres of soybeans, and 38,000 acres of cotton irrigated. These totals rank WRPA 5 third in the region in overall irrigation and third also in the acreage of rice irrigated. Irrigation as a practice is being used throughout most of the WRPA, however, most is in the Southern Mississippi Valley Alluvium LRA. The heavier soils of this LRA are well suited for rice or rice-soybean rotations. The lighter soils of this LRA and the soils of the other LRA's, where the topography is suitable, are well suited for cotton, soybeans, and other crops grown in the area. The present acres of irrigation by crop distribution and the present irrigation water use are shown in table 26. The present irrigated lands by counties or parishes in WRPA 5 are shown in figure 13.

Table 26 - Acres of irrigated land and water use by crops, 1970, WRPA 5

Crop	Acres Irrigated	Water Use (Ac.Ft.)
Soybeans	119,031	186,879
Cotton	38,425	62,249
Corn	338	659
Rice	42,857	140,006
Miscellaneous	11,936	19,669
Total	212,587	409,462 1/

1/ Ground water withdrawals 67 percent of total, surface water withdrawals 33 percent of total.

The livestock of the WRPA consists mostly of beef cattle, with hogs ranking second, and dairy cows and sheep third and fourth respectively. The poultry consists mostly of broiler chicken production, with laying chickens second and turkeys third. The broiler chicken production in WRPA 5 is about two-thirds of all broiler production in the region and is almost five times the production of WRPA 7, the second highest in production. The present kinds and numbers of livestock and poultry and their water use are shown in table 27.



LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

PRESENT IRRIGATED LANDS BY COUNTIES IN ACRES

WRPA 5

FIGURE 13

Table 27 - Kinds and number of livestock and poultry and their water use, 1970, WRPA 5

Kind	Number	Water Use (Ac.Ft.)
LIVESTOCK		
Cattle and Calves	584,000	6,542
Milk Cows	31,300	702
Hogs and Pigs	149,300	502
Sheep and Lambs	12,300	27
Subtotal	776,900	7,773
POULTRY		
Chickens	1,456,600	65
Broilers	59,981,800	413
Turkeys	3,700	2
Subtotal	61,442,100	480
TOTAL	62,219,000	8,253 1/

1/ Ground water withdrawals 50 percent of total, surface water withdrawals 50 percent of total.

Source of Water

Most of this WRPA's irrigated acres (212,600) are watered by private systems which currently withdraw about 409,500 acre feet. This is equivalent to about 366 mgd. for the entire year. During the peak use period, it is estimated that about 1,652 mgd. will be required. An estimated 67 percent of the water used for irrigation comes from ground water sources and 33 percent comes from surface water sources.

Practically all of the presently estimated 8,200 acre feet (7.3 mgd.) used by the livestock and poultry in this WRPA is supplied by private sources. An estimated 50 percent is supplied from ground water sources and 50 percent from surface water sources. Of the total present water used for irrigation and livestock and poultry (417,700 acre feet or 373 mgd.), 67 percent is estimated to be supplied from ground water sources and 33 percent from surface water sources.

Adequacy of Supply

The sources of supply have usually been adequate to supply irrigation needs. The surface water sources, especially in drought periods or over development of source, have been less than adequate at times throughout most of the WRPA. This has occurred in the past during extreme drought periods. There appears to be a plentiful supply of water in this WRPA, however, with some problem in the distribution of water users.

Application of Water for Irrigation

Most of the irrigation water is applied by some sort of gravity system. For rice irrigation, this is normally gravity-flood type. For other crops it is normally flume-siphon tube or gated pipe type.

Sprinkler systems account for almost all of the remaining irrigation and are probably more widely used than gravity systems because of their adaption to more varied topography. The preparation of the land for irrigation is not nearly as demanding or precise for sprinkler type irrigation as for gravity type irrigation.

FUTURE NEEDS

Crops, with the exception of rice, can be produced in this WRPA without irrigation. The total projected acreage of rice was considered as being irrigated since irrigation is a necessity for rice production. The projected acreage of truck crops was also considered as irrigated because of the high losses that would occur if sufficient moisture was not present for growth. The remainder of the crops, pasture, and hay to be irrigated was projected from past trends. The acres expected to be irrigated, by crops, and the water use for future time periods for both Programs A and B are shown in table 28.

Table 28 - Projected acres of irrigated land and water use by crops, Programs A and B, WRPA 5

Crop	1980		2000		2020	
	Acres Irrigated	Water Use (Ac.Ft.)	Acres Irrigated	Water Use (Ac.Ft.)	Acres Irrigated	Water Use (Ac.Ft.)
PROGRAM A						
Soybeans	154,320	242,527	192,287	302,160	222,554	349,703
Cotton	34,458	55,761	34,126	55,224	33,563	54,312
Corn	63	117	79	147	85	158
Rice	42,987	140,442	46,084	150,560	49,854	162,877
Hay	1,715	4,248	1,592	3,928	1,680	4,146
Pasture	6,580	16,209	6,710	16,536	7,050	17,352
Vegetables	7,000	4,490	7,500	4,745	8,000	5,000
Miscellaneous	14,245	23,470	16,528	27,234	18,280	30,123
TOTAL-PROGRAM A	261,368	487,264	304,906	560,534	341,066	623,671
PROGRAM B						
Soybeans	154,432	242,716	206,539	324,553	239,089	375,695
Cotton	34,492	55,813	36,768	59,490	36,220	58,597
Corn	66	123	97	180	115	214
Rice	42,987	140,442	49,506	161,740	53,538	174,912
Hay	1,801	4,461	1,901	4,688	2,287	5,640
Pasture	6,910	17,022	7,717	19,017	8,813	21,671
Vegetables	7,000	4,490	21,000	13,470	32,000	20,920
Miscellaneous	14,958	24,645	19,926	32,837	23,900	39,390
TOTAL-PROGRAM B	262,646	489,712	343,454	615,975	395,962	697,039

The kinds and numbers of livestock and poultry in this WRPA and their water use, for future time periods, for both Programs A and B are shown in table 29.

The total water use needs for irrigation and for livestock and poultry, for future time periods, for both Programs A and B are summarized in table 30.

Table 29 - Projected kinds and numbers of livestock and poultry and their water uses, Programs A and B, WRPA 5

Kind	1980 Number	1980 Water Use (Ac.Ft.)	2000 Number	2000 Water Use (Ac.Ft.)	2020 Number	2020 Water Use (Ac.Ft.)
PROGRAM A						
Livestock						
Cattle & calves	743,731	8,332	1,001,141	11,216	1,344,509	15,063
Milk cows	28,773	644	35,511	795	43,368	972
Hogs & pigs	170,414	573	222,589	748	288,950	972
Sheep & lambs	9,440	22	11,100	25	13,659	31
Subtotal	952,358	9,571	1,270,341	12,784	1,690,486	17,038
Poultry						
Chickens	1,600,221	71	2,048,416	92	2,594,787	116
Broilers	83,656,616	575	116,808,558	804	156,822,416	1,079
Turkeys	4,940	2	6,942	2	9,374	2
Subtotal	85,261,777	648	118,863,916	898	159,426,577	1,197
TOTAL-PROGRAM A	86,214,135	10,219	120,134,257	13,682	161,117,063	18,235
PROGRAM B						
Livestock						
Cattle & calves	743,731	8,332	1,075,466	12,048	1,443,841	16,175
Milk cows	28,773	644	38,148	855	46,572	1,043
Hogs & pigs	170,414	573	239,114	803	310,297	1,043
Sheep & lambs	9,440	22	11,925	26	14,668	33
Subtotal	952,358	9,571	1,364,653	13,732	1,815,378	18,294
Poultry						
Chickens	1,600,221	71	2,200,491	99	2,786,489	125
Broilers	83,656,616	575	125,480,426	863	168,408,456	1,158
Turkeys	4,940	2	7,457	2	10,067	2
Subtotal	85,261,777	648	127,688,374	964	171,205,012	1,285
TOTAL-PROGRAM B	86,214,135	10,219	129,053,027	14,696	173,020,390	19,579

Table 30 - Projected water use needs for irrigation and for livestock and poultry, Programs A and B, WRPA 5

	1980 (Ac.Ft.)	2000 (Ac.Ft.)	2020 (Ac.Ft.)
PROGRAM A			
Irrigation	487,264	560,534	623,671
Livestock and poultry	10,219	13,682	18,235
Total	497,483	574,216	641,906
PROGRAM B			
Irrigation	489,712	615,975	697,039
Livestock and poultry	10,219	14,696	19,579
Total	499,931	630,671	716,618

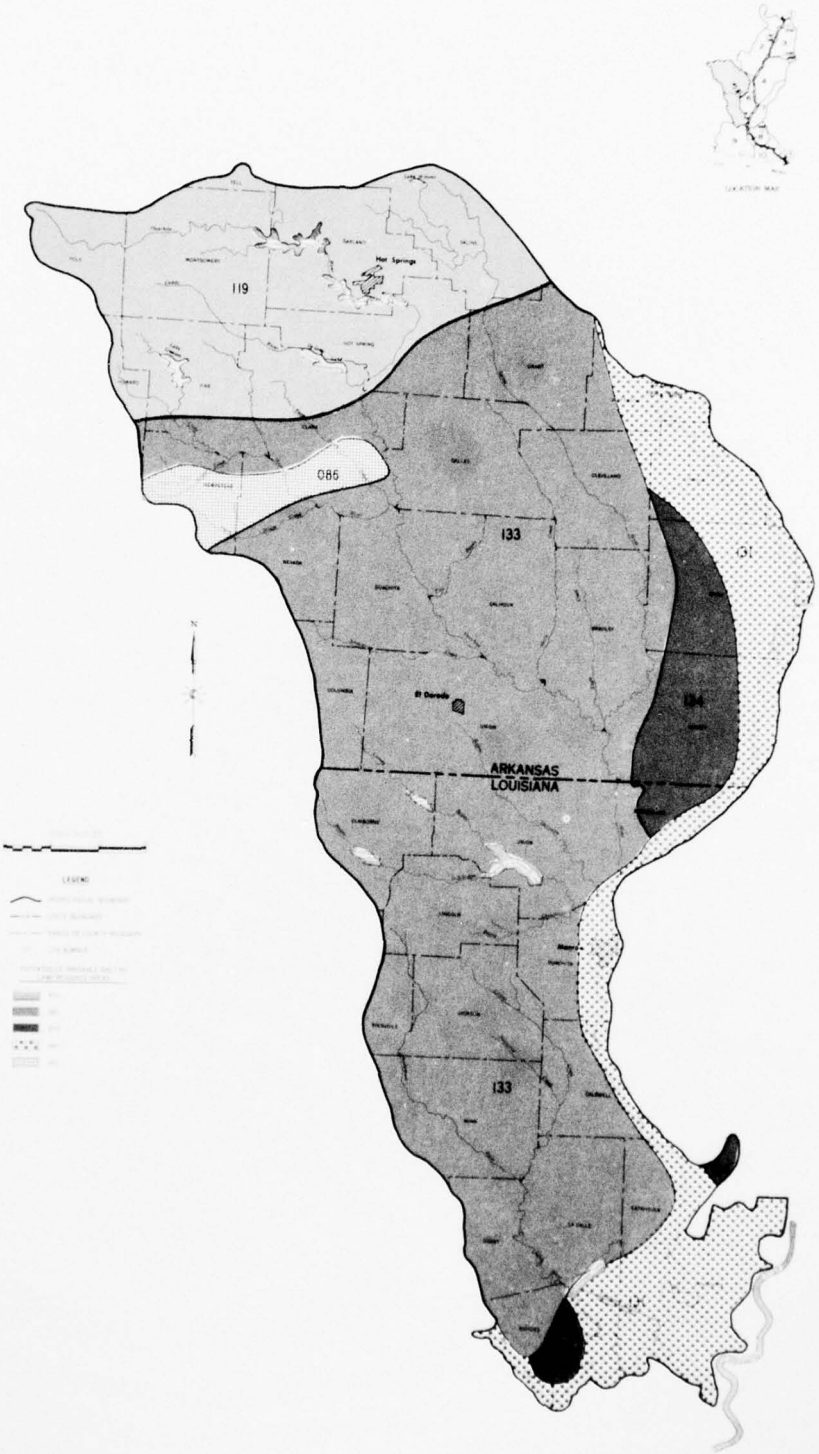
THE POTENTIAL TO MEET THE NEEDS

The potentially available water supply that could be used to meet the needs for irrigation and for use of livestock and poultry in this WRPA are generally considered adequate. The problems associated with the distribution of water users, however, are expected to continue.

There are about 7,847,000 acres of potentially irrigable land (Land Capability Classes I-IV) in WRPA 5. These soils by land resource areas and the percentage of the total for each LRA are shown in table 31. The potentially irrigable soils by LRA's are shown in figure 14.

Table 31 - Potentially irrigable soils by land resource areas by percent, WRPA 5

Land Resource Area	Potentially Irrigable (Acres)	Percent
86	109,000	1.39
119	614,800	7.83
131	997,000	12.71
133	5,461,800	69.60
134	664,400	8.47
Total	7,847,000	100.00



LOWER MISSISSIPPI REGION
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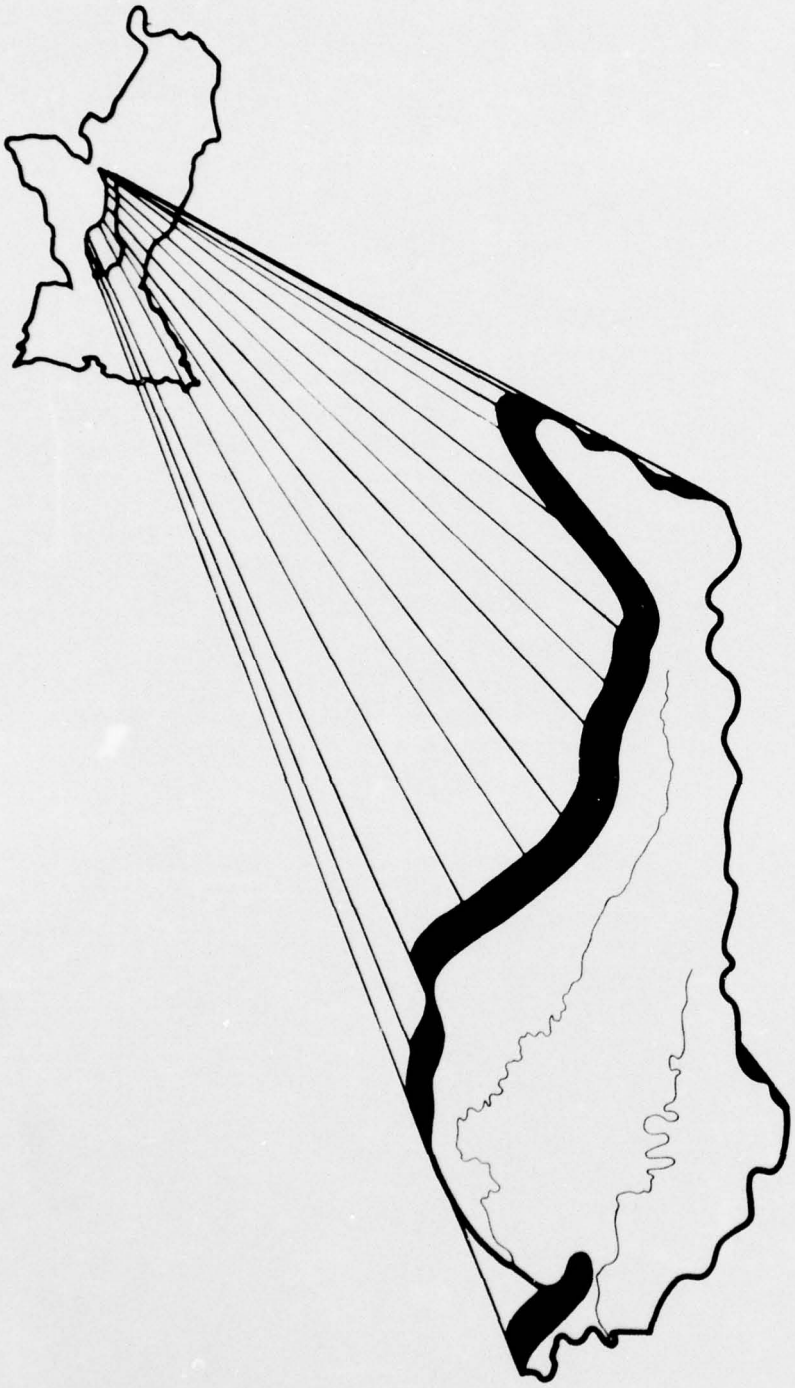
POTENTIALLY IRRIGABLE SOILS BY LAND RESOURCE AREAS

WRPA 5

FIGURE 14



WRPA 6

W R P A 6

THE SETTING

WRPA 6 is located on the west side of the Mississippi River in southeast Arkansas and northeast Louisiana. This WRPA contains about 3.4 million acres of land and 0.1 million acres of water area for a total of 3.5 million acres or about 5,520 square miles. With the exception of WRPA 1, which is inside the Mississippi River levees or to the top bank of the river where no levees exist, this is the smallest of all WRPA's.

The climate is mild with an average annual temperature of around 65 degrees with little variance throughout the area. The average length of growing season is about 240 days with little variance throughout the area. The normal annual precipitation is about 52 inches also with little variance throughout the area.

The topography of this WRPA is fairly flat with about three-fourths of the area being alluvium topography. This alluvium is broken by the rolling hills of Crowley Ridge which is made up of silty uplands. The alluvium lands have been highly developed for agricultural use.

The soils of this WRPA are fairly uniform and are from only two of the region's 11 major land resource areas. These LRA's for WRPA 6 are shown in figure 15. About 97 percent of the agricultural lands in WRPA 6 is in Land Capability Classes I to IV and is suitable for growing crops or for pastures, trees, or wildlife plantings. The remaining 3 percent is in Land Capability Classes V to VIII and is not suitable for the growing of crops.

LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

LAND RESOURCE AREAS

WRPA 6

FIGURE 15

PRESENT STATUS

Characteristics of Irrigated Areas and Livestock and Poultry

The currently irrigated area in WRPA 6 totals about 77,300 acres with about 24,500 acres of rice, 21,300 acres of soybeans, and 19,900 acres of cotton. Practically all of the irrigation is related to the Southern Mississippi Valley Alluvium Major Land Resource Area. The heavier soils of this LRA are well suited for rice and for rice-soybean rotations. The lighter soils of this LRA and the soils of the Southern Mississippi Valley Silty Uplands where topography will allow cultivation are well suited for cotton, soybeans, and other crops grown in the area. The present acres of irrigation by crop distribution and the present irrigation water use are shown in table 32. The present irrigated lands by counties or parishes in WRPA 6 are shown in figure 16.

Table 32 - Acres of irrigated land and water use by crops, 1970, WRPA 6

Crop	Acres Irrigated	Water Use (Ac.Ft.)
Soybeans	21,295	36,627
Cotton	19,920	32,270
Corn	29	56
Rice	24,351	81,576
Miscellaneous	11,666	20,416
Total	77,261	170,945 1/

1/ Ground water withdrawals 76 percent of total, surface water withdrawals 24 percent of total.

The livestock of the WRPA consists mostly of beef cattle with hogs, sheep, and milk cows ranking second, third, and fourth respectively. The poultry consists mostly of laying chickens with turkeys second. The present kinds and numbers of livestock and poultry and their water use are shown in table 33.

Source of Water

Most of this WRPA's irrigated acres (77,300) are watered by private systems which currently withdraw about 170,900 acre feet. This is equivalent to about 154 mgd. for the entire year. During the peak use period,

LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

PRESENT IRRIGATED LANDS BY COUNTIES IN ACRES

WRPA 6

FIGURE 16

Table 33 - Kinds and number of livestock and poultry and their water use, 1970, WRPA 6

Kind	Number	Water Use (Ac.Ft.)
LIVESTOCK		
Cattle and Calves	330,800	3,706
Milk Cows	9,200	205
Hogs and Pigs	48,800	164
Sheep and Lambs	11,300	25
Subtotal	400,100	4,100
POULTRY		
Chickens	455,900	20
Turkeys	9,100	1
Subtotal	465,000	21
TOTAL	865,100	4,121 1/

1/ Ground water withdrawals 70 percent of total, surface water withdrawals 30 percent of total.

it is estimated that about 476 mgd. will be required. An estimated 76 percent of the water used for irrigation comes from ground water sources and 24 percent comes from surface water sources.

Practically all of the presently estimated 4,120 acre feet (3.7 mgd.) used by the livestock and poultry in this WRPA is supplied by private sources. An estimated 70 percent is supplied from ground water sources and 30 percent from surface water sources. Of the total present water use for irrigation and livestock and poultry (175,020 acre feet or 158 mgd.), 76 percent is estimated to be supplied from ground water sources and 24 percent from surface water sources.

Adequacy of Supply

The sources of supply have usually been adequate to supply the needs. In some cases, such as the Southern Mississippi Valley Alluvium LRA, the drawdown resulting in the ground water sources has been more than desirable. This has required additional power for pumpage and, in some cases, the installation of additional wells or modification of equipment at existing wells. The surface water sources in some cases have been less than adequate at times. This has occurred in the past during extreme

drought periods. There appears to be a plentiful supply of water in this WRPA, however, with some problems in distribution of water users.

Application of Water for Irrigation

Most of the irrigation water is applied by some sort of gravity system. For rice irrigation this is normally gravity-flood type. For other crops it is normally flume-siphon tube or gated pipe type.

Sprinkler systems account for almost all of the remaining irrigation and are probably more widely used than gravity systems because of their adaption to more varied topography. The preparation of the land for irrigation is not nearly as demanding or precise for sprinkler type irrigation as for gravity type irrigation.

FUTURE NEEDS

Crops, with the exception of rice, can be produced in this WRPA without irrigation. The total projected acreage of rice was considered as being irrigated since irrigation is a necessity for rice production. The projected acreage of truck crops was also considered as irrigated because of the high losses that would occur if sufficient moisture was not present for growth. The remainder of the crops, pasture, and hay to be irrigated was projected from past trends. The acres expected to be irrigated, by crops, and the water use for future time periods for both Programs A and B are shown in table 34.

Table 34 - Projected acres of irrigated land and water use by crops, Programs A and B, WRPA 6

Crop	1980		2000		2020	
	Acres Irrigated	Water Use (Ac.Ft.)	Acres Irrigated	Water Use (Ac.Ft.)	Acres Irrigated	Water Use (Ac.Ft.)
PROGRAM A						
Soybeans	24,134	41,510	27,683	47,615	34,072	58,604
Cotton	18,869	30,567	18,647	30,208	18,310	29,662
Rice	31,533	105,636	33,804	113,243	36,567	122,499
Hay	721	1,932	700	1,876	807	2,163
Pasture	3,450	9,246	3,600	9,648	3,650	9,782
Vegetables	455	364	419	335	383	306
Miscellaneous	13,096	22,918	14,361	25,132	16,489	28,856
TOTAL-PROGRAM A	92,258	212,173	99,214	228,057	110,278	251,872
PROGRAM B						
Soybeans	25,341	43,587	27,582	47,441	36,071	62,042
Cotton	19,812	32,095	23,021	37,294	24,569	39,802
Rice	31,533	105,636	36,313	121,649	39,270	131,555
Hay	757	2,029	865	2,318	1,083	2,902
Pasture	3,623	9,710	4,140	11,095	4,563	12,229
Vegetables	455	364	1,200	960	2,500	2,000
Miscellaneous	14,537	25,440	16,424	28,742	20,040	35,070
TOTAL-PROGRAM B	96,058	218,861	109,545	249,499	128,096	285,600

The kinds and numbers of livestock and poultry in this WRPA and their water use, for future time periods, for both Programs A and B are shown in table 35.

The total water use needs for irrigation and for livestock and poultry, for future time periods, for both Programs A and B are summarized in table 36.

Table 35 - Projected kinds and numbers of livestock and poultry and their water uses, Programs A and B, WRPA 6

Kind	1980 Number	1980 Water Use (Ac.Ft.)	2000 Number	2000 Water Use (Ac.Ft.)	2020 Number	2020 Water Use (Ac.Ft.)
PROGRAM A						
Livestock						
Cattle & calves	421,261	4,719	567,062	6,353	761,551	8,532
Milk cows	8,413	189	10,383	233	12,680	284
Hogs & pigs	55,718	187	72,777	245	94,474	318
Sheep & lambs	8,673	19	10,197	23	12,549	28
Subtotal	494,065	5,114	660,419	6,854	881,254	9,162
Poultry						
Chickens	500,852	22	641,132	29	812,140	36
Turkeys	12,149	1	17,074	1	23,056	2
Subtotal	513,001	23	658,206	30	835,196	38
TOTAL-PROGRAM A	1,007,066	5,137	1,318,625	6,884	1,716,450	9,200
PROGRAM B						
Livestock						
Cattle & calves	421,261	4,719	609,161	6,825	817,814	9,162
Milk cows	8,413	189	11,154	350	13,617	305
Hogs & pigs	55,718	187	78,180	263	101,454	341
Sheep & lambs	8,673	19	10,954	25	13,476	30
Subtotal	494,065	5,114	709,449	7,463	946,361	9,838
Poultry						
Chickens	500,852	22	688,730	31	872,141	39
Turkeys	12,149	1	18,342	1	24,759	2
Subtotal	513,001	23	707,072	32	896,900	41
TOTAL-PROGRAM B	1,007,066	5,137	1,416,521	7,495	1,843,261	9,879

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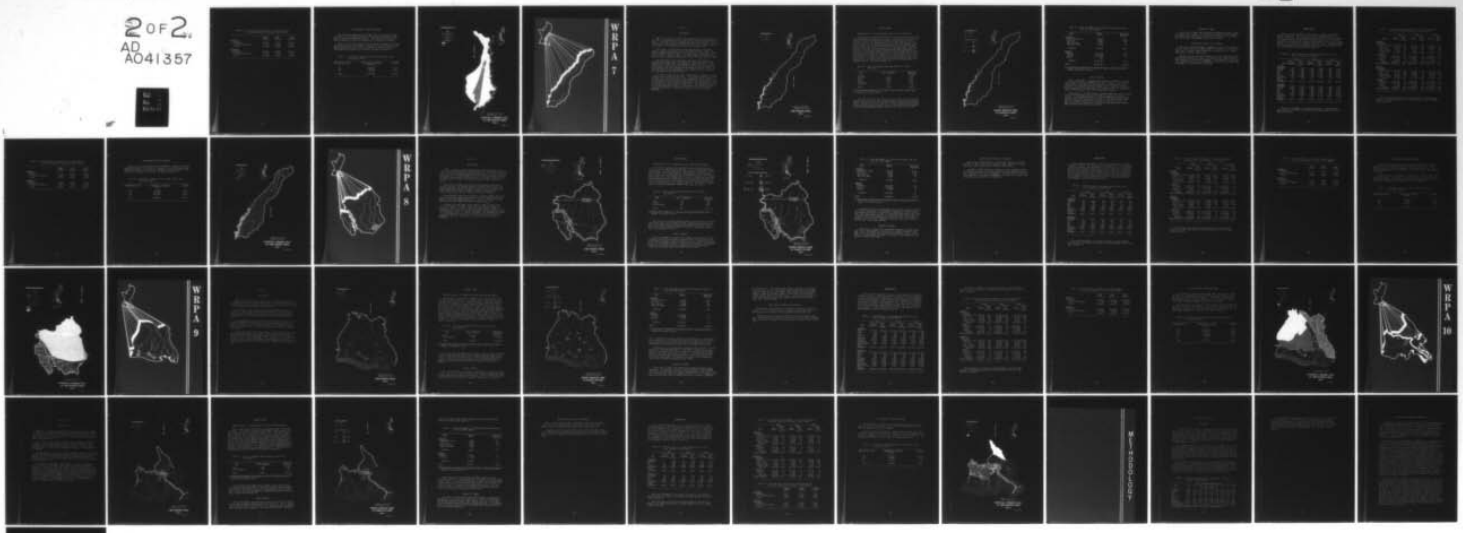

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Table 36 - Projected water use needs for irrigation and for livestock and poultry, Programs A and B, WRPA 6

	1980 (Ac.Ft.)	2000 (Ac.Ft.)	2020 (Ac.Ft.)
PROGRAM A			
Irrigation	212,173	228,057	251,872
Livestock and poultry	5,137	6,884	9,200
Total	217,310	234,941	261,072
PROGRAM B			
Irrigation	218,861	249,499	285,600
Livestock and poultry	5,137	7,495	9,879
Total	223,998	256,994	295,479

THE POTENTIAL TO MEET THE NEEDS

The potentially available water supply that could be used to meet the needs for irrigation and for use of livestock and poultry in this WRPA are generally considered adequate. The problems associated with the distribution of water users, however, are expected to continue.

There are about 3,237,000 acres of potentially irrigable land (Land Capability Classes I-IV) in WRPA 6. These soils by land resource areas and the percentage of the total for each LRA are shown in table 37. The potentially irrigable soils by LRA's are shown in figure 17.

Table 37 - Potentially irrigable soils by land resource areas by percent, WRPA 6

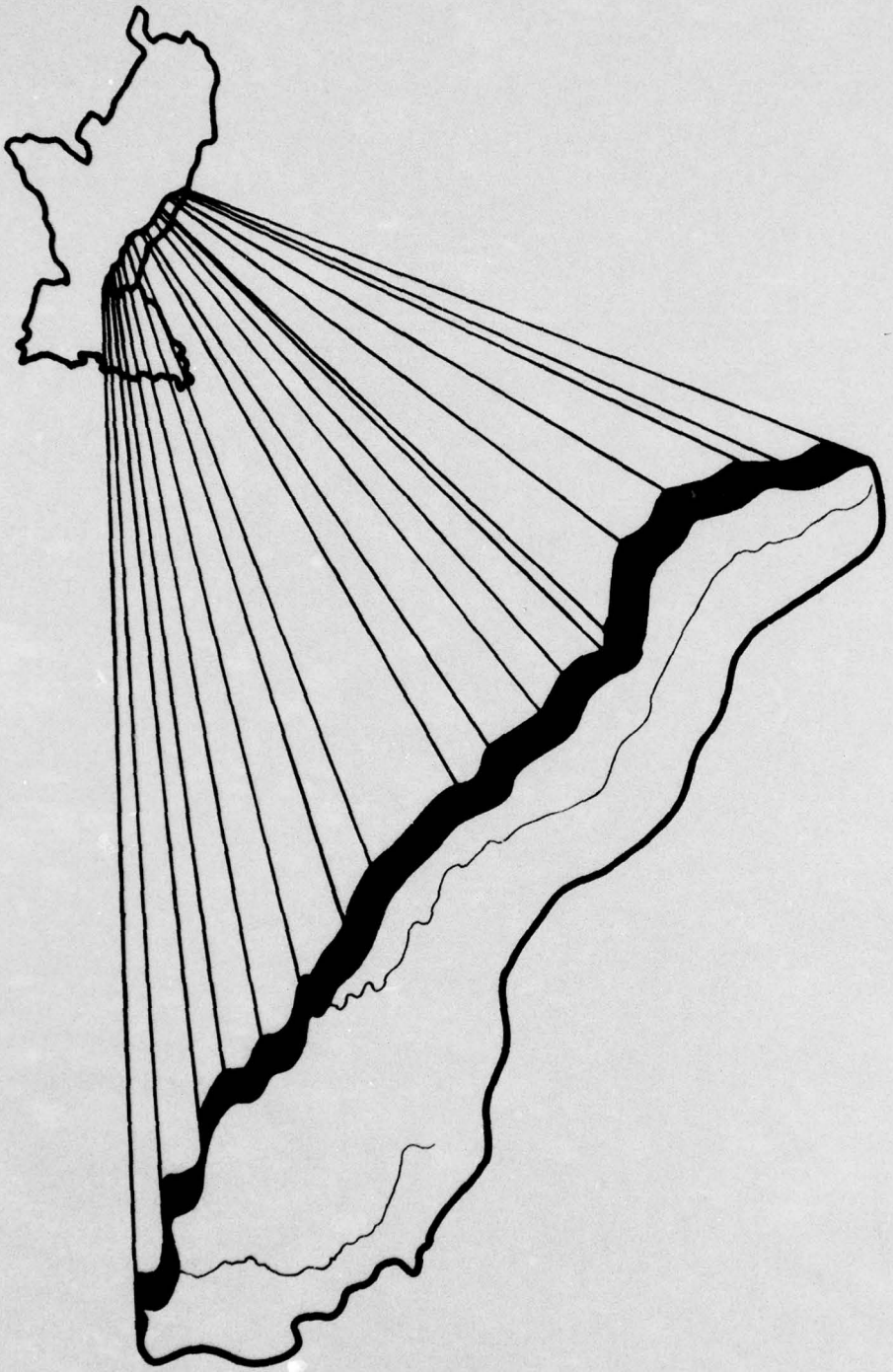
Land Resource Area	Potentially Irrigable (Acres)	Percent
131	2,440,200	75.39
134	796,600	24.61
Total	3,236,800	100.00

LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

POTENTIALLY IRRIGABLE SOILS BY LAND RESOURCE AREAS

WRPA 6

FIGURE 17



WRPA 7

W R P A 7

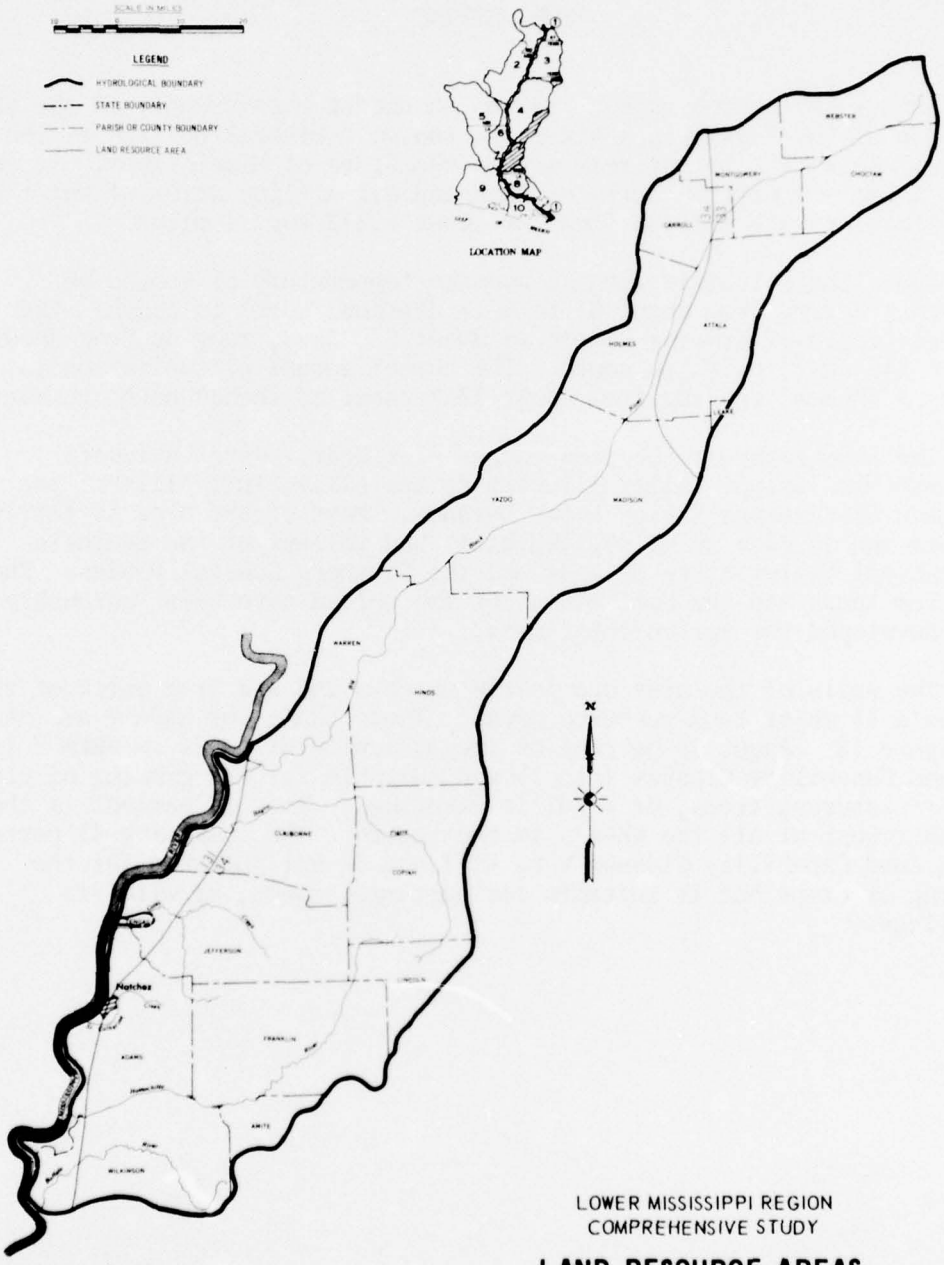
THE SETTING

WRPA 7 is located in central and southwest Mississippi, on the eastern side of the Mississippi River, in the east central portion of the region. This WRPA is entirely within the State of Mississippi. It contains about 4.1 million acres of land and 0.1 million acres of water area for a total of 4.2 million acres or about 6,573 square miles.

The climate is mild with an average temperature of around 66 degrees, ranging from about 65 to 67.5 degrees, north to south. The average length of growing season is about 230 days, ranging from about 220 to 240 days, north to south. The normal annual precipitation is about 55 inches, ranging from about 52 to near 60 inches north to south.

The topography of the area ranges from nearly level unleveed Southern Mississippi Valley Alluvium to the hilly bluff hills of the Southern Mississippi Valley Silty Uplands. Most of the area is fairly uniform and is made up of rolling hills and valleys of the Southern Mississippi Valley Silty Uplands and the Southern Coastal Plains. The alluvium lands and the bottomlands of the upland have been reasonably well developed for agricultural uses.

The soils of the area are fairly uniform and are from three of the region's 11 major land resource areas. These LRA's for WRPA 7 are shown in figure 18. About 59 percent of the agricultural lands in WRPA 7 is in Land Capability Classes I to IV and suitable for the growing of crops or for pastures, trees, or wildlife plantings. This 59 percent is the second lowest of all the WRPA's in the region. The remaining 41 percent is in Land Capability Classes V to VIII and is not suitable for the growing of crops but is suitable for pastures, trees, or wildlife plantings.



LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

LAND RESOURCE AREAS

WRPA 7

FIGURE 18

PRESENT STATUS

Characteristics of Irrigated Areas and Livestock and Poultry

The currently irrigated area in WRPA 7 totals about 4,200 acres with about 1,300 acres of cotton, 1,110 acres of vegetables, and 1,010 acres of corn. These totals rank WRPA 7 seventh in the region in overall irrigation with no rice being produced in the WRPA. Most of the irrigation is located in the Southern Mississippi Valley Silty Uplands Land Resource Area. The soils of the Southern Mississippi Valley Alluvium are well suited for cotton, soybeans, rice, and other crops grown in the area but are subject to frequent flooding from the Mississippi River. The soils of the Southern Mississippi Valley Silty Uplands and the Southern Coastal Plains LRA's are suitable for all crops grown in the area, with topography being the limiting factor to the growing of crops. The present acres of irrigation by crop distribution and the present irrigation water use are shown in table 38. The present irrigated lands by counties in WRPA 7 are shown in figure 19.

Table 38 - Acres of irrigated land and water use by crops, 1970, WRPA 7

Crop	Acres Irrigated	Water Use (Ac.Ft.)
Soybeans	75	106
Cotton	1,300	1,717
Corn	1,010	1,737
Pasture	785	1,947
Vegetables	1,111	544
Total	4,281	6,050 1/

1/ Ground water withdrawals 40 percent of total, surface water withdrawals 60 percent of total.

The livestock of the WRPA consists mostly of beef cattle, with hogs ranking second, and milk cows and sheep ranking third and fourth respectively. The poultry consists mostly of broiler chicken production, with laying chickens second and turkeys third. The present kinds and numbers of livestock and poultry and their water use are shown in table 39.

LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

PRESENT IRRIGATED LANDS BY COUNTIES IN ACRES

WRPA 7

FIGURE 19

Table 39 - Kinds and numbers of livestock and poultry and their water use, 1970, WRPA 7

Kind	Number	Water Use (Ac.Ft.)
LIVESTOCK		
Cattle and Calves	299,400	3,353
Milk Cows	13,600	305
Hogs and Pigs	52,100	175
Sheep and Lambs	6,100	14
Subtotal	371,200	3,847
POULTRY		
Chickens	2,337,200	105
Broilers	12,418,600	85
Turkeys	2,100	1
Subtotal	14,757,900	191
TOTAL	15,129,100	4,038 1/

1/ Ground water withdrawals 40 percent of total, surface water withdrawals 60 percent of total.

Source of Water

Most of this WRPA's irrigated acres (4,280) are watered by private systems which currently withdraw about 6,050 acre feet. This is equivalent to about 5 to 6 mgd. for the entire year. During the peak use period, it is estimated that about 19 mgd. will be required. An estimated 40 percent of the water used for irrigation comes from ground water sources and 60 percent comes from surface water sources.

Practically all of the presently estimated 4,040 acre feet (3.6 mgd.) used by livestock and poultry in this WRPA is supplied by private sources. An estimated 40 percent is supplied from ground water sources and 60 percent from surface water sources. Of the total present water used for irrigation and livestock and poultry (10,090 acre feet or 9 mgd.) 40 percent is estimated to be supplied from ground water sources and 60 percent from surface water sources.

Adequacy of Supply

The sources of supply have usually been adequate to supply irrigation needs. There appears to be a plentiful supply of water in WRPA 7. Some ground water sources have been fairly deep, however, increasing the cost of wells and pumpage cost per unit of water.

Application of Water for Irrigation

Most of the irrigation water is applied by some sort of gravity system. There is no rice acreage in WRPA 7 at present. For most other crops this is normally flume-siphon tube or gated pipe type. Gravity-flood type is used on some pastures.

Sprinkler systems account for almost all of the remaining irrigation and are probably more widely used than gravity systems because of their adaption to more varied topography. The preparation of the land for irrigation is not nearly as demanding or precise for sprinkler type irrigation as for gravity type irrigation.

FUTURE NEEDS

Crops, with the exception of rice, can be produced in this WRPA without irrigation. No rice is expected to be produced in WRPA 7 in future time periods. The projected acreage of truck crops was considered as irrigated because of the high losses that would occur if sufficient moisture was not present for growth. The remainder of the crops, pasture, and hay to be irrigated was projected from past trends. The acres expected to be irrigated, by crops, and the water use for future time periods for both Programs A and B are shown in table 40.

Table 40 - Projected acres of irrigated land and water use by crops, Programs A and B, WRPA 7

Crop	1980		2000		2020	
	Acres Irrigated	Water Use (Ac.Ft.)	Acres Irrigated	Water Use (Ac.Ft.)	Acres Irrigated	Water Use (Ac.Ft.)
PROGRAM A						
Soybeans	996	1,404	1,130	1,593	1,190	1,678
Cotton	1,032	1,362	1,018	1,344	999	1,319
Corn	486	836	611	1,051	665	1,144
Hay	546	1,354	515	1,277	597	1,481
Pasture	5,100	12,648	5,180	12,846	5,250	13,020
Vegetables	302	148	300	147	300	147
TOTAL-PROGRAM A	8,462	17,752	8,754	18,258	9,001	18,789
PROGRAM B						
Soybeans	1,046	1,475	1,396	1,968	1,596	2,250
Cotton	1,084	1,431	1,289	1,701	1,339	1,767
Corn	510	877	756	1,300	893	1,536
Hay	573	1,421	636	1,577	801	1,986
Pasture	5,355	13,280	5,957	14,773	6,563	16,276
Vegetables	302	148	3,000	1,470	6,000	2,940
TOTAL-PROGRAM B	8,870	18,632	13,034	22,789	17,192	26,755

The kinds and numbers of livestock and poultry in this WRPA and their water use, for future time periods, for both Programs A and B are shown in table 41.

Table 41 - Projected kinds and numbers of livestock and poultry and their water uses, Programs A and B, WRPA 7

Kind	1980 Number	1980 Water Use (Ac.Ft.)	2000 Number	2000 Water Use (Ac.Ft.)	2020 Number	2020 Water Use (Ac.Ft.)
PROGRAM A						
Livestock						
Cattle & calves	381,231	4,271	513,176	5,749	689,184	7,721
Milk cows	12,521	281	15,453	346	18,872	423
Hogs & pigs	59,494	200	77,709	261	100,877	339
Sheep & lambs	4,682	10	5,505	12	6,774	15
Subtotal	457,928	4,762	611,843	6,368	815,707	8,498
Poultry						
Chickens	2,567,648	115	3,286,804	147	4,163,488	187
Broilers	17,320,221	119	24,183,982	166	32,468,430	223
Turkeys	2,804	1	3,940	1	5,321	1
Subtotal	19,890,673	235	27,474,726	314	36,637,239	411
TOTAL-PROGRAM A	20,348,601	4,997	28,086,569	6,682	37,452,946	8,909
PROGRAM B						
Livestock						
Cattle & calves	381,231	4,271	551,274	6,176	740,101	8,291
Milk cows	12,521	281	16,600	372	20,266	454
Hogs & pigs	59,494	200	83,478	281	108,330	364
Sheep & lambs	4,682	10	5,914	13	7,274	16
Subtotal	457,928	4,762	657,266	6,842	875,971	9,125
Poultry						
Chickens	2,567,648	115	3,530,816	158	4,471,086	200
Broilers	17,320,221	119	25,979,401	179	34,867,198	240
Turkeys	2,804	1	4,233	1	5,714	1
Subtotal	19,890,673	235	30,171,716	338	39,343,998	441
TOTAL-PROGRAM B	20,348,601	4,997	30,828,982	7,180	40,219,969	9,566

The total water use needs for irrigation and for livestock and poultry, for future time periods, for both Programs A and B are summarized in table 42.

Table 42 - Projected water use needs for irrigation and for livestock and poultry, Programs A and B, WRPA 7

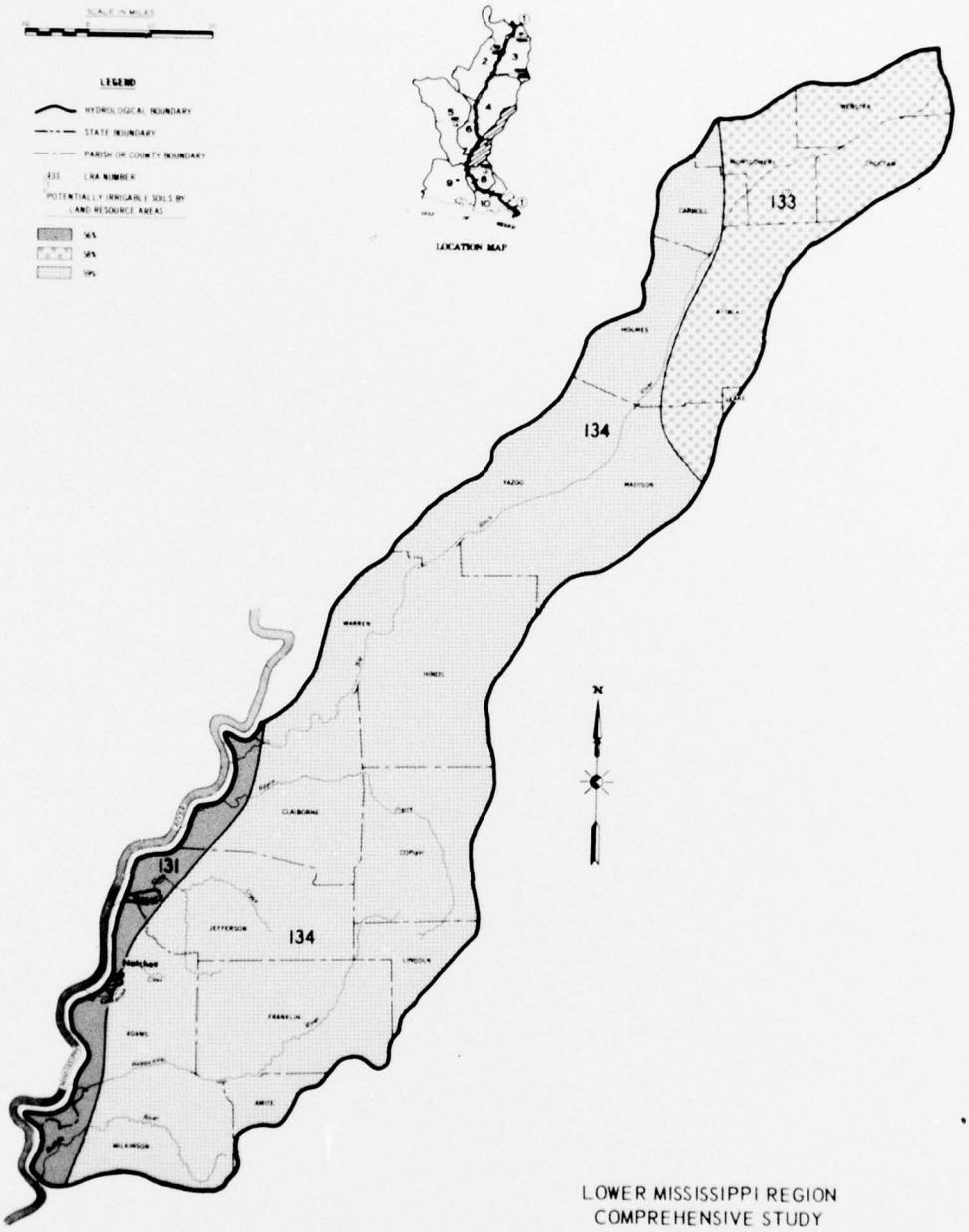
	1980 (Ac.Ft.)	2000 (Ac.Ft.)	2020 (Ac.Ft.)
PROGRAM A			
Irrigation	17,752	18,258	18,789
Livestock and poultry	4,997	6,682	8,909
Total	22,749	24,940	27,698
PROGRAM B			
Irrigation	18,632	22,789	26,755
Livestock and poultry	4,997	7,180	9,566
Total	23,629	29,969	36,321

THE POTENTIAL TO MEET THE NEEDS

There are about 2,188,000 acres of potentially irrigable land (Land Capability Classes I-IV) in WRPA 7. These soils by land resource areas and the percentage of the total for each LRA are shown in table 43. The potentially irrigable soils by LRA's are shown in figure 20.

Table 43 - Potentially irrigable soils by land resource areas by percent, WRPA 7

Land Resource Area	Potentially Irrigable (Acres)	Percent
131	59,800	2.73
133	316,100	14.45
134	1,812,500	82.82
Total	2,188,400	100.00



LOWER MISSISSIPPI REGION
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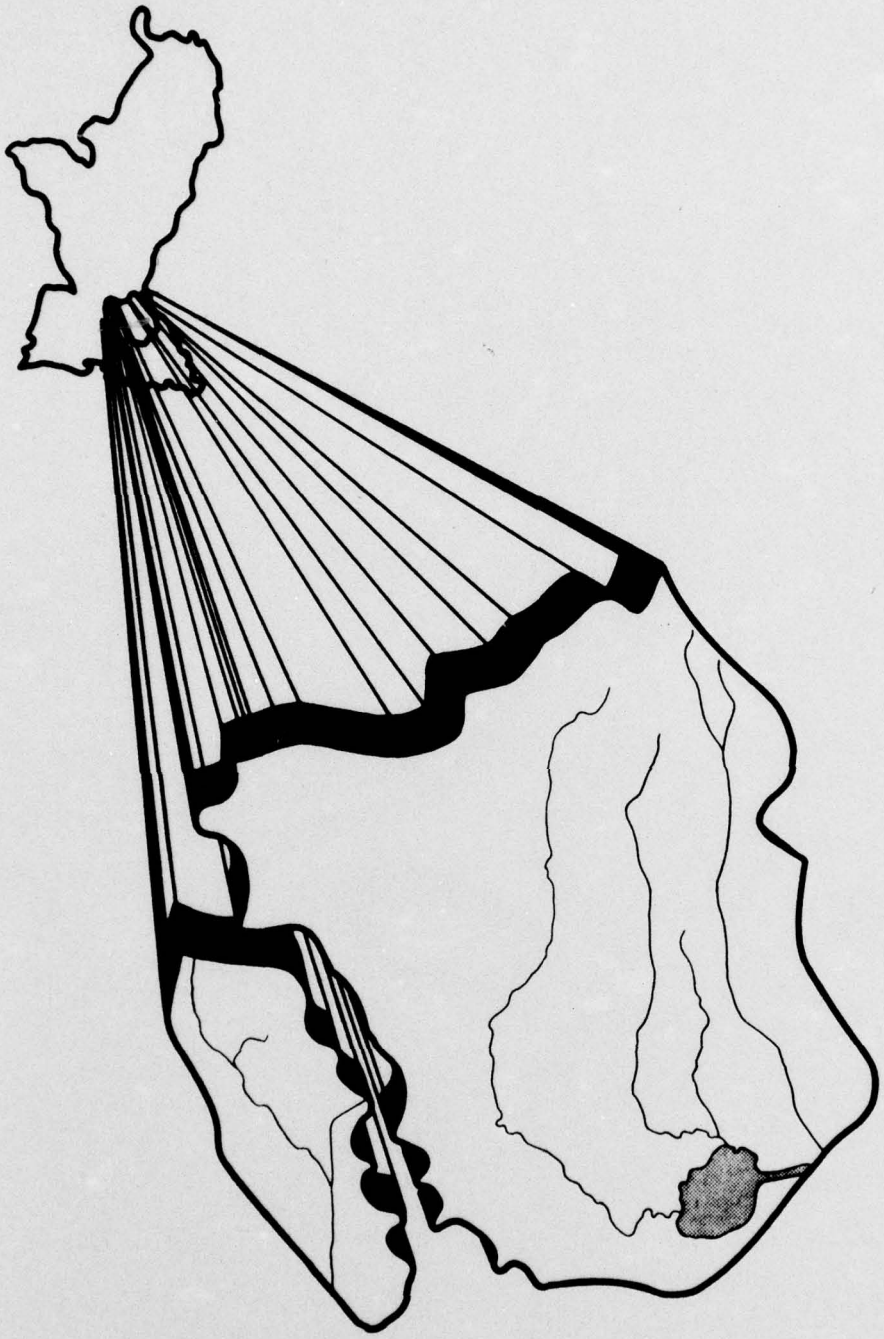
POTENTIALLY IRRIGABLE SOILS BY LAND RESOURCE AREAS

WRPA 7

FIGURE 20



WRPA 8

W R P A 8

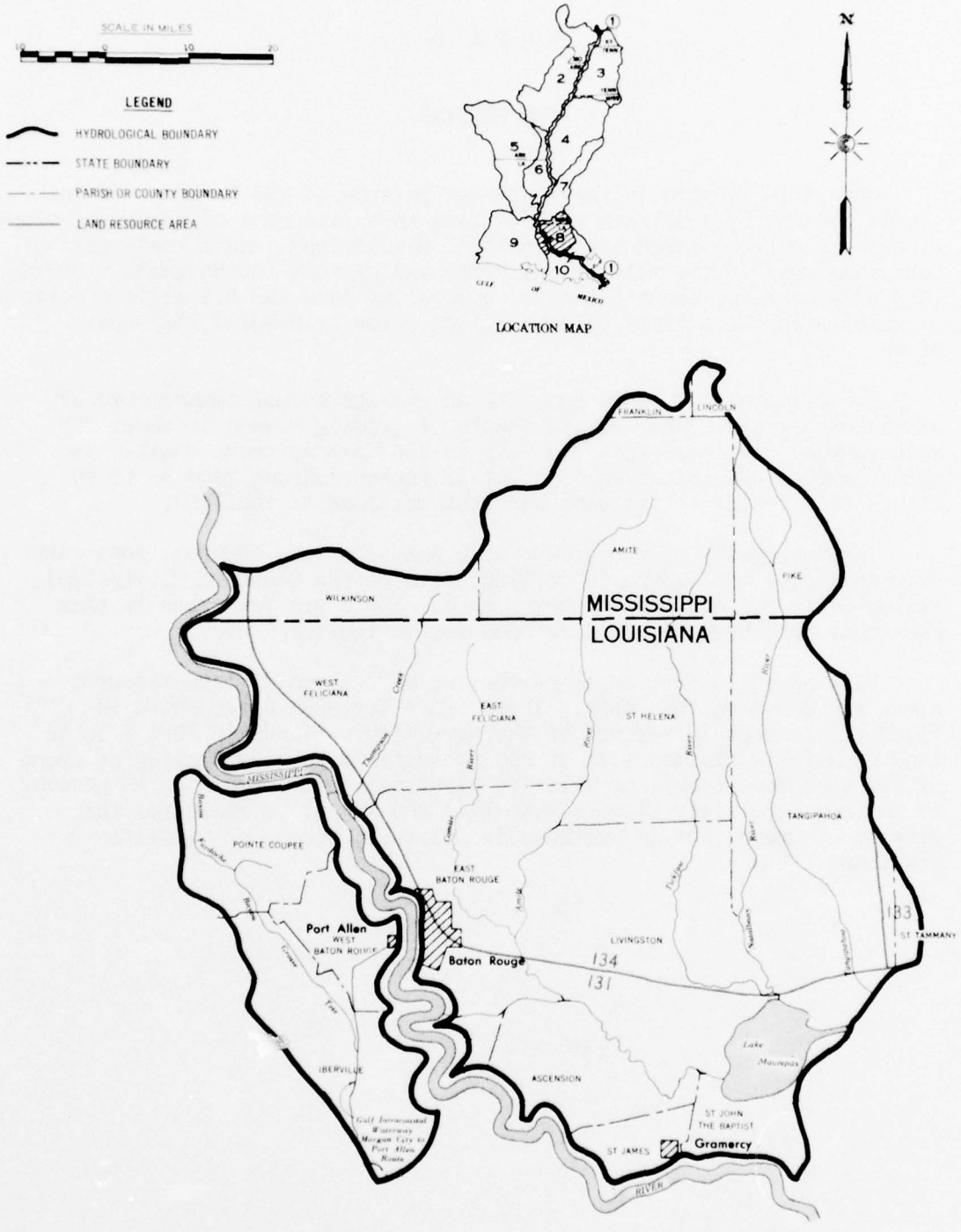
THE SETTING

WRPA 8 is located in the southeast portion of the region. It includes the northern portion of Louisiana that lies east of the Mississippi River, the extreme southwestern part of Mississippi, and a small part of Louisiana west of the Mississippi River and east of the Morganza Floodway. This WRPA contains about 3.5 million acres of land and 0.1 million acres of water area for a total of 3.6 million acres or about 5,705 square miles.

The climate is mild to hot with an average annual temperature of around 68 degrees. The average length of growing season is about 255 days ranging from less than 240 days to 270 days north to south. The normal annual precipitation is about 58 inches ranging from 56 to 60 inches from center to the east and west portions of the WRPA.

The topography of the area, while not of severe changes, does vary from sea level and swamps to rolling hills of the Southern Mississippi Valley Silty Uplands Land Resource Area. There are few areas in this WRPA that have been highly developed for agricultural use.

Varying soils from three of the region's 11 major land resource areas are found in this WRPA. These LRA's for WRPA 8 are shown in figure 21. About 70 percent of the agricultural lands in WRPA 8 is in Land Capability Classes I to IV and is suitable for the growing of crops or for pastures, trees, or wildlife plantings. The remaining 30 percent is in Land Capability Classes V to VIII and is not suitable for the growing of crops, but is suitable for pasture, trees, or wildlife plantings.



LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

LAND RESOURCE AREAS

WRPA 8

FIGURE 21

PRESENT STATUS

Characteristics of Irrigated Areas and Livestock and Poultry

The currently irrigated area in WRPA 8 totals about 1,060 acres with no rice or soybeans being irrigated. This total ranks WRPA 8 last in the region in overall irrigation. About 860 acres of this is miscellaneous land. The irrigated area is located mostly in the Southern Mississippi Valley Alluvium LRA with the remainder being in the Southern Mississippi Valley Silty Uplands LRA. The soils in these two major land resource areas are well suited for the crops and pastures grown in the area. The present acres of irrigation by crop distribution and the present irrigation water use are shown in table 44. The present irrigated lands by counties or parishes in WRPA 8 are shown in figure 22.

Table 44 - Acres of irrigated land and water use by crops, 1970, WRPA 8

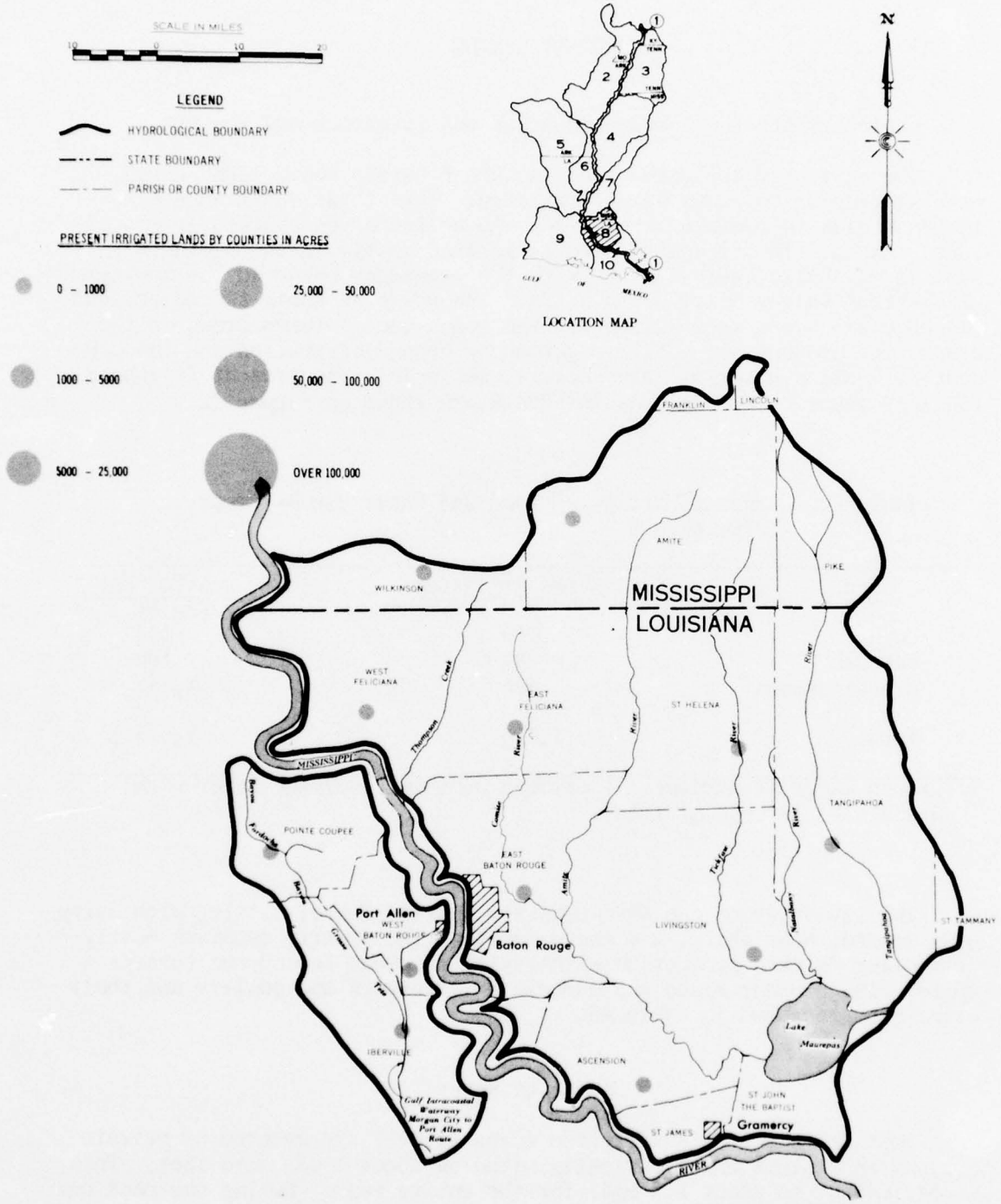
Crop	Acres Irrigated	Water Use (Ac.Ft.)
Corn	120	194
Pasture	80	190
Miscellaneous	856	1,241
Total	1,056	1,625 1/

1/ Ground water withdrawals 77 percent of total, surface water withdrawals 23 percent of total.

The livestock of the WRPA consists mostly of beef cattle, with dairy cows second, hogs third, and sheep fourth. The poultry consists mostly of broiler chicken production with laying chickens second and turkeys third. The present kinds and numbers of livestock and poultry and their water use are shown in table 45.

Source of Water

Most of this WRPA's irrigated acres (1,060) are watered by private irrigation systems which currently withdraw about 1,625 acre feet. This is equivalent to about 1.5 mgd. for the entire year. During the peak use period, it is estimated that about 7 mgd. will be required. An estimated 77 percent of the water used for irrigation comes from ground water sources and 23 percent comes from surface water sources.



LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

PRESENT IRRIGATED LANDS BY COUNTIES IN ACRES

WRPA 8

FIGURE 22

Table 45 - Kinds and numbers of livestock and poultry and their water use, 1970, WRPA 8

Kind	Number	Water Use (Ac.Ft.)
LIVESTOCK		
Cattle and Calves	324,100	3,631
Milk Cows	76,500	1,715
Hogs and Pigs	43,500	146
Sheep and Lambs	3,400	8
Subtotal	447,500	5,500
POULTRY		
Chickens	2,217,000	99
Broilers	5,293,000	36
Turkeys	4,900	1
Subtotal	7,514,900	136
TOTAL	7,962,400	5,636 1/

1/ Ground water withdrawals 43 percent of total, surface water withdrawals 57 percent of total.

Practically all of the estimated 5,640 acre feet (5.0 mgd.) used by the livestock and poultry in this WRPA is supplied by private sources. An estimated 43 percent is supplied from ground water sources and 57 percent from surface water sources. Of the total present water used for irrigation and livestock and poultry (7,265 acre feet or 6.5 mgd.), 51 percent is estimated to be supplied from ground water sources and 49 percent from surface water sources.

Adequacy of Supply

The sources of supply have usually been adequate to supply irrigation needs. There appears to be a plentiful supply of water in this WRPA. There are always some problems associated with improper development or over-development of supply, even with the small amount of irrigation as found in this WRPA.

Application of Water for Irrigation

Most of the irrigation water is applied by some sort of gravity system. For most crops, this is normally flume-siphon tube or gated pipe type. Gravity-flood type is used on some pastures.

Sprinkler systems account for almost all of the remaining irrigation and are probably more widely used than gravity systems because of their adaption to more varied topography. The preparation of the land for irrigation is not nearly as demanding or precise for sprinkler type irrigation as for gravity type irrigation.

FUTURE NEEDS

Crops, with the exception of rice, can be produced in this WRPA without irrigation. The total projected acreage of rice was considered as being irrigated since irrigation is a necessity for rice production. The projected acreage of truck crops was also considered as irrigated because of the high losses that would occur if sufficient moisture was not present for growth. The remainder of the crops, pasture, and hay to be irrigated was projected from past trends. The acres expected to be irrigated, by crops, and the water use for future time periods for both Programs A and B are shown in table 46.

Table 46 - Projected acres of irrigated land and water use by crops, Programs A and B, WRPA 8

Crop	1980		2000		2020	
	Acres Irrigated	Water Use (Ac.Ft.)	Acres Irrigated	Water Use (Ac.Ft.)	Acres Irrigated	Water Use (Ac.Ft.)
PROGRAM A						
Soybeans	869	1,199	973	1,343	1,037	1,431
Corn	104	168	131	212	142	230
Rice	130	416	139	445	151	483
Hay	981	2,335	923	2,197	943	2,244
Pasture	3,830	9,115	4,000	9,520	4,150	9,877
Vegetables	3,000	1,890	3,000	1,890	3,000	1,890
TOTAL-PROGRAM A	8,914	15,123	9,166	15,607	9,423	16,155
PROGRAM B						
Soybeans	912	1,259	1,203	1,660	1,393	1,922
Corn	109	177	162	262	191	309
Rice	130	416	149	477	162	518
Hay	1,030	2,451	1,140	2,713	1,266	3,013
Pasture	4,022	9,572	4,600	10,948	5,188	12,347
Vegetables	3,000	1,890	6,000	3,780	10,000	6,300
TOTAL-PROGRAM B	9,203	15,765	13,254	19,840	18,200	24,409

The kinds and numbers of livestock and poultry in this WRPA and their water use, for future time periods, for both Programs A and B are shown in table 47.

Table 47 - Projected kinds and numbers of livestock and poultry and their water uses, Programs A and B, WRPA 8

Kind	1980 Number	1980 Water Use (Ac.Ft.)	2000 Number	2000 Water Use (Ac.Ft.)	2020 Number	2020 Water Use (Ac.Ft.)
PROGRAM A						
Livestock						
Cattle & calves	412,769	4,624	555,630	6,225	746,199	8,360
Milk cows	70,300	1,575	86,765	1,944	105,963	2,374
Hogs & pigs	49,646	167	64,846	218	84,178	283
Sheep & lambs	2,610	6	3,068	7	3,776	8
Subtotal	535,325	6,372	710,309	8,394	940,116	11,025
Poultry						
Chickens	2,435,592	109	3,117,767	140	3,949,364	177
Broilers	7,382,147	51	10,307,588	71	13,838,549	95
Turkeys	6,542	1	9,194	1	12,415	1
Subtotal	9,824,281	161	13,434,549	212	17,800,328	273
TOTAL-PROGRAM A	10,359,606	6,533	14,144,858	8,606	18,740,444	11,298
PROGRAM B						
Livestock						
Cattle & calves	412,769	4,624	596,880	6,687	801,328	8,977
Milk cows	70,300	1,575	93,206	2,088	113,792	2,550
Hogs & pigs	49,646	167	69,600	234	90,397	304
Sheep & lambs	2,610	6	3,296	7	4,055	9
Subtotal	535,325	6,372	762,982	9,016	1,009,572	11,840
Poultry						
Chickens	2,435,592	109	3,349,230	150	4,241,143	190
Broilers	7,382,147	51	11,072,823	76	14,860,941	102
Turkeys	6,542	1	9,877	1	13,332	1
Subtotal	9,824,281	161	14,431,930	227	19,115,416	293
TOTAL-PROGRAM B	10,359,606	6,533	15,194,912	9,243	20,124,988	12,133

The total water use needs for irrigation and for livestock and poultry, for future time periods, for both Programs A and B are summarized in table 48.

Table 48 - Projected water use needs for irrigation and for livestock and poultry, Programs A and B, WRPA 8

	1980 (Ac.Ft.)	2000 (Ac.Ft.)	2020 (Ac.Ft.)
PROGRAM A			
Irrigation	15,123	15,607	16,155
Livestock and poultry	6,533	8,606	11,298
Total	21,656	24,213	27,453
PROGRAM B			
Irrigation	15,765	19,840	24,409
Livestock and poultry	6,533	9,243	12,133
Total	22,298	29,083	36,542

THE POTENTIAL TO MEET THE NEEDS

The potentially available water supply that could be used to meet the needs for irrigation and for use of livestock and poultry in this WRPA are generally considered adequate. The problems associated with improper development or over-development of supply, however, are expected to continue.

There are about 2,321,000 acres of potentially irrigable land (Land Capability Classes I-IV) in WRPA 8. These soils by land resource areas and the percentage of the total for each LRA are shown in table 49. The potentially irrigable soils by LRA's are shown in figure 23.

Table 49 - Potentially irrigable soils by land resource areas by percent, WRPA 8

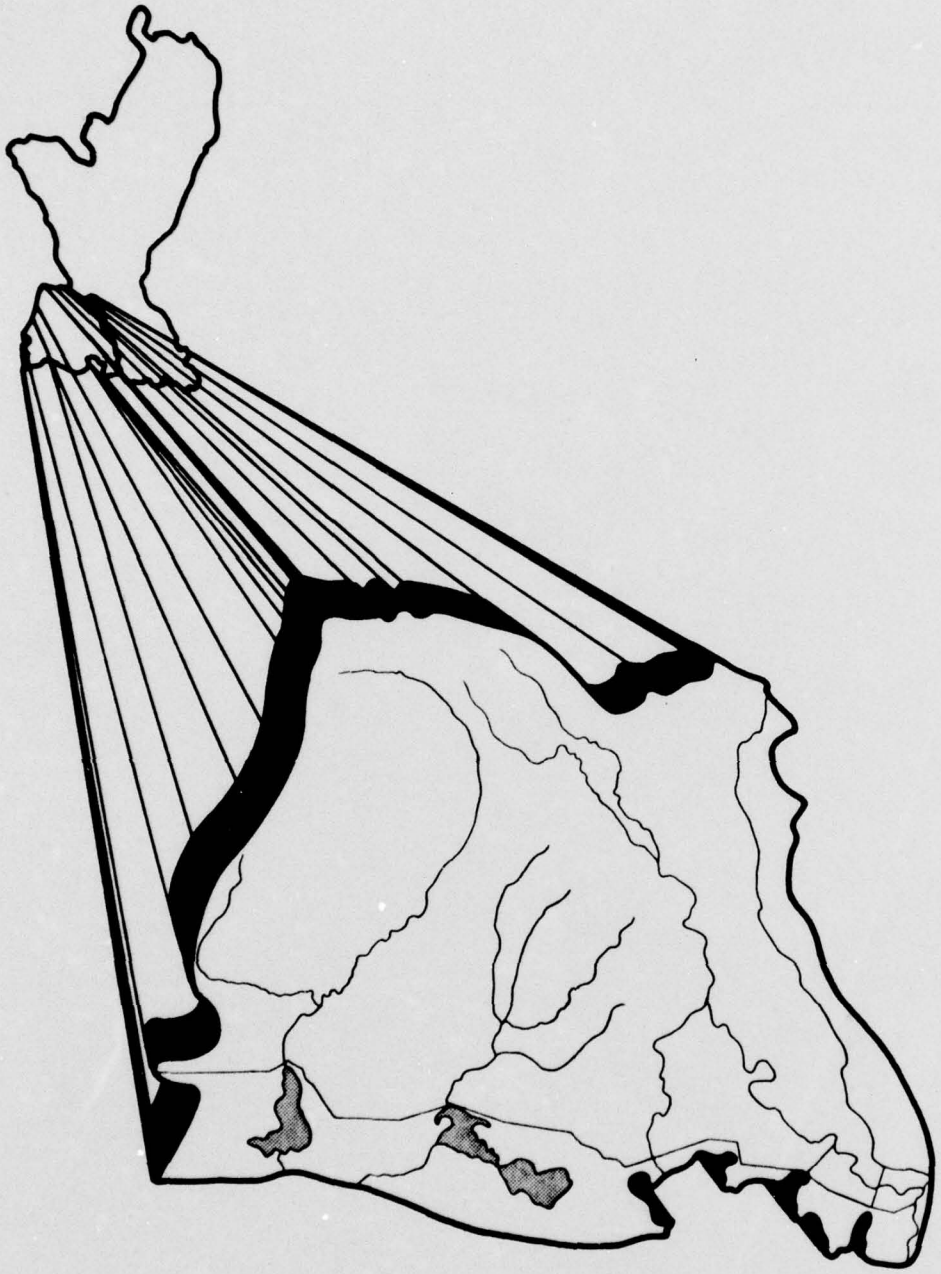
Land Resource Area	Potentially Irrigable (Acres)	Percent
131	473,600	20.40
133	48,800	2.10
134	1,799,000	77.50
Total	2,321,400	100.00

LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

POTENTIALLY IRRIGABLE SOILS BY LAND RESOURCE AREAS

WRPA 8

FIGURE 23



WRPA 9

W R P A 9

THE SETTING

WRPA 9 is located in the southwest portion of the region and in the southwest portion of the State of Louisiana. This WRPA contains about 8.0 million acres of land and 0.5 million acres of water area for a total of 8.5 million acres or about 13,297 square miles.

The climate is mild to hot with an average annual temperature of 69 degrees. The average length of growing season is about 270 days, ranging from 240 to 300 days from north to south. The normal annual precipitation is about 60 inches with little variation throughout the area.

The topography of the area is fairly flat ranging from the coastal marshes through the coastal prairies to the rolling coastal plains. Most of the area is flat to slightly rolling. The alluvium, silty uplands and coastal prairie areas have been highly developed for agricultural uses.

Varying soils from five of the region's 11 major land resource areas are found in this WRPA. These LRA's for WRPA 9 are shown in figure 24. About 70 percent of the agricultural lands in WRPA 9 is in Land Capability Classes I to IV and is suitable for the growing of crops or for pastures, trees, or wildlife plantings. The remaining 30 percent is in Land Capability Classes V to VIII and is not suitable for the growing of crops.

LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

LAND RESOURCE AREAS

WRPA 9

FIGURE 24

PRESENT STATUS

Characteristics of Irrigated Areas and Livestock and Poultry

The currently irrigated area in WRPA 9 totals about 507,100 acres with about 505,100 acres of rice. Most of the irrigation is in two of the major land resource areas. These are LRA 150, Gulf Coast Prairie, and LRA 131, Southern Mississippi Valley Alluvium. The soils of the Gulf Coast Prairie and the heavier soils of the Southern Mississippi Valley Alluvium are well suited for rice and for rice-soybean rotations. The lighter soils of the Southern Mississippi Valley Alluvium and soils of the Southern Coastal Plains and Southern Mississippi Valley Silty Uplands, where topography will allow, are well suited for cotton, soybeans, and other crops grown in the area. The present acres of irrigation by crop distribution and the present irrigation water use are shown in table 50. The present irrigated lands by parishes in WRPA 9 are shown in figure 25.

Table 50 - Acres of irrigated land and water use by crops, 1970, WRPA 9

Crop	Acres Irrigated	Water Use (Ac. Ft.)
Rice	505,143	1,661,920
Miscellaneous	1,993	3,246
Total	507,135	1,665,166 1/

1/ Ground water withdrawals 48 percent of total, surface water withdrawals 52 percent of total.

The livestock of the WRPA consists mostly of beef cattle, with sheep ranking second, and hogs and milk cows ranking third and fourth respectively. The poultry consists mostly of laying chickens, with broiler chicken production second, and turkeys third. The present kinds and numbers of livestock and poultry and their water use are shown in table 51.

Source of Water

Most of this WRPA's irrigated acres (507,100) are watered by private systems. There are a number of private water companies furnishing water to individual farms as a business enterprise. It is estimated that about 1,665,000 acre feet of water are currently withdrawn for irrigation.

LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

PRESENT IRRIGATED LANDS BY COUNTIES IN ACRES

WRPA 9

FIGURE 25

Table 51 - Kinds and numbers of livestock and poultry and their water use, 1970, WRPA 9

Kind	Number	Water Use (Ac.Ft.)
LIVESTOCK		
Cattle and Calves	534,400	5,986
Milk Cows	41,400	927
Hogs and Pigs	135,600	456
Sheep and Lambs	89,300	200
Subtotal	800,700	7,569
POULTRY		
Chickens	1,587,200	71
Broilers	1,313,800	9
Turkeys	4,700	1
Subtotal	2,905,700	81
TOTAL	3,706,400	7,650 1/

1/ Ground water withdrawals 35 percent of total, surface water withdrawals 65 percent of total.

This is equivalent to about 1,487 mgd. for the entire year. During the peak use period, it is estimated that about 8,117 mgd. will be required. An estimated 48 percent of the water used for irrigation comes from ground water sources and 52 percent comes from surface water sources.

Practically all of the presently estimated 7,650 acre feet (7.0 mgd.) used by the livestock and poultry in this WRPA is supplied by private sources. An estimated 35 percent is supplied from ground water sources and 65 percent from surface water sources. Of the total present water used for irrigation and livestock and poultry (1,673,000 acre feet or 1,494 mgd.), 48 percent is estimated to be supplied from ground water sources and 52 percent from surface water sources.

Adequacy of Supply

The sources of supply have usually been adequate to supply irrigation needs. In some cases, such as in the Gulf Coast Prairie Land Resource Area, the drawdown resulting in the ground water sources has been more than desirable. This has required additional power for pumpage and in some cases the installation of additional wells or changes in equipment

at existing wells. The surface water sources have been less than adequate at times. This has occurred in the past during extreme drought periods throughout most of the WRPA. There appears to be a plentiful supply of water in this WRPA, however, with a large amount of water coming into the WRPA from outside sources. There are some problems of water distribution because of the concentration of water users into small areas within the WRPA.

Application of Water for Irrigation

Most of the irrigation water is applied by some sort of gravity system. For rice irrigation, this is normally gravity-flood type. For other crops it is normally flume-siphon tube or gated pipe type.

Sprinkler systems account for almost all of the remaining irrigation. The preparation of the land for irrigation is not nearly as demanding or precise for sprinkler type irrigation as for gravity type irrigation.

FUTURE NEEDS

Crops, with the exception of rice, can be produced in this WRPA without irrigation. The total projected acreage of rice was considered as being irrigated since irrigation is a necessity for rice production. The projected acreage of truck crops was also considered as irrigated because of the high losses that would occur if sufficient moisture was not present for growth. The remainder of the crops, pasture, and hay to be irrigated was projected from past trends. The acres expected to be irrigated, by crops, and the water use for future time periods for both Programs A and B are shown in table 52.

Table 52 - Projected acres of irrigated land and water use by crops, Programs A and B, WRPA 9

Crop	1980 Acres Irrigated	1980 Water Use (Ac.Ft.)	2000 Acres Irrigated	2000 Water Use (Ac.Ft.)	2020 Acres Irrigated	2020 Water Use (Ac.Ft.)
PROGRAM A						
Rice	391,723	1,288,769	419,934	1,381,583	454,676	1,495,884
Cotton	408	526	402	519	394	508
Corn	186	327	234	412	254	447
Soybeans	4,506	6,669	5,048	7,471	5,330	7,888
Sugarcane	1,172	2,696	1,239	2,850	1,264	2,907
Pasture	8,757	22,593	8,122	20,929	7,593	19,590
Vegetables	3,934	2,911	4,639	3,433	5,439	4,025
Miscellaneous	1,941	3,164	2,107	3,451	2,245	3,659
TOTAL-PROGRAM A	412,627	1,327,655	441,725	1,420,648	477,195	1,534,908
PROGRAM B						
Rice	391,723	1,288,769	451,126	1,484,205	488,273	1,606,418
Cotton	428	552	498	642	531	685
Corn	195	343	289	509	341	600
Soybeans	4,731	7,002	6,236	9,229	7,155	10,589
Sugarcane	1,231	2,831	1,531	3,521	1,696	3,901
Pasture	9,122	23,535	8,088	20,867	7,981	20,591
Vegetables	6,000	4,440	13,000	9,620	20,000	14,800
Miscellaneous	2,049	3,340	2,615	4,262	3,014	4,913
TOTAL-PROGRAM B	415,479	1,330,812	483,383	1,532,855	528,991	1,662,497

The kinds and numbers of livestock and poultry in this WRPA and their water use, for future time periods, for both Programs A and B are shown in table 53.

Table 53 - Projected kinds and numbers of livestock and poultry and their water uses, Programs A and B, WRPA 9

Kind	1980 Number	1980 Water Use (Ac.Ft.)	2000 Number	2000 Water Use (Ac.Ft.)	2020 Number	2020 Water Use (Ac.Ft.)
PROGRAM A						
Livestock						
Cattle & calves	680,551	7,624	916,093	10,263	1,230,292	13,783
Milk cows	37,990	851	46,887	1,051	57,262	1,283
Hogs & pigs	154,738	520	202,113	679	262,371	882
Sheep & lambs	68,538	154	80,584	181	99,168	222
Subtotal	941,817	9,149	1,245,677	12,174	1,649,093	16,170
Poultry						
Chickens	1,743,698	78	2,232,079	100	2,827,438	127
Broilers	1,832,357	13	2,558,494	18	3,434,930	24
Turkeys	6,275	1	8,819	1	11,908	1
Subtotal	3,582,330	92	4,799,392	119	6,274,276	152
TOTAL-PROGRAM A	4,524,147	9,241	6,045,068	12,293	7,923,369	16,322
PROGRAM B						
Livestock						
Cattle & calves	680,551	7,624	984,104	11,025	1,321,186	14,801
Milk cows	37,990	851	50,368	1,129	61,493	1,378
Hogs & pigs	154,738	520	217,118	730	281,755	947
Sheep & lambs	68,538	154	86,567	194	106,495	239
Subtotal	941,817	9,149	1,338,157	13,078	1,770,929	17,365
Poultry						
Chickens	1,743,698	78	2,397,789	107	3,036,329	136
Broilers	1,832,357	13	2,748,437	19	3,688,703	25
Turkeys	6,275	1	9,474	1	12,788	1
Subtotal	3,582,330	92	5,155,700	127	6,737,820	162
TOTAL-PROGRAM B	4,524,147	9,241	6,493,857	13,205	8,508,749	17,527

The total water use needs for irrigation and for livestock and poultry, for future time periods, for both Programs A and B are summarized in table 54.

Table 54 - Projected water use needs for irrigation and for livestock and poultry, Programs A and B, WRPA 9

	1980 (Ac.Ft.)	2000 (Ac.Ft.)	2020 (Ac.Ft.)
PROGRAM A			
Irrigation	1,327,655	1,420,648	1,534,908
Livestock and poultry	9,241	12,293	16,322
Total	1,336,896	1,432,941	1,551,230
PROGRAM B			
Irrigation	1,330,812	1,532,855	1,662,497
Livestock and poultry	9,241	13,205	17,527
Total	1,340,053	1,546,060	1,680,024

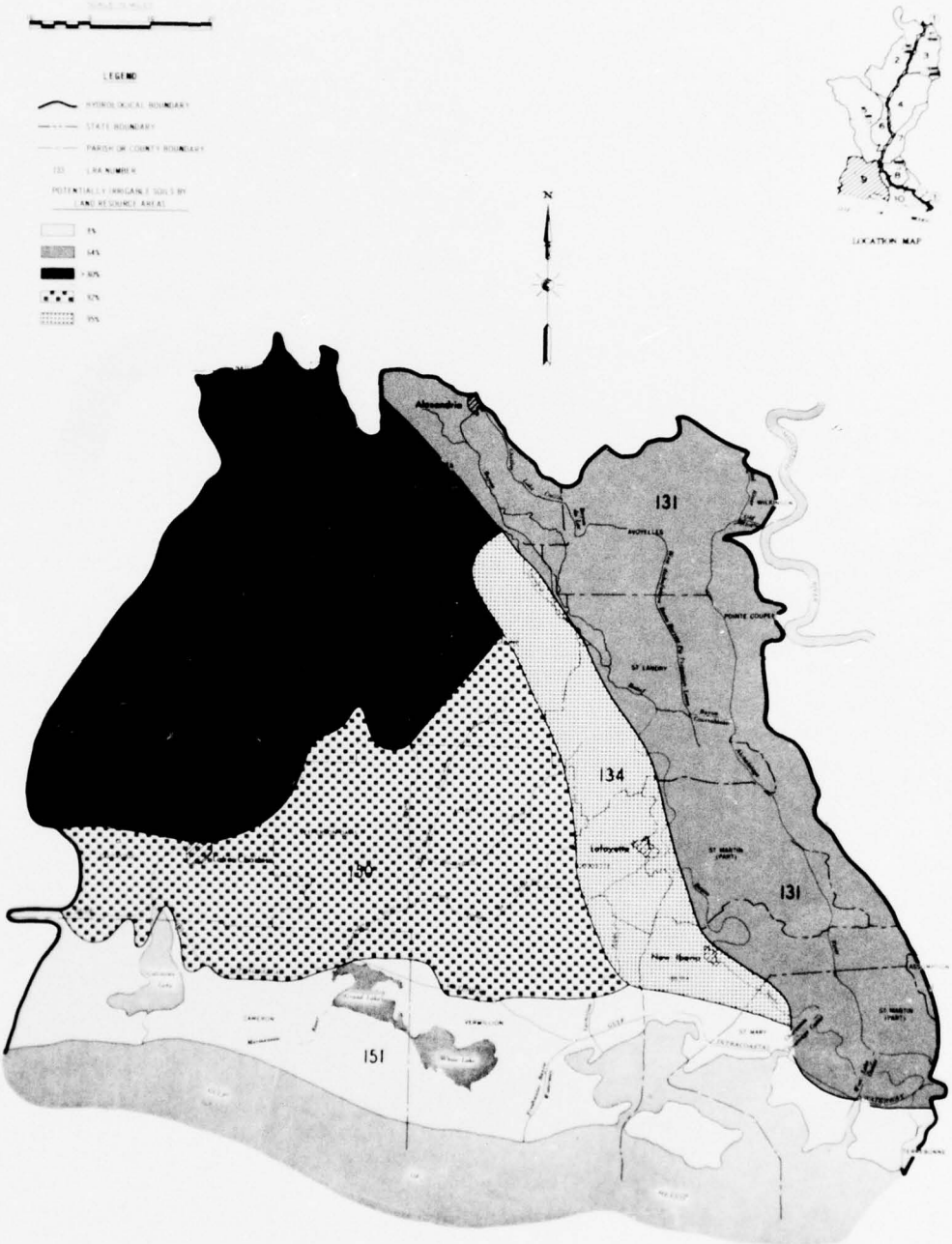
THE POTENTIAL TO MEET THE NEEDS

The potentially available water supply that could be used to meet the needs for irrigation and for use of livestock and poultry in this WRPA are generally considered adequate. The problems associated with distribution because of the concentration of water users into small areas within the WRPA, however, are expected to continue.

There are about 5,176,000 acres of potentially irrigable land (Land Capability Classes I-IV) in WRPA 9. These soils by land resource areas and the percentage of the total for each LRA are shown in table 55. The potentially irrigable soils by LRA's are shown in figure 26.

Table 55 - Potentially irrigable soils by land resource areas by percent, WRPA 9

Land Resource Area	Potentially Irrigable (Acres)	Percent
131	1,271,200	24.56
133	1,522,200	29.41
134	735,200	14.20
150	1,560,900	30.16
151	86,600	1.67
Total	5,176,100	100.00



LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

POTENTIALLY IRRIGABLE SOILS BY LAND RESOURCE AREAS

WRPA 9

FIGURE 26

WRPA 10

W R P A 10

THE SETTING

WRPA 10 is located in the extreme southeast portion of the region. This WRPA lies entirely within the State of Louisiana and in the southeast portion of the state. It contains about 3.8 million acres of land and 1.1 million acres of water area for a total of 4.9 million acres or about 7,730 square miles.

The climate is mild to hot with an average temperature of around 69 degrees. The average length of growing season is about 270 days ranging from about 240 to 300 days north to south. The normal annual precipitation is about 62 inches ranging from 60 to 64 inches northwest to southeast.

The topography of the area is flat to slightly rolling. The coastal marsh, alluvium lands, and large water areas make up most of the WRPA and are flat. The remaining area consists of coastal plains and is slightly rolling. Some of the alluvium lands have been highly developed for agricultural uses.

Varying soils from three of the region's 11 major land resource areas are found in this WRPA. These LRA's for WRPA 10 are shown in figure 27. These soils range from coastal marsh to coastal plains to alluvium soils. This area is not as well suited for agricultural production as some of the other WRPA's. This is due in large part to the low elevation of the lands in relation to mean sea level. About 28 percent of the agricultural lands in WRPA 10 is in Land Capability Classes I to IV and is suitable for the growing of crops or for pastures, trees, or wildlife plantings. The remaining 72 percent is in Land Capability Classes V to VIII and is not suitable for crops.

LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

LAND RESOURCE AREAS

WRPA 10

FIGURE 27

PRESENT STATUS

Characteristics of Irrigated Areas and Livestock and Poultry

Only a small percent of the total agricultural land is now being irrigated. The currently irrigated area in WRPA 10 totals about 1,630 acres with most of this being rice (1,500 acres). This total ranks WRPA 10 next to last in the region in overall irrigation and seventh in the acreage of rice irrigated. The irrigated acreage is mostly in the Southern Mississippi Valley Alluvium with a few scattered areas in the Gulf Coast Marsh and Southern Coastal Plains major land resource areas. The soils of the Southern Mississippi Valley Alluvium and the Southern Coastal Plains LRA's are suitable for crops normally grown in the area. The present acres of irrigation by crop distribution and the present irrigation water use are shown in table 56. The present irrigated lands by parishes in WRPA 10 are shown in figure 28.

Table 56 - Acres of irrigated land and water use by crops, 1970, WRPA 10

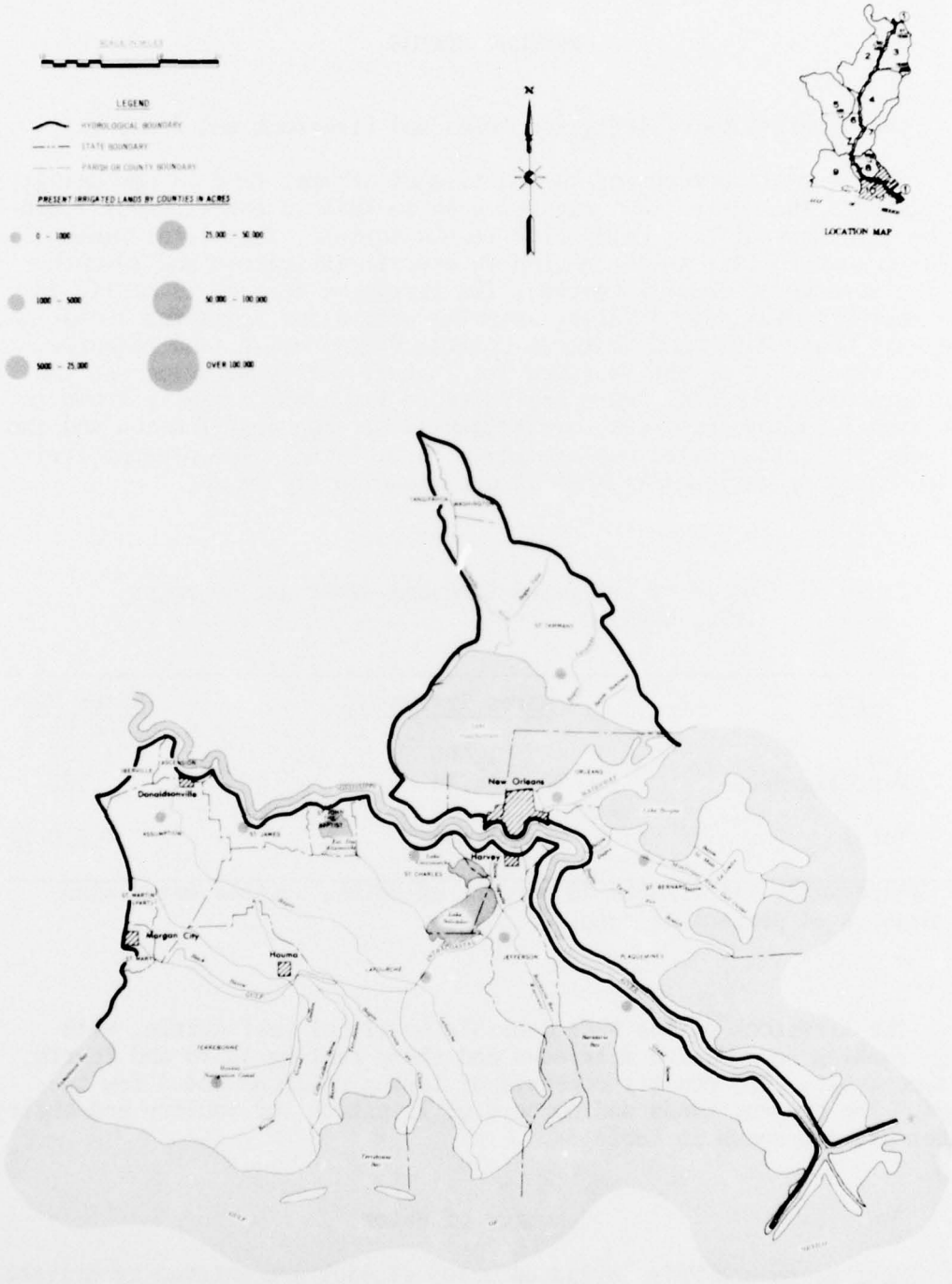
Crop	Acres Irrigated	Water Use (Ac.Ft.)
Rice	1,500	4,725
Miscellaneous	134	185
Total	1,634	4,910 1/

1/ Ground water withdrawals 46 percent of total, surface water withdrawals 54 percent of total.

The livestock of the WRPA consists mostly of beef cattle, with hogs ranking second, and milk cows and sheep ranking third and fourth, respectively. The poultry consists of laying chickens and a few turkeys. The present kinds and numbers of livestock and poultry and their water use are shown in table 57.

Source of Water

Most of this WRPA's irrigated acres (1,630) are watered by private systems which currently withdraw about 4,900 acre feet. This is equivalent to about 4.4 mgd. for the entire year. During the peak use period, about 25.0 mgd. will be required. An estimated 46 percent of the water



LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

PRESENT IRRIGATED LANDS BY COUNTIES IN ACRES

WRPA 10

FIGURE 28

used for irrigation comes from ground water sources and 54 percent comes from surface water sources.

Table 57 - Kinds and numbers of livestock and poultry and their water use, 1970, WRPA 10

Kind	Number	Water Use (Ac.Ft.)
LIVESTOCK		
Cattle and Calves	73,500	824
Milk Cows	4,500	101
Hogs and Pigs	13,400	45
Sheep and Lambs	3,900	9
Subtotal	95,300	979
POULTRY		
Chickens	331,100	15
Turkeys	800	1
Subtotal	331,900	16
TOTAL	427,200	995 1/

1/ Ground water withdrawals 29 percent of total, surface water withdrawals 71 percent of total.

Practically all of the presently estimated 1,000 acre feet (0.9 mgd.) used by livestock and poultry in this WRPA is supplied from private sources. An estimated 29 percent is supplied from ground water sources and 71 percent from surface water sources. Of the total present water used for irrigation and livestock and poultry (5,900 acre feet or 5.3 mgd.), 43 percent is estimated to come from ground water sources and 57 percent from surface water sources.

Adequacy of Supply

The sources of supply have usually been adequate to supply irrigation needs. There have been some cases of salt water encroachment in both the ground and surface water supplies, but not to the extent of presenting serious problems under present conditions. There appears to be a plentiful supply of water in this WRPA for irrigation and for use by livestock and poultry.

Application of Water for Irrigation

Most of the irrigation water is applied by some sort of gravity system. For rice irrigation this is normally gravity-flood type. For other crops it is normally flume-siphon tube or gated pipe type.

Sprinkler systems account for almost all of the remaining irrigation. The preparation of the land for irrigation is not nearly as demanding or precise for sprinkler type irrigation as for gravity type irrigation.

FUTURE NEEDS

Crops, with the exception of rice, can be produced in this WRPA without irrigation. The total projected acreage of rice was considered as being irrigated since irrigation is a necessity for rice production. The projected acreage of truck crops was also considered as irrigated because of the high losses that would occur if sufficient moisture was not present for growth. The remainder of the crops, pasture, and hay to be irrigated was projected from past trends. The acres expected to be irrigated, by crops, and the water use for future time periods for both Programs A and B are shown in table 58.

Table 58 - Projected acres of irrigated land and water use by crops, Programs A and B, WRPA 10

Crop	1980		2000		2020	
	Acres Irrigated	Water Use (Ac.Ft.)	Acres Irrigated	Water Use (Ac.Ft.)	Acres Irrigated	Water Use (Ac.Ft.)
PROGRAM A						
Soybeans	553	680	619	761	660	812
Hay	247	563	223	508	236	538
Pasture	2,000	4,560	2,300	5,130	2,400	5,472
Vegetables	4,000	2,800	4,000	2,800	4,000	2,800
TOTAL-PROGRAM A	6,800	8,603	7,142	9,199	7,296	9,622
PROGRAM B						
Soybeans	581	715	307	378	343	422
Hay	259	591	275	627	318	725
Pasture	2,100	4,788	2,588	5,901	3,000	6,840
Vegetables	4,000	2,800	15,000	10,500	25,000	17,500
TOTAL-PROGRAM B	6,940	8,894	18,170	17,406	28,661	25,487

The kinds and numbers of livestock and poultry in this WRPA and their water use, for future time periods, for both Programs A and B are shown in table 59.

The total water use needs for irrigation and for livestock and poultry, for future time periods, for both Programs A and B are summarized in table 60.

Table 59 - Projected kinds and numbers of livestock and poultry and their water uses, Programs A and B, WRPA 10

Kind	1980 Number	1980 Water Use (Ac.Ft.)	2000 Number	2000 Water Use (Ac.Ft.)	2020 Number	2020 Water Use (Ac.Ft.)
PROGRAM A						
Livestock						
Cattle & calves	93,664	1,049	126,082	1,413	169,325	1,897
Milk cows	4,155	93	5,128	115	6,263	140
Hogs & pigs	15,254	51	19,924	67	25,865	87
Sheep & lambs	2,993	7	3,519	8	4,330	10
Subtotal	116,066	1,200	154,653	1,603	205,783	2,134
Poultry						
Chickens	363,746	16	465,626	21	589,822	26
Turkeys	1,068	1	1,501	1	2,027	1
Subtotal	364,814	17	467,127	22	591,849	27
TOTAL-PROGRAM A	480,880	1,217	621,780	1,625	797,632	2,161
PROGRAM B						
Livestock						
Cattle & calves	93,664	1,049	135,442	1,517	181,835	2,037
Milk cows	4,155	93	5,509	123	6,726	151
Hogs & pigs	15,254	51	21,403	72	27,776	93
Sheep & lambs	2,993	7	3,780	8	4,650	10
Subtotal	116,066	1,200	161,134	1,720	220,987	2,291
Poultry						
Chickens	363,746	16	500,194	22	633,398	28
Turkeys	1,068	1	1,612	1	2,177	1
Subtotal	364,814	17	501,806	23	635,575	29
TOTAL-PROGRAM B	480,880	1,217	662,940	1,743	856,562	2,320

Table 60 - Projected water use needs for irrigation and for livestock and poultry, Programs A and B, WRPA 10

	1980 (Ac.Ft.)	2000 (Ac.Ft.)	2020 (Ac.Ft.)
PROGRAM A			
Irrigation	8,603	9,199	9,622
Livestock and poultry	1,217	1,625	2,161
Total	9,820	10,824	11,783
PROGRAM B			
Irrigation	8,894	17,406	25,487
Livestock and poultry	1,217	1,743	2,320
Total	10,111	19,149	27,807

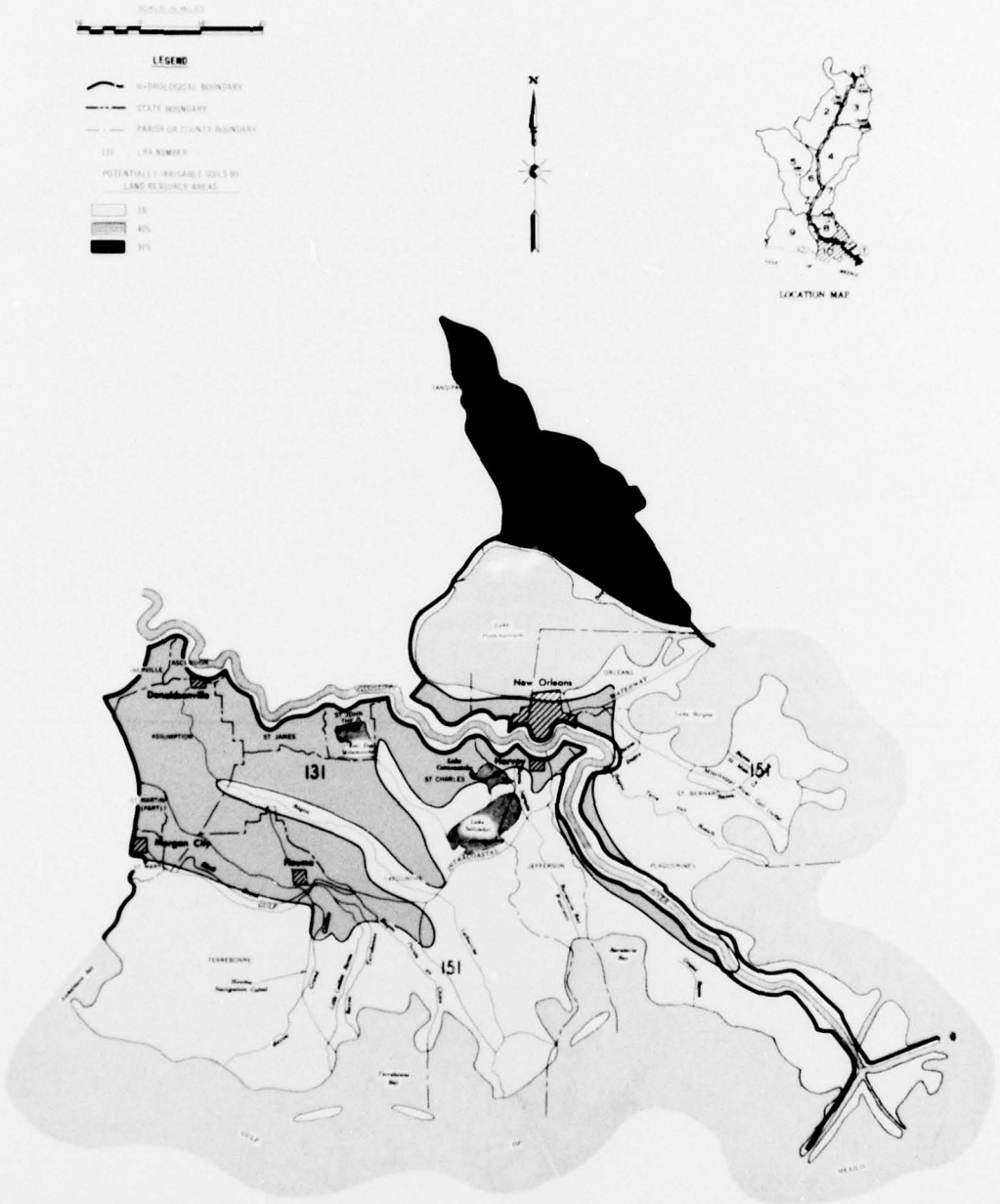
THE POTENTIAL TO MEET THE NEEDS

The potentially available water supply that could be used to meet the needs for irrigation and for use of livestock and poultry in this WRPA are generally considered adequate.

There are about 979,000 acres of potentially irrigable land (Land Capability Classes I-IV) in WRPA 10. These soils by land resource areas and the percentage of the total for each LRA are shown in table 61. The potentially irrigable soils by LRA's are shown in figure 29.

Table 61 - Potentially irrigable soils by land resource areas by percent, WRPA 10

Land Resource Area	Potentially Irrigable (Acres)	Percent
131	570,100	58.24
133	384,000	39.23
151	24,800	2.53
Total	978,900	100.00



LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

POTENTIALLY IRRIGABLE SOILS BY LAND RESOURCE AREAS

WRPA 10

FIGURE 29

METHODOLOGY

METHODOLOGY

IRRIGATION

The current (1970) acreage of irrigated land in the Lower Mississippi Region was determined by a survey conducted by local agricultural workers in each county or parish in the region. The acreage irrigated may vary considerably from year to year dependent upon climate, water availability, land use, economics, management practices employed by farmers, and other similar factors. Results of the above survey are for one year only and, therefore, may not be entirely representative of the normal irrigated acreage of the various crops.

The acreage of land, by crops, expected to be irrigated in the future will also depend on many factors such as climate, land use, economics, and the desire of farmers to stabilize year-to-year variations in moisture availability and income. Based on historical trends of the increase in irrigation in the region, however, it is expected that farmers in the region will irrigate, on an annual basis, at least the acreage shown in this appendix as expected to be irrigated in future time periods of 1980, 2000, and 2020.

The current and future water use by crops by WRPA's was estimated by applying water use coefficients based on an 80 percent chance of need to the current and future acreage of crops irrigated, and using a farm irrigation efficiency of 70 percent. The water requirement for specific crops in the region varies by WRPA's because of differences in soils and climatic or growing season conditions and are shown in table 62.

Table 62 - Current and future water requirements by crops by WRPA's, Programs A and B

Crop	Water Resource Planning Areas								
	2	3	4	5	6	7	8	9	10
	Acre Feet/Acre								
Soybeans	1.48	1.19	1.51	1.57	1.72	1.41	1.38	1.48	1.23
Cotton	1.49	1.20	1.43	1.62	1.62	1.32	1.23	1.29	1.08
Corn	1.83	1.49	1.82	1.95	1.92	1.72	1.62	1.76	1.59
Rice	3.30	3.29	3.32	3.26	3.35	3.22	3.20	3.29	3.15
Sugarcane	-	-	-	-	-	-	-	2.30	-
Hay	2.42	2.46	2.55	2.36	2.68	2.48	2.38	-	2.28
Pasture	2.42	2.46	2.55	2.36	2.68	2.48	2.38	2.58	2.28
Vegetables	0.85	0.85	0.64	0.74	0.80	0.49	0.63	0.74	0.70
Miscellaneous[1/]	1.62	1.44	1.59	1.65	1.75	1.48	1.45	1.63	1.38

1/ Average of soybeans, cotton, corn, hay, and vegetables.

The potentially irrigable lands are those lands or soils with favorable characteristics for irrigation such as topography, water-holding capacity, and suitability for growing crops. The potentially irrigable acreage data shown in this appendix were developed from the Conservation Needs Inventory, individual irrigation guides for each state, the soils classification system, and consultation with soil scientists in each state.

ECONOMICS OF SUPPLEMENTAL IRRIGATION

Supplemental irrigation was included in the linear programming model as a competing development alternative. Ordinarily, land is protected from floods, drained, and leveled prior to being developed for irrigation. Irrigation is considered the last increment of resource development. Three crops, cotton, corn, and soybeans, were included in the analysis of supplemental irrigation. Rice was not evaluated from a supplemental irrigation viewpoint because use of water as a cultural practice is a standard practice in this region; therefore, all acres of rice were considered irrigated.

The evaluation of the economics of supplemental irrigation was based on the need for irrigation in meeting the food and fiber production requirements consistent with the national income objective. Two evaluations were considered for each time frame, one without further resource development after 1970 and one with resource development after 1970. Projections of irrigation based on historical trends were used to constrain the model to the maximum amount of irrigation that would be considered. In each time frame, the model was allowed to bring in no irrigation or up to the maximum amount projected outside the model. Assuming no resource development after 1970, constraints were necessary to get reasonable answers from the evaluations because irrigation of cotton and corn is very attractive economically if other types of resource development are held constant. Thus, the model evaluated the economics of irrigation within the above constraints by comparing the cost of irrigated production on a unit basis to the cost of non-irrigated production. Results of the model runs assuming resource development in the future indicated less irrigation than projected outside the model. These results indicate that if historical resource development trends continue, additional irrigation development will not be needed to produce this region's projected food and fiber.

Assuming no further resource development, the LP model shows a need for a greater amount of irrigation than under the previous assumption, but did not bring in irrigation to the limits of all of the constraints. Soybean irrigation in the model was considerably less than projected outside the model. This occurred because the irrigation costs included in the model for soybeans are greater than those currently realized by the farmers. Soybeans in Arkansas are generally irrigated on rice rotation lands where the full cost of the irrigation facilities are not considered in the decision to irrigate the soybeans. Acres of land to be irrigated in the future will likely be greater than those indicated by the model because of the desire of farmers to stabilize year-to-year variation in moisture availability and income. Thus, the future development of irrigation in this region will be influenced more by the farmers' desire to minimize risk than the absolute need to produce the region's requirements of food and fiber.

LIVESTOCK AND POULTRY

The rationale for the derivation of livestock and poultry populations for present and future time frames is contained in Appendix B, Economics.

Many factors influence the consumption of water by livestock and poultry. Water intake by animals generally parallels the dry matter in feeds when animals are on dry feeds. Also, water intake is affected by the water content in the feed itself. The level of production will also affect water consumption. Environmental temperatures may affect the intake of water. Current and future estimates of water use by various classes of livestock and poultry in gallons per day are as follows: cattle and calves, 10; hogs and pigs, 3; sheep and lambs, 2; chickens and broilers, .04; and turkeys, .06. This gallons per day useage was converted to acre feet per year per animal or bird multiplied by the number of animals or birds to obtain the water use for each category of livestock and poultry. It was assumed the future use rate would be the same as at present.