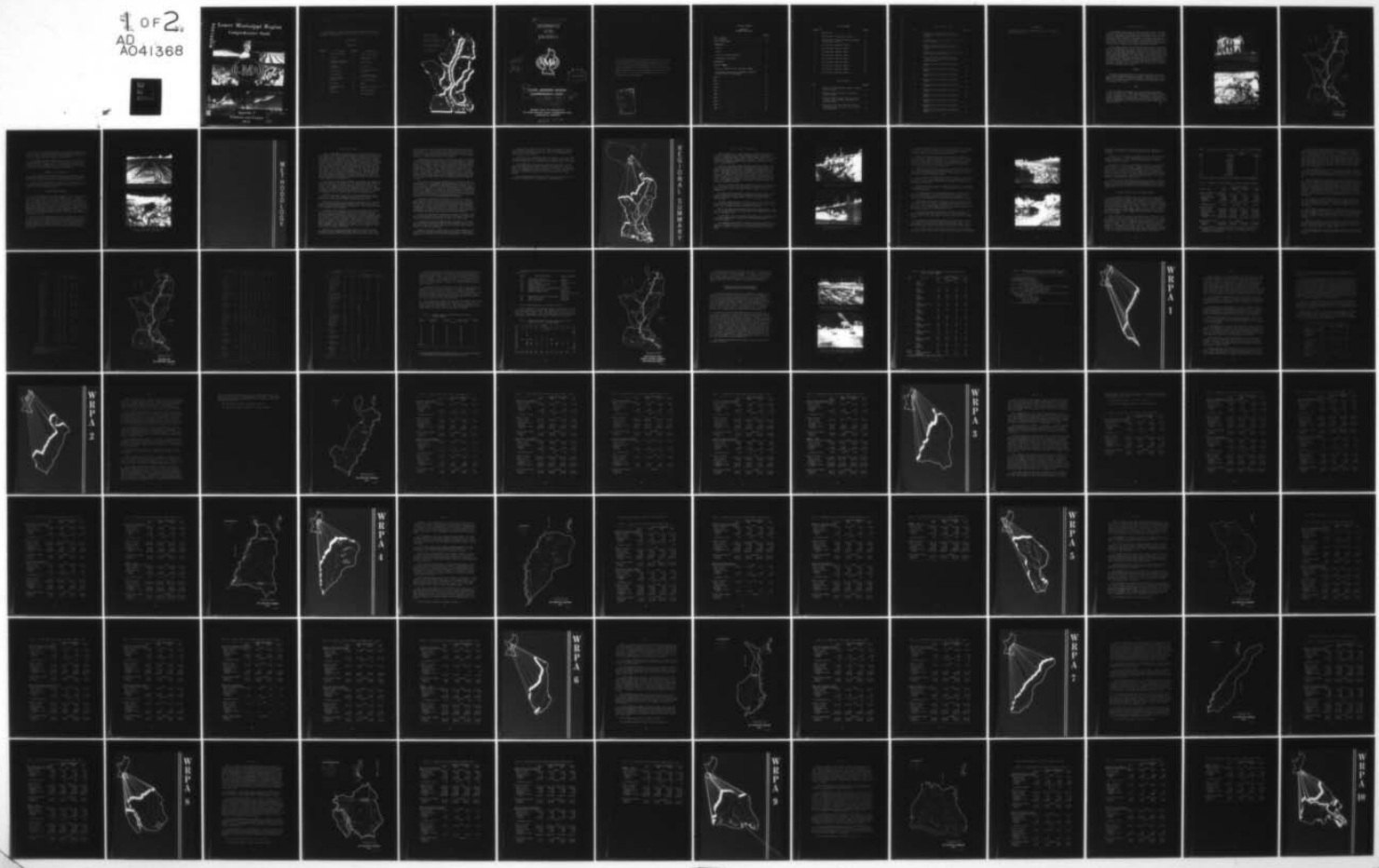
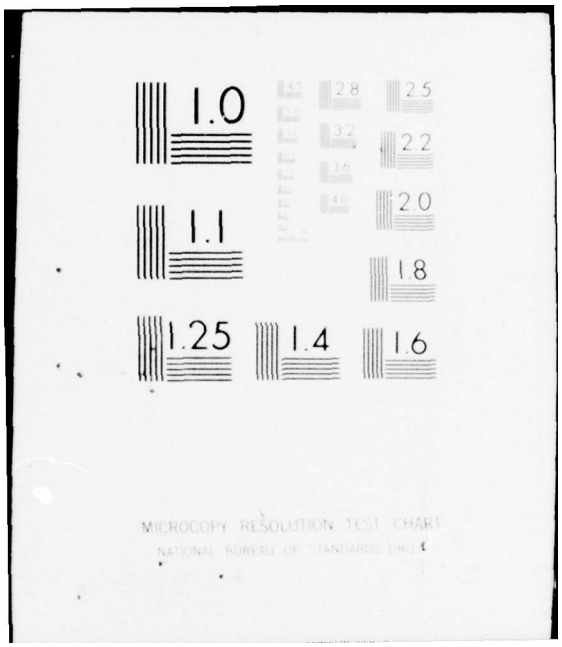
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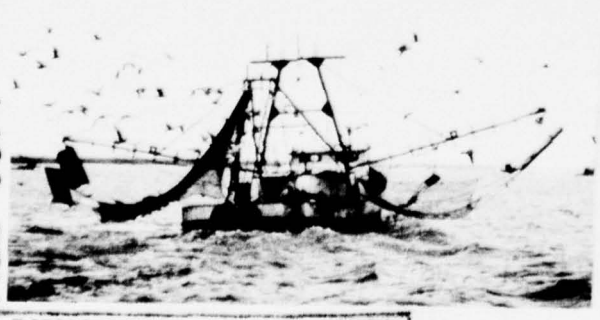

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Lower Mississippi Region
Comprehensive Study







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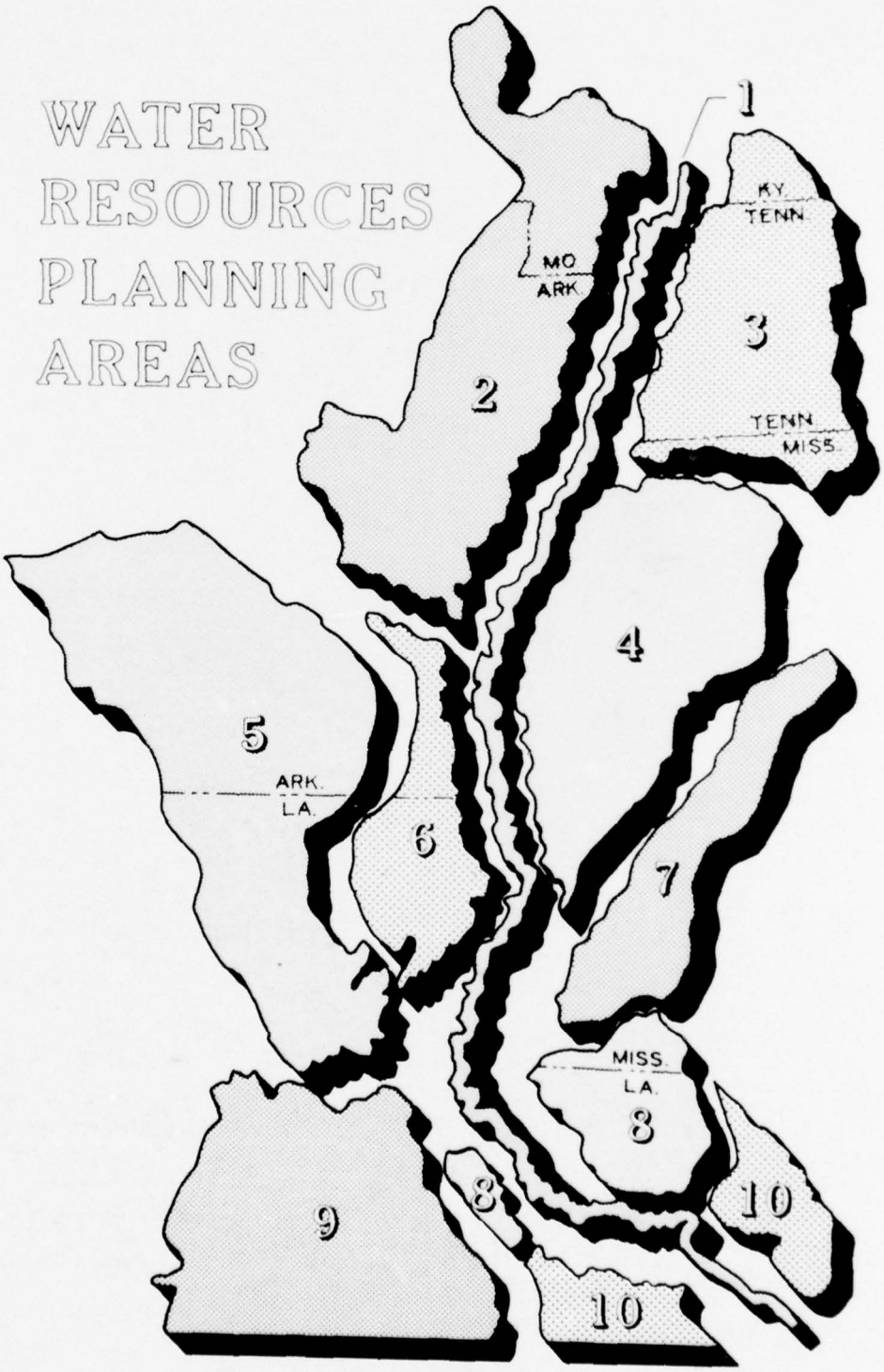
This appendix is one of a series of 22 documents comprising the complete Lower Mississippi Region Comprehensive Study. A list of the documents is shown below.

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 PLANNING AREAS



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LOWER MISSISSIPPI REGION COMPREHENSIVE STUDY.

Appendix S.

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COORDINATING COMMITTEE

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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.

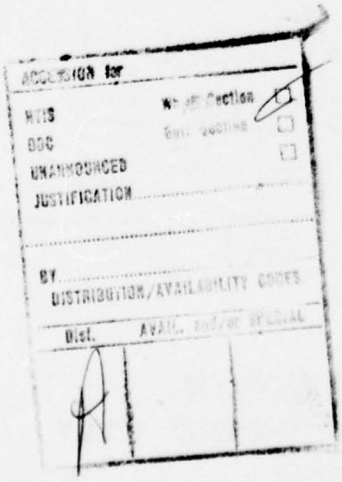


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PHOTOGRAPHS

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

INTRODUCTION

The Lower Mississippi Region is one of the most fertile and productive agricultural areas of the United States and the world. It has a history of development dating back more than 3,000 years when the American Indian began to farm open land areas. Pressures on the land increased with the settlement in the region of the early American pioneers which began in the early 18th century. These pressures on the land have steadily increased with increases in population and the demand for food and fiber to satisfy needs of the region and the nation.

The increased pressures on the land resulted in man's acceleration of the natural destructive forces of erosion and resultant sediment production. The problems and damages caused by these forces peaked in the early 1930's when large areas of the region were, of economic necessity, almost completely abandoned from agriculture. Conditions in these areas have improved considerably since then, however, due to the large amount of financial and educational assistance provided by the Federal and State governments. Although much improvement has been made, the sediment and erosion problems in the region need further study and intensive treatment to provide for a sound agriculture and the best use and protection of the land resource base.

PURPOSE

The purpose of this appendix is to make an appraisal of existing and potential sediment and erosion problems in the Lower Mississippi Region and to provide information about the destructive forces of sediment and erosion on one of the most important and widespread resources in the region - the land.

SCOPE

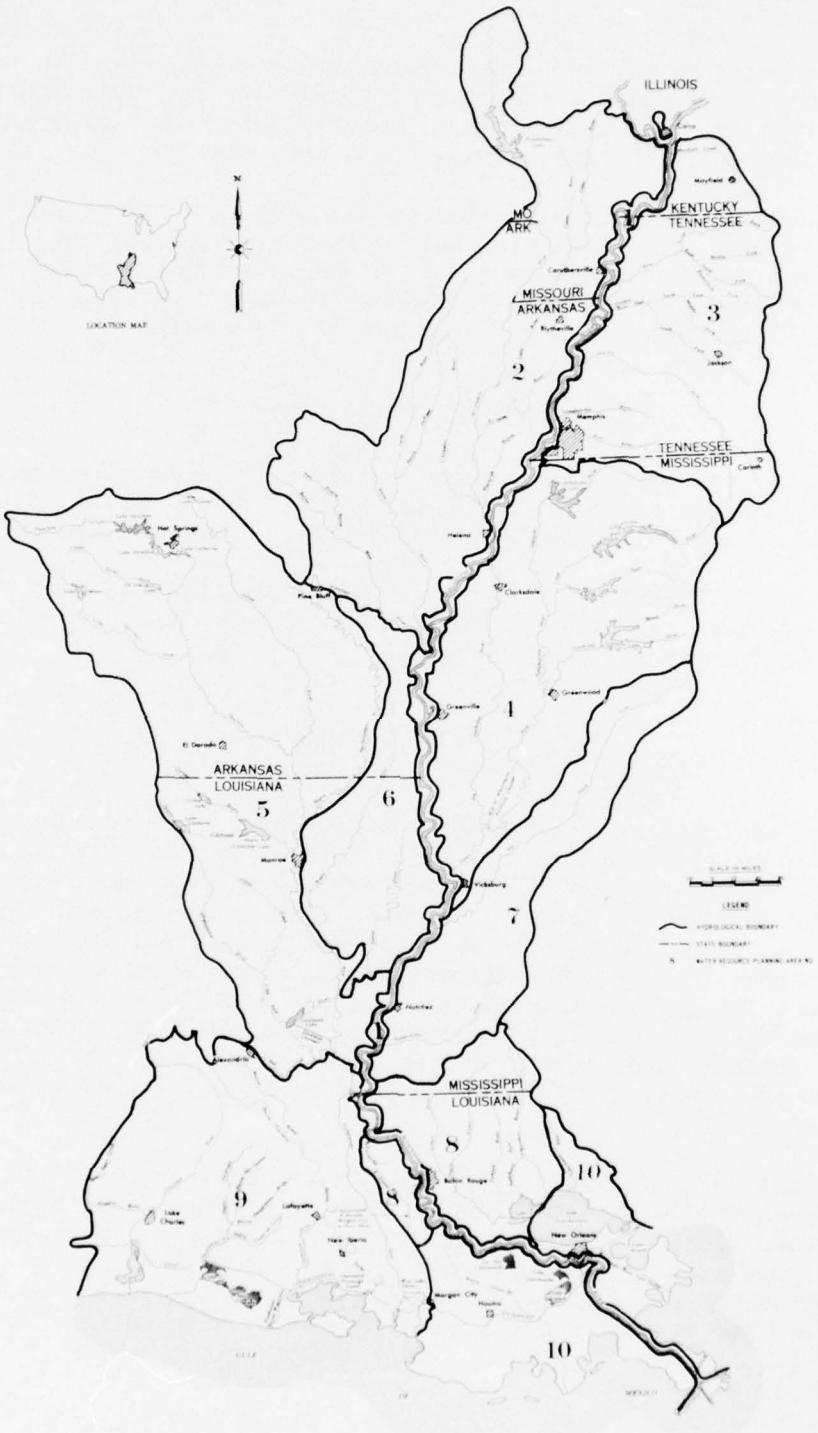
The area within the boundaries of the Lower Mississippi Region exceeds 65 million acres. While some water and land problems and needs in this vast area relate to the entire region, many are too complex to attempt a solution on a regional basis. To provide a practical basis for plan formulation, the region was subdivided into 10 hydrologic areas which are referred to as water resource planning areas (WRPA's), and are shown in figure 1.



Stark evidence of past misuse of the land in the region is illustrated above in this 100-year old house abandoned about 35 years ago.



Scenes such as the above were common in upland areas of the region in the mid to late 1930's.



LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

REGIONAL MAP

FIGURE 1

The effects of sediment and erosion on agriculture, municipal and industrial water supplies, reservoirs, flood problems, navigation channels, recreation, fish and wildlife, health, and aesthetics are discussed. Sediment and erosion damages are estimated.

The appendix includes information and data on acres of land and tons of sediment from sheet erosion, gully erosion, floodplain scour, and roadbank and streambank erosion. Although data is included for future time frames, no attempt is made to recommend specific solutions to the erosion and sediment problems identified herein.

RELATION TO OTHER APPENDIXES

Outputs from this study element relative to sediment and erosion problems and needs served as input to the following: Flood Problems, Water Quality and Pollution, Fish and Wildlife, and Plan Formulation.

Inputs to this study element related to land use and open pit areas and were obtained respectively from Appendix F, Land Resources, and Appendix G, Related Mineral Resources.

PRESENTATION OF MATERIAL

Areas affected by gross erosion are shown as acres of sheet erosion, gully erosion, floodplain scour, and roadbank erosion. Streambank erosion is shown in miles. The extent of the erosion is presented in tons. The damages are shown in dollars. The above values are given for the present and estimates were made for the years 1980, 2000, and 2020. Data are shown for both the National Income (Program A) and the Regional Development (Program B) objectives. For the purposes of this study, the region was divided into 10 Water Resource Planning Areas (WRPA's). Each WRPA was further subdivided into hydrologic subbasins. The data are shown for 46 subbasins within the 10 WRPA's and summarized by WRPA's and for the entire region.

The data are also summarized to show the percentage of the area affected by erosion in each subbasin and the average tons per acre from the affected areas. Yields of sediment are shown for each subbasin as average annual tons per square mile per year and concentration of suspended sediments as parts per million, ppm. Areas affected by wind erosion and the results of this kind of erosion were not evaluated in this study.



Sheet erosion such as the above produces the largest amount of sediment of any source in the region.



A view of a large gully with desilting dam trapping most of the sediment.

METHODOLOGY

METHODOLOGY

The U. S. Department of Agriculture 1967 Conservation Needs Inventory, adjusted for more recent land clearing, was used as the main source of information for determining areas that have sediment and erosion problems under present conditions. It is not possible to project future problems and needs without assuming a future land use pattern; therefore, a future land use pattern was developed based on projections of economic needs, resource availability, land capability, and historical trends. The areas expected to have projected sediment and erosion problems and needs were based on this land use pattern for the 1980, 2000, and 2020 time frames. This future land use pattern is not necessarily compatible with that which will result from formulation of the regional land use plan as displayed in Appendix T, Plan Formulation. This assumed land use pattern appears conservative in regard to acreages of future crop and pasture lands when compared to future crop and pasture land needs as shown in Appendix F, Land Resources.

The acreages of land shown throughout this appendix as being affected by sheet erosion in 1970 consist of all agricultural lands (cropland, pasture, forest land, and other) with soils where susceptibility to erosion is the dominant problem or hazard to their use. The acreages of gully and roadbank erosion and of floodplain scour were also included to comprise the total land area affected by erosion and may be referred to synonymously as the "affected area" or the "contributing area."

Sheet erosion rates in tons per acre for each land use by land resource area (LRA) were computed, using sediment survey data obtained from previous studies made in Public Law 566 watershed plans.

The area and erosion rates for gullies, floodplain scour, and roadbanks for each Conservation Needs Inventory (CNI) subbasin were made using existing data from PL-566 watershed plans. These data were adjusted for each LRA in each subbasin.

Streambank erosion studies for the region were made prior to this study as a part of the "National Assessment of Streambank Erosion." The primary agency preparing this report was the Corps of Engineers with the Soil Conservation Service providing data on upstream watershed areas. This "National Assessment" data was reviewed and also reevaluated where additional information was available. This review and reevaluation resulted in changes in the magnitude of the streambank erosion problem. Monetary damages were determined for sediment, scour, roadside erosion, and streambank caving. Damages were based on current conditions (1970) and projected to future time frames.

Gross erosion is the total erosion from sheet, roadside, gully, floodplain scour, streambank, and other types of erosion. This total erosion was divided by the "affected" area in acres to arrive at a ton

per acre figure. Only the agricultural lands acreage was used in the calculations. If the total area of each subbasin and region had been used, the ton per acre figure would have been smaller. Wind erosion is a problem in some isolated areas within the region. The total damage, however, is insignificant and was not evaluated.

Sediment yields were calculated using delivery curves published by the Soil Conservation Service based on size of each subbasin. Sediment yields from tributary subbasins were not routed through the principal basins. For example, in the St. Francis River Basin sediment from the Little River subbasin or the L'Anguille subbasin was not routed into or through the St. Francis River. The yields given relate only to the erosion and subsequent average annual yield at the outlet of the subbasin. Concentration of sediment in milligrams per liter in streams were calculated at the outlet of each subbasin using the average annual sediment yield and the average annual streamflow. Concentrations were not calculated in WRPA 6 due to the very large amounts of streambank erosion.

Soil surveys are based upon characteristics of the soils that influence their use and management and interpretations are needed for each of the many uses. Among these interpretations, the grouping of soils into capability classes is one of the most important. A land capability class is a grouping of soils that have similar potentials, limitations, and hazards. Type of soil, degree of slope, and extent of erosion comprise a land capability class.. The units used for land classification are characterized by differences which significantly affect conservation practices, use suitability, and management requirements.

The USDA Land Capability Classification classifies all soils in eight capability classes (Class I, II, III, IV, V, VI, VII, and VIII). The suitability of the soil for agricultural uses decreases from Class I to Class VIII. Soils in the first four classes under good management are generally defined as land suited to cultivation. Soils in Classes V through VIII are generally defined as land limited in use--not generally suited for cultivation but are best used for pasture, forest, wildlife habitat, recreation, water supply, and aesthetic purposes.

In 1967 the Department of Agriculture completed a nationwide inventory of land and water and conservation needs. Included in this inventory was an estimate of the acreage of land in the various uses.

Soil survey data are also summarized into subclasses to indicate major limitations or hazards within the land capability classes. Soils are usually divided into three subclasses to indicate erosion hazards, wetness, or root zone limitations.

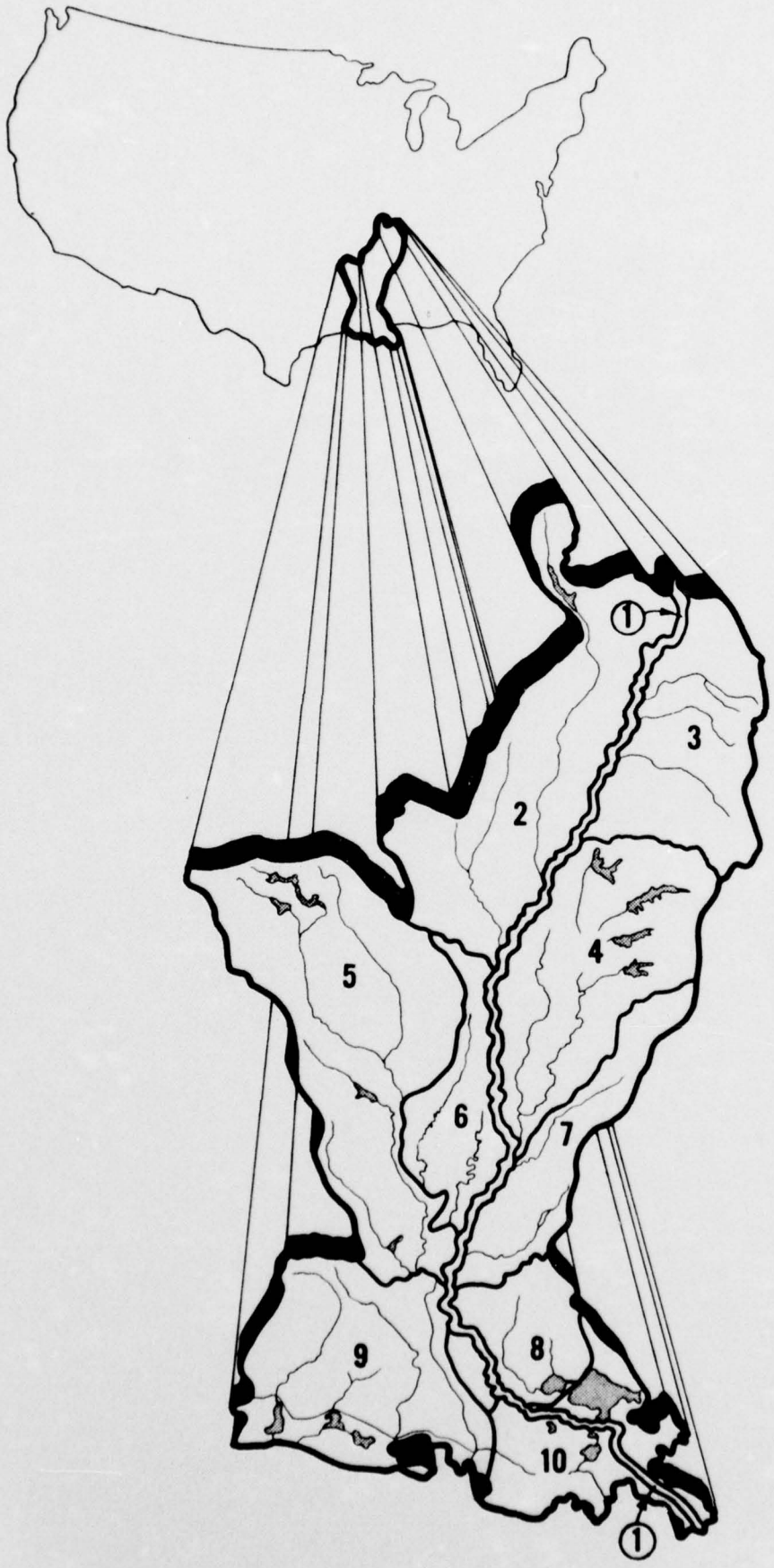
Subclass "e" erosion is comprised of soils where susceptibility to erosion is the dominant problem or hazard in their use. Erosion susceptibility is the major soil factor for placing soils in this subclass.

Subclass "w" is comprised of soils where excess water is the dominant hazard or limitation in their use. Poor soil drainage, wetness, high water table, and overflow are the criteria for determining which soils belong in this subclass.

Subclass "s" soil limitations within the rooting zone include soils that have limitations such as shallowness of rooting zones, stones, low moisture-holding capacity, low fertility difficult to correct, or sodium.

For the purposes of this appendix, the areas affected by erosion were considered as the inventory acreage (agricultural lands only) of upland soils which had an erosion (subclass "e") problem. The remaining soils in the region have a wetness (subclass "w") or soil (subclass "s") problem. Sedimentation usually occurs on soils that have a wetness problem.

Land resource areas, land capabilities, classes, and subclasses are explained in further detail in Appendix F, Land Resources.



REGIONAL SUMMARY

REGIONAL SUMMARY

Areas of high rates of sheet and gully erosion are generally associated with areas of below-average farming potentials and generally economically depressed areas. Areas of high sediment deposition increase farming costs and limit alternatives of land use. Sediment in flood prevention and drainage channels and in navigable waterways increases channel maintenance costs.

Land use is the major factor affecting erosion and sediment rates. Cultivated silty and sandy soils on steep slopes are very erosive and produce large amounts of sediment. Roadbanks, urban development, and gullies contribute proportionally large amounts of sediment in local areas. Some natural erosion occurs in the study area due to climate, specifically rainfall. Variations in the 30-minute rainfall-two year frequency factor in the region is from 0.8 inches in the north to 2.2 inches in the south. Floodplain scour and wind erosion are local problems. Good permanent vegetative cover almost eliminates erosion and resultant sediment production.

The type of geologic material from which the soils were developed is a significant factor in determining their erodability. Soils from loess, alluvium, and sandstone have different inherent factors of erodability.

Flooding and water management problems are related to erosion and sediment deposition in that both are associated with high runoff of rainfall, reservoir filling, channel filling, floodplain scour, and water quality.

Irrigation of agricultural land in the region is not extensive compared to arid or semi-arid areas. Insignificant erosion occurs in the region where irrigation measures are properly practiced.

Most of the land needing drainage has insignificant amounts of erosion but may be affected by floodplain deposition, swamping, and in some cases by floodplain scour.

Sedimentation, as well as channel bed movement, is a constant threat to navigation and requires regular monitoring and maintenance in the navigation channels.

The suspended sediments must be removed from surface water used for municipal and industrial purposes. Water supply reservoirs must be designed for sediment storage in order to meet anticipated future water needs.



Roadbank erosion is still a problem in some areas of the region.



Many roadbanks throughout the region have been properly treated.

Suspended sediment in water decreases its aesthetic or visual quality and its value for recreation use. Sediment polluted water is detrimental to biologic and aquatic life systems supported by the water. Suspended sediment is the largest pollutant of water.

Swamping or filling of drainage systems and the development of natural levees by sediment deposition may subsequently result in stagnated water which serves as breeding places for mosquitoes. Suspended sediment in water often carries with it soil chemicals, herbicides, pesticides, and fertilizers which may affect the health of humans and other animals and plant life using the water.

Sediment is a deterrent to recreation in water stored for recreation use or when deposited on parks and playgrounds. People do not like muddy water for swimming or water skiing. Recreational use of land may contribute to erosion and sedimentation.

Bare or sparsely vegetated, eroded land with gullies is usually poor in aesthetic value. Also, large areas of mud and silt deposits are unattractive. In fact, these conditions are considered as depressing to many people who see them.

Most game and sport fishery is damaged in proportion to the amount of suspended sediment in the water. Sedimentation may completely destroy fish breeding habitats.

The erosion rate of any storm depends upon the energy in the raindrops that bombard the soil and the amount and speed of runoff water. Other factors affecting erosion include the kind and amount of cover, the kind of soil management, and the steepness and length of the slope.

Large amounts of energy are dissipated in the soil when high intensity rain occurs. This energy is the force that loosens soil particles and causes soil erosion to begin. Vegetative cover on the soil can absorb most of the rainfall energy and reduce the velocity of runoff and thus prevent nearly all erosion from this source.

Soil properties, such as organic matter, texture, colloids, and base exchange complex, that tend to hold soil particles together, influence erosion. Also, soil depth and profile characteristics influence erosion.

The steepness of the land and length of the soil slope has a significant effect on the velocity of runoff and on erosion rates. As the slope doubles, erosion increases about two and one-half times, and as the slope length increases by ten times, the erosion more than doubles.

Soil erosion in forest land can be influenced by over grazing, poor management, roads, logging trails, and heavy recreation use. Agricultural



Open lands and fixed improvements are often lost from streambank caving.



Streambank erosion occurs in many areas of the region.

management can influence erosion by such practices as timeliness of operations, fertilization, crop residue use, and other conservation practices.

Some soil loss by erosion is tolerable and is not considered an on-site problem unless it reduces the productive capacity of the soil. However, downstream or off-site sediment problems may be created by tolerable amounts of erosion.

Deposition of sediment is influenced by the velocity of the moving water and the size of the sediment. Damages caused by sedimentation include deposits of sterile overwash, swamping or ponding of water on certain lands, increased areas of inundation, increased streambank erosion, scour or erosion of certain floodplain lands, damaged transportation and reservoir facilities, impaired drainage, higher water tables, deposition on crop, pasture, and forest lands, destruction of wildlife habitats, and degradation of aquatic life.

Activities, other than agriculture, that can contribute large sediment yields are dredging of navigation and drainage channels, road and highway construction, strip-mining, urban development, ditch construction, excessively heavy recreation use, and fires that destroy the vegetative cover.

EROSION, SEDIMENT YIELDS, AND ANNUAL DAMAGES

All of the above described conditions are present to some degree in the Lower Mississippi Region, and various types of significant erosion are occurring at an average rate of nearly 7 tons per acre each year on about one-third of the soils in the region. The annual sediment and erosion damage is about $14,851,000. More than one-half of the total erosion and sediment damages are in WRPA 3. WRPA's 3, 4, and 7 account for 80 percent of the total damages. WRPA 9 has less than 1 percent of the damages and the average annual damage per affected acre is only 4 cents in this WRPA. On site damages to acres effected by sheet erosion were not evaluated.

More than 19 million acres of agricultural land (subclass "e") in the region is presently affected by erosion and occurs as sheet, gully, and roadbank erosion and as floodplain scour. Additionally, it is estimated that 11,073 miles of streambanks throughout the region are subject to erosion damage. Almost 133 million tons of sediment are produced annually in the region by all forms of erosion. These problems and damages for 1970 and the future time frames are summarized for the region in table 2. As previously explained, the problems and damages for these future time frames are based on an assumed future land use pattern.

Table 1 - Present erosion and sediment damages by WRPA's, REGIONAL SUMMARY

WRPA	DAMAGES	
	Dollars	Percent
1	0 1/	0 1/
2	904,539	6
3	7,728,217	52
4	2,722,776	18
5	508,633	3
6	358,900	2
7	1,539,738	10
8	975,185	7
9	46,976	1
10	66,376	1
Total	14,851,340	100

1/ Monetary damages and sediment yields in WRPA 1 were not evaluated.

Table 2 - Sediment and erosion problems and damages, REGIONAL SUMMARY

REGIONAL TOTAL	NEEDS FOR PROTECTION			
	1970	1980	2000	2020
	ACRES			
Land area affected by erosion				
Sheet erosion	19,018,847	18,672,189	18,198,091	17,727,585
Gully erosion	153,792	130,366	111,512	96,236
Floodplain scour	4,046	3,380	3,375	3,364
Roadbanks	50,024	47,495	44,568	42,487
Total 1/	19,226,709	18,853,430	18,357,546	17,869,672
	MILES			
Streambank erosion	11,073	11,073	11,073	11,073
	TONS			
Extent of erosion				
Sheet erosion	89,068,456	78,091,154	68,153,072	59,128,385
Gully erosion	23,275,260	16,568,860	11,386,726	8,631,849
Floodplain scour	367,150	210,765	204,415	204,195
Roadbanks	4,496,075	2,236,768	1,419,373	1,032,308
Streambank erosion	15,375,762	15,375,762	15,375,762	15,375,762
Total	132,582,703	112,483,309	96,539,348	84,372,499
	DOLLARS			
Average annual damages				
Program A	14,851,340	17,805,243	21,865,874	27,298,120
Program B	14,851,340	17,906,649	22,734,833	28,312,749

1/ Excludes lands with wetness (subclass "w") and soils (subclass "s") problems but includes lands with gully and roadbank erosion and floodplain scour problems.

The present estimated average annual gross erosion in tons per square mile for the contributing area of the hydrologic subbasins in the region ranges from a low of 122 tons per square mile or 0.2 tons per acre in the Black River subbasin (CNI No. 3p) in WRPA 5 to a high of 17,878 tons per square mile or 27.9 tons per acre in the Tensas River subbasin (CNI No. 3p2) in WRPA 6. This highest rate, however, is due to severe streambank erosion in the Tensas River subbasin. Other subbasins with significantly high rates are the L'Anguille River (CNI No. 5b) in WRPA 2 with 16,757 tons per square mile or 26.2 tons per acre and the Forked Deer River (CNI No. 1a) in WRPA 3 with 16,376 tons per square mile or 25.6 tons per acre.

Average annual gross erosion in the region is the lowest in WRPA 9 with 1,207 tons per square mile or 1.9 tons per acre and the highest in WRPA 3 with 8,497 tons per square mile or 13.3 tons per acre. The average for the entire region is 4,413 tons per square mile or 6.9 tons per acre.

Sediment yields were not estimated on a regional or WRPA basis and thus were not evaluated for the main stem (WRPA 1) or other areas larger than subbasins. The estimated average annual sediment yields in the region, at the mouth of the subbasins, ranges from a low of 22 tons per square mile of contributing area in the Black River subbasin in WRPA 5 to a high of 12,400 tons per square mile in the Tensas River subbasin in WRPA 6. This extremely high rate is also due to severe streambank erosion in the Tensas River. The next highest rate exclusive of streambank erosion is in the L'Anguille River subbasin with 3,351 tons per square mile.

Gross erosion for the future time periods, as shown on tables in individual WRPA sections, and sediment yields correspond in magnitude and scope to that for the present. As previously explained, these problems for the future time frames are based on an assumed future land use pattern.

The estimated average annual gross erosion in tons per square mile, the average annual sediment yield in tons per square mile and the concentration of sediment in milligrams per liter (mg/l) for the contributing area for each CNI subbasin and summarized for each WRPA and the region is shown in table 3. The hydrologic subbasins for each WRPA are shown in figure 2.

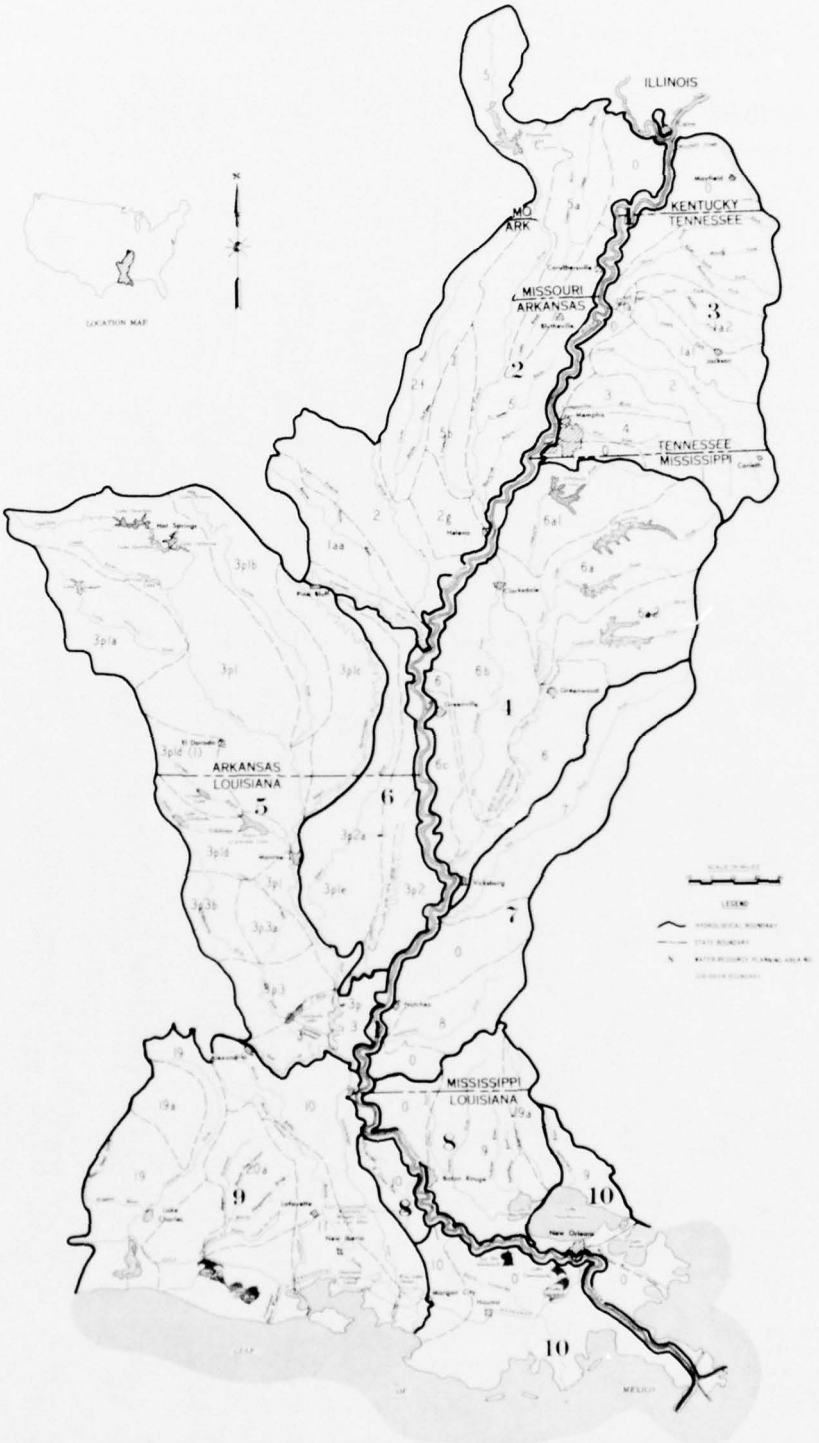
Additional information on the persentage of land area affected by erosion and the extent of erosion in average tons per acre per year for each CNI subbasin, summarized by WRPA's and the region for the present and the future time frames are shown in table 4.

The percentage of dollars damage from present erosion and sediment by type for each subbasin, summarized by WRPA's and the region are shown in table 5.

Table 3 - Estimated present average annual erosion and sediment yield, by WRPA's and subbasins, REGIONAL SUMMARY

WRPA	Subbasin Name	CNI Number	Contributing Area Sq.Mi. 1/	Estimated Ave. Annual Gross Erosion Tons/Sq.Mi.	Estimated Ave. Annual Yields Tons/Sq.Mi. 2/	Estimated Yield mg/l 2/
1	Mississippi River	0	44.7	509	-	-
2	Bayou Meto	1aa	194.5	2,198	110	13
	Arkansas River	1	30.8	942	120 3/	19 3/
	White River	2	504.7	2,646	132 3/	24 3/
	Cache River	2f	335.7	11,093	1,042	144
	Big Creek	2g	168.5	14,692	2,938	383
	Mississippi River	0	25.9	1,249	250 3/	152 3/
	St. Francis River	5	1,176.9	5,449	546 3/	126 3/
	L'Anguille River	5b	146.0	16,757	3,351	406
	Little River	5a	188.8	2,684	135	10
	WRPA 2		2,771.8	6,274	-	-
3	Mississippi River	0	892.2	6,892	1,390 3/	-
	North Fork, Forked Deer	1a2	514.1	10,110	1,020	447
	Obion River	1	1,214.4	12,960	1,305 3/	581 3/
	South Fork, Forked Deer	1a1	607.3	11,000	1,112	498
	Forked Deer River	1a	11.8	16,376	1,638 3/	192 3/
	Hatchie River	2	1,661.0	4,545	459	230
	Loosahatchie River	3	363.3	9,409	1,411	586
	Wolf River	4	519.8	8,122	1,218	649
	WRPA 3		5,783.9	8,497	-	-
4	Tallahatchie River	6a	1,651.0	4,541	902 3/	400 3/
	Yalobusha River	6a2	1,030.3	3,818	759	330
	Coldwater River	6a1	781.4	7,954	1,601	558
	Steele Bayou	6c	6.4	1,380	138	< 10
	Sunflower	6b	176.1	1,608	161	< 10
	Yazoo	6	864.6	4,025	800 3/	261 3/
	WRPA 4		4,509.8	4,749	-	-
5	Big Corine Bayou	3p1d(1)	428.8	1,246	125	59
	Ouachita River	3p1	2,909.3	1,065	56 3/	19 3/
	Bayou Bartholomew	3p1c	373.2	3,229	375	57
	Little Missouri	3p1a	1,003.6	1,147	114	45
	Saline River	3p1b	1,159.1	941	93	31
	Bayou D'Arbonne	3p1d	700.7	1,123	112	57
	Little River	3p3	527.5	612	61 3/	31 3/
	Black River	3p	0.5	112	22 3/	< 10 3/
	Dugdemona River	3p3b	591.3	816	82	44
	Castor Bayou	3p3a	622.1	701	70	36
	Red River	3	377.6	655	131 3/	27 3/
	WRPA 5		8,693.7	1,076	-	-
6	Bayou Macon	3p2(a)	80.3	6,655	4,659	-
	Boeuf River	3p1(e)	281.3	4,655	2,395	-
	Tensas River	3p2	27.4	17,878	12,400	-
	WRPA 6 4/		389.0	5,099	-	-
7	Big Black River	7	2,088.4	4,420	452	222
	Homochitto River	8	625.3	8,005	824	456
	Mississippi River	0	1,217.9	4,762	978 3/	-
	WRPA 7		3,931.6	5,096	-	-
8	Amite River	9	1,050.8	5,720	869 3/	201 3/
	Atchafalaya River	10	12.9	697	174 3/	< 10 3/
	Tangipahoa River	9a	407.5	5,202	531	206
	Mississippi River	0	437.7	3,858	789 3/	-
	WRPA 8		1,908.9	5,148	-	-
9	Calcasieu	19 5/	1,256.8	1,408	71	24
	Mermentau	20 6/	197.2	658	66	< 10
	Vermilion	11	77.2	903	45	< 10
	Atchafalaya	10	268.9	760	152 3/	-
	WRPA 9		1,800.1	1,207	-	-
10	Amite River	9	187.1	4,655	468 3/	-
	Atchafalaya	10	10.5	696	- 3/	-
	Mississippi River	0	10.6	175	- 3/	-
	WRPA 10		208.2	4,227	-	-
REGION TOTAL			30,041.7	4,413	-	-

1/ Excludes lands with wetness (subclass "W") and soils (subclass "S") problems but includes lands with gully and roadbank erosion and floodplain scour problems.
2/ At mouth of subbasin.
3/ Excludes subbasin draining into principal streams.
4/ More than 85 percent of the gross erosion is caused by severe channel erosion.
5/ Includes Bundicker CNI No. 19a.
6/ Includes Bayou Nezipqua CNI No. 20a.



LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

REGIONAL MAP
CNI HYDROLOGIC SUBBASINS

FIGURE 2

Table 4 - Percentage of land area affected by erosion and average gross erosion of affected area, REGIONAL SUMMARY

WRPA	Subbasin Name	CNI No.	Land Area Affected				Extent of Erosion			
			1970	1980	2000	2020	1970	1980	2000	2020
			Percent				Average tons/acre/year			
1	Mississippi River	0	2.4	2.4	2.4	2.4	0.8	0.8	0.8	0.8
2	Bayou Meto	1aa	14.7	13.7	13.1	12.9	3.4	3.2	3.0	2.8
	Arkansas River	1	13.5	13.6	13.7	13.7	1.5	1.1	1.1	1.0
	White River	2	23.1	22.4	21.8	21.1	4.1	3.8	3.5	3.2
	Cache River	2f	16.5	16.1	15.6	15.2	17.7	15.0	13.0	12.1
	Big Creek	2g	16.8	16.3	15.7	15.3	23.2	20.5	19.0	17.7
	Mississippi River	0	3.3	3.2	3.2	3.1	2.0	1.9	1.8	1.6
	St. Francis River	5	23.5	22.9	22.2	21.9	8.6	7.7	7.0	6.4
	L'Anguille River	5b	15.2	14.7	13.8	13.5	27.2	23.7	21.6	20.3
	Little River Ditches	5a	9.8	8.8	7.9	7.6	4.2	4.3	4.5	4.4
	WRPA 2		17.9	17.3	16.7	16.4	9.8	8.8	8.0	7.4
3	Mississippi River	0	47.8	47.8	48.0	47.1	10.9	9.1	7.3	5.8
	N. Fork, Forked Deer	1a2	56.4	55.7	55.7	55.6	16.2	12.6	10.0	8.2
	Obion River	1	55.7	55.4	55.1	54.8	21.3	16.6	12.8	10.0
	S. Fork, Forked Deer	1a1	57.8	57.1	57.3	56.9	17.6	14.7	12.0	9.7
	Forked Deer	1a	15.1	21.6	20.9	20.4	26.0	24.4	20.7	18.6
	Hatchie River	2	64.5	63.8	63.8	63.9	7.3	5.8	4.4	3.5
	Loosahatchie River	3	52.7	52.7	50.9	49.7	15.1	11.5	8.7	6.5
	Wolf River	4	62.5	61.7	61.1	60.5	14.1	10.9	7.9	5.7
	WRPA 3		56.7	56.5	56.3	55.9	13.3	10.9	8.5	6.7
4	Tallahatchie River	6a	57.1	57.6	57.9	57.9	7.1	6.5	6.1	5.5
	Yalobusha River	6a2	56.1	56.3	56.7	57.0	6.0	5.4	5.2	5.0
	Coldwater River	6a1	45.6	46.1	46.2	46.2	12.5	11.7	11.1	10.6
	Steele Bayou	6c	0.9	0.8	0.7	0.7	2.2	2.1	2.0	1.9
	Sunflower River	6b	6.2	6.0	5.5	4.5	2.5	2.5	2.4	2.4
	Yazoo River	6	42.1	42.7	41.9	41.8	6.3	5.8	5.2	4.9
	WRPA 4		37.4	37.7	37.6	37.5	7.4	6.9	6.5	6.1
5	Big Corine Bayou	3p1d1	61.1	61.1	60.5	60.2	2.0	1.8	1.8	1.7
	Ouachita River	3p1	46.7	46.9	46.3	45.2	1.7	1.5	1.5	1.4
	Bayou Bartholomew	3p1c	22.9	22.7	22.3	22.0	5.1	4.5	4.2	4.0
	Little Missouri River	3p1a	52.1	51.9	51.7	51.5	1.8	1.7	1.6	1.5
	Saline River	3p1b	44.1	44.2	43.8	43.1	1.5	1.4	1.3	1.2
	Bayou D'Arbonne	3p1d	66.5	66.2	66.3	65.4	1.8	1.7	1.6	1.5
	Little River	3p3	65.1	64.9	65.6	65.5	1.0	0.9	0.9	0.8
	Black River	3p	3.4	3.4	3.4	3.4	0.2	0.2	0.2	0.2
	Dugdemona River	3p3b	71.2	71.0	70.6	70.4	1.3	1.2	1.2	1.1
	Castor Bayou	3p3a	67.6	67.5	67.2	67.0	1.1	1.0	1.0	0.9
	Red River	3	27.2	27.4	27.0	27.3	1.0	1.0	0.9	0.8
	WRPA 5		47.9	47.9	47.5	46.8	1.7	1.6	1.5	1.4
6	Bayou Macon	3p2a	6.8	6.5	6.0	5.6	10.5	10.6	11.3	12.0
	Boeuf River	3p1e	10.2	9.3	7.6	6.2	7.3	7.8	9.1	10.9
	Tensas River	3p2	2.0	1.7	1.3	1.3	28.1	34.8	43.9	43.8
	WRPA 6		7.4	6.7	5.7	4.8	9.4	10.1	11.7	13.5
7	Big Black River	7	65.2	63.6	63.6	63.4	7.0	6.0	5.3	4.9
	Homochitto River	8	73.8	71.8	71.7	71.6	12.6	12.4	11.8	11.5
	Mississippi River	0	68.5	66.7	67.1	66.9	7.5	6.9	6.3	6.0
	WRPA 7		67.4	65.7	65.9	65.7	8.0	7.3	6.7	6.3
8	Amite River	9	35.5	34.6	35.3	35.5	9.0	7.8	7.3	7.0
	Atchafalaya River	10	1.7	1.8	1.8	1.8	1.1	1.1	1.0	1.0
	Tangipahoa River	9a	51.3	50.1	49.7	49.2	8.2	7.6	6.8	6.3
	Mississippi River	0	64.2	62.8	62.6	63.4	6.1	5.5	4.9	4.7
	WRPA 8		36.9	35.9	36.3	36.4	8.1	7.2	6.6	6.2
9	Calcasieu	19 & 19a	36.9	36.6	35.6	34.8	2.2	2.0	1.7	1.5
	Mermentau	20 & 20a	5.7	5.4	4.8	4.8	1.0	1.1	0.7	0.7
	Vermilion	11	4.2	3.8	3.0	2.6	1.4	1.4	1.0	1.1
	Atchafalaya	1	9.3	9.2	9.1	8.8	1.2	1.1	1.3	1.3
	WRPA 9		15.5	15.2	14.6	14.2	1.9	1.7	1.5	1.4
10	Amite River	9	23.5	21.9	20.6	18.2	7.3	6.2	5.4	4.9
	Atchafalaya	10	1.3	1.3	1.3	1.1	1.1	1.0	0.9	0.7
	Mississippi River	0	0.3	0.2	0.2	0.2	0.3	0.3	0.3	0.2
	WRPA 10		3.8	3.5	3.2	2.8	6.6	5.6	4.9	4.4
REGION TOTAL			32.9	32.6	32.2	31.8	7.0	6.0	5.3	4.8

Table 5 - Percentages of dollars damage from present erosion and sediment by type, REGIONAL SUMMARY

WRPA	Subbasin Name	CNI No.	Type of Damage			
			Sediment	Scour	Roadside Erosion	Streambank Erosion
			Percent			
1	Mississippi River	0	100	0	0	0
2	St. Francis River	5	6	0	25	69
	Little River Ditches	5a	21	0	2	77
	Cache River	2b	18	0	14	68
	Mississippi River	0	0	0	0	0
	L'Anguille River	5b	7	0	14	79
	Arkansas River	1	0	0	1	99
	Bayou Meto	1aa	39	0	4	57
	White River	2	44	0	3	53
	Big Creek	2g	0	0	13	87
	WRPA 2		16	0	13	71
3	Mississippi River	0	82	0	1	17
	N. Fork, Forked Deer	1a2	81	0	8	11
	Obion River	1	97	0	1	2
	S. Fork, Forked Deer	1a1	98	0	1	1
	Forked Deer River	1a	98	0	<1	2
	Hatchie River	2	60	0	40	0
	Loosahatchie River	3	52	0	9	39
	Wolf River	4	64	0	12	24
	WRPA 3		96	0	1	3
4	Tallahatchie River	6a	55	<1	2	43
	Yalobusha	6a2	71	<1	1	28
	Coldwater River	6a1	40	<1	1	59
	Sunflower River	6b	21	<1	1	78
	Yazoo	6	72	1	3	24
	WRPA 4		58	<1	1	41
5	Big Corine Bayou	3p1d1	0	0	38	62
	Ouachita River	3p1	52	0	12	36
	Bayou Bartholomew	3p1c	27	0	5	68
	Little Missouri River	3p1a	83	0	1	16
	Saline River	3p1b	59	0	3	38
	Bayou D'Arbonne	3p1d	0	0	71	29
	Little River	3p3	68	0	21	11
	Black River	3p	0	0	0	0
	Dugdemona River	3p3b	92	0	0	8
	Castor Bayou	3p3a	9	0	63	28
	Red River	3	0	0	100	0
	WRPA 5		57	0	13	30
6	Bayou Macon	3p2a	0	0	0	100
	Boeuf River	3p1e	0	0	0	100
	Tensas River	3p2	0	0	0	100
	WRPA 6		0	0	0	100
7	Big Black River	7	89	<1	2	9
	Homochitto River	8	35	<1	1	64
	Mississippi River	0	55	<1	2	43
	WRPA 7		72	<1	2	26
8	Amite River	9	75	<1	1	24
	Tangipahoa River	9a	99	<1	1	0
	Mississippi River	0	96	1	3	0
	WRPA 8		81	<1	1	18
9	Calcasieu	19	20	16	59	5
	Mermentau	20	15	0	85	0
	Vermilion	11	0	0	100	0
	Atchafalaya	10	0	0	73	27
	WRPA 9		16	12	64	8
10	Amite River	9	96	<1	1	3
REGION TOTAL			79	1	2	18

The present land use of areas affected by erosion in the region is 19 percent cropland, 18 percent pasture, 61 percent forest land, and 2 percent other land. WRPA's 2, 3, and 6 have the highest proportion of cropland and WRPA's 5 and 9 have the highest proportion of forest land. None of the WRPA's have more than 25 percent of the area affected by erosion in pasture. The present land use of areas affected by erosion in the region by percentage of land use for each WRPA and the region is shown in table 6.

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.

Table 6 - Present land use on areas affected by erosion, REGIONAL SUMMARY

WRPA	Cropland	Pasture	Forest Land	Other
	Percent			
1	31	5	62	2
2	41	25	31	3
3	40	19	37	4
4	16	20	62	2
5	4	11	84	1
6	63	23	12	2
7	9	24	66	1
8	13	25	61	1
9	11	8	80	1
10	26	18	55	1
Region	19	18	61	2

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

Eleven major land resource areas are found in the study area and are as follows:

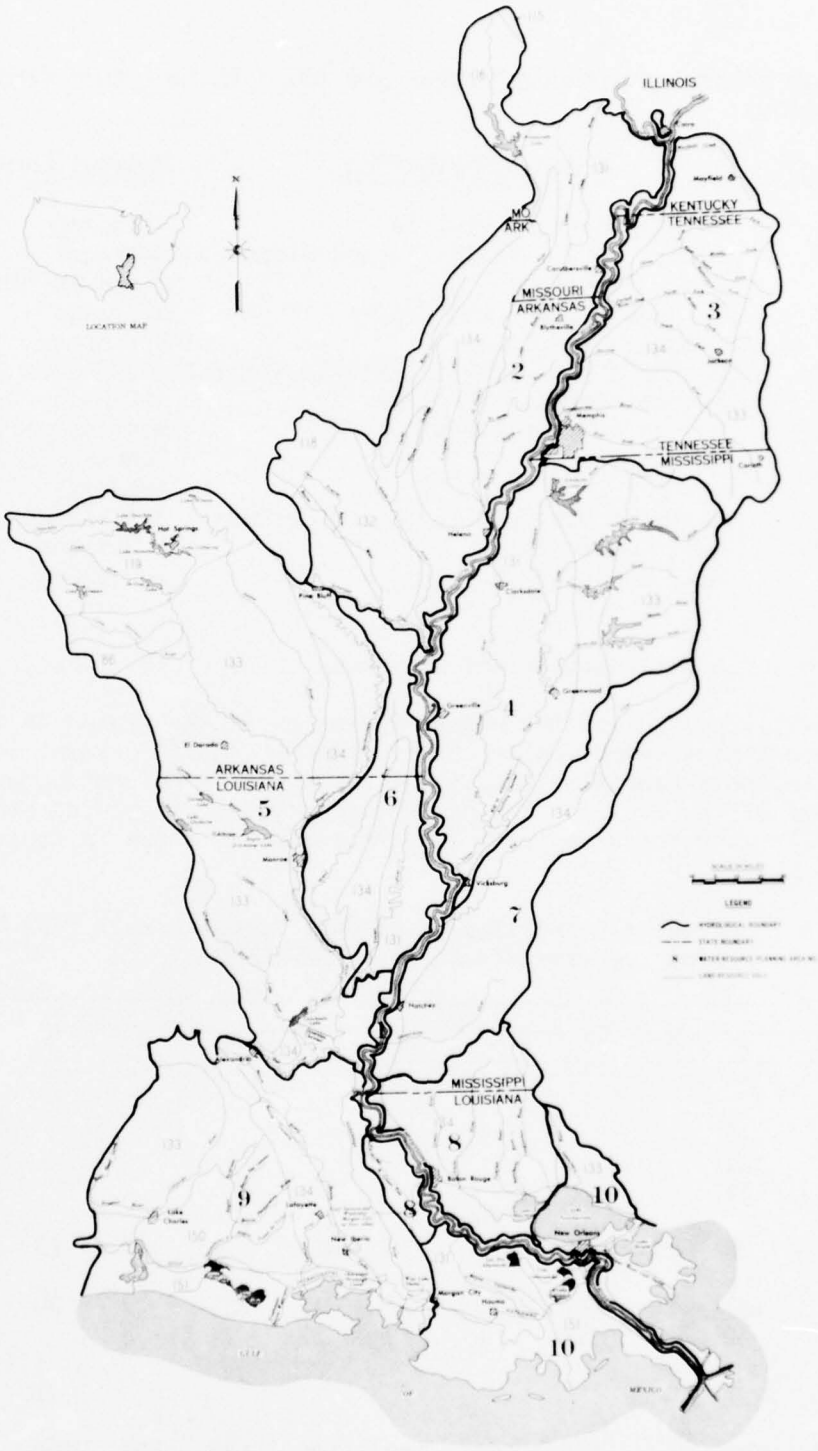
LRA No.	General Definition	General Location
86	Texas Blackland Prairie	Arkansas
115	Central Miss. Valley Wooded Slopes	Missouri
116	Ozark Highlands	Arkansas-Missouri
118	Arkansas Valley and Ridges	Arkansas
119	Ouachita Mountains	Arkansas
131	Southern Miss. Valley Alluvium(Delta)	All States
132	Eastern 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

These 11 land resource areas are shown on figure 3.

Forty-six percent of the damaging erosion in the region is in LRA 134, Southern Mississippi Valley Silty Uplands, and 40 percent is in LRA 133, Southern Coastal Plains. The remaining 14 percent occurs in other LRA's of the region. The present percentage of eroding areas in each WRPA by land resource areas for the region is shown in table 7.

Table 7 - Present percentage of eroding acres in each WRPA by Land Resource Areas, REGIONAL SUMMARY

LRA	WRPA 1	2	3	4	5	6	7	8	9	10	All
	Percent										
86					1						<1
115		3									<1
116		21									2
118		11									1
119					16						5
131	100	26	<1	8	1	28	<1	2	4	10	5
132		9									1
133		<1	26	41	76		13	<1	79	90	40
134		30	74	51	6	72	87	98	8		46
150										8	<1
151										1	<1
Totals	100	100	100	100	100	100	100	100	100	100	100



LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

LAND RESOURCE AREA SHOWING REGIONAL BOUNDARY AND HYDROLOGIC WRPA'S

FIGURE 3

Sixty-eight percent of all erosion in the region is from sheet erosion, 18 percent is from gully erosion, 11 percent is from streambank erosion, and 3 percent is from roadbanks. The greatest deviations from the regional average, exclusive of WRPA 1, are in WRPA's 5 and 6 where sheet erosion contributes 89 percent and 19 percent, respectively. Table 8 summarizes sources by WRPA for the present and future time frames.

RELATIONSHIP OF EROSION AND SEDIMENT TO NATURAL RESOURCES AND THE ENVIRONMENT

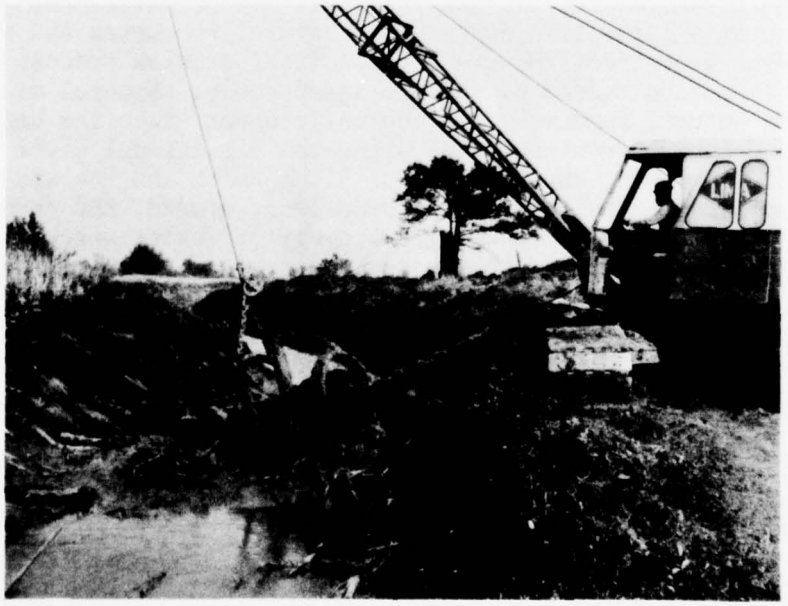
Soil particles moved by erosion and transported as sediment for subsequent deposition may result in severe losses in the natural productivity of the soil and cause long-lasting scars on the environment. Soil erosion and sediment can destroy land for agricultural purposes. Accelerated stream and channel filling by sediment may cause more frequent and extensive flooding, swamping, sterile overwash, and may result in rivers changing their courses. Fish and wildlife habitat are frequently altered or destroyed by erosion and sediment. Recreational benefits from natural resources can be reduced or lost by sediment deposits or by suspended particles that pollute surface waters.

Agricultural fertilizers and chemicals may be carried off during erosion and at a later time degrade the natural resources and environment wherever deposited. However, the natural erosion process and the accelerated erosion caused by man are inseparable. Natural erosion has altered the natural resources and the environment since the beginning of time. The deep, alluvial material along the Mississippi River and its tributaries, including the Mississippi River Delta and the widespread loessial uplands in the region, was deposited, eroded, and redeposited over many thousands of years under extremely different vegetative and climatic regimes. Compared to these amounts of erosion and sedimentation, man, in his short time, has not significantly altered the landscape. However, in some places he has drastically increased the rates of erosion and sedimentation as compared to the natural processes and has completely changed the environment and natural resources to conditions that would not have existed naturally.

Miscellaneous information on total gross erosion in the region is displayed in table 9.



Developing urban areas are often a source of severe erosion and resultant sediment production.



Sediment fills many drainage and navigation channels in the region causing maintenance problems.

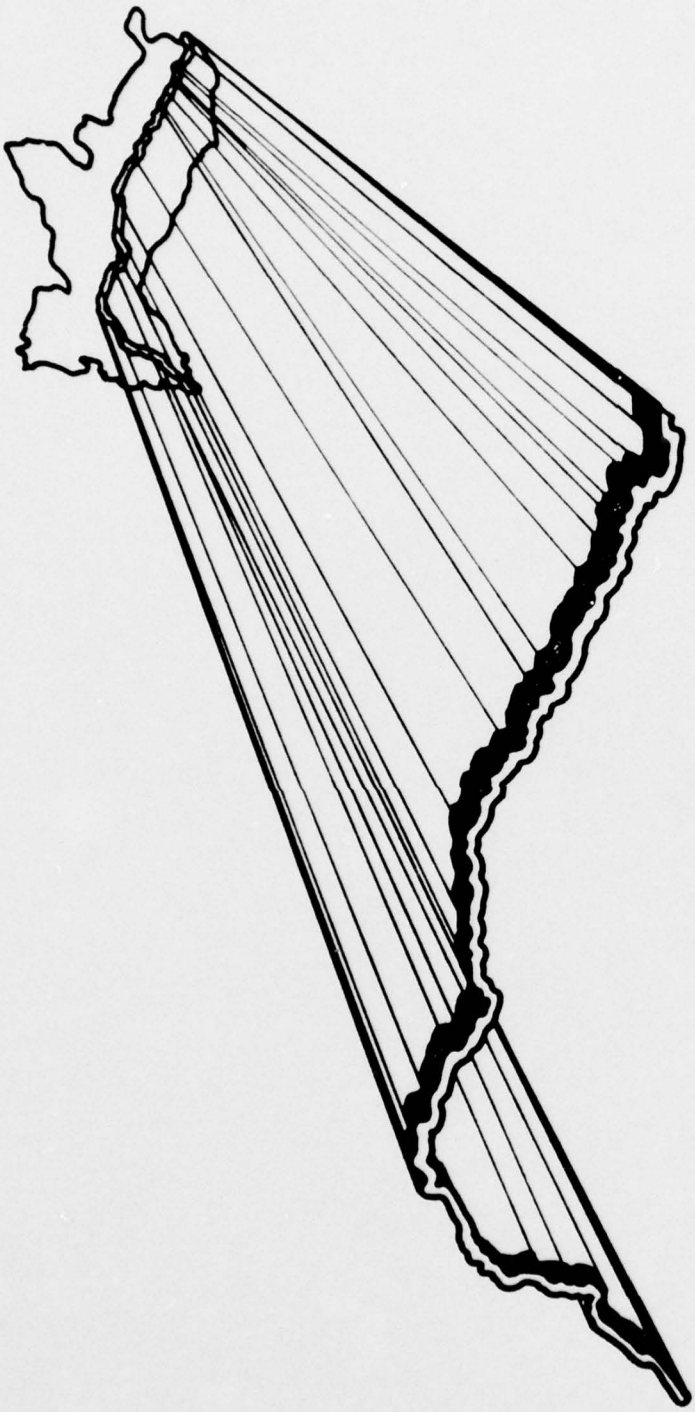
Table 8 - Sediment source by WRPA for present and future time frames, REGIONAL SUMMARY

WRPA	Source 1/	Time Frame			
		1970	1980	2000	2020
		Percent			
1	Sheet	100	100	100	100
	Channel	-	-	-	-
	Roadbanks	-	-	-	-
2	Sheet	65	69	72	71
	Channel	28	28	26	27
	Roadbanks	7	3	2	2
3	Sheet	61	64	66	68
	Channel	36	33	32	30
	Roadbanks	3	3	2	2
4	Sheet	71	72	71	69
	Channel and Scour	26	27	28	30
	Roadbanks	3	1	1	1
5	Sheet	89	91	91	91
	Channel	7	7	8	8
	Roadbanks	4	2	1	1
6	Sheet	19	16	13	10
	Channel	80	83	87	90
	Roadbanks	1	1	-	-
7	Sheet	69	69	68	67
	Channel and Scour	28	30	31	32
	Roadbanks	3	1	1	1
8	Sheet	79	79	79	78
	Channel and Scour	19	20	20	21
	Roadbanks	2	1	1	1
9	Sheet	83	89	86	85
	Channel and Scour	16	10	13	14
	Roadbanks	1	1	1	1
10	Sheet	80	80	76	70
	Channel	15	18	22	29
	Roadbanks	5	2	2	1
Total Region	Sheet	68	69	71	70
	Channel and Scour	29	29	28	29
	Roadbanks	3	2	1	1

1/ Channel erosion includes gully erosion.

Table 9 - Miscellaneous data on present total gross erosion in the Lower Mississippi Region, REGIONAL SUMMARY

132,582,703	tons per year
265,165,060,000	pounds per year
2,651,650,000	cu. ft. per year
1/4	mile cube per year
2000' base 2000' high	pyramid per year
1/8	inch on each agricultural acre per year in the region
1 ft. x 100 ft.	across United States per year
1 ft. x 20 ft.	around equator of earth per year
1 ft. x 2 ft.	from earth to moon per year
12' high, 6' top, 3:1 sides	levees on both sides of Mississippi River in the region per year
7,200,000	cu. ft. per day
80	cu. ft. per second
3	cu. yd. per second
4	tons per second



WRPA 1

W R P A 1

WRPA 1 consists of the land and water area within the main stream of the Mississippi River below the mouth of the Ohio extending to and including the levees or to the top bank of the stream where levees do not exist. It contains 1,191,000 acres of land and 368,000 acres of large water areas for a total area of 1,559,000 acres or approximately 2,436 square miles. The land area is generally almost level and is within the Southern Mississippi Valley Alluvium (131) Land Resource Area. Most of the land is presently used for forest with pasture second in predominance. Most of the cropland is used for soybeans, cotton, and wheat. The levees are generally used for grazing beef cattle. Present land use in this WRPA is not expected to change in future time periods.

The most spectacular sediment and erosion problem in the Lower Mississippi Region is in WRPA 1. The Mississippi River, a giant among the world's rivers, is a destructive force, one which can eat away miles of streambank and deposit thousands of tons of material in a single flood.

As the banks of the Mississippi are caved, the bankline slowly, sometimes quickly, moves landward where the levees stand. If allowed to continue unchecked, the river would destroy the levees as it does its banks, becoming wider and shallower, and ultimately interfering with, perhaps even halting, navigation on the nation's busiest waterway.

Without levees to hold back the floods, the people of the valley would be forced to endure great suffering and hardship. Loss of life would occur and damage to crops, homes, and industry would be staggering in scope and magnitude.

Silting problems at the mouth of the Mississippi River have been encountered annually, and reached critical proportions during the early 1970's. The draft and width restrictions encountered at the passes of the river have adversely affected the navigating safety of vessels transiting the area and have had a profound affect on the amount of cargo being imported or exported via the Mississippi River system.

Where navigation is significantly hindered or halted, the flow of millions of tons of commodities which move on the river is slowed or stopped. The capacity of other modes of transport under these conditions can be quickly exceeded with the result that goods delivered are more expensive to the consumer.

The great sediment load that the river carries also causes considerable damage and could cause a great deal more were it not for the levee system. The sediment is deposited in the channel in locations which hinder navigation and necessitates dredging of much of the channel

annually. Sediment is also deposited on lands that are overflowed. Often the materials deposited on farmlands are not conducive to agricultural use.

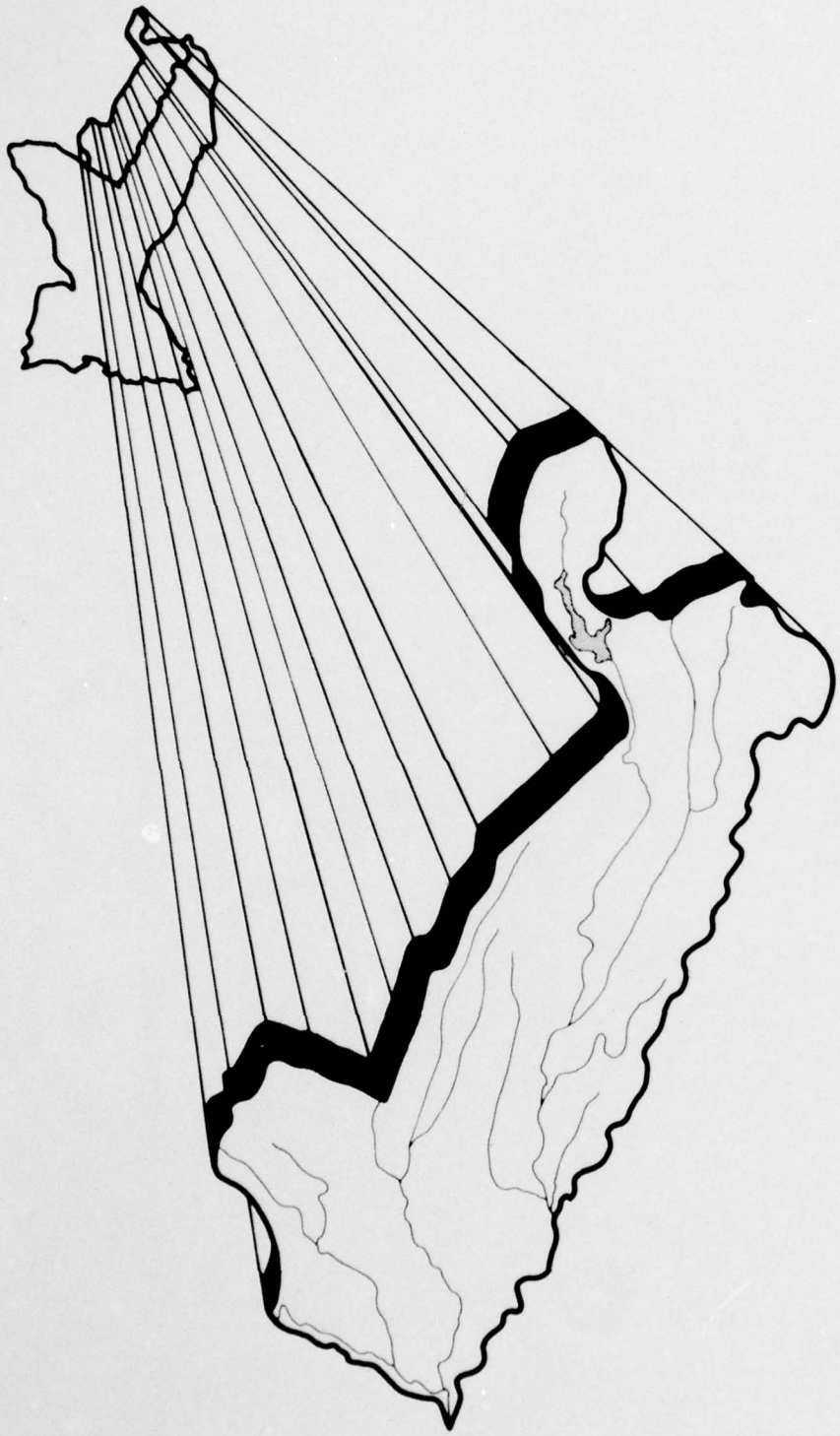
Because of these considerations and their substantial national import, a major, long-term undertaking to control the erosion of banks and the further meandering of the river was begun in 1928. This great task is now well over halfway complete, both physically and in terms of investment required. About 778 miles of streambank have been stabilized, mainly by installation of wooden pile and stone dikes and concrete revetments. There are about 486 miles of streambanks which are either now critically eroding or certain to pose a threat of serious erosion in the future. Determination of monetary damages and sediment yields from this streambank erosion was considered beyond the scope of this study. Additional discussion concerning the main stem stabilization needs and programs is contained in Appendix T, Plan Formulation.

Due to the location of the land area in this WRPA, its characteristics, and the anticipated static land use from the present to future time periods, monetary damages from sediment and erosion problems within the WRPA itself, except for streambank erosion, are negligible and therefore were not evaluated.

About 2 percent or 28,611 acres of the total land area in the WRPA is affected by erosion and is all from sheet erosion except for the eroding streambanks. The average gross erosion on the affected land area is 0.8 tons per acre. The sediment yield, exclusive of streambanks, is 22,755 tons annually as shown in table 10.

Table 10 - Sediment and erosion problems and damages, WRPA 1

	NEEDS FOR PROTECTION			
	1970	1980	2000	2020
Mississippi River (0) Subbasin and Summary				
Land area affected by erosion		ACRES		
Sheet erosion	28,611	28,611	28,611	28,611
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	-	-	-	-
Total	28,611	28,611	28,611	28,611
		MILES		
Streambank erosion	486	486	486	486
Extent of erosion		TONS		
Sheet erosion	22,755	22,755	22,755	22,755
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	-	-	-	-
Streambank erosion	-	-	-	-
Total	22,755	22,755	22,755	22,755
Average annual damages		DOLLARS		
Program A	-	-	-	-
Program B	-	-	-	-



WRPA 2

W R P A 2

WRPA 2 is located in the northwest portion of the Lower Mississippi Region. It lies in parts of two states-southeast Missouri and northeast Arkansas. The WRPA contains about 10.7 million acres or approximately 16,722 square miles of land and water area. It is bounded by the Mississippi River on the east, by the limits of the Lower Mississippi Valley on the north and west, and by the Arkansas River on the south.

There are three major drainage systems within this area--the White, Arkansas, and St. Francis Rivers. The White and Arkansas Rivers drain areas from outside the region. One subarea is drained by St. James and St. Johns Bayous. The St. Francis River drainage area is divided into four subareas, the Upper St. Francis above Little River, Little River, the Lower St. Francis, and The L'Anguille River. The White River also is divided into three areas, the Cache River, Big Creek, and Lower White River. Bayou Meto and the Lower Arkansas River make up one subarea.

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 climate is mild with an average annual temperature of around 60 degrees. The average length of growing season is about 210 days and the normal annual precipitation is about 48 inches.

The present land use of WRPA 2 is as follows: cropland (including pastured cropland), 6,572,000 acres; pasture, 693,000 acres; forest, 2,634,000 acres; other agricultural land, 247,000 acres; urban and built-up areas, 367,000 acres; small water areas, 98,000 acres; and large water areas, 91,000 acres.

About 59 percent of the WRPA is in LRA 131, 19 percent is in LRA 134, 9 percent is in LRA 116, and the remainder is in LRA's 115, 118, 119, and 132.

About 20 percent of the total area in the WRPA is affected by erosion. The average gross erosion on the affected land for the area is 9.8 tons per acre. Of the total erosion, 65 percent is from sheet erosion, 28 percent is from gully and channel erosion, and 7 percent is from roads. There are 1,093 miles of streambanks affected by erosion.

The estimated average annual yields of sediment at the outlets of the subbasin range from a high of 3,351 tons to a low of 110 tons of sediment per square mile per year. The total average annual damages in WRPA 2 are about $904,539. Sediment causes 16 percent of the damages. The St. Francis and White Rivers subbasins have the highest percent of land area affected by erosion. L'Anguille River has the highest rate of erosion, which is 26.2 tons per acre per year. Crowleys Ridge is where most of the erosion and sediment occur. The alluvial sands from Crowleys

Ridge are limited in extent but the yield of sediment and suspended particles in the water have far-reaching effects on the area. Both erosion and sediment are creating a harmful effect on the fishery resources and aesthetics of the area.

The CNI subbasins and LRA's are shown in figure 4.

The problems and damages for WRPA 2 are shown in table 11.



LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

CNI HYDROLOGIC SUBBASINS

WRPA 2

FIGURE 4

Table 11 - Sediment and erosion problems and damages, WRPA 2

	NEEDS FOR PROTECTION			
	1970	1980	2000	2020
Bayou Meto (1aa) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	124,399	114,221	107,043	104,941
Gully erosion	7	6	6	6
Floodplain scour	-	-	-	-
Roadbanks	69	68	66	64
Total	124,475	114,295	107,115	105,011
		MILES		
Streambank erosion	73	73	73	73
Extent of erosion		TONS		
Sheet erosion	365,786	315,661	276,942	246,821
Gully erosion	2,195	1,375	848	772
Floodplain scour	-	-	-	-
Roadbanks	18,247	7,208	4,547	3,222
Streambank erosion	41,364	41,364	41,364	41,364
Total	427,592	365,608	323,701	292,179
Average annual damages		DOLLARS		
Program A	60,879	70,221	77,780	83,983
Program B	60,879	70,221	83,634	90,519
Arkansas River (1) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	19,739	19,739	19,739	19,739
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	2	2	2	2
Total	19,741	19,741	19,741	19,741
		MILES		
Streambank erosion	6	6	6	6
Extent of erosion		TONS		
Sheet erosion	26,105	18,168	18,049	17,050
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	435	435	435	435
Streambank erosion	2,465	2,465	2,465	2,465
Total	29,005	21,068	20,949	19,950
Average annual damages		DOLLARS		
Program A	2,232	2,001	2,314	2,477
Program B	2,232	2,001	2,488	2,667

Table 11 - Sediment and erosion problems and damages, WRPA 2 (Cont.)

	NEEDS FOR PROTECTION			
	1970	1980	2000	2020
White River (2) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	322,773	310,149	295,707	284,546
Gully erosion	39	36	30	25
Floodplain scour	-	-	-	-
Roadbanks	189	187	181	174
Total	323,001	310,372	295,918	284,745
		MILES		
Streambank erosion	105	105	105	105
Extent of erosion		TONS		
Sheet erosion	1,125,778	1,017,475	908,175	794,452
Gully erosion	13,782	9,277	4,765	3,618
Floodplain scour	-	-	-	-
Roadbanks	86,458	34,258	21,553	15,141
Streambank erosion	109,256	109,256	109,256	109,256
Total	1,335,274	1,170,266	1,043,749	922,467
Average annual damages		DOLLARS		
Program A	121,242	136,241	146,455	151,718
Program B	121,242	136,241	157,481	163,354
Cache River (2f) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	210,053	204,052	195,309	190,055
Gully erosion	3,420	3,380	3,350	3,315
Floodplain scour	-	-	-	-
Roadbanks	1,352	1,325	1,298	1,245
Total	214,825	208,757	199,957	194,615
		MILES		
Streambank erosion	185	185	185	185
Extent of erosion		TONS		
Sheet erosion	1,889,410	1,726,280	1,546,847	1,368,396
Gully erosion	1,026,350	740,220	452,250	407,745
Floodplain scour	-	-	-	-
Roadbanks	345,097	135,150	86,057	60,320
Streambank erosion	463,226	463,226	463,226	463,226
Total	3,724,083	3,064,876	2,548,380	2,299,687
Average annual damages		DOLLARS		
Program A	174,393	184,508	186,385	194,018
Program B	174,393	184,508	200,408	208,913

Table 11 - Sediment and erosion problems and damages, WRPA 2 (Cont.)

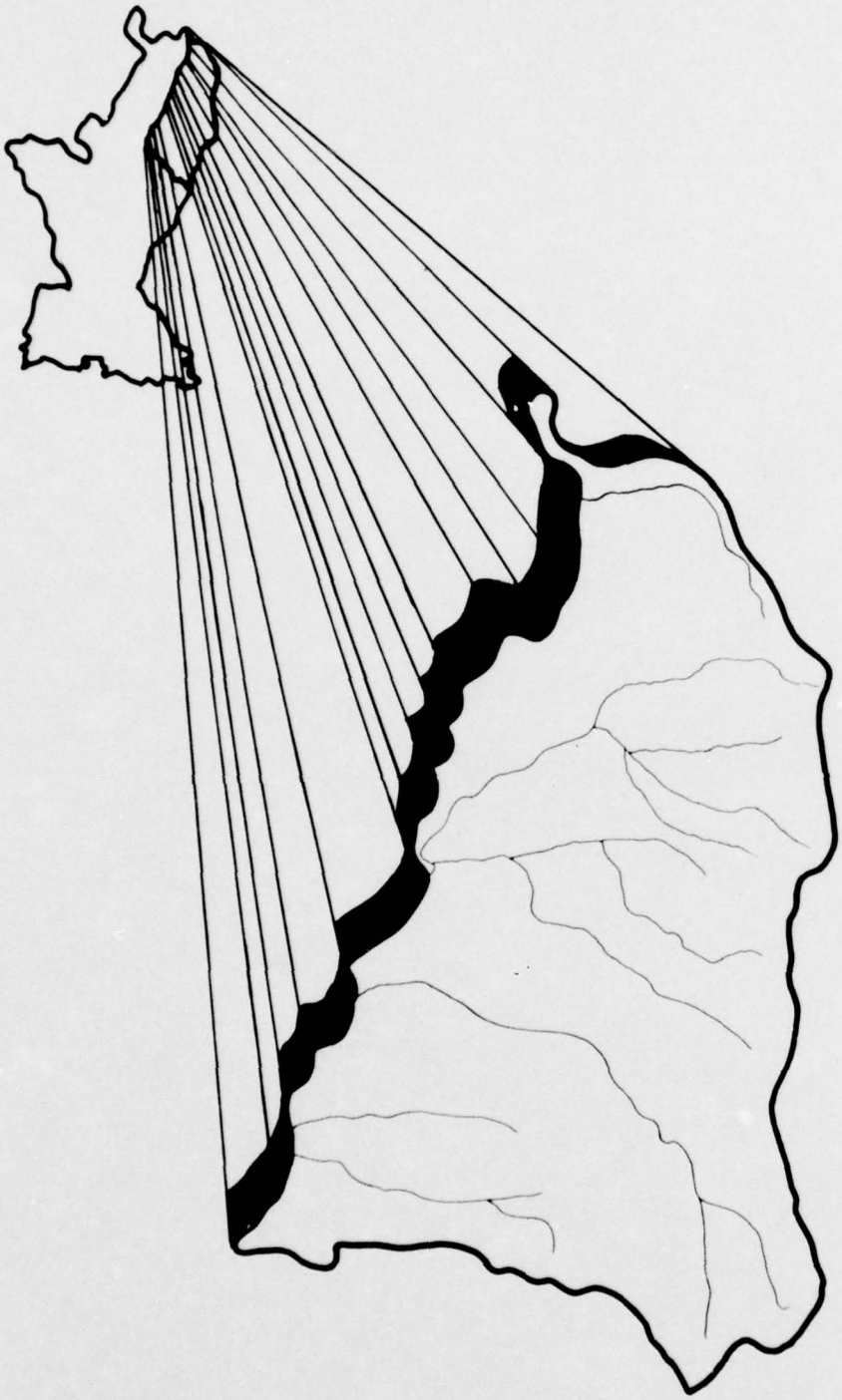
	NEEDS FOR PROTECTION			
	1970	1980	2000	2020
Big Creek (2g) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	106,598	102,250	97,650	94,529
Gully erosion	400	395	390	385
Floodplain scour	-	-	-	-
Roadbanks	865	848	830	795
Total	107,863	103,493	98,870	95,709
		MILES		
Streambank erosion	165	165	165	165
Extent of erosion		TONS		
Sheet erosion	1,676,126	1,509,006	1,349,132	1,187,284
Gully erosion	140,033	100,922	61,425	55,248
Floodplain scour	-	-	-	-
Roadbanks	280,773	110,240	70,135	49,091
Streambank erosion	378,751	378,751	378,751	378,751
Total	2,475,683	2,098,919	1,859,443	1,670,374
Average annual damages		DOLLARS		
Program A	129,955	142,263	151,936	158,935
Program B	129,955	142,263	163,376	171,126
Mississippi River (0) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	16,551	15,500	15,000	14,500
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	-	-	-	-
Total	16,551	15,500	15,000	14,500
		MILES		
Streambank erosion	15	15	15	15
Extent of erosion		TONS		
Sheet erosion	29,104	25,643	23,232	20,416
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	-	-	-	-
Streambank erosion	3,234	3,234	3,234	3,234
Total	32,338	28,877	26,466	23,650
Average annual damages		DOLLARS		
Program A	-	-	-	-
Program B	-	-	-	-

Table 11 - Sediment and erosion problems and damages, WRPA 2 (Cont.)

	NEEDS FOR PROTECTION			
	1970	1980	2000	2020
St. Francis River (5) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	749,212	726,167	695,673	679,716
Gully erosion	3,000	2,970	2,940	2,910
Floodplain scour	-	-	-	-
Roadbanks	1,019	1,000	978	937
Total	753,231	730,137	699,591	683,563
		MILES		
Streambank erosion	257	257	257	257
Extent of erosion		TONS		
Sheet erosion	4,571,896	4,163,842	3,734,373	3,317,014
Gully erosion	903,786	652,598	398,223	359,123
Floodplain scour	-	-	-	-
Roadbanks	305,127	119,600	76,030	53,231
Streambank erosion	631,864	631,864	631,864	631,864
Total	6,412,673	5,567,904	4,840,490	4,361,232
Average annual damages		DOLLARS		
Program A	211,112	260,638	267,839	288,806
Program B	211,112	260,638	288,002	310,948
L'Anguille River (5b) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	89,944	86,060	79,827	78,082
Gully erosion	2,570	2,540	2,510	2,490
Floodplain scour	-	-	-	-
Roadbanks	896	885	860	820
Total	93,410	89,485	83,197	81,392
		MILES		
Streambank erosion	213	213	213	213
Extent of erosion		TONS		
Sheet erosion	1,121,287	1,054,010	986,730	897,030
Gully erosion	771,946	563,500	347,400	316,500
Floodplain scour	-	-	-	-
Roadbanks	223,982	89,600	58,200	42,600
Streambank erosion	329,313	329,313	329,313	329,313
Total	2,446,528	2,036,423	1,721,643	1,585,443
Average annual damages		DOLLARS		
Program A	146,357	162,057	171,751	184,666
Program B	146,357	162,057	184,659	198,866

Table 11 - Sediment and erosion problems and damages, WRPA 2 (Cont.)

	NEEDS FOR PROTECTION			
	1970	1980	2000	2020
Little River Ditches (5a) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	120,704	107,979	94,921	89,755
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	107	105	103	98
Total	120,811	108,084	95,024	89,853
		MILES		
Streambank erosion	74	74	74	74
Extent of erosion		TONS		
Sheet erosion	414,599	389,720	364,850	331,680
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	36,277	14,510	9,430	6,900
Streambank erosion	55,821	55,821	55,821	55,821
Total	506,697	460,051	430,101	394,401
Average annual damages		DOLLARS		
Program A	58,369	66,806	73,738	77,338
Program B	58,369	66,806	79,237	83,339
SUMMARY - WRPA 2				
Land area affected by erosion		ACRES		
Sheet erosion	1,759,973	1,686,117	1,600,869	1,555,863
Gully erosion	9,436	9,327	9,226	9,131
Floodplain scour	-	-	-	-
Roadbanks	4,499	4,420	4,318	4,135
Total	1,773,908	1,699,864	1,614,413	1,569,129
		MILES		
Streambank erosion	1,093	1,093	1,093	1,093
Extent of erosion		TONS		
Sheet erosion	11,220,091	10,219,805	9,208,330	8,180,143
Gully erosion	2,858,092	2,067,892	1,264,911	1,143,006
Floodplain scour	-	-	-	-
Roadbanks	1,296,396	511,001	326,387	230,940
Streambank erosion	2,015,294	2,015,294	2,015,294	2,015,294
Total	17,389,873	14,813,992	12,814,922	11,569,383
Average annual damages		DOLLARS		
Program A	904,539	1,024,735	1,078,198	1,141,941
Program B	904,539	1,024,735	1,159,285	1,229,732



WRPA 3

W R P A 3

WRPA 3 is located in the southwest corner of Kentucky, the western portion of Tennessee, and the extreme northern portion of Mississippi. It is located in the northeast portion of the Lower Mississippi Region and contains about 6.8 million acres or approximately 10,653 square miles of land and water area. The principal drainage areas include the Obion, Forked Deer, Hatchie, and Wolf Rivers in Tennessee and Mayfield Creek in Kentucky.

The topography of the area is fairly uniform, ranging from flat along the stream bottoms to rolling hills. The hills become more rolling as you move from the Mississippi River toward the eastern edge of the area. The climate is mild with an average annual temperature of around 61 degrees. The average length of the growing season is about 210 days and the normal annual precipitation is approximately 51 inches.

The present land use of WRPA 3 is as follows: cropland,(including pastured cropland), 2,952,000 acres; pasture, 929,000 acres; forest 2,310,000 acres; other agricultural land, 200,000 acres; urban areas, 355,000 acres; small water areas, 32,000 acres; and large water areas, 40,000 acres.

The WRPA is made up mostly of LRA 134 which is Southern Mississippi Valley Silty Uplands and is highly erosive. A small area is made up of the Southern Coastal Plains (LRA 133) and Southern Mississippi Valley Alluvium (LRA 131) Land Resource Areas. More than 60 percent of the land area is affected by erosion. This is the second highest percentage of any WRPA in the region. The average gross erosion on the affected land for the area is 13.3 tons per acre. Of the total erosion, 61 percent is from sheet erosion, 36 percent is from gully and channel erosion, and 3 percent is from roads. There are 2,877 miles of streambank affected by erosion.

The estimated average annual yields of sediment at the outlets of the subbasins range from 1,020 to 1,638 tons per square mile per year except in the Hatchie River where the yield is 459 tons. The total average annual damages in WRPA 3 are about $7,728,000. Sediment causes 96 percent of the damages. About 60 percent of the total damages is in the Obion River and 28 percent is in the South Fork of Forked Deer River. Nearly one-half of the area affected by erosion in the Obion River is in cropland and more than 90 percent of the cropland is in LRA 134, Southern Mississippi Valley Silty Uplands, which is highly erosive.

Erosion and sediment are causing a degradation of soils in WRPA 3 at a rapid rate by sheet and gully erosion and by sterile overwash on the lower, more productive soils. High sediment yields are causing a

reduction in quality of surface water and the associated fishery resource is being damaged. Both erosion and sediment are creating a harmful effect on the aesthetics of the area.

The CNI subbasins and LRA's are shown in figure 5.

The problems and damages of WRPA 3 are shown in table 12.

Table 12 - Sediment and erosion problems and damages, WRPA 3

	NEEDS FOR PROTECTION			
	1970	1980	2000	2020
Mississippi River (0) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	565,535	560,535	540,329	521,036
Gully erosion	5,310	4,779	4,301	3,871
Floodplain scour	-	-	-	-
Roadbanks	147	132	119	107
Total	570,992	565,446	544,749	525,014
		MILES		
Streambank erosion	72	72	72	72
Extent of erosion		TONS		
Sheet erosion	5,016,262	4,182,910	3,180,040	2,407,806
Gully erosion	1,115,100	903,231	731,170	592,263
Floodplain scour	-	-	-	-
Roadbanks	14,847	12,012	9,746	7,886
Streambank erosion	2,441	2,441	2,441	2,441
Total	6,148,650	5,100,594	3,923,397	3,010,396
Average annual damages		DOLLARS		
Program A	185,785	204,488	203,003	308,656
Program B	185,785	204,655	260,638	319,627

Table 12 - Sediment and erosion problems and damages, WRPA 3 (Cont.)

	NEEDS FOR PROTECTION			
	1970	1980	2000	2020
North Fork Forked Deer River (Ta2) Subbasin				
Land area affected by erosion	ACRES			
Sheet erosion	321,323	315,961	315,961	307,890
Gully erosion	6,367	5,098	4,080	3,264
Floodplain scour	-	-	-	-
Roadbanks	1,341	1,073	859	688
Total	329,031	322,132	320,900	311,842
	MILES			
Streambank erosion	478	478	478	478
Extent of erosion	TONS			
Sheet erosion	3,864,886	2,994,462	2,435,141	1,932,458
Gully erosion	1,165,161	841,170	603,842	477,312
Floodplain scour	-	-	-	-
Roadbanks	87,165	62,228	44,668	35,371
Streambank erosion	80,279	80,279	80,279	80,279
Total	5,197,491	3,978,139	3,163,930	2,525,420
Average annual damages	DOLLARS			
Program A	247,492	272,028	337,198	416,206
Program B	247,492	272,250	348,126	430,282
Obion River (1) Subbasin				
Land area affected by erosion	ACRES			
Sheet erosion	737,820	731,820	723,596	715,255
Gully erosion	33,611	26,889	21,512	17,208
Floodplain scour	-	-	-	-
Roadbanks	5,793	4,634	3,106	2,482
Total	777,224	763,343	748,214	734,945
	MILES			
Streambank erosion	1,201	1,201	1,201	1,201
Extent of erosion	TONS			
Sheet erosion	7,511,985	6,157,193	4,988,851	4,004,248
Gully erosion	7,058,310	5,082,021	3,657,040	2,632,824
Floodplain scour	-	-	-	-
Roadbanks	984,810	708,966	428,628	307,768
Streambank erosion	183,996	183,996	183,996	183,996
Total	15,739,101	12,132,176	9,258,515	7,128,836
Average annual damages	DOLLARS			
Program A	4,688,620	5,350,449	7,280,140	9,953,385
Program B	4,688,620	5,358,743	7,468,960	10,216,667

Table 12 - Sediment and erosion problems and damages, WRPA 3 (Cont.)

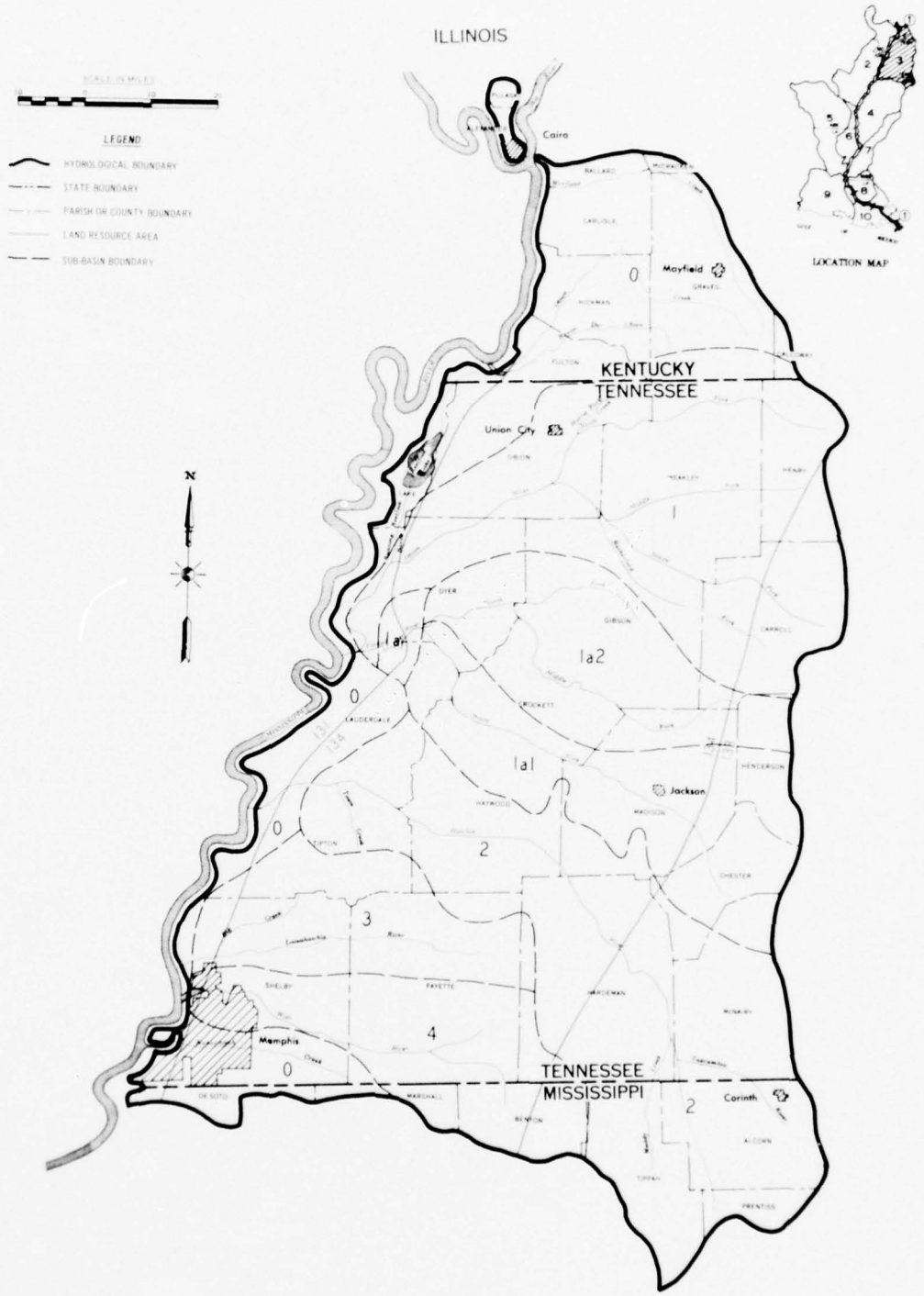
	NEEDS FOR PROTECTION			
	1970	1980	2000	2020
South Fork Forked Deer River (1a1) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	380,021	374,783	372,783	367,686
Gully erosion	7,142	5,714	4,572	3,658
Floodplain scour	-	-	-	-
Roadbanks	1,503	1,203	962	771
Total	388,666	381,700	378,317	372,115
		MILES		
Streambank erosion	462	462	462	462
Extent of erosion		TONS		
Sheet erosion	5,196,340	4,418,329	3,681,758	2,963,753
Gully erosion	1,306,986	942,810	676,656	486,514
Floodplain scour	-	-	-	-
Roadbanks	97,695	69,774	50,024	36,237
Streambank erosion	79,065	79,065	79,065	79,065
Total	6,680,086	5,509,978	4,487,503	3,565,569
Average annual damages		DOLLARS		
Program A	2,158,900	2,434,901	3,439,585	4,799,435
Program B	2,158,900	2,511,545	3,522,455	4,917,921
Forked Deer River (1a) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	7,432	10,541	10,131	9,817
Gully erosion	63	51	39	31
Floodplain scour	-	-	-	-
Roadbanks	27	22	18	15
Total	7,522	10,614	10,188	9,863
		MILES		
Streambank erosion	11	11	11	11
Extent of erosion		TONS		
Sheet erosion	178,108	246,078	201,403	175,576
Gully erosion	11,529	8,415	5,772	4,123
Floodplain scour	-	-	-	-
Roadbanks	1,755	1,276	936	705
Streambank erosion	1,848	1,848	1,848	1,848
Total	193,240	257,617	209,959	182,252
Average annual damages		DOLLARS		
Program A	189,737	214,085	303,406	424,824
Program B	189,737	220,914	310,626	435,192

Table 12 - Sediment and erosion problems and damages, WRPA 3 (Cont.)

	NEEDS FOR PROTECTION			
	1970	1980	2000	2020
Hatchie River (2) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	1,035,294	1,021,808	1,016,808	1,011,438
Gully erosion	26,800	21,440	17,152	13,722
Floodplain scour	-	-	-	-
Roadbanks	924	740	593	475
Total	1,063,018	1,043,988	1,034,553	1,025,635
		MILES		
Streambank erosion	20	20	20	20
Extent of erosion		TONS		
Sheet erosion	4,651,445	3,968,048	3,207,225	2,679,730
Gully erosion	2,790,850	1,847,720	1,225,592	815,858
Floodplain scour	-	-	-	-
Roadbanks	101,318	70,164	48,844	34,016
Streambank erosion	5,000	5,000	5,000	5,000
Total	7,548,613	5,890,932	4,486,661	3,534,604
Average annual damages		DOLLARS		
Program A	67,065	78,097	79,104	78,270
Program B	67,065	78,097	82,904	82,953
Loosahatchie (3) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	225,935	220,769	205,686	190,560
Gully erosion	6,150	4,920	3,936	3,149
Floodplain scour	-	-	-	-
Roadbanks	420	336	269	215
Total	232,505	226,025	209,891	193,924
		MILES		
Streambank erosion	359	359	359	359
Extent of erosion		TONS		
Sheet erosion	1,581,580	1,333,949	1,001,269	703,513
Gully erosion	1,740,450	1,116,840	716,352	459,754
Floodplain scour	-	-	-	-
Roadbanks	42,420	30,576	22,058	15,910
Streambank erosion	53,850	53,850	53,850	53,850
Total	3,418,300	2,535,215	1,793,529	1,233,027
Average annual damages		DOLLARS		
Program A	68,410	71,030	73,382	68,681
Program B	68,410	71,030	76,972	72,809

Table 12 - Sediment and erosion problems and damages, WRPA 3 (Cont.)

	NEEDS FOR PROTECTION			
	1970	1980	2000	2020
Wolf River (4) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	299,024	285,853	270,768	255,638
Gully erosion	32,807	26,246	20,997	16,799
Floodplain scour	-	-	-	-
Roadbanks	855	685	549	440
Total	332,686	312,784	292,314	272,877
		MILES		
Streambank erosion	274	274	274	274
Extent of erosion		TONS		
Sheet erosion	1,800,263	1,294,397	853,626	526,019
Gully erosion	2,291,289	1,651,184	1,188,423	856,623
Floodplain scour	-	-	-	-
Roadbanks	86,355	62,335	44,969	32,441
Streambank erosion	44,082	44,082	44,082	44,082
Total	4,221,989	3,051,998	2,131,100	1,459,165
Average annual damages		DOLLARS		
Program A	122,208	128,719	135,224	128,921
Program B	122,208	128,719	141,799	136,740
SUMMARY - WRPA 3				
Land area affected by erosion		ACRES		
Sheet erosion	3,572,384	3,522,070	3,456,062	3,379,320
Gully erosion	118,250	95,137	76,589	61,702
Floodplain scour	-	-	-	-
Roadbanks	11,010	8,825	6,475	5,193
Total	3,701,644	3,626,032	3,539,126	3,446,215
		MILES		
Streambank erosion	2,877	2,877	2,877	2,877
Extent of erosion		TONS		
Sheet erosion	29,800,869	24,595,366	19,549,313	15,393,103
Gully erosion	17,479,675	12,393,391	8,804,847	6,325,271
Floodplain scour	-	-	-	-
Roadbanks	1,416,365	1,017,331	649,873	470,334
Streambank erosion	450,561	450,561	450,561	450,561
Total	49,147,470	38,456,649	29,454,594	22,639,269
Average annual damages		DOLLARS		
Program A	7,728,217	8,753,797	11,851,042	16,178,378
Program B	7,728,217	8,845,953	12,212,480	16,612,191

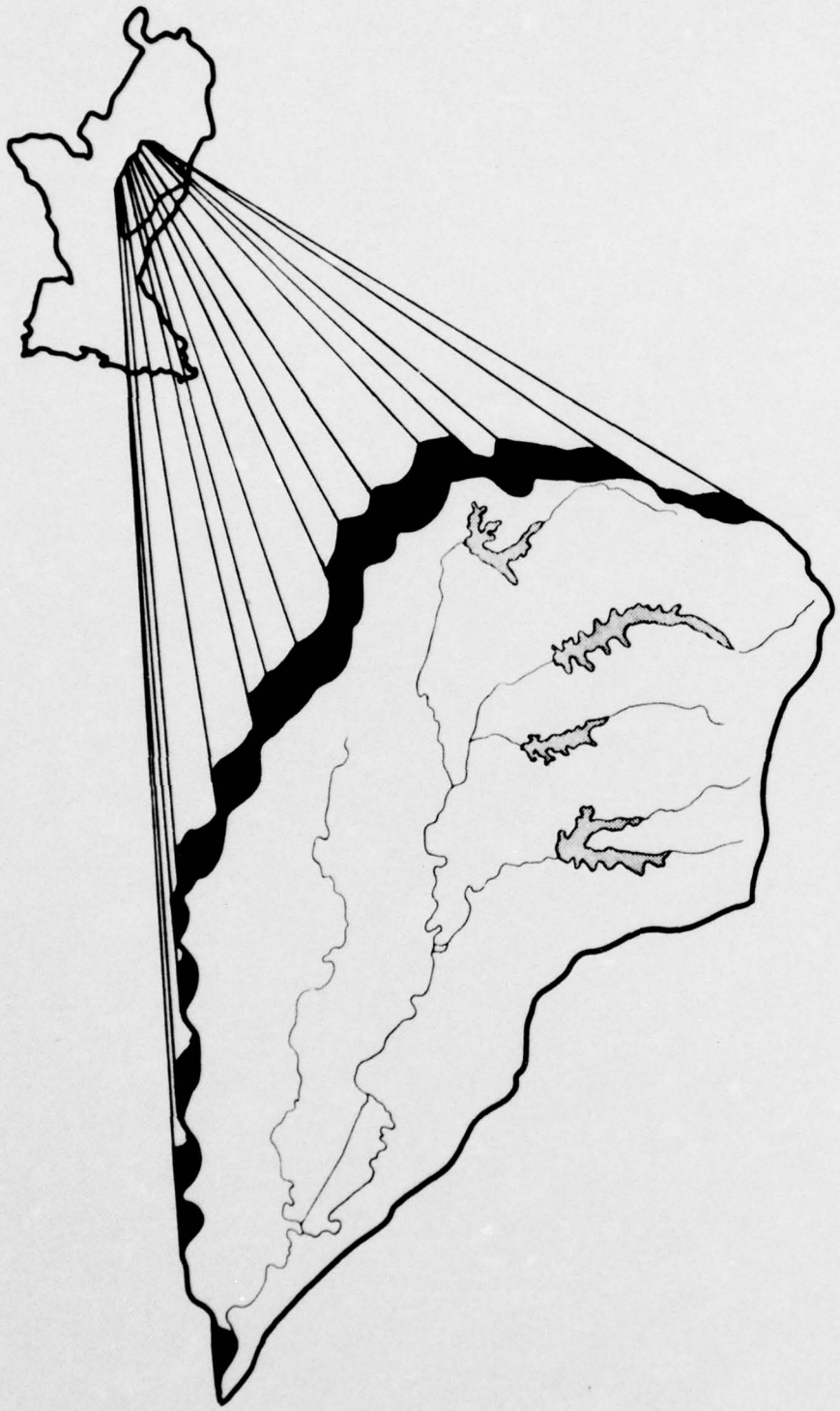


LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

CNI HYDROLOGIC SUBBASINS

WRPA 3

FIGURE 5



WRPA 4

W R P A 4

WRPA 4 is located along the east side of the Mississippi River in northwest Mississippi and contains most of the alluvial valley land in the state. It contains approximately 8.5 million acres or approximately 13,355 square miles of land and water area. The main drainage is the Yazoo River. The principal tributaries to the system include the Coldwater, Tallahatchie, Yocona, Yalobusha, and Sunflower Rivers, and Steele Bayou.

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 are on the eastern side of the area and have a gently rolling to rolling topography.

The climate is mild with an annual average temperature of around 64 degrees. The average length of growing season is from 225 to 230 days and the normal annual precipitation is around 52 inches.

The present land use of WRPA 4 is as follows: cropland (including pastured cropland), 3,640,000 acres; pasture, 943,000 acres; forest, 3,222,000 acres; other agricultural land, 207,000 acres; urban and built-up areas, 328,000 acres; small water areas, 133,000 acres; and large water areas, 74,000 acres.

About 51 percent of the area is in Land Resource Area 131, 28 percent is in LRA 134, and 21 percent is in LRA 133. Approximately 38 percent of the area is affected by erosion. The average gross erosion on the affected land is 7.4 tons per acre per year. Of the total erosion, 71 percent is from sheet erosion, 26 percent is from gully and channel erosion, and 3 percent is from roads. There are 2,767 miles of streambank affected by erosion.

The estimated average annual yield of sediment at the outlets of the subbasin range from a high of 1,601 tons in the Coldwater River to a low of 138 tons per square mile in Steele Bayou. The total average annual damages from erosion is about $2,723,000. Sediment causes 58 percent of the damages and 41 percent is from streambank erosion.

The soils in the upland area are inherently highly erosive and sedimentation and erosion continue to occur. This causes a degradation of soils and sterile overwash in the lower more productive alluvial valley. High sedimentation yields are causing a reduction in quality of surface water and the associated fishery resource is being damaged. Both erosion and sediment are creating a harmful effect on the aesthetics of the area.

The CNI subbasins and LRA's are shown in figure 6.



LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

CNI HYDROLOGIC SUBBASINS

WRPA 4

FIGURE 6

The problems and damages for WRPA 4 are shown in table 13.

Table 13 - Sediment and erosion problems and damages, WRPA 4

	NEEDS FOR PROTECTION			
	1970	1980	2000	2020
Tallahatchie River (6a) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	1,050,458	1,051,408	1,041,408	1,025,166
Gully erosion	2,748	2,722	2,715	2,661
Floodplain scour	254	127	126	124
Roadbanks	3,203	3,190	3,143	3,094
Total	1,056,663	1,057,447	1,047,392	1,031,045
		MILES		
Streambank erosion	1,178	1,178	1,178	1,178
Extent of erosion		TONS		
Sheet erosion	5,561,853	5,172,799	4,846,724	4,085,420
Gully erosion	302,280	217,760	135,750	119,745
Floodplain scour	5,080	2,540	2,520	2,480
Roadbanks	290,909	115,849	71,983	57,007
Streambank erosion	1,336,733	1,336,733	1,336,733	1,336,733
Total	7,496,855	6,845,681	6,393,710	5,601,385
Average annual damages		DOLLARS		
Program A	977,683	1,338,142	1,457,921	1,591,113
Program B	977,683	1,338,142	1,549,871	1,696,063
Yalobusha River (6a2) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	655,565	652,565	645,524	636,524
Gully erosion	1,528	1,511	1,511	1,505
Floodplain scour	162	80	80	79
Roadbanks	2,108	2,090	2,048	2,003
Total	659,363	656,246	649,163	640,111
		MILES		
Streambank erosion	573	573	573	573
Extent of erosion		TONS		
Sheet erosion	2,606,593	2,356,984	2,231,982	2,111,955
Gully erosion	168,080	120,880	75,550	67,725
Floodplain scour	3,240	1,600	1,600	1,580
Roadbanks	185,608	73,448	45,906	36,445
Streambank erosion	970,272	970,272	970,272	970,272
Total	3,933,793	3,523,184	3,325,310	3,187,977
Average annual damages		DOLLARS		
Program A	716,883	963,901	1,041,683	1,139,678
Program B	716,883	963,901	1,107,301	1,214,834

Table 13 - Sediment and erosion problems and damages, WRPA 4 (Cont.)

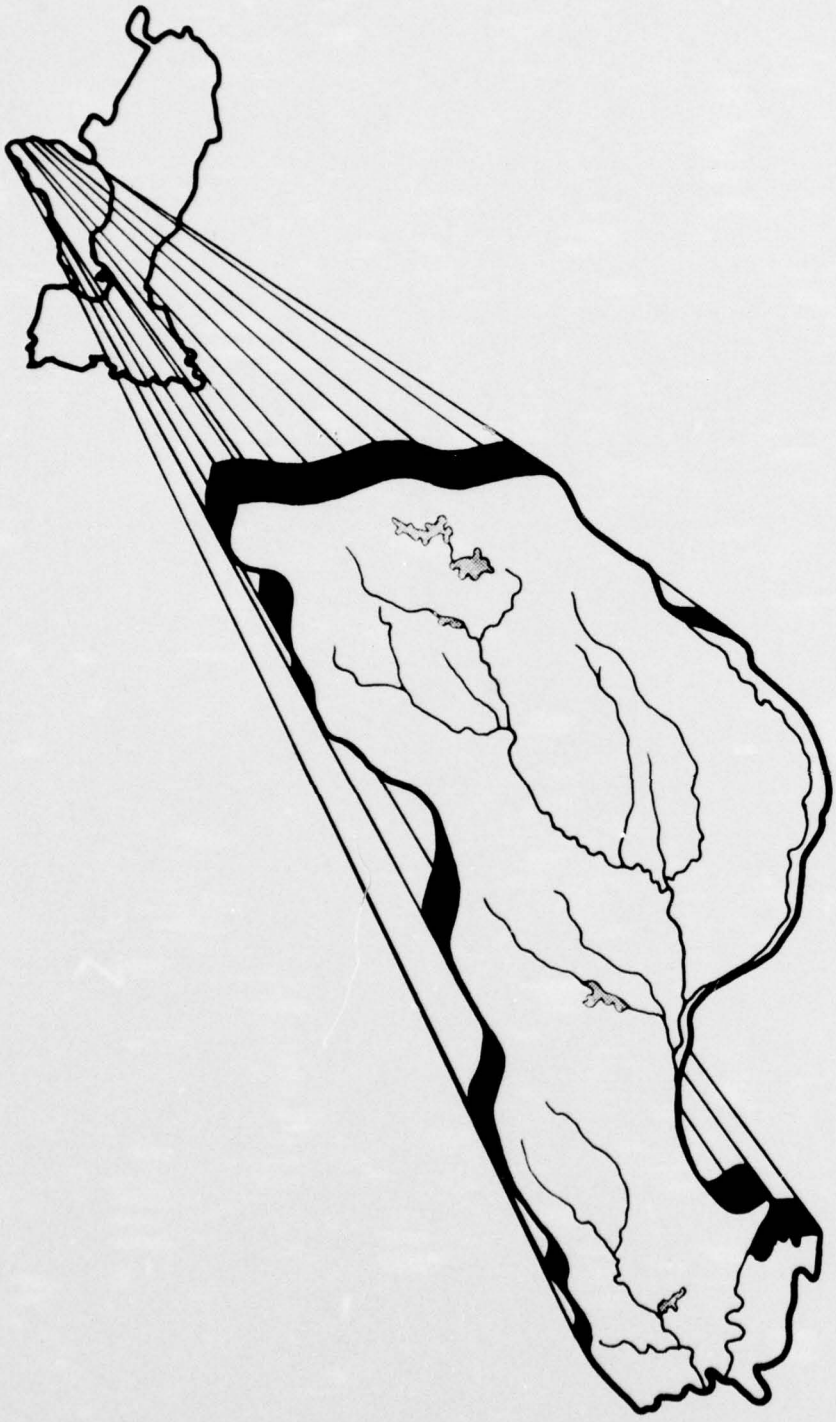
	NEEDS FOR PROTECTION			
	1970	1980	2000	2020
Coldwater River (6a1) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	496,772	498,372	491,047	483,710
Gully erosion	2,170	2,136	2,109	2,103
Floodplain scour	96	47	47	46
Roadbanks	1,087	1,073	1,052	1,018
Total	500,125	501,628	494,255	486,877
		MILES		
Streambank erosion	699	699	699	699
Extent of erosion		TONS		
Sheet erosion	3,908,057	3,635,838	3,345,323	3,085,203
Gully erosion	238,640	170,880	105,450	94,635
Floodplain scour	1,920	940	940	920
Roadbanks	102,262	40,442	24,952	6,415
Streambank erosion	1,964,317	1,964,317	1,964,317	1,964,317
Total	6,215,196	5,812,417	5,440,982	5,151,490
Average annual damages		DOLLARS		
Program A	606,787	863,786	978,347	1,081,922
Program B	606,787	863,786	1,040,142	1,153,176
Steele Bayou (6e) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	4,068	3,568	3,068	3,068
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	25	22	19	19
Total	4,093	3,590	3,087	3,087
		MILES		
Streambank erosion	-	-	-	-
Extent of erosion		TONS		
Sheet erosion	8,829	7,615	6,236	6,009
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	1	1	1	1
Streambank erosion	-	-	-	-
Total	8,830	7,616	6,237	6,010
Average annual damages		DOLLARS		
Program A	-	-	-	-
Program B	-	-	-	-

Table 13 - Sediment and erosion problems and damages, WRPA 4 (Cont.)

	NEEDS FOR PROTECTION			
	1970	1980	2000	2020
Sunflower River (6b) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	112,032	106,449	96,286	76,286
Gully erosion	79	79	79	79
Floodplain scour	3	1	1	1
Roadbanks	610	576	514	393
Total	112,724	107,105	96,880	76,759
		MILES		
Streambank erosion	72	72	72	72
Extent of erosion		TONS		
Sheet erosion	243,360	230,832	197,057	150,466
Gully erosion	8,690	6,320	3,950	3,555
Floodplain scour	60	20	20	20
Roadbanks	2,901	1,176	740	591
Streambank erosion	28,219	28,219	28,219	28,219
Total	283,230	266,567	229,986	182,851
Average annual damages		DOLLARS		
Program A	10,870	15,900	18,244	20,176
Program B	10,870	15,900	19,395	21,507
Yazoo River (6) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	549,546	553,227	534,227	523,824
Gully erosion	2,550	2,550	2,501	2,476
Floodplain scour	92	46	45	45
Roadbanks	1,142	1,142	1,070	1,028
Total	553,330	556,965	537,843	527,373
		MILES		
Streambank erosion	245	245	245	245
Extent of erosion		TONS		
Sheet erosion	2,778,539	2,665,402	2,290,360	2,090,886
Gully erosion	280,500	204,000	125,050	111,420
Floodplain scour	1,840	920	900	900
Roadbanks	94,206	37,686	23,104	18,303
Streambank erosion	324,978	324,978	324,978	324,978
Total	3,480,063	3,232,986	2,764,392	2,546,487
Average annual damages		DOLLARS		
Program A	410,553	593,078	680,431	752,312
Program B	410,553	593,078	723,373	801,943

Table 13 - Sediment and erosion problems and damages, WRPA 4 (Cont.)

	NEEDS FOR PROTECTION			
	1970	1980	2000	2020
SUMMARY - WRPA 4				
Land area affected by erosion		ACRES		
Sheet erosion	2,868,441	2,865,589	2,811,560	2,748,578
Gully erosion	9,075	8,998	8,915	8,824
Floodplain scour	607	301	299	295
Roadbanks	8,175	8,093	7,846	7,555
Total	2,886,298	2,882,981	2,828,620	2,765,252
		MILES		
Streambank erosion	2,767	2,767	2,767	2,767
Extent of erosion		TONS		
Sheet erosion	15,107,231	14,069,470	12,917,682	11,529,939
Gully erosion	998,190	719,840	445,750	397,080
Floodplain scour	12,140	6,020	5,980	5,900
Roadbanks	675,887	268,602	166,686	118,762
Streambank erosion	4,624,519	4,624,519	4,624,519	4,624,519
Total	21,417,967	19,688,451	18,160,617	16,676,200
Average annual damages		DOLLARS		
Program A	2,722,776	3,774,807	4,176,626	4,585,201
Program B	2,722,776	3,774,807	4,440,082	4,887,523



WRPA 5

W R P A 5

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. It contains about 13.1 million acres or approximately 20,412 square miles of land and water area. The area is made up of one major drainage system, the Ouachita River. The red River, a major drainage system from outside the region, crosses the southern end of the area. Major tributary streams to the Ouachita River are the Little Missouri River, the Saline River, Bayou Bartholomew, and Little River.

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 climate is mild with an average annual temperature of around 65 degrees. 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.

The present land use of WRPA 5 is as follows: cropland (including pastured cropland), 971,000 acres; pasture, 982,000 acres; forest, 10,228,000 acres; other agricultural land, 111,000; urban and builtup areas, 440,000 acres; federal land, 81,000 acres; small water areas, 76,000 acres; and large water areas, 175,000 acres.

Approximately 69 percent of the area is in Land Resource Area 133 13 percent is in LRA 119, 10 percent is in LRA 131, 7 percent is in LRA 134, and 1 percent is in LRA 86.

Approximately 50 percent of the total area is affected by erosion. The average annual gross erosion rate on the affected land is 1.7 tons per acre which is one of the lowest in the region. Of the total erosion, 89 percent is from sheet erosion, 7 percent is from gully and channel erosion, and 4 percent is from roads. There are 638 miles of streambanks affected by erosion in the area.

The estimated average annual yields for sediment at the outlets of the principal streams range from a high of 375 tons in Bayou Bartholomew to a low of 22 tons of sediment per square mile in Black River. The total total average annual damages in WRPA 5 are about $509,000. About one-fourth of the damages from sediment and erosion is occuring in the Ouachita River subbasin. Erosion and sediment have not significantly affected the natural resources or the environment in the area.

The CNI subbasins and LRA's are shown in figure 7.



LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

CNI HYDROLOGIC SUBBASINS

WRPA 5

FIGURE 7

The problems and damages for WRPA 5 are shown in table 14.

Table 14 - Sediment and erosion problems and damages, WRPA 5

	NEEDS FOR PROTECTION			
	1970	1980	2000	2020
Big Corine Bayou [3p1d(1)] Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	273,632	271,043	262,912	256,181
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	784	736	720	700
Total	274,416	271,779	263,632	256,881
		MILES		
Streambank erosion	23	23	23	23
Extent of erosion		TONS		
Sheet erosion	507,730	477,300	446,800	406,200
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	9,675	3,870	2,510	1,840
Streambank erosion	16,810	16,810	16,810	16,810
Total	534,215	497,980	466,120	424,850
Average annual damages		DOLLARS		
Program A	9,903	12,256	13,713	14,596
Program B	9,903	12,256	14,310	15,179
Ouachita River (3p1) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	1,859,194	1,847,916	1,787,919	1,711,327
Gully erosion	32	32	30	30
Floodplain scour	-	-	-	-
Roadbanks	2,740	2,710	2,630	2,520
Total	1,861,966	1,850,658	1,790,579	1,713,877
		MILES		
Streambank erosion	160	160	160	160
Extent of erosion		TONS		
Sheet erosion	2,753,071	2,587,900	2,422,700	2,202,500
Gully erosion	6,408	4,678	2,884	2,627
Floodplain scour	-	-	-	-
Roadbanks	111,974	44,790	29,113	21,275
Streambank erosion	225,815	225,815	225,815	225,815
Total	3,097,268	2,863,183	2,680,512	2,452,217
Average annual damages		DOLLARS		
Program A	164,452	207,729	238,573	264,302
Program B	164,452	207,729	248,724	274,864

Table 14 - Sediment and erosion problems and damages, WRPA 5 (Cont.)

	NEEDS FOR PROTECTION			
	1970	1980	2000	2020
Bayou Bartholomew (3p1c) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	238,022	235,152	227,952	222,704
Gully erosion	252	250	245	244
Floodplain scour	-	-	-	-
Roadbanks	585	580	562	538
Total	238,859	235,982	228,759	223,486
		MILES		
Streambank erosion	141	141	141	141
Extent of erosion		TONS		
Sheet erosion	875,902	823,348	770,794	700,722
Gully erosion	63,106	46,067	28,398	25,873
Floodplain scour	-	-	-	-
Roadbanks	131,710	52,684	34,245	25,025
Streambank erosion	134,458	134,458	134,458	134,458
Total	1,205,176	1,056,557	967,895	886,078
Average annual damages		DOLLARS		
Program A	55,790	64,976	71,141	76,024
Program B	55,790	64,976	74,188	79,059
Little Missouri River (3p1a) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	642,026	636,233	624,798	614,351
Gully erosion	63	61	59	58
Floodplain scour	-	-	-	-
Roadbanks	211	208	202	194
Total	642,300	636,502	625,059	614,603
		MILES		
Streambank erosion	59	59	59	59
Extent of erosion		TONS		
Sheet erosion	1,004,764	944,478	884,192	803,811
Gully erosion	14,155	10,333	6,370	5,804
Floodplain scour	-	-	-	-
Roadbanks	51,167	20,467	13,303	9,722
Streambank erosion	80,907	80,907	80,907	80,907
Total	1,150,993	1,056,185	984,772	900,244
Average annual damages		DOLLARS		
Program A	109,441	135,709	153,544	167,069
Program B	109,441	135,709	160,106	173,701

Table 14 - Sediment and erosion problems and damages, WRPA 5 (Cont.)

	NEEDS FOR PROTECTION			
	1970	1980	2000	2020
Saline River (3p1b) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	741,640	739,606	722,685	700,774
Gully erosion	18	18	16	16
Floodplain scour	-	-	-	-
Roadbanks	191	189	183	176
Total	741,849	739,813	722,884	700,966
		MILES		
Streambank erosion	55	55	55	55
Extent of erosion		TONS		
Sheet erosion	967,573	909,519	851,464	774,058
Gully erosion	3,696	2,698	1,663	1,515
Floodplain scour	-	-	-	-
Roadbanks	43,003	17,201	11,181	8,171
Streambank erosion	76,336	76,336	76,336	76,336
Total	1,090,608	1,005,754	940,644	860,080
Average annual damages		DOLLARS		
Program A	57,387	72,746	83,761	93,267
Program B	57,387	72,746	87,426	97,013
Bayou D'Arbonne (3p1d) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	446,560	439,665	428,955	412,269
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	1,900	1,900	1,900	1,900
Total	448,460	441,565	430,855	414,169
		MILES		
Streambank erosion	58	58	58	58
Extent of erosion		TONS		
Sheet erosion	774,521	728,050	681,578	619,617
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	57	50	50	50
Streambank erosion	12,354	12,354	12,354	12,354
Total	786,932	740,454	693,982	632,021
Average annual damages		DOLLARS		
Program A	12,710	15,883	17,802	18,922
Program B	12,710	15,883	18,564	19,677

Table 14 - Sediment and erosion problems and damages, WRPA 5 (Cont.)

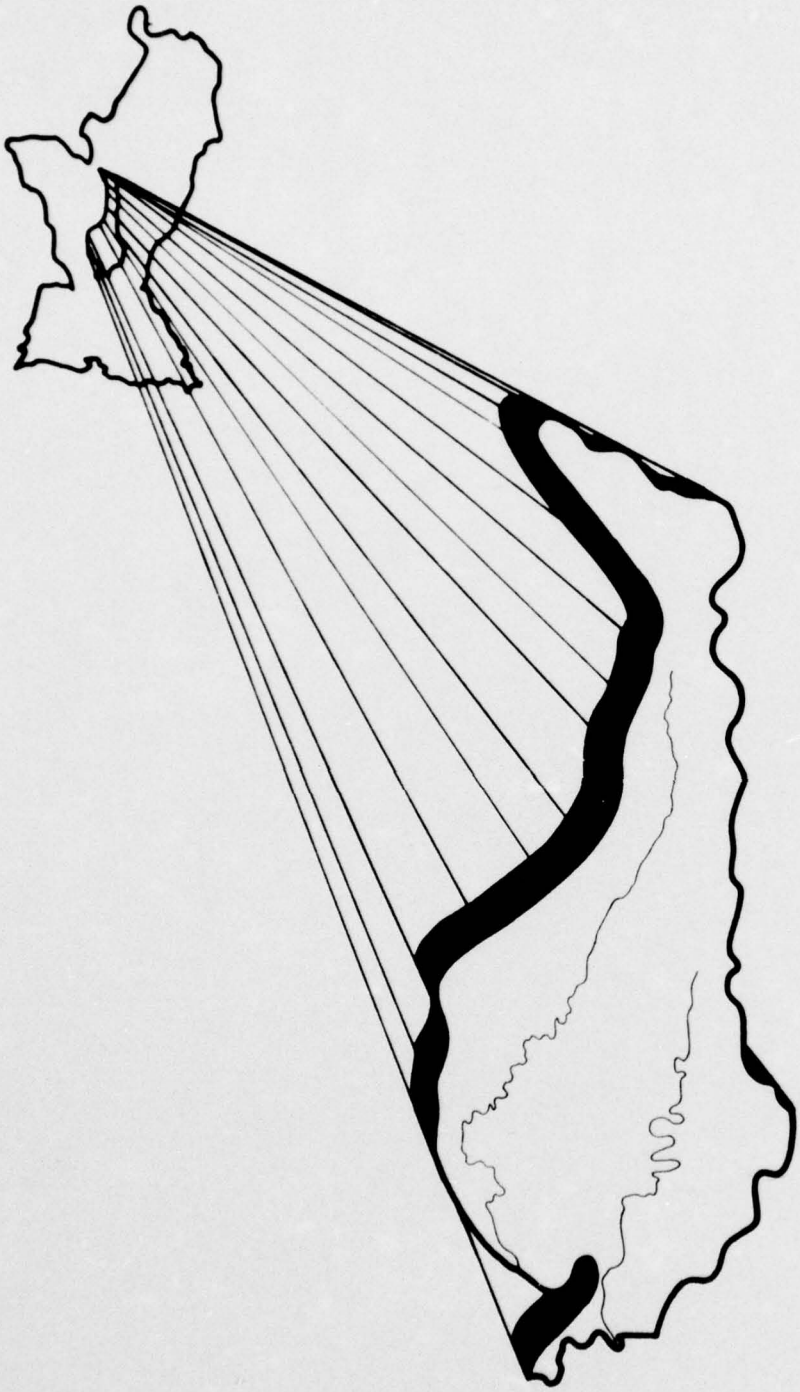
	NEEDS FOR PROTECTION			
	1970	1980	2000	2020
Little River Ditches (3p3) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	335,962	331,514	328,514	321,514
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	1,630	1,630	1,630	1,630
Total	337,592	333,144	330,144	323,144
		MILES		
Streambank erosion	40	40	40	40
Extent of erosion		TONS		
Sheet erosion	313,168	294,378	275,588	250,534
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	49	45	45	45
Streambank erosion	9,409	9,409	9,409	9,409
Total	322,626	303,832	285,042	259,988
Average annual damages		DOLLARS		
Program A	37,278	46,634	52,271	55,705
Program B	37,278	46,634	54,510	57,929
Black River (3p) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	294	294	294	294
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	-	-	-	-
Total	294	294	294	294
		MILES		
Streambank erosion	-	-	-	-
Extent of erosion		TONS		
Sheet erosion	56	56	56	56
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	-	-	-	-
Streambank erosion	-	-	-	-
Total	56	56	56	56
Average annual damages		DOLLARS		
Program A	-	-	-	-
Program B	-	-	-	-

Table 14 - Sediment and erosion problems and damages, WRPA 5 (Cont.)

	NEEDS FOR PROTECTION			
	1970	1980	2000	2020
Dugdemona River (3p3b) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	378,444	375,448	369,099	363,199
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	-	-	-	-
Total	378,444	375,448	369,099	363,199
		MILES		
Streambank erosion	49	49	49	49
Extent of erosion		TONS		
Sheet erosion	471,786	443,480	415,172	377,428
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	-	-	-	-
Streambank erosion	10,585	10,585	10,585	10,585
Total	482,371	454,065	425,757	388,013
Average annual damages		DOLLARS		
Program A	40,555	50,679	56,866	60,452
Program B	40,555	50,679	59,301	62,865
Castor Bayou (3p3a) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	396,259	394,059	389,376	384,695
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	1,900	1,900	1,900	1,900
Total	398,159	395,959	391,276	386,595
		MILES		
Streambank erosion	53	53	53	53
Extent of erosion		TONS		
Sheet erosion	424,769	399,282	373,800	339,815
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	57	50	50	50
Streambank erosion	11,369	11,369	11,369	11,369
Total	436,195	410,701	385,219	351,234
Average annual damages		DOLLARS		
Program A	14,220	17,770	19,939	21,223
Program B	14,220	17,770	20,793	22,070

Table 14 - Sediment and erosion problems and damages, WRPA 5 (Cont.)

	NEEDS FOR PROTECTION			
	1970	1980	2000	2020
Red River (3) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	240,207	240,206	234,918	234,818
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	1,452	1,452	1,452	1,452
Total	241,659	241,658	236,370	236,270
		MILES		
Streambank erosion	-	-	-	-
Extent of erosion		TONS		
Sheet erosion	247,251	232,416	217,581	197,800
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	41	36	36	36
Streambank erosion	-	-	-	-
Total	247,292	232,452	217,617	197,836
Average annual damages		DOLLARS		
Program A	6,897	8,610	9,638	10,230
Program B	6,897	8,610	10,051	10,638
SUMMARY - WRPA 5				
Land area affected by erosion		ACRES		
Sheet erosion	5,552,240	5,511,136	5,377,422	5,222,126
Gully erosion	365	361	350	348
Floodplain scour	-	-	-	-
Roadbanks	11,393	11,305	11,179	11,010
Total	5,563,998	5,522,802	5,388,951	5,233,484
		MILES		
Streambank erosion	638	638	638	638
Extent of erosion		TONS		
Sheet erosion	8,340,591	7,840,207	7,339,725	6,672,541
Gully erosion	87,365	63,776	39,315	35,819
Floodplain scour	-	-	-	-
Roadbanks	347,733	139,193	90,533	66,214
Streambank erosion	578,043	578,043	578,043	578,043
Total	9,353,732	8,621,219	8,047,616	7,352,617
Average annual damages		DOLLARS		
Program A	508,633	632,992	717,248	781,790
Program B	508,633	632,992	747,973	812,995



WRPA 6

W R P A 6

WRPA 6 is located in the west side of the Mississippi River and in southeast Arkansas and northeast Louisiana. It contains approximately 3.5 million acres or approximately 5,520 square miles of land and water area. The two primary streams of the area are the Boeuf River and the Tensas River. Bayou Macon is the tributary stream of the Tensas. The topography of the area is fairly flat with about three-fourths in the Mississippi Valley Alluvium. This alluvium area is broken by rolling hills of Crowley's Ridge which is made up of silty uplands.

The climate is mild with an average temperature of about 65 degrees. The average length of growing season is 240 days and the annual precipitation is about 52 inches.

The present land use of WRPA 6 is as follows: cropland (including pastured cropland), 2,026,000 acres; pasture, 494,000 acres; forest, 831,000 acres; other agricultural land, 32,000 acres; urban and builtup areas, 78,000 acres; small water areas, 40,000 acres; and large water areas, 32,000 acres.

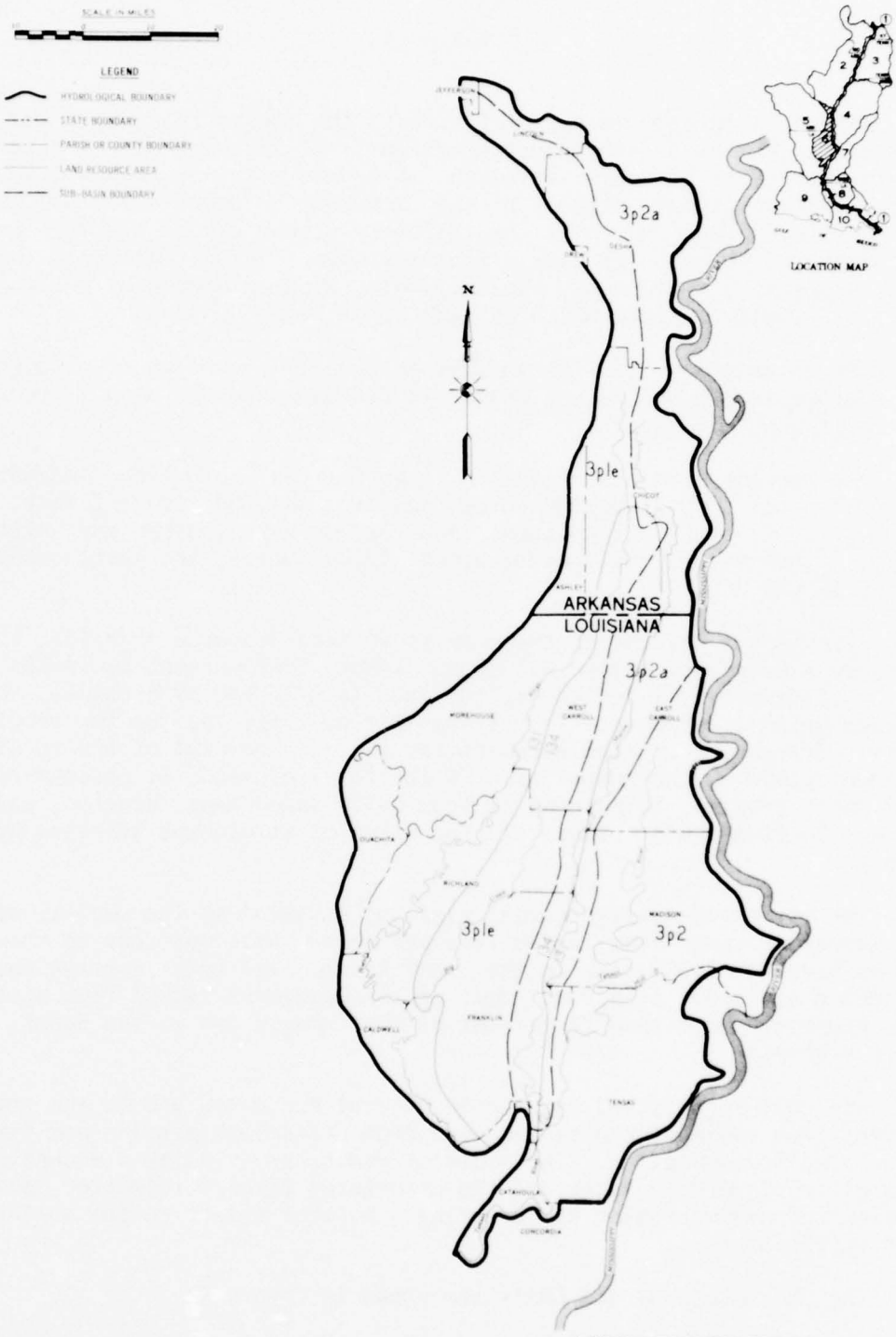
Seventy-six percent of the area is in Land Resource Area 131, the Southern Mississippi Valley Alluvium. Twenty-four percent is in LRA 134. Approximately 7 percent of the land is affected by erosion. The average gross erosion rate is 9.4 tons per acre per year on the eroding areas. Streambank erosion accounts for 75 to 96 percent of the total sediment yield in the subbasins. Of the total erosion, 19 percent is from sheet erosion, 80 percent is from gully and channel erosion, and 1 percent is from roads. There are 766 miles of streambank affected by erosion.

The estimated average annual yield of sediment at the outlets of the subbasins range from 12,400 tons per square mile per year in the Tensas River to 2,395 tons in the Boeuf River. The total average damages in WRPA 6 are about $359,000. Most of the damage is caused from streambank erosion. More than 70 percent of the damages are in the Boeuf River subbasin.

The only significant damages to natural resources and to the environment from sediment and erosion are from streambank erosion and the associated sedimentation. The sediment yields are causing a reduction in quality of surface water and the associated fishery resource. Both erosion and sedimentation are creating a harmful effect on the aesthetics of the area.

The CNI subbasins and LRA's are shown in figure 8.

The problems and damages of WRPA 6 are shown in table 15.



LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

CNI HYDROLOGIC SUBBASINS

WRPA 6

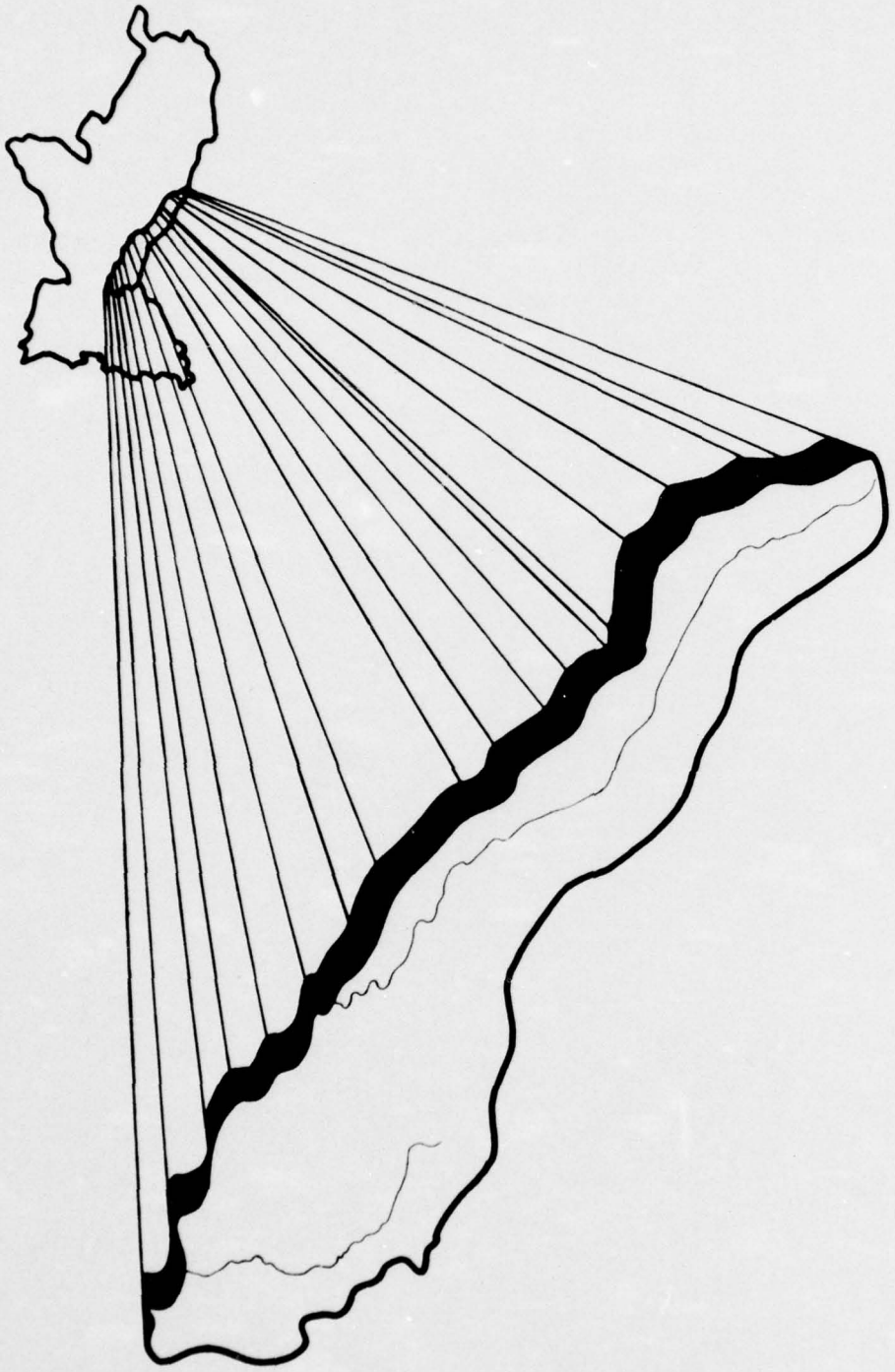
FIGURE 8

Table 15 - Sediment and erosion problems and damages, WRPA 6

	NEEDS FOR PROTECTION			
	1970	1980	2000	2020
Bayou Macon [3p2(a)] Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	50,848	48,549	43,959	40,366
Gully erosion	5	5	5	5
Floodplain scour	-	-	-	-
Roadbanks	530	525	509	488
Total	51,383	49,079	44,473	40,859
		MILES		
Streambank erosion	183	183	183	183
Extent of erosion		TONS		
Sheet erosion	107,580	92,729	75,609	62,567
Gully erosion	1,228	921	553	503
Floodplain scour	-	-	-	-
Roadbanks	6,588	2,635	1,713	1,252
Streambank erosion	419,001	419,001	419,001	419,001
Total	534,397	515,286	496,876	483,323
Average annual damages		DOLLARS		
Program A	88,200	122,259	138,645	165,662
Program B	88,200	122,259	149,843	180,162
Boeuf River [3p1(e)] Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	179,101	160,591	129,747	102,947
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	960	960	960	960
Total	180,061	161,551	130,707	103,907
		MILES		
Streambank erosion	401	401	401	401
Extent of erosion		TONS		
Sheet erosion	324,947	261,763	190,728	135,890
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	29	29	29	29
Streambank erosion	984,409	984,409	984,409	984,409
Total	1,309,385	1,246,201	1,175,166	1,120,328
Average annual damages		DOLLARS		
Program A	196,400	263,108	295,348	331,908
Program B	196,400	263,108	319,014	360,825

Table 15 - Sediment and erosion problems and damages, WRPA 6 (Cont.)

	NEEDS FOR PROTECTION			
	1970	1980	2000	2020
Tensas River (3p2) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	17,407	13,941	10,941	10,941
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	100	100	100	100
Total	17,507	14,041	11,041	11,041
		MILES		
Streambank erosion	182	182	182	182
Extent of erosion		TONS		
Sheet erosion	18,764	13,523	9,519	8,533
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	3	3	3	3
Streambank erosion	471,096	471,096	471,096	471,096
Total	489,863	484,622	480,618	479,632
Average annual damages		DOLLARS		
Program A	74,300	102,639	119,729	138,638
Program B	74,300	102,639	129,300	150,779
Summary - WRPA 6				
Land area affected by erosion		ACRES		
Sheet erosion	247,356	223,081	184,647	154,254
Gully erosion	5	5	5	5
Floodplain scour	-	-	-	-
Roadbanks	1,590	1,585	1,569	1,548
Total	248,951	224,671	186,221	155,807
		MILES		
Streambank erosion	766	766	766	766
Extent of erosion		TONS		
Sheet erosion	451,291	368,015	275,856	206,990
Gully erosion	1,228	921	553	503
Floodplain scour	-	-	-	-
Roadbanks	6,620	2,667	1,745	1,284
Streambank erosion	1,874,506	1,874,506	1,874,506	1,874,506
Total	2,333,645	2,246,109	2,152,660	2,083,283
Average annual damages		DOLLARS		
Program A	358,900	488,006	553,722	636,208
Program B	358,900	488,006	598,157	691,766



WRPA 7

W R P A 7

WRPA 7 is located in central and southwest Mississippi on the east side of the Mississippi River. It is located entirely within the State of Mississippi and contains approximately 4.2 million acres or approximately 6,573 square miles of land and water area. It is made up of two main drainage areas, the Big Black River and a group of individual streams that drain directly into the Mississippi River. These streams include the Homochitto River, Bayou Pierre, Coles Creek, St. Catherine Creek, and Buffalo River. The topography of the area ranges from the flat, unleveed Southern Mississippi Valley Alluvium to the steep bluff hills of the Southern Mississippi Valley Silty Uplands. However, most of the area is fairly uniform and is made up of rolling hills and valleys.

The climate is mild with an average temperature of around 66 degrees. The average length of growing season is 230 days and the normal annual precipitation is about 55 inches.

The present land use in WRPA 7 is as follows: cropland (including pastured cropland), 517,000 acres; pasture, 941,000 acres; forest, 2,509,000 acres; other agricultural land, 30,000 acres; urban and built-up areas, 116,000 acres; small water areas, 56,000 acres; and large water areas, 38,000 acres.

About 82 percent of the area is in Land Resource Area 134, 15 percent is in LRA 133, and 3 percent is in LRA 131. Approximately two-thirds of the area is affected by erosion. The average annual gross erosion rate is approximately 8.0 tons per acre. Of the total erosion, sheet erosion contributes 69 percent to the total sediment yield, channel and gully erosion contribute 28 percent, and roadbanks contribute 3 percent. There are 1,432 miles of streambanks affected by erosion in the area.

The average annual sediment yield at the outlets of the Big Black River is 452 tons per square mile per year. For the Homochitto River, the yield is 824 tons per square mile per year. Damages from the erosion and sediment are about $1,540,000 annually. Approximately 60 percent of the damages are in the Big Black River subbasin and 17 percent is in the Homochitto River subbasin. Sediment causes 72 percent of the damages and 26 percent is from streambank erosion.

The value of the soil as a resource is being reduced by sheet and gully erosion and by overwash from sediment deposition. The quality of surface water is reduced from pollution caused by high sediment yields and its value for municipal, industrial, recreational, and fishing uses is severely reduced. The aesthetics and the natural beauty of the area are also being degraded by erosion and sediment.

The CNI subbasins and LRA's are shown in figure 9.



LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

CNI HYDROLOGIC SUBBASINS

WRPA 7

FIGURE 9

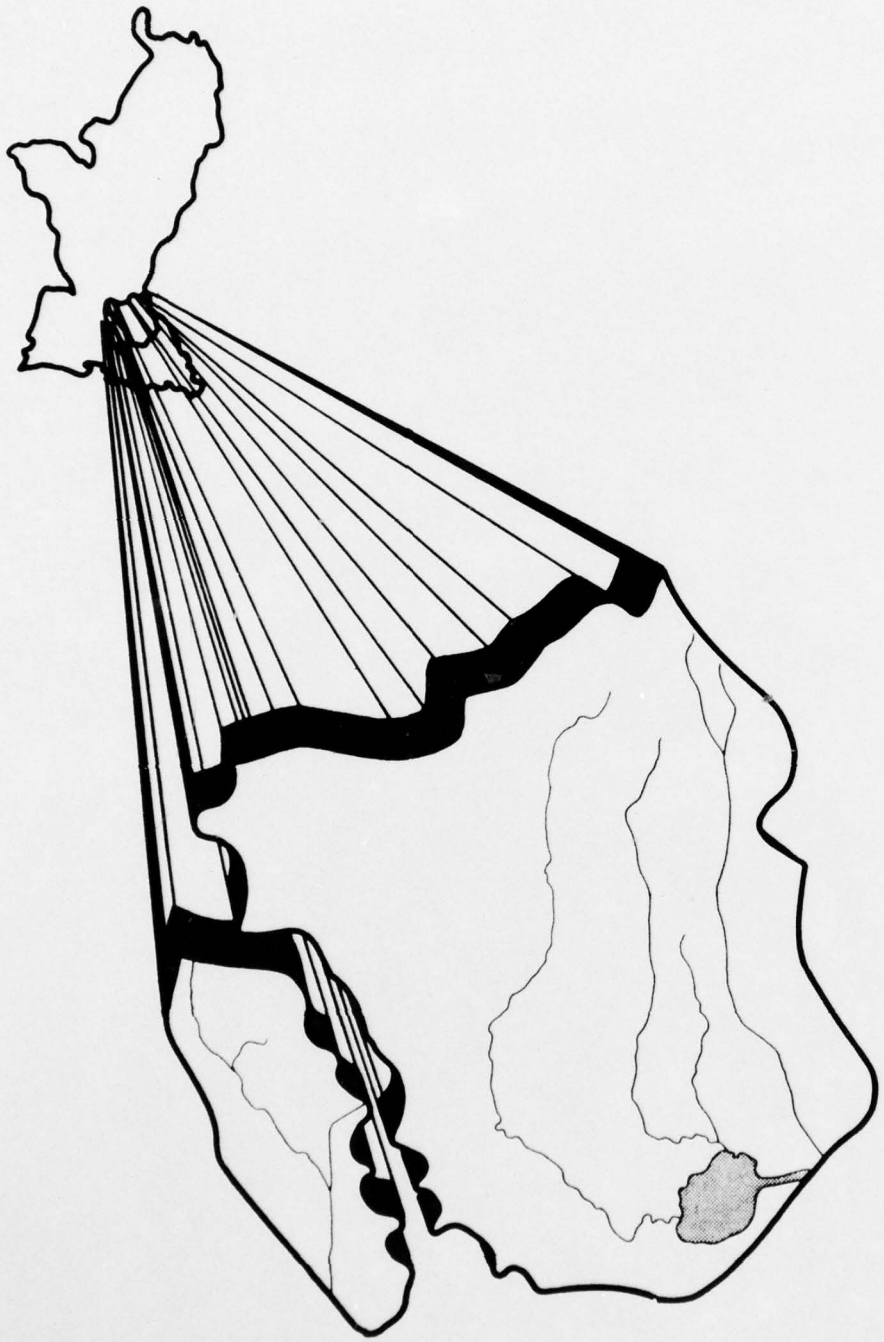
The problems and damages for WRPA 7 are shown in table 16.

Table 16 - Sediment and erosion problems and damages, WRPA 7

	NEEDS FOR PROTECTION			
	1970	1980	2000	2020
Big Black River (7) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	1,328,214	1,293,010	1,285,440	1,274,006
Gully erosion	5,184	5,165	5,141	5,095
Floodplain scour	271	135	134	132
Roadbanks	2,932	2,919	2,899	2,874
Total	1,336,601	1,301,229	1,293,614	1,282,107
		MILES		
Streambank erosion	571	571	571	571
Extent of erosion		TONS		
Sheet erosion	7,797,114	6,628,272	5,961,428	5,382,062
Gully erosion	570,240	413,200	257,050	229,275
Floodplain scour	5,420	2,700	2,680	2,640
Roadbanks	293,200	116,760	72,475	57,480
Streambank erosion	565,200	565,200	565,200	565,200
Total	9,231,174	7,726,132	6,858,833	6,236,657
Average annual damages		DOLLARS		
Program A	903,576	1,153,002	1,229,208	1,347,038
Program B	903,576	1,153,002	1,251,023	1,382,387
Homochitto River (8) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	397,548	385,307	382,934	380,469
Gully erosion	1,900	1,889	1,877	1,865
Floodplain scour	68	34	34	34
Roadbanks	702	698	694	689
Total	400,218	387,928	385,539	383,057
		MILES		
Streambank erosion	397	397	397	397
Extent of erosion		TONS		
Sheet erosion	1,971,343	1,828,852	1,661,070	1,527,162
Gully erosion	209,000	151,120	93,850	83,925
Floodplain scour	1,360	680	680	680
Roadbanks	70,200	27,920	17,350	13,780
Streambank erosion	2,753,514	2,753,514	2,753,514	2,753,514
Total	5,005,417	4,762,086	4,526,464	4,379,601
Average annual damages		DOLLARS		
Program A	289,555	409,947	454,092	497,697
Program B	289,555	409,947	462,151	510,758

Table 16 - Sediment and erosion problems and damages, WRPA 7 (Cont.)

	NEEDS FOR PROTECTION			
	1970	1980	2000	2020
Mississippi River (0) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	774,286	750,170	747,170	737,321
Gully erosion	3,684	3,667	3,652	3,604
Floodplain scour	133	66	66	65
Roadbanks	1,374	1,368	1,363	1,345
Total	779,477	755,271	752,251	742,335
		MILES		
Streambank erosion	464	464	464	464
Extent of erosion		TONS		
Sheet erosion	4,130,573	3,669,013	3,354,666	3,142,502
Gully erosion	405,240	293,360	182,600	162,180
Floodplain scour	2,660	1,320	1,320	1,300
Roadbanks	136,100	54,200	33,750	26,640
Streambank erosion	1,125,000	1,125,000	1,125,000	1,125,000
Total	5,799,573	5,142,893	4,697,336	4,457,622
Average annual damages		DOLLARS		
Program A	346,607	474,813	518,721	568,385
Program B	346,607	474,813	527,928	583,300
Summary - WRPA 7				
Land area affected by erosion		ACRES		
Sheet erosion	2,500,048	2,428,487	2,415,544	2,391,796
Gully erosion	10,768	10,721	10,670	10,564
Floodplain scour	472	235	234	231
Roadbanks	5,008	4,985	4,956	4,908
Total	2,516,296	2,444,428	2,431,404	2,407,499
		MILES		
Streambank erosion	1,432	1,432	1,432	1,432
Extent of erosion		TONS		
Sheet erosion	13,399,030	12,126,137	10,977,164	10,051,726
Gully erosion	1,184,480	857,680	533,500	475,380
Floodplain scour	9,440	4,700	4,680	4,620
Roadbanks	499,500	198,880	123,575	97,900
Streambank erosion	4,443,714	4,443,714	4,443,714	4,443,714
Total	20,036,164	17,631,111	16,082,633	15,073,340
Average annual damages		DOLLARS		
Program A	1,539,738	2,037,762	2,202,021	2,413,120
Program B	1,539,738	2,037,762	2,241,102	2,476,445



WRPA 8

W R P A 8

WRPA 8 is located in the southeastern portion of the region. It includes the northern portion of Louisiana that lies east of the Mississippi River, an area west of the Mississippi River and east of the Morganza Floodway, and the extreme southwestern part of Mississippi. It contains approximately 3.7 million acres, or approximately 5,705 square miles of land and water area. There are two main drainage areas in the WRPA. One area drains into Lake Maurepas and/or Lake Pontchartrain and the other into the Atchafalaya River System. The Amite, Tickfaw, and Natalbany Rivers drain into Lake Maurepas. The Tangipahoa River drains into Lake Pontchartrain and Bayou Grosse Tete drains into the Morgan City-Port Allen Route of the Gulf Intracoastal Waterway. The topography of the area does not vary drastically. It ranges from very level swamps to the rolling hills of the Southern Mississippi Valley Silty Uplands land resource area.

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 and the normal annual precipitation is approximately 58 inches.

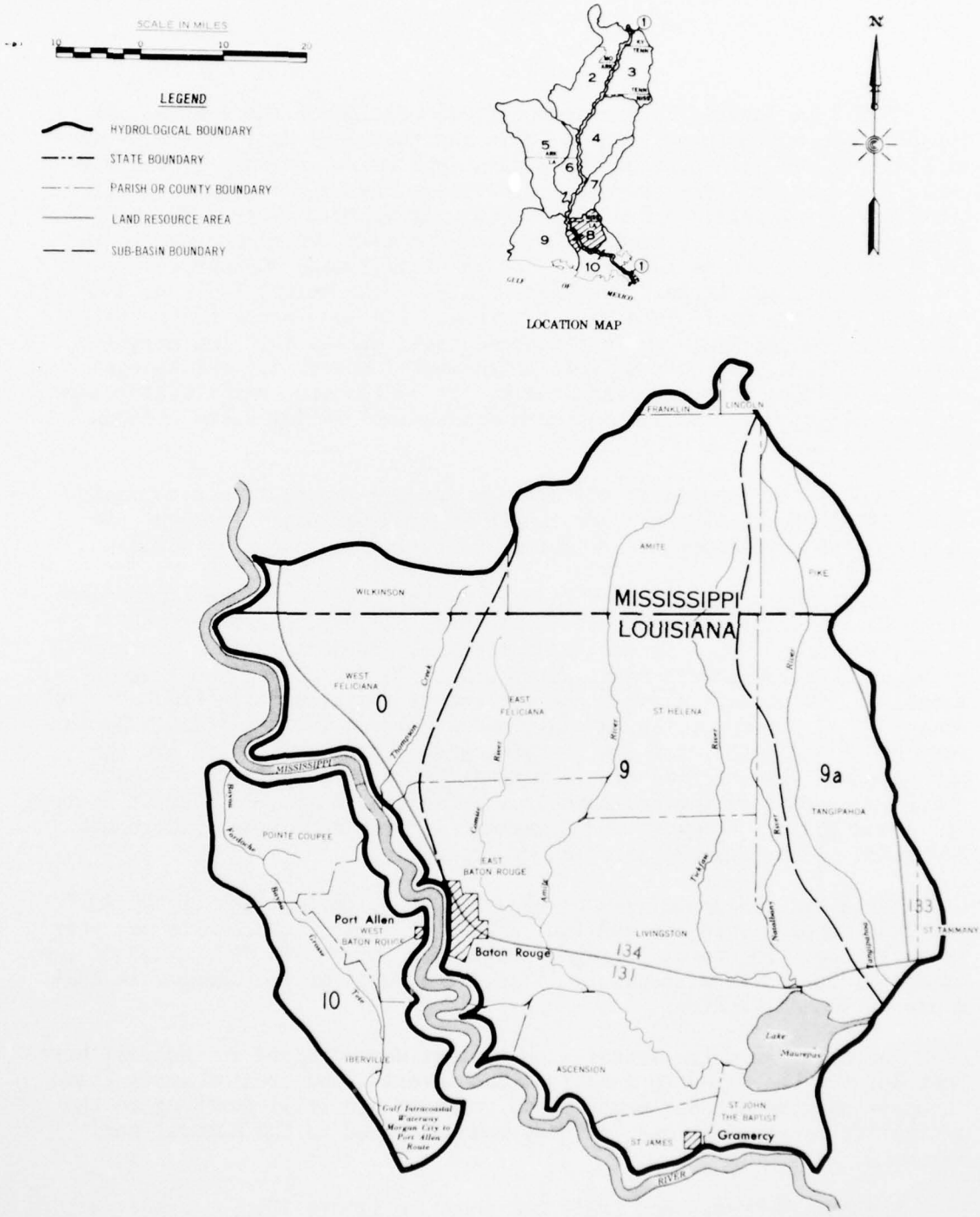
The present land use in WRPA 8 is as follows: cropland (including pastured cropland), 383,000 acres; pasture, 655,000 acres; forest, 2,265,000 acres; other agricultural land, 48,000 acres; urban and built-up areas, 182,000 acres; small water areas, 45,000 acres; and large water areas, 73,000 acres. Sixty-eight percent of the area is in Land Resource Area 134, 30 percent is in LRA 131, and 2 percent is in LRA 133. Approximately 33 percent of the area is affected by erosion with an average annual gross erosion rate of 8.1 tons per acre on the affected area. About 79 percent of the sediment is from sheet erosion, 19 percent is from gully and channel erosion, and 2 percent is from roadbanks. There are 820 miles of streambanks affected by erosion.

The estimated annual yields of sediment at the outlets of the Amite and Tangipahoa Rivers are 869 tons and 531 tons per square mile per year respectively. The total average damages are about $975,000. Most of the damage is caused from sediment. Also, 75 percent of the damages in WRPA 8 are in the Amite River.

The highly erosive loessial soils that were cropped in the past have been largely converted to grassland and forest. The erosion scars from the past and the present erosion and sediment are still damaging to the aesthetics, recreation use, fishery resource, and to the natural soil resource.

The CNI subbasins and LRA's are shown in figure 10.

The problems and damages in WRPA 8 are shown in table 17.



LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

CNI HYDROLOGIC SUBBASINS

WRPA 8

FIGURE 10

Table 17 - Sediment and erosion problems and damages, WRPA 8

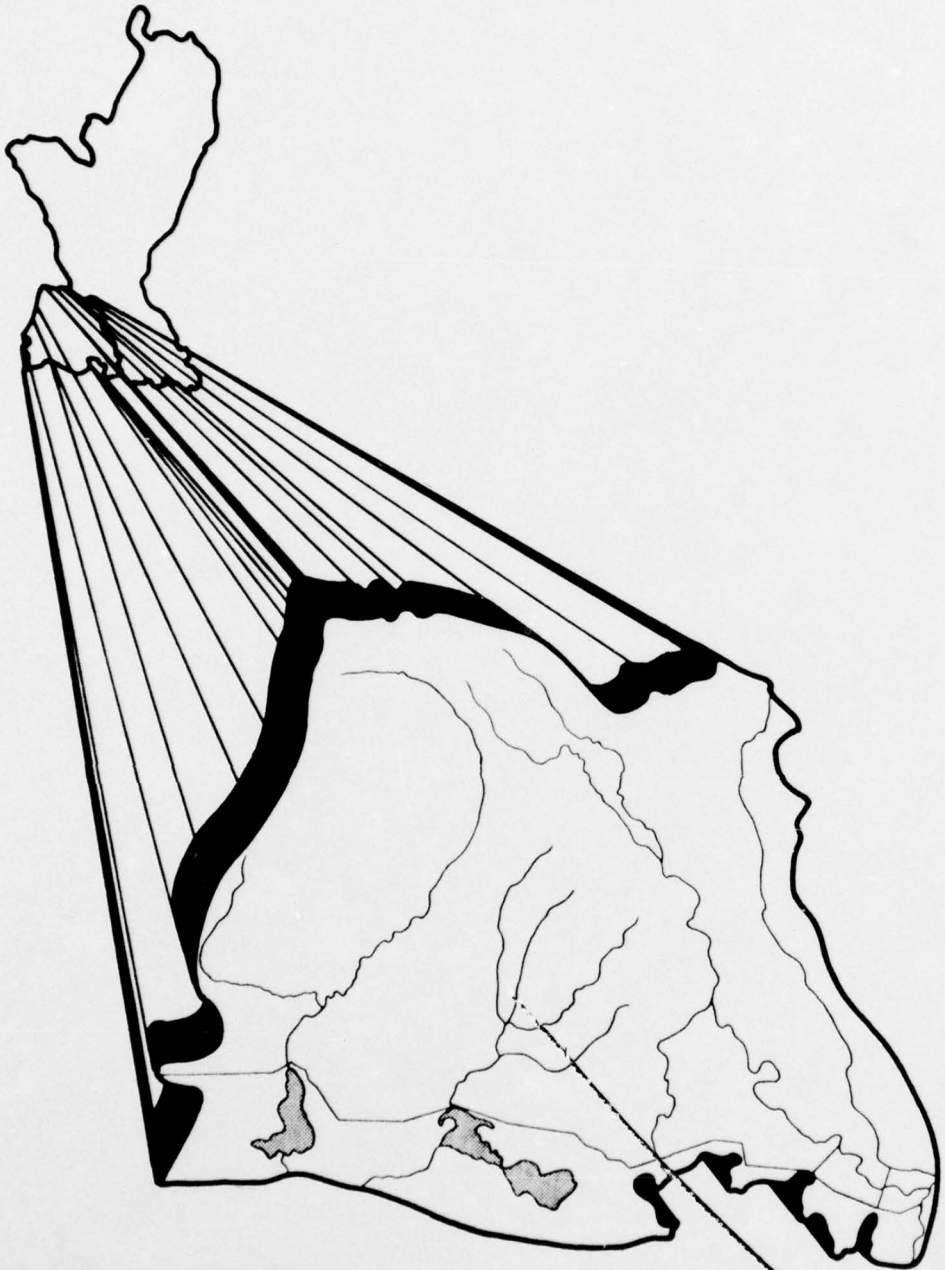
	NEEDS FOR PROTECTION			
	1970	1980	2000	2020
Amite River (9) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	668,036	644,101	644,101	634,101
Gully erosion	3,147	3,103	3,103	3,054
Floodplain scour	113	56	56	55
Roadbanks	1,230	1,214	1,214	1,196
Total	672,526	648,474	648,474	638,406
		MILES		
Streambank erosion	820	820	820	820
Extent of erosion		TONS		
Sheet erosion	4,268,056	3,451,436	3,253,254	2,995,833
Gully erosion	364,170	248,240	165,150	137,430
Floodplain scour	2,260	1,120	1,120	1,100
Roadbanks	116,302	45,882	28,677	22,582
Streambank erosion	1,259,450	1,259,450	1,259,450	1,259,450
Total	6,010,238	5,006,128	4,707,651	4,416,395
Average annual damages		DOLLARS		
Program A	741,830	746,892	866,417	1,026,206
Program B	741,830	746,892	888,612	1,031,425
Atchafalaya River (10) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	8,235	8,235	8,235	8,235
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	50	50	50	50
Total	8,285	8,285	8,285	8,285
		MILES		
Streambank erosion	-	-	-	-
Extent of erosion		TONS		
Sheet erosion	8,992	8,707	8,307	7,995
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	2	2	2	2
Streambank erosion	-	-	-	-
Total	8,994	8,709	8,309	7,997
Average annual damages		DOLLARS		
Program A	-	-	-	-
Program B	-	-	-	-

Table 17 - Sediment and erosion problems and damages, WRPA 8 (Cont.)

	NEEDS FOR PROTECTION			
	1970	1980	2000	2020
Tangipahoa River (9a) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	259,045	251,662	247,228	242,804
Gully erosion	1,232	1,224	1,203	1,181
Floodplain scour	45	22	22	21
Roadbanks	466	460	452	444
Total	260,788	253,368	248,905	244,450
		MILES		
Streambank erosion	-	-	-	-
Extent of erosion		TONS		
Sheet erosion	1,936,682	1,802,728	1,608,767	1,460,907
Gully erosion	135,520	97,920	60,150	53,145
Floodplain scour	900	440	440	420
Roadbanks	46,600	18,400	11,300	8,880
Streambank erosion	-	-	-	-
Total	2,119,702	1,919,488	1,680,657	1,523,352
Average annual damages		DOLLARS		
Program A	155,578	146,630	168,460	203,582
Program B	155,578	146,630	172,767	204,595
Mississippi River (0) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	278,243	270,618	266,325	266,325
Gully erosion	1,333	1,325	1,304	1,304
Floodplain scour	48	24	24	24
Roadbanks	495	492	484	484
Total	280,119	272,459	268,137	268,137
		MILES		
Streambank erosion	-	-	-	-
Extent of erosion		TONS		
Sheet erosion	1,491,762	1,359,667	1,236,255	1,171,976
Gully erosion	146,630	106,000	65,200	58,680
Floodplain scour	960	480	480	480
Roadbanks	49,300	19,600	12,050	9,640
Streambank erosion	-	-	-	-
Total	1,688,652	1,485,747	1,313,985	1,240,776
Average annual damages		DOLLARS		
Program A	77,777	75,590	89,788	103,809
Program B	77,777	75,590	92,084	104,326

Table 17 - Sediment and erosion problems and damages, WRPA 8 (Cont.)

	NEEDS FOR PROTECTION			
	1970	1980	2000	2020
SUMMARY - WRPA 8				
Land area affected by erosion		ACRES		
Sheet erosion	1,213,559	1,174,616	1,165,889	1,151,465
Gully erosion	5,712	5,652	5,610	5,539
Floodplain scour	206	102	102	100
Roadbanks	2,241	2,216	2,200	2,174
Total	1,221,718	1,182,586	1,173,801	1,159,278
		MILES		
Streambank erosion	820	820	820	820
Extent of erosion		TONS		
Sheet erosion	7,705,492	6,622,538	6,106,583	5,636,711
Gully erosion	646,320	452,160	290,500	249,255
Floodplain scour	4,120	2,040	2,040	2,000
Roadbanks	212,204	83,884	52,029	41,104
Streambank erosion	1,259,450	1,259,450	1,259,450	1,259,450
Total	9,827,586	8,420,072	7,710,602	7,188,520
Average annual damages		DOLLARS		
Program A	975,185	969,112	1,124,665	1,333,597
Program B	975,185	969,112	1,153,463	1,340,346



WRPA 9

W R P A 9

WRPA 9 is located in the southwest portion of the region and in the southwest portion of Louisiana. It contains approximately 8.5 million acres or approximately 13,297 square miles of land and water area. There are four major drainage areas within the WRPA which drain directly into the Gulf of Mexico. These are the Calcasieu River, the Mermentau River, the Vermilion River, and Bayou Teche. An additional area drains into the Atchafalaya River. The topography of the area is fairly flat ranging from the coastal marshes through the coastal prairies to the rolling coastal plains. The majority of the area is flat to slightly rolling.

The climate is mild to hot with an average annual temperature of 69 degrees. The average length of growing season is 270 days and the normal annual precipitation is about 60 inches.

The present land use in WRPA 9 is as follows: cropland (including pastured cropland), 2,576,000 acres; pasture, 911,000 acres; forest, 3,442,000 acres; other agricultural land, 807,000 acres; urban and built-up areas, 236,000 acres; small water areas, 138,000 acres; and large water areas, 400,000 acres. Twenty-seven percent of the area is in Land Resource Area 131, 26 percent is in LRA 133, 23 percent is in LRA 150, 14 percent is in LRA 151, and 10 percent is in LRA 134. Approximately 15 percent of the area is affected by erosion with an annual average gross erosion rate of 1.9 tons per acre for the affected area. Approximately 83 percent of the sediment is from sheet erosion, 1 percent is from gully and channel erosion, and 16 percent is from floodplain scour. There are 149 miles of streambanks affected by erosion.

The estimated annual yield of sediment in the outlets of the major streams vary from 152 tons per square mile on the Atchafalaya to a low of 45 tons per square mile on the Vermilion. The total average annual damages are about $47,000. Most of the damage is from roadside erosion which makes up 64 percent of the total. Approximately three-fourths of the damages are presently occurring in the Calcasieu subbasin.

Sediment and erosion except for coastal shore and beach erosion are not serious problems in this WRPA at present. Forest covers more than 90 percent of the eroding area. Erosion from the past and the present, however, are damaging to the aesthetics, recreational use, fishery resource, and to the natural soil resource.

The CNI subbasins and LRA's are shown in figure 11.



LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

CNI HYDROLOGIC SUBBASINS

WRPA 9

FIGURE 11

The problems and damages in WRPA 9 are shown in table 18.

Table 18 - Sediment and erosion problems and damages, WRPA 9

	NEEDS FOR PROTECTION			
	1970	1980	2000	2020
Calcasieu (19 & 19a) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	797,837	783,280	746,422	716,507
Gully erosion	-	-	-	-
Floodplain scour	2,726	2,726	2,726	2,726
Roadbanks	3,804	3,804	3,804	3,804
Total	804,367	789,810	752,952	723,037
		MILES		
Streambank erosion	134	134	134	134
Extent of erosion		TONS		
Sheet erosion	1,409,254	1,312,954	1,027,471	859,475
Gully erosion	-	-	-	-
Floodplain scour	340,750	197,685	191,435	191,435
Roadbanks	114	114	114	114
Streambank erosion	19,313	19,313	19,313	19,313
Total	1,769,431	1,530,066	1,238,333	1,070,337
Average annual damages		DOLLARS		
Program A	36,216	49,241	78,764	132,286
Program B	36,216	56,336	90,591	154,960
Mermentau (20 & 20a) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	125,792	116,689	104,697	103,697
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	414	414	414	414
Total	126,206	117,103	105,111	104,111
		MILES		
Streambank erosion	0	0	0	0
Extent of erosion		TONS		
Sheet erosion	129,848	125,635	75,340	68,296
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	12	12	12	12
Streambank erosion	-	-	-	-
Total	129,860	125,647	75,352	68,308
Average annual damages		DOLLARS		
Program A	2,333	3,229	5,664	9,914
Program B	2,333	3,338	6,578	11,709

Table 18 - Sediment and erosion problems and damages, WRPA 9 (Cont.)

	NEEDS FOR PROTECTION			
	1970	1980	2000	2020
Vermilion (11) Subbasin				
Land area affected by erosion	ACRES			
Sheet erosion	49,059	43,835	33,835	28,835
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	345	345	345	345
Total	49,404	44,180	34,180	29,180
	MILES			
Streambank erosion	0	0	0	0
Extent of erosion	TONS			
Sheet erosion	69,707	60,009	35,479	30,724
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	10	10	10	10
Streambank erosion	-	-	-	-
Total	69,717	60,019	35,489	30,734
Average annual damages	DOLLARS			
Program A	1,639	2,313	4,289	7,762
Program B	1,639	2,783	5,042	9,184
Atchafalaya (10) Subbasin				
Land area affected by erosion	ACRES			
Sheet erosion	171,018	168,074	163,574	154,574
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	1,051	1,051	1,051	1,051
Total	172,069	169,125	164,625	155,625
	MILES			
Streambank erosion	15	15	15	15
Extent of erosion	TONS			
Sheet erosion	204,161	191,691	210,727	193,686
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	32	32	32	32
Streambank erosion	162	162	162	162
Total	204,355	191,885	210,921	193,880
Average annual damages	DOLLARS			
Program A	6,788	9,355	16,200	28,128
Program B	6,788	10,931	18,763	33,154

Table 18 - Sediment and erosion problems and damages, WRPA 9 (Cont.)

	NEEDS FOR PROTECTION			
	1970	1980	2000	2020
SUMMARY - WRPA 9				
Land area affected by erosion			ACRES	
Sheet erosion	1,143,706	1,111,878	1,048,528	1,003,613
Gully erosion	-	-	-	-
Floodplain scour	2,726	2,726	2,726	2,726
Roadbanks	5,614	5,614	5,614	5,614
Total	1,152,046	1,120,218	1,056,868	1,011,953
			MILES	
Streambank erosion	149	149	149	149
Extent of erosion			TONS	
Sheet erosion	1,812,970	1,690,289	1,349,017	1,152,181
Gully erosion	-	-	-	-
Floodplain scour	340,750	197,685	191,435	191,435
Roadbanks	168	168	168	168
Streambank erosion	19,475	19,475	19,475	19,475
Total	2,173,363	1,907,617	1,560,095	1,363,259
Average annual damages			DOLLARS	
Program A	46,976	64,138	104,917	178,090
Program B	46,976	73,388	120,974	209,007

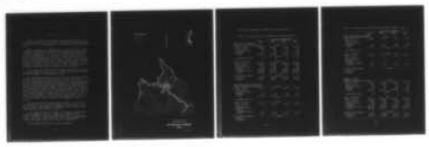


WRPA 10

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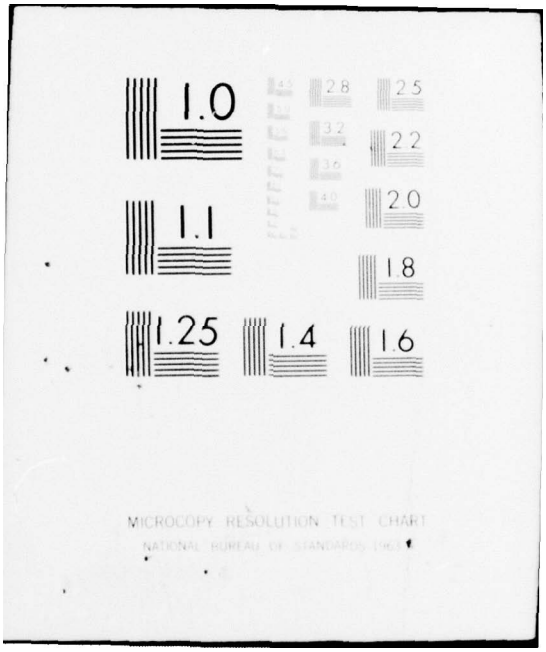
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W R P A 10

WRPA 10 is located in the southeast portion of the region. It is entirely within the State of Louisiana. This WRPA contains approximately 4.9 million acres or approximately 7,730 square miles of land and water area.

WRPA 10 has three main drainage areas: In the area north of Lake Pontchartrain, the major streams are the Tchefuncte River and its major tributary, the Bogue Falaya. These streams flow generally southward into Lake Pontchartrain. The area east of the Mississippi River and south of Lake Pontchartrain is drained by outfall canals that drain directly into Lake Pontchartrain or the marsh. The area west of the Mississippi River drains into the Gulf of Mexico through a number of bayous and man-made canals, the largest of which is Bayou Lafourche. The topography of the area is flat to slightly rolling. The coastal marsh, delta areas, and large water areas make up most of the WRPA.

The climate is mild to hot with an average temperature of 69 degrees. The average length of growing season is about 270 days, and the normal annual precipitation is approximately 62 inches.

The present land use in WRPA 10 is as follows: cropland (including pastured cropland), 359,000 acres; pasture, 202,000 acres; forest, 1,317,00 acres; other agricultural land, 1,640,000 acres; urban and built-up areas, 230,000 acres; federal lands, 41,000 acres; small water areas, 219,000 acres; and large water areas, 939,000 acres. Approximately 47 percent of the area is Land Resource Area 151, 41 percent is in LRA 131, and 12 percent is in LRA 133. Only 3.7 percent of the area is significantly affected by erosion with an average annual gross erosion rate of 6.6 tons per acre for the affected area. Most of the erosion occurs in the Amite River subbasin. About 80 percent of the sediment is from sheet erosion, 15 percent is from gully and channel erosion, and 5 percent is from roads. There are 45 miles of streambanks affected by erosion.

The Amite River has an average annual sediment yield of 468 tons per square mile. The total average damages are about $66,000. More than 90 percent of the damage is caused from sediment and most of the damage occurred in the Amite River subbasin.

In the coastal portion of the WRPA, an estimated 13 square miles of land are being lost each year through the combined effects of erosion, subsidence, compaction, organic decay, and the various works of man. Land loss, salinity intrusion, water level management, and coastal shore erosion problems are discussed in Appendix O.

The CNI subbasins and LRA's are shown in figure 12.



LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

CNI HYDROLOGIC SUBBASINS

WRPA 10

FIGURE 12

The problems and damages in WRPA 10 are shown in table 19.

Table 19 - Sediment and erosion problems and damages, WRPA 10

	NEEDS FOR PROTECTION			
	1970	1980	2000	2020
Amite River (9) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	119,086	108,161	96,516	80,516
Gully erosion	181	165	147	123
Floodplain scour	35	16	14	12
Roadbanks	412	376	335	280
Total	119,714	108,718	97,012	80,931
		MILES		
Streambank erosion	45	45	45	45
Extent of erosion		TONS		
Sheet erosion	698,974	528,431	399,037	276,953
Gully erosion	19,910	13,200	7,350	5,535
Floodplain scour	700	320	280	240
Roadbanks	41,200	15,040	8,375	5,600
Streambank erosion	110,200	110,200	110,200	110,200
Total	870,984	667,191	525,242	398,528
Average annual damages		DOLLARS		
Program A	66,376	59,894	57,435	49,795
Program B	66,376	59,894	61,317	52,744
Atchafalaya River (10) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	6,693	6,693	6,693	5,693
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	41	41	41	35
Total	6,734	6,734	6,734	5,728
		MILES		
Streambank erosion	-	-	-	-
Extent of erosion		TONS		
Sheet erosion	7,307	6,483	6,105	3,972
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	1	1	1	1
Streambank erosion	-	-	-	-
Total	7,308	6,484	6,106	3,973
Average annual damages		DOLLARS		
Program A	-	-	-	-
Program B	-	-	-	-

Table 19 - Sediment and erosion problems and damages, WRPA 10 (Cont.)

	NEEDS FOR PROTECTION			
	1970	1980	2000	2020
Mississippi River (0) Subbasin				
Land area affected by erosion		ACRES		
Sheet erosion	6,750	5,750	5,750	5,750
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	41	35	35	35
Total	6,791	5,785	5,785	5,785
		MILES		
Streambank erosion	-	-	-	-
Extent of erosion		TONS		
Sheet erosion	1,855	1,658	1,505	1,371
Gully erosion	-	-	-	-
Floodplain scour	-	-	-	-
Roadbanks	1	1	1	1
Streambank erosion	-	-	-	-
Total	1,856	1,659	1,506	1,372
Average annual damages		DOLLARS		
Program A	-	-	-	-
Program B	-	-	-	-
SUMMARY - WRPA 10				
Land area affected by erosion		ACRES		
Sheet erosion	132,529	120,604	108,959	91,959
Gully erosion	181	165	147	123
Floodplain scour	35	16	14	12
Roadbanks	494	452	411	350
Total	133,239	121,237	109,531	92,444
		MILES		
Streambank erosion	45	45	45	45
Extent of erosion		TONS		
Sheet erosion	708,136	536,572	406,647	282,296
Gully erosion	19,910	13,200	7,350	5,535
Floodplain scour	700	320	280	240
Roadbanks	41,202	15,042	8,377	5,602
Streambank erosion	110,200	110,200	110,200	110,200
Total	880,148	675,334	532,854	403,873
Average annual damages		DOLLARS		
Program A	66,376	59,894	57,435	49,795
Program B	66,376	59,894	61,317	52,744