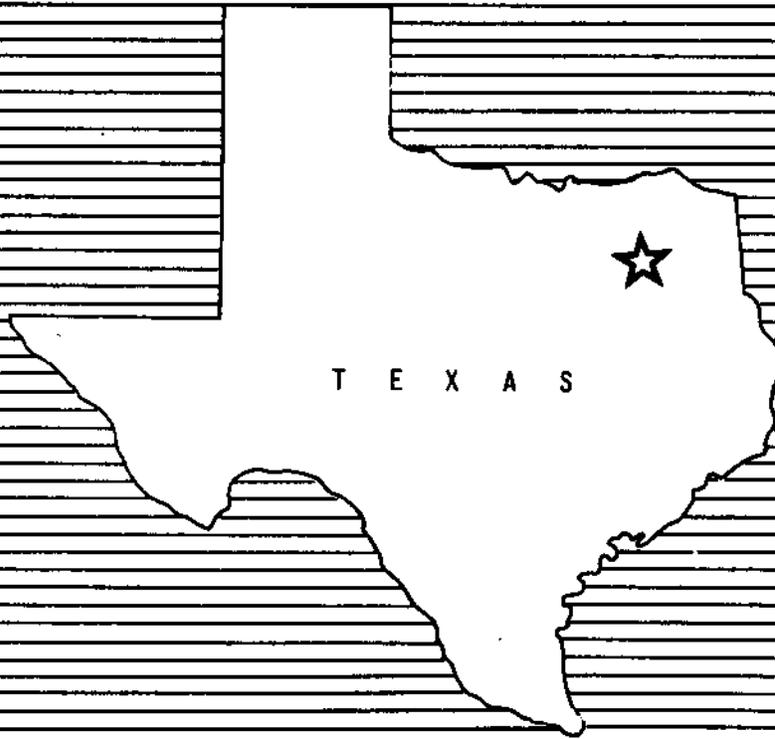


Cook

SUPPLEMENTAL  
WORK PLAN No.1

FOR WATERSHED PROTECTION AND FLOOD PREVENTION  
**UPPER LAKE FORK CREEK  
WATERSHED**

HOPKINS, RAINS, AND HUNT COUNTIES, TEXAS



September 1972

TABLE OF CONTENTS

	<u>Page</u>
SUPPLEMENTAL WATERSHED WORK PLAN AGREEMENT NUMBER I . . . . .	1
PURPOSE OF THE SUPPLEMENTAL WATERSHED WORK PLAN . . . . .	1
SUMMARY OF PLAN . . . . .	2
DESCRIPTION OF THE WATERSHED . . . . .	3
WATERSHED PROBLEMS . . . . .	4
Floodwater Damages . . . . .	4
Sediment Damages . . . . .	4
Erosion Damage . . . . .	5
PROJECTS OF OTHER AGENCIES . . . . .	5
BASIS FOR PROJECT FORMULATION . . . . .	5
WORKS OF IMPROVEMENT TO BE INSTALLED . . . . .	6
Land Treatment . . . . .	6
Structural Measures . . . . .	6
EXPLANATION OF INSTALLATION COSTS . . . . .	7
Land Treatment . . . . .	7
Structural Measures . . . . .	7
EFFECTS OF WORKS OF IMPROVEMENT . . . . .	8
PROJECT BENEFITS . . . . .	10
COMPARISON OF BENEFITS AND COSTS . . . . .	10
PROJECT INSTALLATION . . . . .	11
Land Treatment . . . . .	11
Structural Measures . . . . .	11
FINANCING PROJECT INSTALLATION . . . . .	13
PROVISIONS FOR OPERATION AND MAINTENANCE . . . . .	14
Land Treatment Measures . . . . .	14
Structural Measures . . . . .	14

TABLES

Table 1 - Estimated Project Installation Cost . . . . .	16
Table 2 - Estimated Structural Cost Distribution . . . . .	17
Table 3 - Structural Data Floodwater Retarding Structures . . . . .	18
Table 4 - Annual Cost . . . . .	21
Table 5 - Estimated Average Annual Flood Damage Reduction Benefits . . . . .	22
Table 6 - Comparison of Benefits and Costs for Structural Measures . . . . .	23

FIGURES

Figure 2 - Problem Location Map . . . . .	
Figure 4 - Project Map . . . . .	

SUPPLEMENTAL WATERSHED WORK PLAN AGREEMENT NUMBER I

Between the

Hopkins-Rains Soil and Water Conservation District  
Local Organization

Upper Sabine Soil and Water Conservation District  
Local Organization

Lake Fork Creek Water Control and Improvement District No. I  
Local Organization

State Of Texas  
(hereinafter referred to as the Sponsoring Local Organization)

and the  
Soil Conservation Service  
United States Department of Agriculture  
(hereinafter referred to as the Service)

Whereas, the Watershed Work Plan Agreement for Upper Lake Fork Creek Watershed, State of Texas, executed by the Sponsoring Local Organization named therein and the Service became effective on the 25th day of July, 1958; and

Whereas, in order to carry out the watershed work plan for said watershed, it has become necessary to modify said Watershed Work Plan Agreement; and

Whereas, it has become necessary to modify the work plan to reflect the effects on said watershed of the proposed Corps of Engineers Lake Fork Reservoir located in the lower reaches, and

Whereas, it has become necessary to modify the watershed work plan to comply with the provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646, 84th Stat. 1894); and

Whereas, it has become necessary to modify the Watershed Work Plan to reflect current policy and terminology relative to engineering and project administration costs; and

Whereas, a Supplemental Watershed Work Plan, which modifies the Watershed Work Plan dated March 1958, has been developed through the cooperative efforts of the Sponsoring Local Organization and the Service; which plan is annexed to and made a part of this agreement; and

Now, therefore, the Sponsoring Local Organization and the Service hereby agree upon the following modifications of the terms, conditions, and stipulations of said Watershed Work Plan Agreement:

1. Floodwater retarding structures No. 11, 16, and 20 are hereby deleted from the plan.
2. Floodwater retarding structures No. 11A, 11B-1, 16B, 16C, 20B, and 20C are hereby added to the plan.
3. A paragraph numbered 14 is added to read as follows:

The sponsoring local organization assures that comparable replacement dwellings will be available for individuals and persons displaced from dwellings, and will provide relocation assistance advisory services and relocation assistance, make the relocation payments to displaced persons, and otherwise comply with the real property acquisition policies contained in the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646, 84 Stat. 1894) effective as of January 2, 1971, and the Regulations issued by the Secretary of Agriculture pursuant thereto. The costs of relocation payments will be shared by the Sponsoring Local Organization and the Service as follows:

	<u>Sponsoring Local Organization</u> (percent)	<u>Service</u> (percent)	<u>Estimated Relocation Payment Costs</u> (dollars)
Relocation Payments	69.15	30.85	3,125

4. Paragraph numbered 1 is modified to read as follows:

The Sponsoring Local Organization will acquire without cost to the Federal Government from PL-566 funds, such land rights as will be needed in connection with works of improvement. (Estimated Cost \$297,820)

5. Paragraph numbered 3 is modified to read as follows:

The percentages of construction costs of structural measures to be paid by the Sponsoring Local Organization and by the Service are as follows:

<u>Works of Improvement</u>	<u>Sponsoring Local Organization (percent)</u>	<u>Service (percent)</u>	<u>Estimated Construction Cost (dollars)</u>
26 Floodwater Retarding Structures	0	100	1,301,747

6. Paragraph numbered 4 is modified to read as follows:

The percentages of the engineering costs to be borne by the Sponsoring Local Organization and the Service are as follows:

<u>Works of Improvement</u>	<u>Sponsoring Local Organization (percent)</u>	<u>Service (percent)</u>	<u>Estimated Construction Cost (dollars)</u>
26 Floodwater Retarding Structures	0	100	163,000

7. Paragraph numbered 5 is modified to read as follows:

The Sponsoring Local Organization and the Service will each bear the costs of Project Administration which it incurs, estimated to be \$13,500 and \$381,030 respectively.

8. A paragraph numbered 15 is added to read as follows:

The program conducted will be in compliance with all requirements respecting nondiscrimination as contained in the Civil Rights Act of 1964 and the regulations of the Secretary of Agriculture (7 C.F.R. 15.1-15.12), which provide that no person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any activity receiving federal financial assistance.

9. The Sponsoring Local Organization and the Service further agree to all other terms, conditions, and stipulations of said Watershed Work Plan Agreement not modified herein.

Hopkins-Rains Soil and Water Conservation District  
Local Organization

By Bellie Anderson  
 Title Chairman  
 Address Rt 4 Sulphur Springs  
 Date Aug 8, 1973 Zip Code 75482

The signing of this agreement was authorized by a resolution of the governing body of the Hopkins-Rains Soil and Water Conservation District  
Local Organization

adopted at a meeting held on August 8, 1973

W. H. Browning  
 (Secretary, Local Organization)  
 Address Rt 1 Winters Texas  
 Date 8-8-1973 Zip Code 75494

Upper Sabine Soil and Water Conservation District  
Local Organization

By W. Cunningham  
 Title Chairman of Board  
 Address Box 1122 Beeville Tex  
 Date 9-4-73 Zip Code 75401

The signing of this agreement was authorized by a resolution of the governing body of the Upper Sabine Soil and Water Conservation District  
Local Organization

adopted at a meeting held on 9-4-1973

W. E. Dooley  
 (Secretary, Local Organization)  
 Address Low Creek Tex. 75453  
 Date 9-4-1973 Zip Code

Lake Fork Creek Water Control and Improvement District No. I  
Local Organization

By B. J. Koon

Title President

Address Brashear Tex. 75420  
Zip Code

Date Aug 23, 1973

The signing of this agreement was authorized by a resolution of governing body of the Lake Fork Creek WCID No. I

Local Organization  
adopted at a meeting held on Aug 23, 1973

Fred C. Haynes  
(Secretary, Local Organization)

Address pt 2 Lone Oak, Tex. 75453  
Zip Code

Date Aug 23, 1973

Soil Conservation Service  
United States Department of Agriculture

By Harold Baker "Acting"  
State Conservationist

Date 9-11-73

SUPPLEMENTAL  
WATERSHED WORK PLAN NUMBER I

UPPER LAKE FORK CREEK WATERSHED  
of the Sabine River Watershed  
Rains, Hopkins and Hunt Counties, Texas

Prepared Under Authority of the  
Watershed Protection and Flood  
Prevention Act (Public Law  
566, 83rd Congress; 68  
Stat. 666), as Amended

Prepared By:

Hopkins-Rains Soil and Water Conservation District

Upper Sabine Soil and Water Conservation District

Lake Fork Creek Water Control and Improvement District No. I

With Assistance By:

U.S. Department of Agriculture  
Soil Conservation Service

September 1972

SUPPLEMENTAL

WATERSHED WORK PLAN NUMBER I

UPPER LAKE FORK CREEK WATERSHED  
of the Sabine River Watershed  
Rains, Hopkins and Hunt Counties, Texas

September 1972

PURPOSE OF THE SUPPLEMENTAL WATERSHED WORK PLAN

It has become necessary to modify the work plan for Upper Lake Fork Creek Watershed to make the following changes:

1. Delete planned Floodwater Retarding Structure Nos. 11, 16 and 20 and add Floodwater Retarding Structure Nos. 11A, 11B-1, 16B, 16C, 20B and 20C. Since completion of the work plan, developments in the form of houses, a farm-to-market road and utility lines have been installed in the vicinity of the three planned structures. These improvements would have to be modified or relocated if the structures are installed as planned. It is necessary to make the above changes in the floodwater retarding structure program in order to have an economically feasible plan that can be applied.
2. Modify the work plan to reflect the effects on the watershed which would result from installation of the Lake Fork Reservoir as proposed by the Corps of Engineers.
3. Incorporate provisions for implementing the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970.
4. Extend the installation period an additional five years.
5. Modify the work plan to reflect current terminology relative to engineering and project administration costs.
6. Update costs to 1971 price levels for all structural measures not constructed and for installation of planned land treatment measures.
7. To reaffirm economic feasibility.

Change in Major Features

This supplement will delete three and add six for a total of 26 floodwater retarding structures for the watershed.

The Upper Lake Fork Creek Watershed Work Plan of March 1958 includes a combination of land treatment measures and structural works of improvement for watershed protection. The planning and application of the land

treatment and structural measures will be carried out in accordance with provisions of the 1958 work plan, as supplemented. Eighteen floodwater retarding structures have been installed.

The watershed was re-evaluated in order to determine feasibility of the project as supplemented.

#### SUMMARY OF PLAN

The Upper Lake Fork Creek Watershed consists of an area of 145,472 acres or 227.3 square miles including 8,576 acres in the proposed Lake Fork Reservoir and is located in Hopkins, Hunt and Rains Counties, Texas.

Sponsoring Local Organizations remain unchanged from those listed in the original work plan.

The flood plain if this watershed covers 8,970 acres excluding 3,828 acres inundated by the Lake Fork Reservoir when at the 5-year frequency pool elevation. A total of 39 major floods inundating more than half of the flood plain occurred during the 31-year elevation period.

It is estimated that average annual floodwater damages without the project would amount to \$126,310. Indirect damages are estimated to be \$14,990 annually. Without the project the sediment depletion damage annually to Lake Fork Reservoir is estimated to be \$11,090. Erosion damage from scour in the area above the proposed Lake Fork Reservoir is estimated to be \$3,980 annually.

It is estimated that \$4,305,606 is needed to establish land treatment measures during the total installation period. Of this amount, \$3,281,206 has been expended to date for installation of these measures. A total of \$147,836 of Public Law 566 funds has been expended to date. No additional PL-566 funds will be available for use in planning and installing land treatment measures.

Structural measures to be installed during the total installation period consist of 26 floodwater retarding structures at an estimated cost of \$2,160,222. To date, 18 floodwater retarding structures have been installed at a cost of \$987,487.

With the installation of all planned measures, the average annual flooding will be reduced from 12,616 acres to 3,548 acres, a reduction of 71.9 percent. The total average annual benefits from structural measures are expected to be \$120,400 as compared to average annual costs of \$87,515, giving a benefit-cost ratio of 1.4 to 1.0.

Lake Fork Creek Water Control and Improvement District No. 1 will acquire all land rights for Floodwater Retarding Structure Nos. 1, 8, 11A, 11B-1, 16B, 16C, 20B and 20C during the 5-year extended installation period.

Funds for the local share of the cost of installing the structural measures will be provided by the Lake Fork Creek Water Control and Improvement District No. I.

The installation and maintenance of land treatment measures will be the responsibility of the Hopkins-Rains and the Upper Sabine Soil and Water Conservation Districts and their individual cooperators.

The Lake Fork Creek Water Control and Improvement District No. I will be responsible for operation and maintenance of all floodwater retarding structures, and bear all related costs.

#### DESCRIPTION OF THE WATERSHED

The land use in the watershed is as follows:

Land Use	Acres	Per-Cent
Cropland	8,228	6
Pastureland	114,256	78
Rangeland	11,279	8
Miscellaneous <u>1/</u>	11,709	8
<b>TOTAL</b>	<b>145,472</b>	<b>100</b>

1/ Includes roads, highways, railroads, towns and 8,576 acres in Lake Fork Reservoir.

#### Land Treatment Data

Farmers and ranchers are applying soil and water conservation measures on their land in cooperation with the Hopkins-Rains and the Upper Sabine Soil and Water Conservation Districts. The Service field offices at Greenville, Mineola and Sulphur Springs are assisting the Districts in the preparation and application of soil and water conservation plans.

There are 725 operating units in the watershed, of which 553 (105,977 acres) are under District agreement.

Approximately 50 percent of the needed land treatment measures have been applied. An estimated 73 percent of land is adequately protected from erosion.

Standard soil surveys have been completed in the watershed.

## WATERSHED PROBLEMS

### Floodwater Damage

The flood plain of Upper Lake Fork Creek Watershed, above the 5-year frequency pool of Lake Fork Reservoir, excluding stream channels, consists of 8,970 acres. This area will be inundated by the runoff from the largest storm considered in the 31-year evaluation series (1923 through 1953).

Lake Fork Reservoir at the 5-year frequency pool elevation will inundate 3,828 acres of flood plain in reaches "C" and "F". No damages have been calculated on these areas for this supplemental work plan.

With the changes in floodwater retarding structure locations there will be 1,045 acres of benefited area below sites that were not protected or evaluated in the original plan.

During the 31-year evaluation period, there were 39 major floods that covered half or more of the flood plain and 113 minor floods covering less than half of the flood plain.

As a result of frequent flooding, the percent of cropland has been greatly reduced. This land, formerly cultivated, is now in Johnson grass meadow, pasture or idle.

Based on floods considered in the 31-year evaluation series, average annual direct floodwater damages without the program of land treatment and structural measures are estimated to total \$126,310. These consist of \$82,470 of crop and pasture damage, \$13,230 of other agricultural damage and \$30,610 of road and bridge damage.

Indirect damages such as interruption of travel, re-routing school bus and mail routes, losses sustained by businesses in the area and similar losses are estimated to be \$14,990 annually.

### Sediment Damage

Without the Upper Lake Fork Project, it is estimated that 180 acre-feet of sediment would be deposited annually in Lake Fork Reservoir from the watershed. The annual damage to the reservoir by depletion of its capacity would be \$11,090.

Without the project, overbank deposition would cause a loss of productive capacity on 4,600 acres of flood plain lying above the proposed Lake Fork Reservoir. Damaged land, grouped according to percent loss of productive capacity, is estimated as follows: 1,521 acres, 5 percent; 2,028 acres, 10 percent; 991 acres, 20 percent and 60 acres, 30 percent. The average annual damage without project conditions would be \$8,520.

### Erosion Damage

Considering the proposed Lake Fork Reservoir in place, it is estimated that scour would reduce the productive capacity on 1,250 acres of flood plain, distributed as follows: 341 acres, 5 percent; 263 acres, 10 percent; 250 acres, 20 percent; 25 acres, 30 percent; 148 acres, 40 percent; 46 acres, 50 percent; 94 acres, 60 percent; 33 acres, 70 percent and 50 acres, 80 percent. The average annual damage without project conditions would be \$3,980.

### PROJECTS OF OTHER AGENCIES

The proposed Corps of Engineers' Multiple-Purpose Lake Fork Reservoir, sponsored by the Sabine River Authority, will be constructed for flood control, water supply, recreation, and enhancement of wildlife. Construction dates have not been set and it is the general belief that the reservoir cannot be completed before 1980.

The 5-year frequency pool will inundate approximately 3,828 acres of flood plain land of the Upper Lake Fork Creek Watershed.

### BASIS FOR PROJECT FORMULATION

The Sponsoring Local Organization determined that it was impractical to install Floodwater Retarding Structure Nos. 11, 16 and 20 because of changes in conditions that have occurred. They requested that these structures be deleted and alternate methods of achieving objectives for flood protection be investigated. It was agreed that the request is reasonable and consistent with good water resource development.

Meetings were held with the Sponsoring Local Organization to reaffirm project objectives and to discuss possible solutions.

The following specific objectives were agreed to:

1. Continue to establish land treatment measures during the remaining project installation period which contribute directly to watershed protection and flood prevention.
2. Maintain a reduction of approximately 80 percent in average annual floodwater, scour and sediment damages.

Alternate systems of protection from floodwater retarding structures were evaluated to obtain the most economical system that would meet project objectives. Of the seven alternate floodwater retarding structures studied, it was determined that the six alternate structures selected for inclusion in the Supplemental Plan would meet project objectives.

It was determined that a project for watershed protection and flood prevention meets local needs and that no other group or individual is interested in obtaining additional storage capacities for any other purposes.

Land treatment measures and floodwater retarding structures are the most feasible means of meeting project objectives.

#### WORKS OF IMPROVEMENT TO BE INSTALLED

##### Land Treatment Measures

An effective conservation program under the leadership of the Soil and Water Conservation Districts is now underway. Land Treatment measures, applied since work plan development in 1958, have installed at an estimated expenditure of \$3,281,206.

Conservation needs, accomplishments to date and remaining needs were updated to reflect changes in land use and the effects of the proposed Lake Fork Reservoir. This analysis provided a basis for the establishment of priorities for planning, application and maintenance of needed land treatment measures.

During the extended installation period of five years, land treatment measures will be established on 813 acres of cropland, 26,305 acres of pastureland and 2,474 acres of rangeland. Table I shows the total land treatment to be established during the installation period.

##### Structural Measures

A total of 26 floodwater retarding structures are required to provide the desired protection and reduction in floodwater, scour and sediment damage to flood plain lands of Upper Lake Fork Creek Watershed. Eighteen of the 26 structures have been built.

A relocation will be involved in the acquisition of land rights for Floodwater Retarding Structure No. 8. A house that has been unoccupied for several years will be moved from the detention pool. Relocation payments, if needed, for replacement dwelling, moving of household furniture and contents of the barn and relocation advisory assistance services have been allocated in Tables 1 and 2. Sponsors have determined that decent, safe and sanitary replacement housing will be available if needed for all persons subjected to displacement by the project.

The capacity of the 26 floodwater retarding structures totals 31,265 acre-feet. Of this amount, 4,007 acre-feet is provided for sediment accumulation over a 50-year period.

Details on quantities, cost and design features of structural measures are shown in tables 1, 2 and 3.

#### EXPLANATION OF INSTALLATION COSTS

##### Land Treatment

Land treatment measures will be applied by local interests at an estimated cost of \$1,024,400. This includes Public Law 46 funds for technical assistance to be provided by the Service and cost sharing in the establishment of approved conservation measures under the Rural Environmental Assistance Program as administered by the Agricultural Stabilization and Conservation Service. The estimated cost for application of the various treatment measures is based on prices paid by landowners and operators in the area, (see Table 1).

No additional accelerated assistance from PL-566 funds will be available for installation of the project.

##### Structural Measures

The total installation cost of the structural measures is estimated to be \$2,160,222. The Public Law 566 cost will be \$1,846,714 and the local cost will be \$313,481.

The local cost includes \$297,820 for land rights, \$2,161 for relocation payments and \$13,500 for project administration.

The Public Law 566 costs include \$1,301,747 for construction, \$163,000 for engineering service, \$964 for relocation payments and \$381,030 for project administration.

The estimated construction costs reflect an increase of \$324,870 over the original work plan estimate. Of this amount \$202,300 results from increased land prices for construction and \$122,570 results from a change in major features of the planned development. There is no change in project purpose. The estimated construction cost includes the Engineer's estimate and a 10 percent allowance for contingencies. The unit cost for these items is based on actual cost of structural measures in similar areas modified to conditions found in this watershed. The major items considered were earth fill, rock excavation and placement, drop inlet principal spillway, cutoff trench excavation, injection well construction, fencing, site preparation and equipment mobilization.

Engineering and project administration costs are based on analysis of previous work in similar areas. Engineering costs consist of, but are not limited to, detailed surveys, geological investigations, laboratory reports, designs and cartographic services. Project administration costs consist

of construction inspection, contract administration, maintenance of the Service's state office records and accounts, Washington office and Engineering and Watershed Planning Unit costs.

The total costs for apparent eligible relocation payments resulting from dislocations are estimated to be \$3,125. The share of these costs to be borne by Public Law 566 funds is 30.85 percent and the share to be borne by Other funds is 69.15 percent, and are based upon the ratio of Public Law 566 funds and Other funds to the total project costs less relocation payments.

The local costs for project administration include sponsors costs relative to contract administration, overhead and organizational costs, whatever construction inspection they desire to make at their own expense, and all relocation advisory assistance service costs. Relocation assistance advisory services amounting to \$500 are included in the local cost of project administration in order that no hardships will result from the relocations involved in the acquisition of land rights for Floodwater Retarding Structure No. 8.

Public Law 566 project administration costs consist of construction inspection, maintenance of records and accounts, contract administration, and assistance to the Lake Fork Creek Water Control and Improvement District No. 1 in providing relocation advisory assistance.

#### EFFECTS OF WORKS OF IMPROVEMENT

With the installation of the combined program of land treatment and structural measures, the average annual flooding will be reduced from 12,616 to 3,548 acres, a reduction of 71.9 percent. Reaches "C" and "F" will be inundated by Lake Fork Reservoir and these areas are not included in the economic evaluation.

Reduction in area inundated are presented in the following tabulation:

Evaluation Reach: (Figure 1)	Without Project (acres)	:	With Project (acres)	:	Reduction (percent)
A	1,721	:	6	:	99.7
B	3,608	:	1,793	:	50.3
D	4,198	:	1,106	:	73.7
E	3,089	:	643	:	79.2
<b>Total</b>	<b>12,616</b>		<b>3,548</b>		<b>71.9</b>

The following tabulation shows a comparison with and without project by evaluation reach, the area flooded and reduction by the largest storm in the evaluation series, the number of storms which cause floodwater damage

and the number of major storms which inundate half or more of the flood plain:

Evaluation Reach	Area Flooded By Largest Storm		Reduction (percent)	Number of Floods in Evaluation Series		Number of Major Floods in Evaluation Series	
	Without Project (acres)	With Project (acres)		Without Project (No.)	With Project (No.)	Without Project (No.)	With Project (No.)
A	1,840	60	96.7	83	7	22	0
B	1,750	1,360	22.3	124	97	78	24
D	2,576	1,555	39.6	104	48	48	4
E	2,804	1,313	53.2	111	47	30	0
<b>Total</b>	<b>8,970</b>	<b>4,288</b>	<b>52.2</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>

The annual flood plain scour damages on 1,250 acres are expected to be reduced approximately 96.2 percent.

Overbank sediment deposition will be reduced approximately 75.4 percent on 4,600 acres.

It is estimated that the 180 acre-feet of sediment which would be deposited in the Lake Fork Reservoir annually will be reduced to 88 acre-feet with the project installed.

Approximately 120 landowners and operators will be benefited directly by the installation of the project.

Secondary benefits from the installation of the project will accrue in the trade area as a result of increased business to those who furnish equipment and supplies. The increased agricultural production will provide added income, thereby improving the general standard of living in the area.

The effect on the environment resulting from the proposed changes will be minor. The installation of the six floodwater retarding structures, to be added, will require the commitment of 307 less acres than the deleted floodwater retarding structures. The area to be cleared for dams, spillways, sediment pools and for which vegetative habitat will be destroyed or altered, will be about 19 acres less than that required in the original planned structural system.

### PROJECT BENEFITS

The estimated total average annual damage (Table 5) will be reduced from \$164,890 to \$28,930, a reduction of 82.4 percent. These damage reduction benefits amount to \$135,960.

By types of damage for each evaluation reach these reductions for flood-water retarding structures will be:

#### BENEFITS FROM DAMAGE REDUCTION

(Dollars)

Type of Damage	Evaluation Reach				Total Structures Only
	A	B	D	E	
Crop & Pasture	20,247	7,140	13,343	15,928	56,749
Other Agricultural	1,409	1,624	3,424	2,893	9,350
Nonagricultural	4,734	3,358	9,319	5,778	23,189
Overbank Deposition	1,794	240	734	1,134	3,902
Flood Plain Scour	1,724	317	437	375	2,853
Indirect	2,991	1,268	2,735	2,610	9,604
<b>Total</b>	<b>32,899</b>	<b>13,947</b>	<b>30,083</b>	<b>28,718</b>	<b>105,647</b>

Net income will increase an estimated \$1,310 annually to owners and operators of the flood plain land from more intensive land use.

It is estimated that the project will produce local secondary benefits, excluding indirect benefits, averaging \$10,040 annually. Secondary benefits from a national viewpoint were not considered pertinent to the economic evaluation.

In addition to the monetary benefits, there are substantial benefits which will accrue to the project such as increased sense of security, better living conditions and improved wildlife habitat.

#### COMPARISON OF BENEFITS AND COSTS

Average annual benefits accruing to structural measures, excluding secondary benefits, are estimated to be \$110,360. The average annual cost of the structural measures (amortized total installation and project administration cost plus operation and maintenance) is \$87,515 (Table 4) resulting in a benefit-cost ratio of 1.3 to 1.0.

The ratio of total average annual benefits of \$120,400 to the average annual cost of \$87,515 is 1.4 to 1.0. (Table 6)

PROJECT INSTALLATION

Land Treatment

Planned land treatment (Table 1) will be accomplished by farm and ranch operators in cooperation with the Hopkins-Rains and Upper Sabine Soil and Water Conservation Districts during the installation period. The goal is the adequate treatment of 3,600 acres of cropland, 80,885 acres of pastureland and 4,063 acres of rangeland by the end of the installation period.

In reaching this goal, it is expected that accomplishment of additional adequate treatment will be achieved during the extended installation period as follows:

Land Use	Fiscal Year					Total (acres)
	1st (acres)	2nd (acres)	3rd (acres)	4th (acres)	5th (acres)	
Cropland	170	170	170	170	133	813
Pastureland	5,184	5,484	5,584	5,384	4,669	26,305
Rangeland	584	384	584	538	384	2,474
<b>Total</b>	<b>5,938</b>	<b>6,038</b>	<b>6,338</b>	<b>6,092</b>	<b>5,186</b>	<b>29,592</b>

Structural Measures

The Service, in compliance with the request made by the Sponsoring Local Organization, will provide the necessary administrative and clerical personnel, facilities, supplies to advertise, award, administer contracts and will be the contracting agency.

Technical assistance will be provided by the Service in the preparation of plans and specifications, construction inspection, preparation of contract payment estimates, final inspection, execution of certificates of completion and related tasks necessary to install structural measures.

The Lake Fork Creek Water Control and Improvement District No. 1 has the right of eminent domain under applicable State laws and will obtain the necessary land rights for all of the structural measures.

The Lake Fork Creek Water Control and Improvement District No. 1 has assumed responsibility for providing those relocation advisory assistance services and relocation costs associated with Floodwater Retarding Structure No. 8. It will, through its own facilities, (1) provide personally,

or by first class mail, written notice of displacement and appropriate application forms to each displaced person, (2) give displaced persons notice to vacate at least 90 days prior to the date they must move, (3) assist in filing applications, (4) review and approve applications for relocation assistance, (5) review and process grievances in connection with displacements and (6) make relocation payments.

The Sponsor will provide such measures, facilities or services as may be necessary or appropriate in order to, (1) determine the need, if any, of displaced persons for relocation assistance, (2) provide current and continuing information on the availability, prices, and rentals of comparable, decent, safe and sanitary sale and rental housing, and of comparable commercial properties and locations for displaced businesses and farm operations, (3) assure, that within a reasonable period of time prior to displacement, replacement dwellings will be available, (4) assist a displaced person displaced from his business or farm operation in obtaining and becoming established in a suitable replacement location, (5) supply information concerning housing programs, disaster loan programs and other Federal or State programs offering assistance to displaced persons, (6) provide other advisory services to displaced persons in order to minimize hardships to such persons in adjusting to relocation, (7) advise displaced persons that they should notify the displacing agency before they move and (8) prior to initiation of acquisition provide persons from whom it is planned to acquire land a brochure or pamphlet outlining the benefits to which they may be entitled.

Construction of any floodwater retarding structure causing a displacement will not be initiated until decent, safe and sanitary replacement housing is available for all displaced families. The Sponsors have determined that decent, safe and sanitary replacement housing will be available for all persons subject to displacement by the project.

If at the time of additional construction, land rights have not been acquired for the Lake Fork Reservoir, consideration will be given to obtaining flowage easements between valley sections 10 and 15.

The structural measures will be installed during a 5-year installation period pursuant to the following conditions:

1. The requirements for land treatment in the drainage area above the floodwater retarding structures have been met.
2. All land rights and permits have been obtained for all structural measures or written statements have been furnished by the Lake Fork Creek Water Control and Improvement District No. I, giving a schedule for remaining non-cleared sites, by site number and the exact date by which all land rights will be obtained or the right of eminent domain of the District will be used to secure any remaining land rights and that sufficient funds are available

for purchasing these land rights and for condemnation proceedings and awards.

3. The contracting agencies are prepared to discharge their responsibilities.
4. Project, land rights and revised operation and maintenance agreements have been executed.
5. Public Law 566 funds are available.

Following is a schedule of obligations for installing the remaining structures and land treatment:

(Dollars)				
Fiscal:		:PL 566 :	Other :	
Year :	Measures	: Funds :	Funds :	Total
First :	Land Treatment	:	204,880 :	204,880
Second:	Land Treatment	:	204,880 :	204,880
	:Floodwater Retarding Structure	:117,050:	26,750 :	143,800
	: Nos. 16B and 16C	:	:	
Third :	Land Treatment	:	204,880 :	204,880
	:Floodwater Retarding Structure	:149,272:	78,423 :	227,695
	: Nos. 1 and 8	:	:	
Fourth:	Land Treatment	:	204,880 :	204,880
	:Floodwater Retarding Structure	:155,080:	76,000 :	231,080
	: Nos. 11A and 11B-1	:	:	
Fifth :	Land Treatment	:	204,880 :	204,880
	:Floodwater Retarding Structure	:133,050:	42,580 :	175,630
	: Nos. 20B and 20C	:	:	
<b>Total</b>		<b>:554,452:</b>	<b>1,248,153:</b>	<b>1,802,605</b>

#### FINANCING PROJECT INSTALLATION

Federal assistance for carrying out the works of improvement described in this supplemental work plan will be provided under the authority of the Watershed Protection and Flood Prevention Act (Public Law 566, 83rd Congress; 68 Stat. 666), as amended.

The cost of installing the needed land treatment measures during the 5-year extended installation period will be borne by owners and operators

of the land on which these measures are installed. The Agricultural Stabilization and Conservation Service will provide financial assistance for the installation of those land treatment measures which are eligible for this assistance. The Farmers Home Administration, local banks and other lending institutions can arrange financing for the land owners and operators' share of the cost. The Service will provide funds in the amount of \$87,560 to finance the cost of technical assistance in planning the application of the land treatment measures.

Funds for the local share of the cost of installing the structural measures will be provided by the Lake Fork Creek Water Control and Improvement District No. 1.

Financial and other assistance to be furnished by the Service is contingent on the appropriation of funds for this purpose. In addition, all prerequisite conditions will be met before Federal funds will be made available for the installation of the structural measures.

#### PROVISIONS FOR OPERATION AND MAINTENANCE

##### Land Treatment Measures

Land treatment measures will be maintained by landowners and operators of farms on which the measures are applied under agreement with the Hopkins-Rains and Upper Sabine Soil and Water Conservation Districts. Representatives of the Districts will make periodic inspections of land treatment measures to determine maintenance needs and encourage landowners and operators to perform maintenance. They will make district-owned equipment available for this purpose in accordance with existing working arrangements.

##### Structural Measures

The estimated operation and maintenance cost for the eight structures to be built is \$1,900 annually.

The Lake Fork Creek Water Control and Improvement District No. 1 will be responsible for operation and maintenance of all floodwater retarding structures. The costs of operation and maintenance will be borne by the District.

A revised specific operation and maintenance agreement will be executed prior to the issuance of invitations to bid on construction of any of the structural works of improvement included in this work plan.

Structural measures will be inspected at least annually and after each heavy rain by representatives of the Sponsoring Local Organization.

A Service representative will participate in these inspections for a period of at least three years following construction. The Service will participate in inspections as often as it elects to do so after the third year. Items of inspection will include, but will not be limited to, condition of principal spillways and their appurtenances, emergency spillways, earth fills, vegetative cover of earth fills and emergency spillways, fences, gates and vegetative growth in the reservoirs. These items of inspection are those most likely to require maintenance.

Maintenance of structural measures will be performed promptly as the need arises. Possible items of maintenance include (1) removal of any obstructions which may adversely affect functioning of principal and emergency spillways, (2) repair of areas of embankments or emergency spillways damaged by erosion to conform to the original design, (3) maintenance of good vegetative cover on embankments and emergency spillways, (4) removal of undesirable vegetation or debris from reservoirs and embankments, (5) repair of damaged fences and gates and (6) repair of areas of seepage through embankments and foundations or adjacent to principal spillways which threaten the stability of the structures.

The Service will assist in operation and maintenance only to the extent of furnishing technical guidance.

Provisions will be made for unrestricted access of representatives of Sponsoring Local Organization and the Service to inspect all structural measures and their appurtenances at any time and for Sponsoring Local Organization to operate and maintain them.

TABLE 1 - ESTIMATED PROJECT INSTALLATION COST  
Upper Lake Fork Creek Watershed, Texas

Installation Cost Item	Unit	No.	Estimated Cost (Dollars) 1/		
			Public Law-566:	Other:	Total
	Number		Non-	Non-	
	Non-		Fed. Land	Fed. Land	
	Fed. Land		S.C.S. 3/	S.C.S. 3/	
<b>LAND TREATMENT</b>					
Land Areas 2/					
Cropland	Acre	3,600	-	11,770	11,770
Pastureland	Acre	80,885	-	4,017,640	4,017,640
Rangeland	Acre	4,063	-	6,980	6,980
Technical Assistance			147,836	121,380	269,216
<b>TOTAL LAND TREATMENT</b>			147,836	4,157,770	4,305,606
<b>STRUCTURAL MEASURES</b>					
Construction					
Floodwater Retarding					
Structures	No.	26	1,301,747	-	1,301,747
Subtotal - Construction			1,301,747	-	1,301,747
Engineering Services			163,000	-	163,000
Relocation Payments			964	2,161	3,125
Project Administration					
Construction Inspection			181,139	2,600	183,739
Other			199,891	10,400	210,291
Relocation Assistance			-	500	500
Advisory Services					
Subtotal - Administration			381,030	13,500	394,530
Other Costs					
Land Rights				297,820	297,820
Subtotal - Other				297,820	297,820
<b>TOTAL STRUCTURAL MEASURES</b>			1,846,741	313,481	2,160,222
<b>TOTAL PROJECT</b>			1,994,577	4,471,251	6,465,828

1/ 1971 Prices: actual contract cost for structures constructed prior to July 1, 1971.

2/ Include only areas estimated to be adequately treated during the project installation period.

3/ Federal agency responsible for assisting in installation of works of improvement.

TABLE 2 - ESTIMATED STRUCTURAL COST DISTRIBUTION  
 Upper Lake Fork Creek Watershed, Texas  
 Sabine River Watershed  
 (Dollars) 1/

Items	Federal Installation Cost			Installation Cost			Total
	Const.	Eng.	Relocation:	Other Funds	Land	Rights	
	2/	2/	3/				Costs
Constructed prior to July 1, 1971:							
Floodwater Retarding Structures							
Numbers 2 through 7, 9, 10A, 12, 13, 14, 15A, 17, 18, 19, 21, 22, and 23.	785,787	125,350	-	911,137	-	76,350	987,487
In present plan - not constructed:							
Floodwater Retarding Structure							
Numbers							
1	76,950	5,390	-	82,340	-	37,820	120,160
8	61,770	4,320	964	67,054	2,161	38,320	107,535
Subtotal	138,720	9,710	964	149,394	2,161	76,140	227,695
Adding in 1972 Supplement No. 1:							
Floodwater Retarding Structures							
11A	72,680	5,090	-	77,770	-	53,550	131,320
11B-1	72,250	5,060	-	77,310	-	22,450	99,760
16B	55,970	4,480	-	60,450	-	16,500	76,950
16C	52,410	4,190	-	56,600	-	10,250	66,850
20B	80,220	5,620	-	85,840	-	17,300	103,140
20C	43,710	3,500	-	47,210	-	25,280	72,490
Subtotal	377,240	27,940	-	405,180	-	145,330	550,510
Subtotal	515,960	37,650	964	554,574	2,161	221,470	778,205
Watershed Subtotal	1,301,747	163,000	964	1,465,711	2,161	297,820	1,765,692
Project Administration							
Grand Total	1,301,747	163,000	964	1,846,741	2,161	297,820	394,530
							2,160,222

1/ 1971 Prices: actual contract cost for structures constructed prior to July 1, 1971

2/ Relocation payment for displacements will be shared as provided in PL-91-646 and is shown in the Supplemental Watershed Work Plan Agreement No. 1.

3/ Includes \$14,210 for legal fees.

**TABLE 3 - STRUCTURE DATA - FLOODWATER RETARDING STRUCTURES**  
Upper Lake Fork Creek Watershed, Texas

Item	Unit	STRUCTURE NUMBER			
		1	8	11A	11B-1
Class of Structure		A	A	A	A
Drainage Area	Sq.Mi.	4.90	5.00	7.73	3.50
Curve No. (1-day) (AMC II)		83	83	84	83
Tc	Hrs.	2.20	2.20	2.78	3.30
Elevation Top of Dam	Ft.	539.3	493.9	530.1	547.4
Elevation Crest Emergency Spillway	Ft.	536.0	490.0	526.0	543.5
Elevation Crest - Principal Spillway	Ft.	524.6	479.1	513.7	531.3
Elevation Crest Lowest Ungated Outlet	Ft.	524.2	478.5	509.0	531.3
Maximum Height of Dam	Ft.	33	31	30	29
Volume of Fill	Cu.Yds.	118,150	100,600	107,100	92,300
Total Capacity	Ac.Ft.	1,782	1,786	2,782	1,183
Sediment Pool (Lowest Ungated Outlet)1/	Ac.Ft.	200	200	25	130
Sediment Submerged 50-Year	Ac.Ft.	235	240	289	130
Sediment Aerated	Ac.Ft.	26	29	28	13
Retarding	Ac.Ft.	1,521	1,517	2,465	1,040
Surface Area					
Sediment Pool (Lowest Ungated Outlet)	Acres	58	65	25	42
Sediment Pool-Principal Spillway Crest	Acres	62	70	90	42
Retarding Pool	Acres	227	236	337	141
Principal Spillway					
Rainfall Volume (areal) (1-day)	In.	8.30	7.90	8.30	7.80
Rainfall Volume (areal) (10-day)	In.	14.40	13.50	14.20	13.20
Runoff Volume (10-day)	In.	9.90	9.29	10.25	9.00
Capacity (Maximum)	cfs.	108	103	167	65
Frequency Operation - Emer. Spillway	% Chance	2.6	3.8	2.7	4.0
Size of Conduit	In.	30	30	36	24
Emergency Spillway					
Rainfall Volume (ESH) (areal)	In.	7.00	7.10	7.10	7.10
Runoff Volume (ESH)	In.	5.02	5.12	5.24	5.12
Type	Veg.				
Bottom Width	Ft.	250	200	200	120
Velocity of Flow (V <sub>e</sub> )	Ft./Sec.	-	-	-	-
Slope of Exit Channel	Ft./Ft.	.050	.050	.055	.080
Maximum Water Surface Elevation	Ft.	-	-	-	-
Freeboard					
Rainfall Volume (FH) (areal)	In.	14.50	14.60	14.60	14.60
Runoff Volume (FH)	In.	12.30	12.40	12.55	12.40
Maximum Water Surface Elevation	Ft.	539.3	493.9	530.1	547.4
Capacity Equivalents					
Sediment Volume	In.	1.00	1.01	0.77	0.77
Retarding Volume	In.	5.82	5.69	5.98	5.57

(See Footnote on Last page table 3)

Supplement No. I  
September 1972

TABLE 3 - STRUCTURE DATA - FLOODWATER RETARDING STRUCTURES - Continued  
Upper Lake Fork Creek Watershed, Texas

Item	Unit	STRUCTURE NUMBER			
		16B	16C	20B	20C
Class of Structure		A	A	A	A
Drainage Area	Sq.Mi.	2.08	1.20	6.48	3.07
Curve No. (1-day) (AMC II)		83	84	82	82
Tc	Hra.	1.65	1.82	2.10	1.16
Elevation Top of Dam	Ft.	524.8	524.5	539.4	508.4
Elevation Crest Emergency Spillway	Ft.	521.5	521.5	535.5	505.0
Elevation Crest - Principal Spillway	Ft.	511.0	512.0	522.0	493.0
Elevation Crest Lowest Ungated Outlet	Ft.	511.0	512.0	522.0	493.0
Maximum Height of Dam	Ft.	24	23	31	29
Volume of Fill	Cu.Yds	57,750	52,100	143,000	73,300
Total Capacity	Ac.Ft.	697	419	1,963	944
Sediment Pool (Lowest Ungated Outlet)1/	Ac.Ft.	71	63	121	87
Sediment Submerged 50-Year	Ac.Ft.	71	63	121	87
Sediment Aerated	Ac.Ft.	10	9	17	11
Retarding	Ac.Ft.	616	347	1,825	846
Surface Area					
Sediment Pool (Lowest Ungated Outlet)	Acres	23	20	40	28
Sediment Pool-Principal Spillway Crest	Acres	23	20	40	28
Retarding Pool	Acres	110	63	264	131
Principal Spillway					
Rainfall Volume (areal) (1-day)	In.	8.40	7.75	7.75	7.80
Rainfall Volume (areal)(10-day)	In.	14.20	13.30	13.20	13.20
Runoff Volume (10-day)	In.	9.94	9.41	8.86	8.77
Capacity (Maximum )	cfs.	68	31	115	61
Frequency Operation - Emer. Spillway	% Chance	2.6	4.0	4.0	4.0
Size of Conduit	In.	24	18	30	24
Emergency Spillway					
Rainfall Volume (ESH) (areal)	In.	7.10	7.10	7.10	7.10
Runoff Volume (ESH)	In.	5.12	5.24	5.01	5.01
Type		Veg.	Veg.	Veg.	Veg.
Bottom Width	Ft.	100	80	250	200
Velocity of Flow (V <sub>e</sub> )	Ft./Sec.	-	-	-	-
Slope of Exit Channel	Ft./Ft.	.032	.050	.040	.040
Maximum Water Surface Elevation	Ft.	-	-	-	-
Freeboard					
Rainfall Volume (FH) (areal)	In.	14.60	14.60	14.60	14.60
Runoff Volume (FH)	In.	12.40	12.55	12.26	12.26
Maximum Water Surface Elevation	Ft.	524.8	524.5	539.4	508.4
Capacity Equivalents					
Sediment Volume	In.	0.73	1.12	0.40	0.60
Retarding Volume	In.	5.55	5.43	5.28	5.17

(See footnote on last page table 3)

TABLE 3 - STRUCTURE DATA - FLOODWATER RETARDING STRUCTURES - Continued  
Upper Lake Fork Creek Watershed, Texas

Item	Unit	Total for 18 Structures Constructed Prior to July 1, 1971	Total for 8 Structures to be Constructed in Installa- tion Period	Total Project Total
Class of Structure		xxx	xxx	xxx
Drainage Area	Sq.Mil	51.79	33.96	85.75
Curve No. (1-day) (AMC II)		xxx	xxx	xxx
Tc	Hrs.	xxx	xxx	xxx
Elevation Top of Dam	Ft.	xxx	xxx	xxx
Elevation Crest Emergency Spillway	Ft.	xxx	xxx	xxx
Elevation Crest - Principal Spillway	Ft.	xxx	xxx	xxx
Elevation Crest Lowest Ungated Outlet	Ft.	xxx	xxx	xxx
Maximum Height of Dam	Ft.	xxx	xxx	xxx
Volume of Fill	Cu.Yds.	1,486,850	744,300	2,231,150
Total Capacity	Ac.Ft.	19,709	11,556	31,265
Sediment Pool (Lowest Ungated Outlet) <sup>1/</sup>	Ac.Ft.	2,143	897	3,040
Sediment Submerged 50-Year	Ac.Ft..	2,344	1,236	3,580
Sediment Aerated	Ac.Ft.	284	143	427
Retarding	Ac.Ft.	17,081	10,177	27,258
Surface Area				
Sediment Pool (Lowest Ungated Outlet)	Acres	625	301	926
Sediment Pool-Principal Spillway Crest	Acres	666	375	1,041
Retarding Pool	Acres	2,428	1,509	3,937
Principal Spillway				
Rainfall Volume (areal) (1-day)	In.	xxx	xxx	xxx
Rainfall Volume (areal)(10-day)	In.	xxx	xxx	xxx
Runoff Volume (10-day)	In.	xxx	xxx	xxx
Capacity (Maximum)	cfa.	xxx	xxx	xxx
Frequency Operation -Emer. Spillway	% Chance	xxx	xxx	xxx
Size of Conduit	In.	xxx	xxx	xxx
Emergency Spillway				
Rainfall Volume (ESH) (areal)	In.	xxx	xxx	xxx
Runoff Volume (ESH)	In.	xxx	xxx	xxx
Type		xxx	xxx	xxx
Bottom Width	Ft.	xxx	xxx	xxx
Velocity of Flow ( $V_e$ )	Ft./Sec.	xxx	xxx	xxx
Slope of Exit Channel	Ft./Ft.	xxx	xxx	xxx
Maximum Water Surface Elevation	Ft.	xxx	xxx	xxx
Freeboard				
Rainfall Volume (FH) (areal)	In.	xxx	xxx	xxx
Runoff Volume (FH)	In.	xxx	xxx	xxx
Maximum Water Surface Elevation	Ft.	xxx	xxx	xxx
Capacity Equivalents				
Sediment Volume	In.	xxx	xxx	xxx
Retarding Volume	In.	xxx	xxx	xxx
Spillway Storage	In.	xxx	xxx	xxx

<sup>1/</sup> Volume included in Sediment Submerged 50-Year.

Supplement No. 1  
September 1972

TABLE 4 - ANNUAL COST  
Upper Lake Fork Creek Watershed, Texas

(Dollars) 1/

Evaluation Unit	Amortization of Installation Cost <u>2/</u>	Operation and Maintenance Cost	Total
Floodwater Retarding Structures Built Prior to July 1971 - Numbers 2 through 7, 9, 10A, 12, 13, 14, 15A, 17, 18, 19, 21, 22, and 23.			
Floodwater Retarding Structures to be Built During Installa- tion Period - Numbers 1, 8, 11A, 11B-1, 16B, 16C, 20B, and 20C.			
	66,515	6,520	73,035
<u>Project Administration</u>	14,480	xxxxx	14,480
<u>GRAND TOTAL</u>	80,995	6,520	87,515

1/ Price base: Actual contract cost for structures constructed prior to July 1, 1971; 1971 prices for structures to be built during the extended installation period.

2/ 50-years @ 2.5 percent interest on structures built prior to July 1, 1971, and 50 years @ 3.25 percent on structures to be built during the extended installation period.

Supplement No. I  
September 1972

**TABLE 5 - ESTIMATED AVERAGE ANNUAL FLOOD DAMAGE REDUCTION BENEFITS**  
**Upper Lake Fork Creek Watershed, Texas**

(Dollars) 1/

Item	Estimated Average Annual Damage		Damage
	Without Project	With Project	Reduction Benefits
<b>Floodwater</b>			
Crop and Pasture	82,470	10,980	71,490
Other Agricultural	13,230	2,650	10,580
Nonagricultural			
Road and Bridge	30,610	5,010	25,600
<b>Subtotal</b>	<b>126,310</b>	<b>18,640</b>	<b>107,670</b>
<b>Sediment</b>			
Overbank Deposition	8,520	2,090	6,430
Lake Fork Reservoir	11,090	5,420	5,670
<b>Subtotal</b>	<b>19,610</b>	<b>7,510</b>	<b>12,100</b>
<b>Erosion</b>			
Flood Flain Scour	3,980	150	3,830
<b>Indirect</b>	<b>14,990</b>	<b>2,630</b>	<b>12,360</b>
<b>TOTAL</b>	<b>164,890</b>	<b>28,930</b>	<b>135,960</b>

1/ Price Base: Adjusted Normalized Prices, April 1966

Supplement No. I  
September 1972

TABLE 6 - COMPARISON OF BENEFITS AND COSTS FOR STRUCTURAL MEASURES  
Upper Lake Fork Creek Watershed, Texas

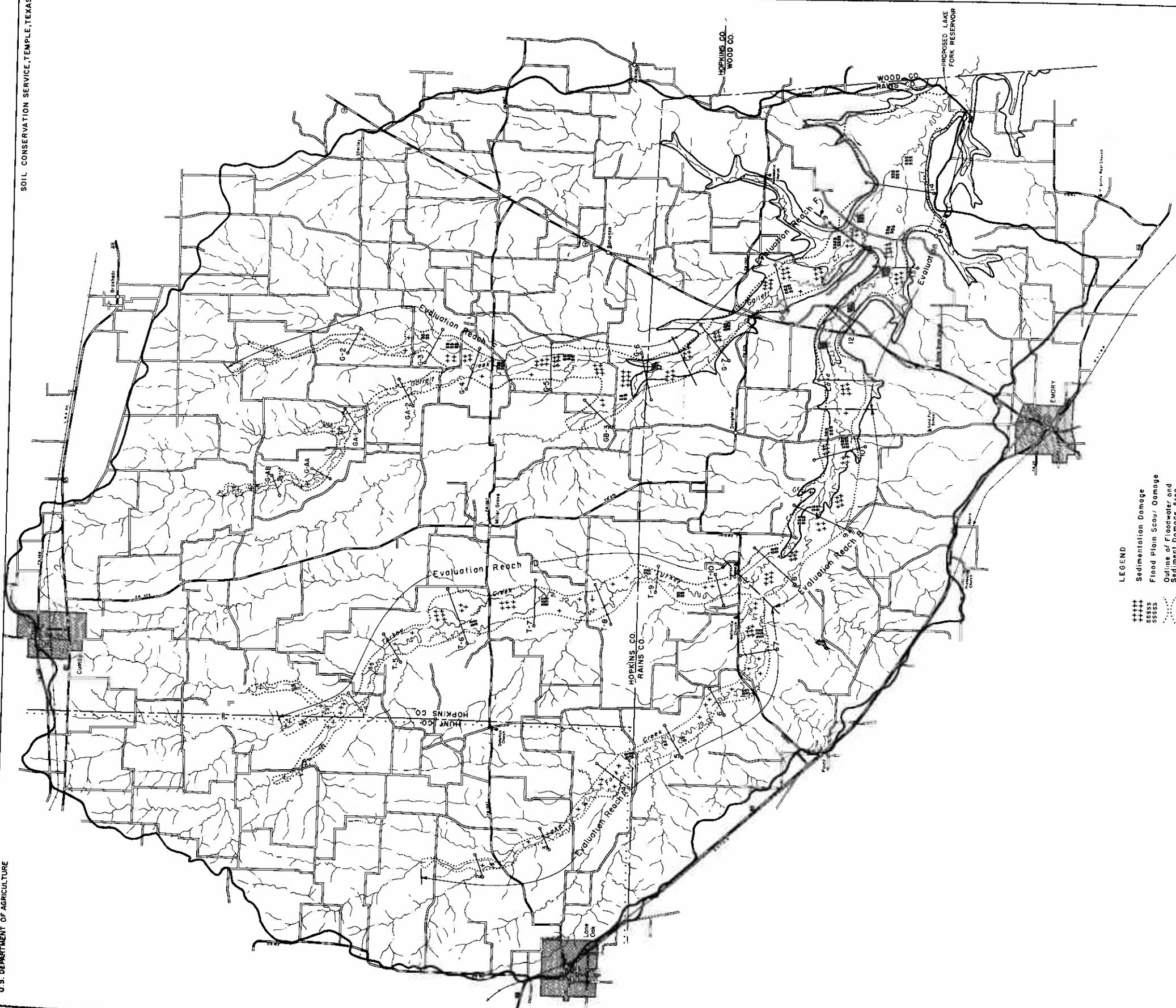
(Dollars)

Evaluation Unit	AVERAGE ANNUAL BENEFITS <sup>1/</sup>				Average Annual Cost <sup>2/</sup>	Benefit-Cost Ratio
	Damage Reduction	Intensive Land Use	Secondary Land Use	Total		
Floodwater Retarding Structures Built Prior to July 1970 - Numbers 2 through 7, 9, 10A, 12, 13, 14, 15A, 17, 18, 19, 21, 22, and 23	109,050 <u>3/</u>	1,310	10,040	120,400	73,035	1.7:1.0
Floodwater Retarding Structures to be Built During Installation Period - Numbers 1, 8, 11A, 11B-1, 16B, 16C, 20B, and 20C.	xxxxxxx	xxxxxx	xxxxxxx	xxxxxxx	14,480	xxxxxxx
Project Administration						
GRAND TOTAL	109,050 <u>3/</u>	1,310	10,040	120,400	87,515	1.4:1.0

<sup>1/</sup> Price Base: Adjusted normalized prices, April 1966.

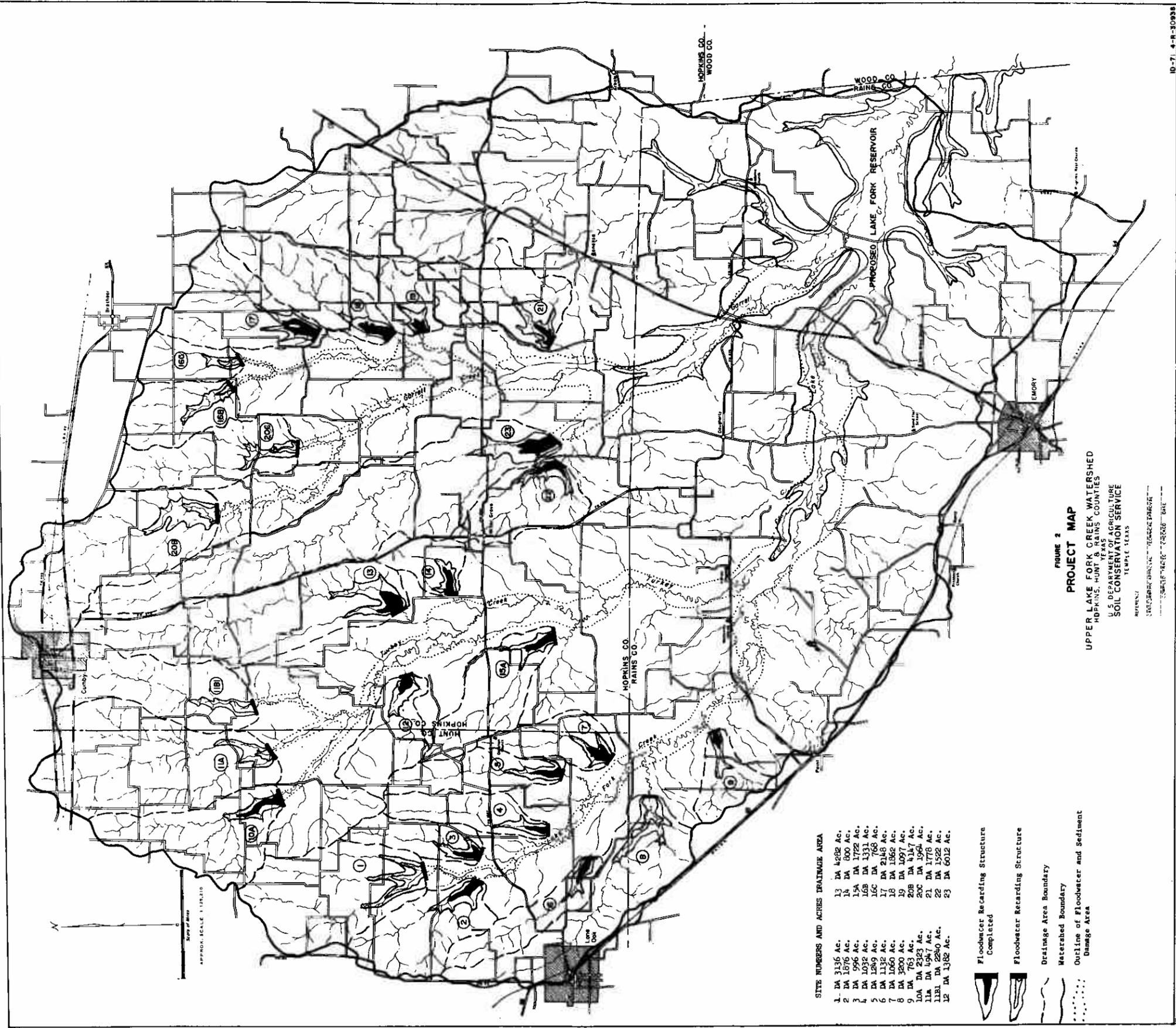
<sup>2/</sup> From Table 4

<sup>3/</sup> In addition, it is estimated that land treatment measures will provide flood damage reduction benefits of \$26,910 annually.



- LEGEND**
- ++++ Sedimentation Damage
  - ~~~~ Flood Plain Scour Damage
  - Outline of Floodwater and Sediment Damage Area
  - Cross Section Hydrologic

Figure 1  
**PROBLEM LOCATION MAP**  
 UPPER LAKE FORK CREEK WATERSHED  
 HOPKINS, HUNT & RAINS COUNTIES  
 TEXAS



**SITE NUMBERS AND ACRES TREATAGE AREA**

1	DA 3136 Ac.
2	DA 1876 Ac.
3	DA 996 Ac.
4	DA 1032 Ac.
5	DA 1249 Ac.
6	DA 1132 Ac.
7	DA 1060 Ac.
8	DA 3200 Ac.
9	DA 763 Ac.
10A	DA 2323 Ac.
11A	DA 1947 Ac.
11B1	DA 2240 Ac.
12	DA 1382 Ac.
13	DA 4282 Ac.
14	DA 600 Ac.
15A	DA 1722 Ac.
16B	DA 1331 Ac.
16C	DA 768 Ac.
17	DA 2145 Ac.
18	DA 1562 Ac.
19	DA 1097 Ac.
20B	DA 4147 Ac.
20C	DA 1964 Ac.
21	DA 1778 Ac.
22	DA 1522 Ac.
23	DA 6012 Ac.

- Floodwater Recording Structure Completed
- Floodwater Recording Structure
- Drainage Area Boundary
- Watershed Boundary
- Outline of Floodwater and Sediment Damage Area

**FIGURE 2  
PROJECT MAP  
UPPER LAKE FORK CREEK WATERSHED  
HOPKINS, HUNT & RAINS COUNTIES  
TEXAS  
U.S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE  
TEMPLE, TEXAS**