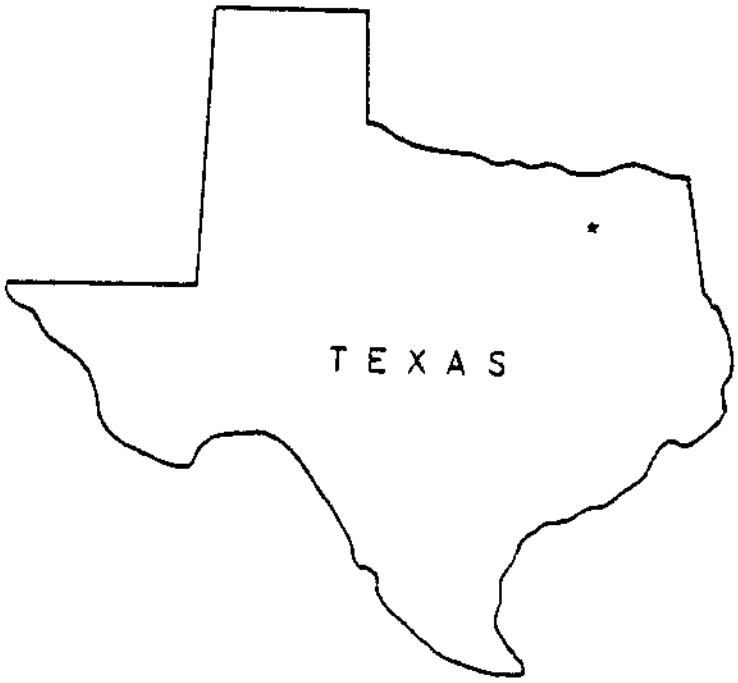
FINAL
WATERSHED PLAN - ENVIRONMENTAL ASSESSMENT

CADDO CREEK WATERSHED
Hunt and Collin Counties, Texas



SOIL CONSERVATION SERVICE

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
TEMPLE, TEXAS 76503

January 1985

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CADDO CREEK WATERSHED
Hunt and Collin Counties, Texas

Prepared by:

Upper Sabine Soil and Water Conservation District

Collin County Soil and Water Conservation District

Assisted by:

USDA, SOIL CONSERVATION SERVICE

Temple, Texas

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Caddo Creek Watershed

Hunt and Collin Counties, Texas

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Abstract

Not a true statement.

This document describes a plan to assure the capability of sustained long-term agricultural production and to reduce soil erosion in the Caddo Creek watershed. Two candidate plans were considered. One consisted of management practices and the other was the no action plan. The recommended plan consists of an accelerated land treatment program which includes funds for technical assistance to apply management practices such as crop residue use, contour farming, and conservation cropping systems and technical and financial assistance to apply enduring practices such as terraces, waterways, and grade stabilization structures. Total project costs are $2,089,590, of which $1,847,510 will be paid from Public Law 566 funds and $242,080 from other funds. Major impacts will be reduced soil loss from eroding cropland fields and maintenance of the long-term productive capacity of the soil resource base. This document is authorized and prepared under the authority of the Watershed Protection and Flood Prevention Act, Public Law 83-566, as amended,(16 U.S.C. 1001-1008).

Prepared by: Upper Sabine Soil and Water Conservation District
Collin County Soil and Water Conservation District
U.S. Department of Agriculture, Soil Conservation Service

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WATERSHED AGREEMENT

Between the

Upper Sabine Soil and Water Conservation District

Collin County Soil and Water Conservation District

(Referred to herein as sponsors)

State of Texas

and the

Soil Conservation Service
United States Department of Agriculture
(Referred to herein as SCS)

Whereas, application has heretofore been made to the Secretary of Agriculture by sponsors for assistance in preparing a plan for works of improvement for the Caddo Creek watershed, State of Texas, under the authority of the Watershed Protection and Flood Prevention Act (16 U.S.C. 1001-1008); and

Whereas, the responsibility for administration of the Watershed Protection and Flood Prevention Act, as amended, has been assigned by the Secretary of Agriculture to SCS; and

Whereas, there has been developed through the cooperative efforts of the sponsors and SCS a plan for works of improvement for the Caddo Creek watershed, State of Texas, hereinafter referred to as the watershed plan, which plan is annexed to and made a part of this agreement;

Now, therefore, in view of the foregoing considerations, the Secretary of Agriculture, through SCS, and the sponsors hereby agree on this plan and that the works of improvement for this project will be installed, operated and maintained in accordance with the terms, conditions, and stipulations provided for in this watershed plan and including the following:

1. Cost-sharing rate for the establishment of enduring conservation practices is 80 percent of the average cost of installing the enduring practices in the selected plan for the evaluation unit. The estimated total financial assistance cost for enduring practices is $968,310.

No practices in the selected plan are approved for an incentive payment.

2. The SCS will assist the sponsors in providing technical assistance to landowners or operators to plan and install conservation practices shown in the plan. Percentages of technical assistance costs to be borne by the sponsors and SCS are as follows:

Works of Improvement	Sponsors (percent	SCS (percent)	Estimated Technical Assistance Cost (dollars)
Conservation Practices	0	100	$879,200

3. The sponsors will obtain applications from owners of not less than 10 percent of the land in the identified problem areas indicating that they will carry out the planned conservation practices. Applications will be obtained before the first long-term land treatment contract is executed.

4. The sponsors will obtain agreement with landowners or operators to operate and maintain the conservation practices for the protection and improvement of the watershed.

5. The costs shown in this plan are preliminary estimates. Final costs to be borne by the parties hereto will be the actual costs, not to exceed average costs or approved variation will be used for payment determinations. Manual recommends avg. cost.

6. This agreement is not a fund obligating document. Financial and other assistance to be furnished by SCS in carrying out the plan is contingent upon the fulfillment of applicable laws and regulations and the availability of appropriations for this purpose.

7. A separate agreement (long-term contract) will be entered into between SCS and landusers before either party initiates work involving funds of the other party. Such agreements will set forth in detail the financial and working arrangements and other conditions that are applicable to the specific works of improvement.

8. This plan may be amended or revised only by mutual agreement of the parties hereto, except that SCS may deauthorize or terminate funding at any time it determines that the sponsor has failed to comply with the conditions of this agreement. In this case, SCS shall promptly notify the sponsor in writing of the determination and the reasons for the deauthorization of project funding, together with the effective date. Payments made to the landowner or operator through long-term contracts or recoveries by SCS shall be in accord with the legal rights and liabilities of the parties when project funding has been deauthorized. An amendment to incorporate changes affecting a specific measure may be made by mutual agreement between SCS and the sponsor(s) having specific responsibilities for the measure involved.

9. No member of or delegate to Congress or resident commissioner shall be admitted to any share or part of this plan, or to any benefit that may arise therefrom; but this provision shall not be construed to extend to this agreement if made with a corporation for its general benefit.

10. The program conducted will be in compliance with all requirements respecting nondiscrimination, as contained in the Civil Rights Act of 1964, as amended, and the regulations of the Secretary of Agriculture (7 CFR 15), which provide that no person in the United States shall, on the ground of race, color, national origin, sex, age, handicap, or religion, be excluded from participation in, be denied the benefits of, or otherwise be subjected to discrimination under any program or activity conducted or assisted by the Department of Agriculture.

Upper Sabine Soil and Water Conservation District

By W. S. Cunningham

W. S. Cunningham

Box 1122, Greenville, TX 75401
Address Zip Code

Title Chairman

Date 1-21-86

The signing of this agreement was authorized by a resolution of the governing body of the Upper Sabine Soil and Water Conservation District adopted at a meeting held on 12-9-85.

M E Dooley

M. E. Dooley
Secretary

Box 1122, Greenville, TX 75401
Address Zip Code

1-21-86
Date

Collin County Soil and Water Conservation District

By John D. Wells

John D. Wells

Box 222, McKinney, TX 75069
Address Zip Code

Title Chairman

Date 1/21/86

The signing of this agreement was authorized by a resolution of the governing body of the Collin County Soil and Water Conservation District adopted at a meeting held on December 5, 1985.

R. M. Sherley

R. M. Sherley
Secretary

Box 222, McKinney, TX 75069

1-21-86

Soil Conservation Service
United States Department of Agriculture

Approved by:

O. Dale Fischgrabe

O. Dale Fischgrabe
Acting State Conservationist

Date 1/23/86

CONTENTS

CONTENTS (cont'd)

SUMMARY OF WATERSHED PLAN - ENVIRONMENTAL ASSESSMENT

Project Name: Caddo Creek Watershed Counties: Hunt and Collin State: Texas

Sponsors: Collin County Soil and Water Conservation District
Upper Sabine Soil and Water Conservation District

Description of Recommended Plan:

This plan-EA proposes conservation treatment on 8,800 acres of cropland which are eroding at a rate which will seriously reduce the land's productive capacity during the 25-year evaluation period. Actively eroding perennial gullies which are destroying cropland areas will be treated by installing grade stabilization structures. Current erosion rates on cropland will be reduced by applying enduring practices such as terraces and grassed waterways and management practices such as crop residue use, contour farming, and conservation cropping systems. Approved alternative conservation practices which will control erosion and protect the productive capacity of the soil resource base may be applied provided the practices meet the objectives of the plan-EA.

Candidate Plans Considered

1. No action plan.

2. Enduring practices of terraces, waterways, and grade stabilization structures plus management practices of contour farming, conservation cropping systems, and crop residue use to protect 8,800 acres of cropland.

Resource Information

Size of watershed: Watershed area - 134,400 acres
Total problem area - 15,990 acres
Project treatment area - 8,800 acres (based on 55 percent participation rate)

Land Use	Present (acres)	Future Without Project (acres)	Future With Project (acres)
Cropland	73,900	59,000	69,500
Pastureland	40,300	44,600	39,900
Rangeland	10,800	15,800	10,000
Other	9,400	15,000	15,000

Land Ownership: Private, 98 percent; state-local, 2 percent; federal, 0 percent.

Number of Farms: 744 wholly or partially in watershed

Average Size: 180 acres

Prime Farmland: 74,000 acres

Endangered Species: The endangered bald eagle (Haliaeetus leucocephalus) winters along Lake Tawakoni in Hunt County. In addition, several migrant bird species may also occur in the area. These include the endangered whooping crane (Grus americana), endangered American peregrine falcon (Falco peregrinus anatum), threatened arctic peregrine falcon (Falco peregrinus tundrius), and endangered Interior least tern (Sterna antillarum). Data indicate none of these species would be impacted by the proposed project.

Cultural Resources: None are expected to be disturbed. If found, significant resources will be avoided whenever practical and feasible, or significant data will be recovered prior to construction disturbance.

Visual Resources: This watershed is located in a rural area where the primary activity is the production of agricultural crops. Application of conservation practices will add to the esthetic value of the landscape by removing unsightly gullies and eroded areas. Landscape architecture rating elements establishes the watershed as a medium priority area.

Problem Identification

The problem which will be addressed in this plan is the permanent loss of soil productive capacity on 15,990 acres of cropland which is caused by excessive erosion and sedimentation.

Project Purpose

The project purpose is the protection of the resource base to sustain its capability for long-term agricultural production.

Principal Project Measures

Principal project measures are: enduring practices consisting of 1,161,600 feet of terraces, 176 acres of grassed waterways, and 78 grade stabilization structures; and management practices consisting of contour farming, conservation cropping systems, and crop residue use.

Total Project Costs

	PL 566 Funds		Other Funds		Total Costs	
	Dollars	Percent	Dollars	Percent	Dollars	Percent
Land Treatment Practices	968,310	80	242,080	20	1,210,390	100
Technical Assistance	879,200	100	0	0	879,200	100

Project Benefits

The average annual value of sustained agricultural production during the 25-year evaluation period: $129,710

Acres benefited: 8,800 acres

Impacts

Land use changes resulting from project action:

Cropland decrease	-	176 acres
Pastureland increase	-	176 acres
Rangeland	-	No effect
Other	-	No effect

Natural Resources Changed or Lost

Prime farmland - Protect 8,000 acres of prime farmland from excessive erosion.

INTRODUCTION

The watershed plan and environmental assessment for this project have been combined into a single document, plan-EA. The plan-EA will hereinafter be referred to as the plan. This document of plan formulation discloses the expected impacts and provides the basis for authorizing federal assistance for implementation. The purpose of the plan is watershed protection to sustain the long-term productive capacity of the soil resources.

The U.S. Department of Agriculture, Soil Conservation Service (SCS), provided assistance to the sponsors in the development of the plan.

The plan was prepared under the authority of the Watershed Protection and Flood Prevention Act, Public Law 83-566, as amended (16 U.S.C. 1001-1008) and in accordance with Section 102(2)(C) of the National Environmental Policy Act of 1969, Public Law 91-190, as amended (42 U.S.C. 4321 et seq). Responsiblity for compliance with the National Environmental Policy Act rests with the SCS.

PROJECT SETTING[1]

Caddo Creek watershed comprises an area of 134,400 acres (210.0 square miles) in eastern Collin County and western Hunt County, Texas. This area is about 25 miles east of the Dallas, Texas, metroplex. Caddo Creek heads about 4 miles northeast of Farmersville in Collin County and flows into Lake Tawakoni in southwest Hunt County. The major tributaries of Caddo Creek are East Caddo, West Caddo, and Brushy Creeks. Lake Tawakoni serves as a water supply for Dallas, Greenville, Terrell, and many small towns. The area is mainly rural with Caddo Mills, Floyd, and Merit the only towns wholly within the area.

The climate is warm, temperate, and humid with an average rainfall of 40 inches. Average temperatures range from 83.0° F in the summer to 42.2° F in the winter. The normal frost-free growing season of 234 days is from March 24 to November 13. (Soil Survey of Hunt County, Texas, USDA)

Land use in the watershed is about 55 percent cropland, 30 percent pastureland, 8 percent rangeland, and 7 percent miscellaneous (urban, built-up areas, water, roads, highways, etc.).

Flood plain deposits of Recent age occur along the flood plains of Brushy Creek and East and West Caddo Creeks, which flow southeast and merge into Caddo Creek before entering Lake Tawakoni. Pleistocene fluviatile terrace deposits flank these three creeks and occur as gently rolling hills along their stream courses. Materials consist of gravel, sand, silt, and clays in varying amounts.

The Wolfe City Formation, the oldest rocks exposed, consist of sand and silt in discontinuous beds. This formation is found in the extreme northern portion of Caddo Creek and is bordered on the south by the Pecan Gap Chalk. This formation is predominantly soft to medium limestone.

The Marlbrook Marl comprises the upper to central portion of the watershed and consists of calcareous silts and clays. The Neylandville Formation occurs in a northeast to southwest band through the central portion of the watershed. It consists of calcareous, silty, sandy clays.

The south-central and southeast portion of the watershed are underlain by the Nacatoch Sand and Kemp Clay formations. The Nacatoch Sand has fine-grained quartz sand, and the Kemp Clay is a calcareous silty clay.

Caddo Creek watershed is in the Texas Blackland Prairie Major Land Resource Area. The area is nearly level to rolling, with well-dissected prairies and moderate to rapid surface drainage. Native vegetation was tall bunchgrass with pecan, oak, and elm trees along the drainageways. About 55 percent of the watershed is in the Houston Black-Leson soil

[1]All information and data, except as otherwise noted by reference to source, were collected during watershed planning investigation by the Soil Conservation Service, U.S. Department of Agriculture.

association and is classified as prime farmland. This land is either presently cropland or has the potential for cropland. More than 40,500 acres of the 74,000 acres of prime farmland soils are used for cropland. Detailed descriptions of the soil are contained in published soil surveys of Hunt County and Collin County.

The 1980 population of the two counties was: Hunt, 55,248 and Collin, 144,490. Population of major communities within or near the watershed was: Farmersville, 2,360; Greenville, 22,161; and Caddo Mills, 1,060. (1980 Census of Population and Housing, U.S. Department of Commerce, Bureau of the Census)

There are 744 operating farm units in the watershed. Fifty of these farm units are operated by women and two farm units are operated by blacks.

RESOURCE PROBLEMS AND OPPORTUNITIES

The major problem is the loss of productive capacity of the soil resource base on 15,990 acres, which has caused a reduction of food and fiber output. The problem is the result of severe soil erosion. The opportunity for project action is to protect the resource base for long-term, sustained agricultural production.

The monetary loss and the reduction of food and fiber production is detrimental to local, regional, and national economies. These problems are interrelated and adversely affect other resources such as visual quality and the social well-being of the watershed residents. These problems are expected to continue and increase at an accelerating rate.

Floodwater damages in the watershed were investigated in a previous study, but no feasible solutions were determined.

Sediment from the 15,990 acres of eroding cropland is a problem in the watershed.

Erosion Damages

The effects of soil erosion are evident throughout the watershed. They include limited crop selection, suppressed yields, reduced farming operation efficiency, and threatened destruction of installed conservation practices. Long-term damages to the soil resource base are manifested by reduced fertility and water-holding capacity, diminished rooting depths, decreased organic matter and biological activity, and degraded soil structure.

The current weighted average annual erosion rate for the watershed (134,400 acres) for all land uses and erosion types is 12.0 tons per acre. The future rate without project action is estimated to be 12.8 tons per acre. However, 15,990 acres of the watershed's cropland are eroding at considerably higher rates and it is these areas that warrant primary attention and treatment. These areas are comprised of 273 treatment areas.

The current erosion rate on these areas is 16 tons per acre. The rate is expected to be 21 tons per acre in the future.

The three types of upland erosion to be addressed by the plan are: perennial gully erosion, ephemeral gully erosion, and sheet-rill erosion.

Perennial gully erosion is caused by concentrated runoff dislodging and moving soil and rock material. This results in a permanently located, steep-sided channel that usually enlarges in width and depth if the runoff remains constant or increases. A perennial gully creates a "voided area" where the soil and rock material is removed, and a "depreciated area" adjacent to and surrounding the voided area where land use is limited or crop yields are suppressed.

Deeply incised and actively eroding perennial gullies are common throughout the watershed. These gullies occur in association with cropland or former cropland fields. Gully depths extend to 15 feet and widths are as much as 100 feet. Lengths range from a few feet to about 1,000 feet. Perennial gullies are eroding into adjacent areas, destroying cropland and threatening existing conservation measures. These gullies have hindered or prevented the construction of adequate water disposal systems. Terraces and waterways require vigilant and intensive maintenance because of encroaching gullies.

Ephemeral gully erosion occurs only on cropland and is the result of concentrated runoff. Gullies created by this erosion type are relatively shallow in depth and narrow in width. However, on an unterraced field, it is possible for them to rival perennial gullies in length. Ephemeral gullies can be traversed by tillage and harvesting equipment. An ephemeral gully develops a "depleted area," which is the area subjected to concentrated runoff, and a "depreciated area" adjacent to and surrounding the depleted area where the crop yields are suppressed.

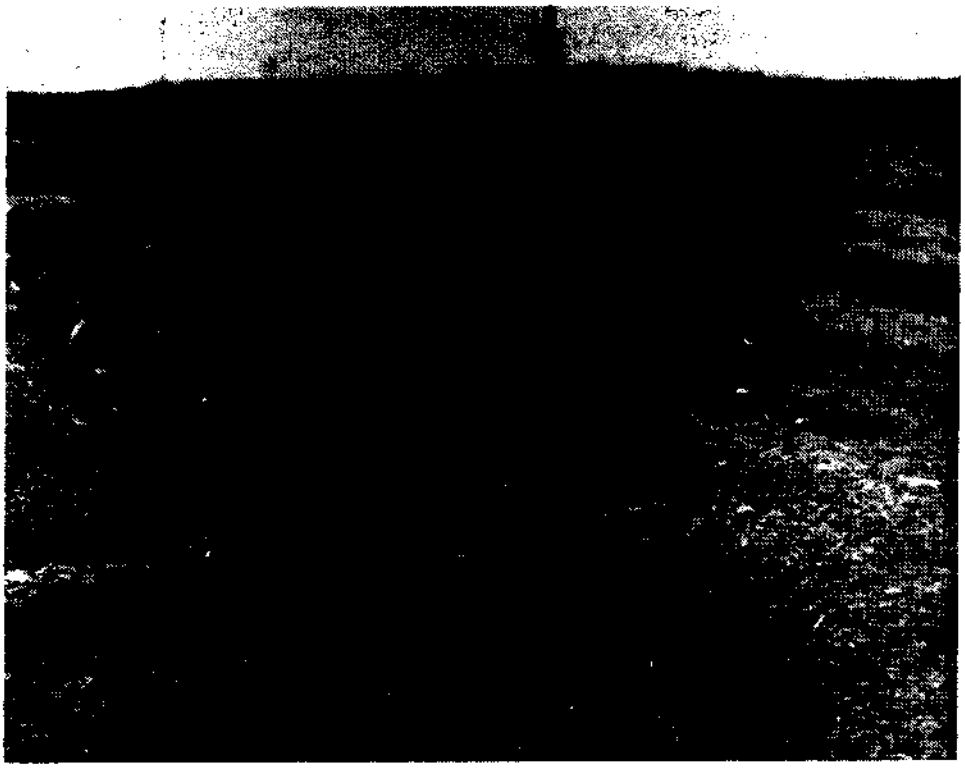
Sheet-rill erosion is the process in which thin layers of surface soil are removed more or less evenly from an extensive area by broad continuous sheets of moving water. All cropland not affected exclusively by perennial or ephemeral gullies is subjected to this type of erosion.

The following table shows the present and expected future erosion rates for the 15,990 acres:

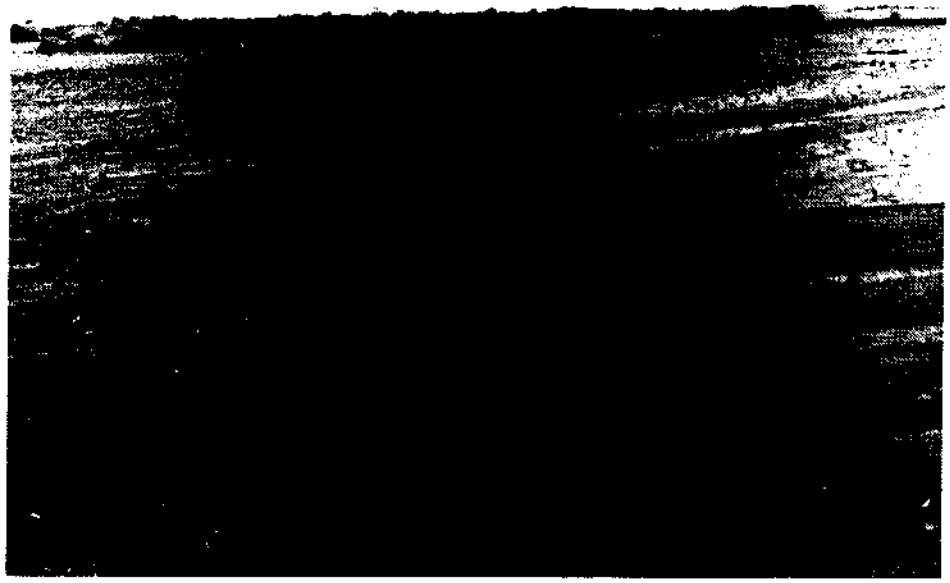
CROPLAND EROSION RATES AND ACRES AFFECTED

Erosion Type	Present		Future Without Project		Area Affected	
	Range in Tons Per Acre	Weighted Average	Range in Tons Per Acre	Weighted Average	Present Acres	Future Without Project Acres
Perennial Gully Erosion Voided Area	15 - 244	100	21 - 310	134	90	100
Ephemeral Gully Erosion						
Depleted Area	6 - 254	118	6 - 286	135	410	590
*Depreciated Area	5 - 102	40	5 - 115	44	*(950)	*(1,210)
Sheet-Rill Erosion	5 - 25	11	5 - 29	12	15,490	15,300
Weighted Average - Total Acres		16		21	15,990	15,990

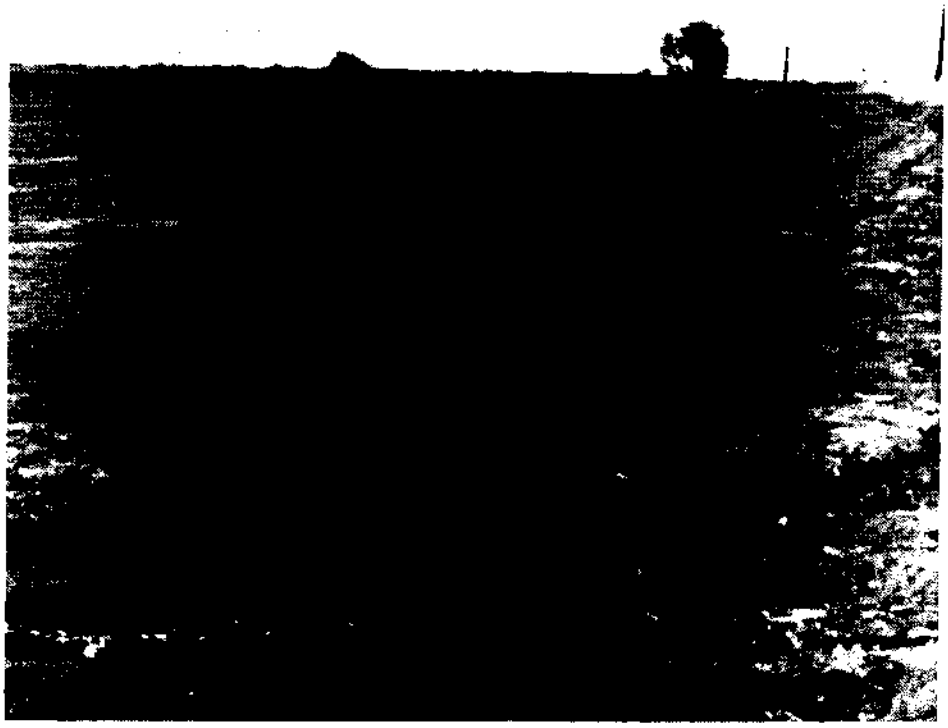
*Depreciated area acres included in Sheet-Rill acreage. Present 950 acres and Future-Without-Project 1,210 acres are subjected to sheet-rill erosion and "cultural erosion." Cultural erosion is the moving of soil material from the depreciated to the depleted area by tillage implements. This soil material is then washed away by concentrated runoff.

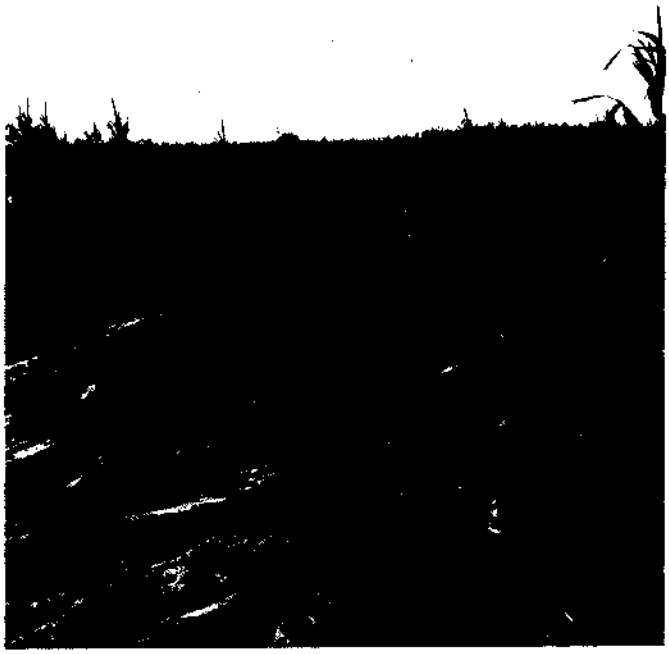


Sheet and rill erosion (top photo) is the uniform removal of soil from an area without the development of conspicuous water channels. Ephemeral gully erosion (bottom photoa) results from a concentrated water flow causing water channels that have not developed perennial gully characteristics and are partially or totally erased by cultivation. This ephemeral gully has removed about 4 to 6 inches of topsoil this crop year (1984).



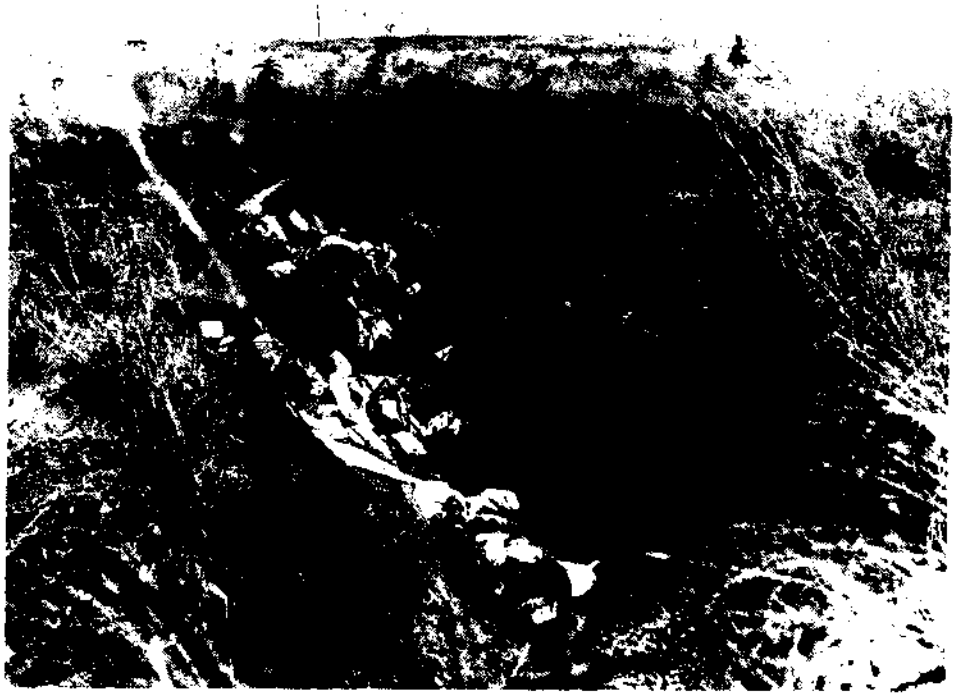
Erosion is destroying the potential for sustained long-term agricultural production in the watershed. It has caused a reduction of food and fiber output and monetary loss to local, regional, and national economies. Erosion of the topsoil results in reduced fertility and water-holding capacity, decreased organic matter content and biological activity, and diminished rooting depths. These pictures were tsken on April 17, 1984, and show seedling corn plants struggling for survival on this field which is being affected by severe sheet and rill erosion snd ephemeral gully erosion.



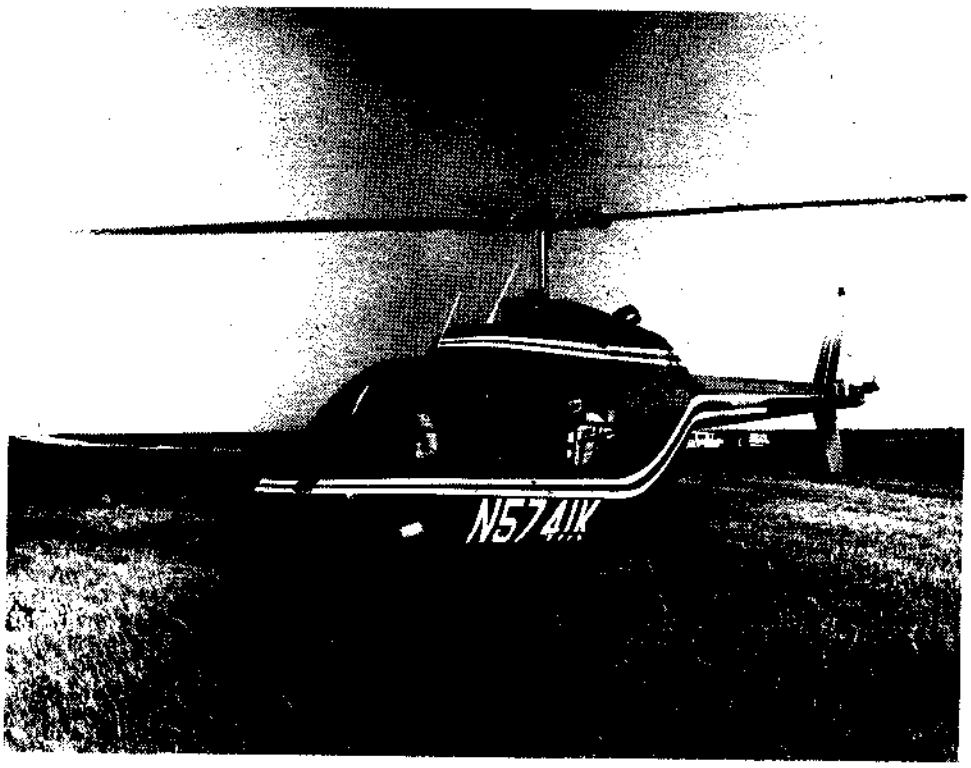


These pictures were taken on June 12, 1984, of the same field as shown on the preceding page. A surprising number of corn plants survived the effects of the severe sheet and rill erosion, but many were deatroyed by the ephemeral gully erosion. The gully floor, which appears to be flowing water, is actually dry sediment displaced by erosion from higher in the corn field. These ephemeral gullies will be erased by plowing and planting to wheat during the next planting season. New ephemeral gullies develop each crop year.

Where runoff weter is concentrated and flows over unstable soil, a perennial gully develops. The hesd of moet gullies is an almost vertical wall. Water flowing into the gully over this wall, sometimes called an overfall, causes severe erosion. These overfalls range from 4 to 15 feet deep. As the overfall erodes, the gully extends further up the slope at a rate of several feet each year. Cropland fields upslope from an overfall will eventually be coneumed by the gully. In addition, terraces cannot be installed in the cropland field until the overfall is treated to provide a stable outlet for the terrsce system. The gully in the bottom photo is adjacent to a county road and is a collection place for diecarded rubbish.



These fields produced crops of cotton, grain sorghum, corn, and wheat until the effects of erosion forced abandonment. They are now idle. The gully erosion is so extensive that the fields cannot be economically returned to cropland.



Conservationists usad helicoptera to assess the extent of erosion problems in the watershed. Use of the helicopters proved to be cost effective in the evaluation of the natural resources and to estimate the treatment needed to assure sustained agricultural production. Treatment units were identified and grouped according to their soil type, slope, and treatment needs. Field data was later input into a computer program to determine the effect of continued erosion on the potential to produce crops. Another computer program was used to compute crop yields, cost of production, and net economic returns under various treatment alternatives. Incremental analysis of the various effective conservation treatment alternatives proved which combination of practices would be the National Economic Development Plan.

Detailed assessment of the watershed revealed that two groups of soils are incurring similar types of damages and that each group could be treated with similar conservation practices. There are 14,990 acres in Evaluation Unit A and 1,000 acres in Evaluation Unit B. These groups, or evaluation units, are described as follows:

suggest showing Eph. gullies per. gullies Ero. Rates.

Evaluation Unit A - Deep, clayey soils with high potential for crop production. Present condition is eroding cropland. Long-term productive capacity is decreasing because of an accelerating rate of erosion. Typical soils are Houston Black and Leson with slopes of 1 to 3 percent.

Evaluation Unit B - Deep, loamy, and clayey soils with medium potential for crop production. Present condition is eroding cropland. Long-term productive capacity is decreasing because of an accelerating rate of erosion. Typical soils are Crockett and Wilson with slopes of 1 to 3 percent.

The productive capacity of the soils in the identified problem areas is being reduced by erosion. In a typical problem area, the surface layer has been removed by erosion and the root zone altered by lowering the organic matter content, lowering the available plant nutrient content, and deteriorating the soil structure. These root zone characteristics reduce the productive capacity of the soil by lowering the available water-holding capacity, which subjects the crops to more frequent and severe water stress. Additional fertilizer can partially compensate for the reduced crop yields from the eroded soil, but production cost is increased. The poor soil structure condition increases the soil erodibility, surface sealing and crusting, and results in poor quality seedbeds. Surface sealing and crusting decrease seedling emergence, infiltration rates, and water storage.

Sedimentation

On cropland fields sediment accumulates at the base or foot of slopes because of concentrated runoff. Sediment also accumulates in terrace channels. Deposition on these areas will destroy emerging crops or suppress crop yields. Sediment in terrace channels also reduces the terrace's capability to convey runoff and increases the potential for overtopping and breaching. Sediment deposited in farm ponds decreases their capacity and useful life. This creates a need for additional ponds or other suitable livestock water sources. In addition to water storage reduction, sediment degrades fish habitat.

Sediment derived from the Caddo Creek watershed annually displaces about 450 acre-feet of water storage in the reservoir of Lake Tawakoni. At the end of 25 years, it is estimated sediment from the watershed will annually deplete 475 acre-feet of water storage.

The Texas Department of Highways and Public Transportation annually removes sediment from roads. In addition, at about 5-year intervals they remove sediment from Caddo Creek stream channel at the Interstate Highway 30 crossing.

costs

Can't we put some $ to these damages.

The sociological and monetary effects of sediment deposition in Lake Tawakoni and along highways were determined in a previous study. This study showed that these damages are caused mainly by streambank erosion. A feasible solution was not determined.

Financial Problems

Financial assistance for the past several years through the Agriculture Conservation Program (ACP) has not met the need for conservation treatment in the watershed. ACP funds are allocated on a yearly basis. The annual ceiling of $3,500 available per landowner and the uncertainty of future availability of funds limit the installation of high-cost conservation practices. Most assistance has been on land use conversion to pastureland and on construction of terraces. Sufficient funds have not been available for the needed accelerated land treatment.

INVENTORY AND FORECASTING

Scoping of Concerns

The scoping process, which began early in planning, has consisted of informational contacts with those agencies or individuals who had knowledge and data useful in assessment of impacts. Scoping has been used to address significant issues related to the formulation of alternatives.

Meetings were held by the sponsors to gain opinions from individuals and inform the general public. Newspapers serving the watershed area published articles announcing public meetings and reported information and conclusions resulting from these meetings.

On October 28, 1982, the SCS, in conjunction with the sponsors, held a scoping meeting in Caddo Mills. The purpose of this meeting was to determine scope of issues to be addressed and establish preliminary project objectives. Fifty-seven individuals registered their attendance. They expressed their concern for reducing erosion and resultant damages. The concern expressed by many is the degradation of the nonrenewable soil resource. The critical need to prevent further deterioration was expressed by all in attendance.

A broad range of environmental, economic, and social factors was considered during the scoping process. The degree of significance to decision making determined the intensity that each factor was studied during project planning. Following is a list of factors considered and their degree of significance:

EVALUATION OF IDENTIFIED CONCERNS

Economic, Environmental, and Social Factors	Degree of Significance to Decision Making[1]	Remarks
Land management	High	
Prime farmland soils	High	
Erosion	High	
Sedimentation	Medium	
Floodwater damages	Low	
Municipal water	Low	
Recreation	Low	
Streams and lakes	Low	
Ground water	Low	
Fish and wildlife habitat	Low	
Wetlands	Low	
Endangered species	Low	No known species affected
Social and cultural	Medium	
Transportation	Low	
Archeological resources	Low	No known resources affected
Air quality	Low	
Visual resources	Low	
Human health and safety	Low	
Mineral resources	Low	

[1] High - Must be considered in the analysis of alternatives
Medium - May be affected by some alternative solutions
Low - Consider, but not too significant

Floodwater damages were considered to be of low degree of significance to decision making in this project because previous studies did not determine a feasible solution.

Existing Resources

Land Resources

The watershed is located in Land Resource Area (LRA) 86, Texas Blackland Prairie. Soils of the watershed have been divided into five associations with each consisting of several related soil series. Detailed soil surveys have been published for both Collin and Hunt Counties. The major soil and associations are shown in the following table:

MAJOR SOIL ASSOCIATIONS

Soil Association	Description
Leson-Houston Black	Clayey, deep, gently sloping, moderately well-drained soils
Ferris-Heiden	Clayey, deep, gently sloping to strongly sloping, well-drained soils
Crockett	Loamy, deep, gently sloping, moderately well-drained soils
Wilson	Loamy, deep, nearly level, somewhat poorly drained soils
Kaufmann-Tinn	Clayey, deep, nearly level, somewhat poorly drained soils on bottomlands.

There are 744 operating units on 125,000 acres in the watershed, of which 461 are district cooperators on 68,573 acres.

Prime Farmland Soils

Prime farmland soils are lands best suited and available for producing food, feed, forage, fiber, and oilseed crops. These lands may be used as cropland, pastureland, rangeland, or other land. Prime farmland soils have the capability to produce sustained high yields of crops economically when treated and managed according to modern farming methods, including soil conservation practices. Existing soil survey data and estimates indicate there are about 74,000 acres of prime farmland soils in the watershed. This represents about 55 percent of the watershed. A list of soil mapping units classified as prime farmland soils is available in local SCS offices.

Water Quality

Water quality information for specific sites within the watershed is not available. However, studies of water quality conditions in existing ponds and streams lying within a similar soils area in a nearby watershed with similar land uses showed that good quality water exists within small impoundments in the area. Tests of water and sediment reflected trace levels of arsenic in sediment, but no residues of other commonly used pesticides were found in water or sediment. The levels of arsenic found in the sediment ranged from 4.3 mg/g to 5.3 mg/g. Water quality is being affected by sediment entering stream channels and reservoirs. Water quality tests in Lake Tawakoni downstream show low levels of total dissolved solids ranging slightly over 100 mg/l.

Plant Resources

The native vegetation of the watershed is typical of the Texas Blackland Prairie with grassland predominating in most of the area. The plants which occurred under climax conditions included grasses such as little bluestem, switchgrass, big bluestem, indiangrass, and sideoats grama (Gould 1962). Woody plants such as pecan, elm, bois d'arc, hackberry, and post oak occur along streams, fence rows, and in motts. Forbs and legumes such as western ragweed, maximilian sunflower, partridge pea, croton, snow-on-the-prairie, engelmanndaisy, and illinois bundleflower add color and diversity to the landscape and variety to the diet of wildlife.

Much of the original native plant ecosystem has been altered through man's activities. The major plant species growing in the water include bermudagrass, splitbeard and bushy bluestem, sideoats grama, Texas wintergrass, Canada wildrye, Japanese bromegrass, silver bluestem, ironweed, poison ivy, greenbriar, cocklebur, buffalobur, American basketflower, mustang grape, green ash, osage orange, box elder, elm, hackberry, roughleaf dogweed, pecan, red mulberry, and cottonwood.

Wetlands

The main wetlands that occur in the watershed are Type 5, open fresh water wetlands, which occur in farm ponds and small lakes having emergent shoreline vegetation. A few acres of Type 1, seasonally flooded basins or flats, and Type 7, wooded swamps wetlands, are found in the Caddo Creek flood plain at the lower end of the watershed.

Fish and Wildlife

The streams in the watershed have ephemeral or intermittent flow. Fishery resources within the watershed are found in farm ponds and Caddo and Brushy Creeks. Many of the farm ponds have been stocked with channel catfish, largemouth black bass, and sunfish. Fishery resources in Caddo Creek move upstream from Lake Tawakoni and consist of warm water fish species such as bullhead catfish, crappie, carp, gar, and a mixture of sunfish. Fishing is limited to local residents or friends using the private farm ponds. Public access to Caddo Creek is available at county road and state highway crossings.

Important wildlife game species in the watershed are fox squirrel, mourning dove, and bobwhite quail. Nongame animals such as raccoon, beaver, nutria, opossum, coyote, fox, armadillo, cottontail rabbit, and jack rabbit are present. Songbirds, waterfowl, and birds of prey such as various species of hawk occur during seasonal migrations. Some white tail deer have been released near the county lime between Hunt and Kaufman Counties outside the watershed. The majority of the wildlife habitat (approximately 75 percent of the watershed) will not support high game populations due to several factors. Past agricultural practices had a detrimental effect on wildlife habitat due to intensive cultivation which altered existing cover.

Threatened and Endangered Species

The endangered bald eagle (Haliaeetus leucocephalus) winters along Lake Tawakoni in Hunt County. In addition, several migrant bird species may also occur in the area. These include the endangered whooping crane (Grus americana), endangered American peregrine falcon (Falco peregrinus anatum), threatened arctic peregrine falcon (Falco peregrinus tundrius), and endangered Interior least tern (Sterna antillarum).

There are no proposed species or critical habitats in the project area.

Historical and Archeological Resources

A general review of the archeological and historical resources in the watershed was made in consultation with local, state, and national sources.

The Hunt and Collin County Historical Commissions were contacted concerning the existence of local recognized sites and the National Register of Historic Places was consulted for listed sites. No important sites were identified within the proposed project area.

Visual Resources

Caddo Creek watershed is located in a rural area where the primary activity is the production of agricultural crops. The proximity to the Dallas metroplex, about 25 miles away, and the city of Greenville influences travel through the watershed on major travelways, including Interstate Highway 30, U.S. Highway 380, and State Highway 66. The large numbers of viewers traveling through the watershed have an intermediate viewing time. Vegetative patterns in the landscape provide the main visual diversity in an otherwise homogeneous landscape. The scars of soil erosion and the low-producing or abandoned cropland fields are a detriment to the visual quality of the landscape. Landscape architecture rating elements establish the watershed as a medium priority area.

Forecasted Conditions

The degradation of the resource base is expected to continue in the future without accelerated assistance in planning and applying conservation practices. An interdisciplinary group of watershed planning specialists and resource specialists from the field office, area office, state office, and national headquarters office of the SCS developed the projected conditions. Local landusers assisted in the projections through interviews and counseling during the assessment. Other factors considered in arriving at the projections were crop yields on land with conservation treatment practices applied where erosion is minimal and on land without conservation treatment where erosion rates are excessive. These studies were compared with trends of crop production, land treatment, and erosion rates over the past several years.

An ongoing program of land treatment is effective in the watershed. Technical assistance in applying conservation practices is being provided by the SCS in cooperation with the local soil and water conservation

districts serving the watershed area. The technical assistance provided has accomplished adequate treatment on about 55 percent of the watershed. Accomplishments are made each year, but additional problem areas develop. The present rate of progress is not sufficient to complete the needed treatment. The severity of the problems on the identified areas in this project indicates the need to accelerate the ongoing program.

Funds through the Agriculture Conservation Program (ACP) have not been sufficient to meet the need for conservation treatment in the past. The problem areas identified in planning this project indicate the need for additional financial assistance. Funds through the ACP program are not expected to increase in the future.

FORMULATION OF ALTERNATIVES

General

Project formulation followed the specifications in the "Principles and Guidelines for Water and Related Land Resource Problems," and opportunities associated with the National Economic Development (NED) objective. Formulation also followed the inventory, forecasting, and analysis of the water and land resource conditions relevant to the identified problems and opportunities.

The scoping process was used on the 134,400-acre watershed to identify the 117 problem areas (Appendix B, Project Map). A problem area contains one or more eroding treatment areas, and one or more active perennial gullies. A total of 15,990 acres comprising 273 treatment areas are eroding at high rates and it is these areas that warrant project action.

The treatment areas were studied in detail (100 percent inventory) during formulation of the alternatives. Alternative conservation practices were studied, using incremental analysis to determine their effects. Economic and environmental evaluations were made to determine which groups of conservation practices would qualify as the NED plan and which tradeoffs should be made to protect the resource base for sustained agricultural production.

Formulation Process

Practices to treat identified problems were studied to determine their effectiveness, costs and benefits, positive or negative effect on the environment, and acceptability to the landusers, the sponsors, and the SCS. Land use change was considered as a means of reducing erosion on cropland. This would convert eroding cropland to pasture or rangeland. It would reduce erosion by establishing a permanent grass cover through pasture planting or range seeding. Application of these practices would be acceptable to the sponsors and some landusers; however, most landusers

indicated their preference to continue cropping these areas because of their need to maintain a greater monetary income. Studies indicated that conversion of cropland to pastureland would cost more than treatment of cropland and would result in reduced returns to landusers.

Critical area planting was considered as a practice to treat the more severely eroding pastureland and rangeland. These eroding areas occur mainly on fields that were previously used as cropland until the erosion problem forced abandonment. Now, most of these areas are not being treated nor used for agricultural production. Under current guidelines, the treatment of these isolated areas of erosion was determined not to be a practical inclusion in this project.

The most practical measures which could be installed on this watershed which would reduce one or more of the identified problems are shown on the following table:

Are we sure we can get participation on conservation tillage with just Tech. assistance??

PLANNING CONSIDERATIONS[1]

Identified Problem	Effect of Treatment Practices			
	Land Use Change	Conservation Tillage	Crop Residue Use	Water Disposal System
Erosion on Cropland				
Sheet and Rill	+	+	+	+
Ephemeral Gully	+	0	-	+
Perennial Gully	+	-	-	+
Sedimentation	+	+	+	+

[1]
+ - Significant positive effect
0 - Minor effect
- - Insignificant effect

Evaluation of Alternative Plans

Individual cropland fields were identified as "treatment areas." Treatment areas are fields which are being severely affected by erosion and which can be treated with conservation practices to reduce the erosion problem and sustain agricultural production. Treatment areas were further combined into two "evaluation units" based on similar problems, soil characteristics, and needed treatment practices. The two evaluation units are described as follows:

> Evaluation Unit A - Deep, clayey soils with high potential for crop production. Present condition is eroding cropland. Long-term productive capacity is decreasing because of an accelerating rate of erosion. Typical soils are Houston Black and Leson with slopes of 1 to 3 percent.
>
> Evaluation Unit B - Deep, loamy, and clayey soils with medium potential for crop production. Present condition is eroding cropland. Long-term productive capacity is decreasing because of an accelerating rate of erosion. Typical soils are Crockett and Wilson with slopes of 1 to 3 percent.

Formulation proceeded with an analysis of land treatment needs in the watershed. Results of this analysis indicated erosion problems could best be treated with various combinations of the following practices: conservation cropping systems, conservation tillage, crop residue use, and a water disposal system. The water disposal system would consist of a terrace system, contour farming, and, where needed, a waterway and a grade stabilization structure. Contour farming was analyzed only where supported by a terrace system because slope percent in relation to slope length would have caused an accelerated erosion rate if contour farming was not supported by terraces.

The Universal Soil Loss Equation (USLE) was used to determine the rate of sheet and rill erosion. Data for this equation plus ephemeral and perennial gully width, length, depth, and drainage area was input for the ELT computer program to determine the erosion loss from each type of erosion and the total or composite erosion. Computations were made for the present condition and expected future (25-year) condition if no conservation practices were applied and with various levels of treatment.

Costs for producing crops of cotton, grain sorghum, and wheat were determined from Texas Crops and Livestock Budgets and by interviews with local farmers. This data, plus yield estimates under various levels of treatment, were input into the ERCDN 4 computer program to determine economic values. The ERCON4 program encompasses data from the ELT (erosion) program to compute net economic returns under the various treatment practices. Each practice was evaluated to determine the effects of erosion reduction and economic returns.

Tables 2A and 2B (pages 32-35) show the incremental analysis of erosion and sediment and of the NED benefits and costs per acre.

An example of an incremental analysis is shown in Appendix A. This study was made on an actual eroded cropland field.

Alternative 1

Alternative 1 is the no action condition. The forecasted future conditions will prevail under this alternative. Erosion will continue to degrade soil resources with associated effects of lowering of economic values and the ability to produce food and fiber crops for use by regional, national, and international commerce.

This should also be shown as R.P plan.

Alternative 2 (National Economic Development Plan)

Components: This alternative consists of applying management and enduring conservation practices on 8,800 acres of cropland. The management practices are contour farming, crop residue use, and conservation cropping systems on 8,624 acres. The enduring practices are 1,161,600 feet of terraces, 176 acres of grassed waterways, and 78 grade stabilization structures. Contour farming will be applied where supported by terrace systems. The water disposal systems will be installed where needed to convey concentrated water flows to stable outlets. This alternative will treat the land area in evaluation units A and B. It reflects the treatment to be applied on 55 percent of the cropland identified in the "RESOURCE PROBLEMS AND OPPORTUNTIES" section of this plan.

Financial assistance of 80 percent cost share will be available to landusers who agree to apply and maintain the designated conservation practices. Technical assistance will be provided by the SCS in cooperation with the local soil and water conservation districts.

Detailed on-site planning with the landuser will determine which conservation practices will be applied. The treatment to be applied may vary from the project designated treatment if the selected practices, including land use change, would accomplish the project purpose of protecting the land for sustained agricultural production. The per-acre cost share of the selected practices would not exceed the cost share of the practices designated by the project.

Participation Rate: Interviews with community leaders and a cross section of landusers established that landusers of 55 percent of the cropland identified in the "RESOURCE PROBLEMS AND OPPORTUNTIES" section of this plan will participate in the project.

Costs: Total project costs are $2,089,590. The total PL 566 share of the cost is $1,847,510. The average annual project cost is $116,790. The annual operation and maintenance cost is $3,450. The total annual cost is $120,240.

Benefits: The average annual benefits will be $129,710. The benefit-cost ratio is 1.1:1.0.

Effects: Soil productivity will be maintained by reducing cropland erosion rates an average of 15 tons per acre per year on 8,800 acres. The total (treatment area) erosion will be reduced from 21 tons per acre per year to 6 tons per acre per year. This reduction of damages will generate an annual increase of $129,710 in net income, which will stimulate the local and regional economy.

This alternative will provide for sustained long-term agricultural production on 8,800 acres.

Soil degradation will be controlled on 8,000 acres of prime farmland needing conservation treatment.

The visual resource will be enhanced by changing erosion-scored fields to well-maintained, productive fields.

During project installation, 87 person-years of employment will be available to possibly unemployed or underemployed labor resources.

More tax revenues will be generated by stimulating the local and regional economy.

Comparison of Plans

Alternative 1 is the no-action alternative. This alternative will allow the future without project conditions to occur. Ongoing programs for soil conservation technical assistance and limited financial assistance will continue to improve soil resources at a slow rate. Accelerated erosion will continue to degrade other soil resources, resulting in the loss of sustained agricultural production.

Alternative 2 is the NED plan and will provide for conservation treatment on 8,800 acres of eroding cropland. The erosion rate on these acres will be reduced from 21 tons per acre per year to 6 tons per acre per year. The soil resources on these acres will be protected for long-term sustained agricultural production. Financial and technical assistance will be provided to cooperating landusers. The benefit-cost ratio is 1.1:1.0.

SUMMARY AND COMPARISON OF PLANS

Effects	Alternative 1 (No Action)	Alternative 2 (NED Plan)
Description of Alternative	No treatment	Land treatment program to adequately protect 8,800 acres
NATIONAL ECONOMIC DEVELOPMENT ACCOUNT		
Project Investment	0	$2,089,590
Adverse Annualized		$ 120,240
Beneficial Annualized		$ 129,710
Net Benefits		$ 9,470
ENVIRONMENTAL QUALITY ACCOUNT		
Beneficial	Continued degradation of soil resources on 15,990 acres of cropland production	Adequately protect 8,800 acres of cropland for sustained agricultural production
	100 acres will be voided	Acres voided will be reduced by 20 percent
	590 acres will be depleted and 1,210 acres will be depreciated annually by ephemeral gully erosion	Acres depleted and depreciated will be reduced by 32 percent and 48 percent, respectively
	63,500 tons of sediment deposited annually in Lake Tawakoni	Sediment deposition reduced by 39 percent
OTHER SOCIAL EFFECTS ACCOUNT		
Beneficial	Depression of economic values of agricultural community	Average annual increase of $129,710 generated by increased net income

Debt Capacity ✓

Less Social Effects

Project Interaction

The soil and water conservation districts in Texas, together with the State of Texas and USDA Agricultural Stabilization and Conservation Service (ASCS) and the Farmers Home Administration (FmHA) are supporting the ongoing installation of land treatment. This plan will accelerate land treatment and technical assistance without duplication of current programs.

Risk and Uncertainty

All data used in evaluating and establishing future conditions in the watershed are based on recent history. Agricultural production estimates are based on local records of farm and ranch units. The net benefits of the recommended plan exceed the cost of the planned measures without consideration of any projections. Therefore, the uncertainty aspects of projections for project justification are not applicable. The participation of individual landusers is entirely voluntary. Interviews with community leaders and landusers indicate that users of 55 percent of the area with identified land resource problems will participate in this project.

Rationale for Plan Selection

Alternative 2 is the recommended plan and NED plan. It provides for conservation practices that are acceptable to the landusers, project sponsors, and SCS. These practices, when properly applied and maintained, will accomplish the project goal of sustaining long-term agricultural production on 8,800 acres in the watershed.

Treatment of the identified needs in the watershed, 15,990 acres of eroding cropland, was determined to be too ambitious, considering the installation period and the expected acceptance of the landowners and operators. A goal of 55 percent was selected as an acceptable participation rate based on interviews with landusers.

There are no unresolved conflicts or objections to the recommended plan.

The NWSM requires specific data for each eval. Unit. Top page - 508-27

RECOMMENDED PLAN

General

The recommended plan consists of applying conservation practices to adequately protect 8,800 acres of cropland. The conservation practices consist of 8,624 acres of conservation cropping systems, contour farming, and crop residue use, 1,161,600 feet of terraces, 176 acres of grassed waterways, and 78 grade stabilization structures.

Total project costs, including technical and financial assistance, are $2,089,590. The average annual project cost is $120,240 and the average annual benefit is $129,710, which results in a benefit-cost ratio of 1.1:1.0. The average annual operation and maintenance costs are $3,450.

Dperation and maintenance costs are the responsibility of the individual landuser who agrees to apply the practices according to the long-term contract between the landuser and the SCS. Upon completion of the contract, the land user is expected to continue the operation and maintenance through an agreement with the local district.

Purpose and Summary

The recommended plan is alternative 2. Purpose of the plan is to reduce the loss of the productive capacity of the soil resource base and to provide for sustained agricultural production. The project will reduce erosion to an acceptable level. The plan consists of accelerated conservation treatment on 8,800 acres of eroding cropland. Project installation period is 10 years.

Plan Elements

The existing Agricultural Stabilization and Conservation Service (ASCS) cost-sharing programs will be unaffected by the actions of this watershed plan. Accelerated land treatment funds provided by this plan will be used to supplement the ongoing program.

shows eligible areas - yes. only 55% w/ be treated.

Project funds will be made available to provide 40 staff years for technical assistance for conservation planning and/or application. Additional funds will be available for cost sharing to install conservation practices. Table 1 lists the acres to be treated and the source of funding. The project map (Appendix B) shows the location of the areas where project treatment will be applied. Specific locations of identified treatment areas eligible for cost-share assistance are on file in the local SCS field offices. Technical and financial assistance funds provided by this project will be used only on identified treatment areas.

Cropland resource management systems will be planned on-site with the landuser. Incremental analysis studies show that management practices and enduring practices are needed to reduce the erosion to an acceptable rate and provide for sustained agricultural production. The management practices which proved to be economically feasible and environmentally preferable are conservation cropping systems and crop residue use. These practices will be used in combination with the enduring practices of

terracing and contour farming, where applicable. Where necessary to convey the concentrated water flow to a stable grade, grassed waterways may be used. In addition, where necessary because of an unstable outlet, a grade stabilization structure will be installed.

The landuser will decide which resource management system to apply in accordance with field office "Technical Guides." Alternative practices, including land use changes, may be selected by the landuser, but the cost share will be based on the lesser of: (1) The amount paid for the practices actually applied; or (2) the amount which would have been paid for the recommended practices in the selected plan.

Mitigation Features

SCS planning activities for protecting and preserving cultural resources will be in accordance with the Programmatic Memorandum of Agreement with the Advisory Council on Historic Preservation. The procedures published in the SCS General Manual, Title 420, Part 401, will be followed. In addition, the following steps will be taken:

a. Impact areas of grade stabilization structures will be evaluated by SCS prior to construction to determine if cultural resources may exist. If a resource exists, SCS will take appropriate action to identify any significant cultural resources and avoid adverse effects on them.

b. During installation of all other practices, the local SCS employees will be observant of cultural resources during installation of the practice.

Permits and Compliance

No federal permits are required for project action.

Costs

Total project cost is $2,089,590, of which $242,080 will be borne by local funds and $1,847,510 by PL 566 funds. The local funds are comprised of the cost of installing the conservation practices. The PL 566 funds consist of $968,310 for cost-share payment for land treatment practices applied and $879,200 for technical assistance (Table 1). All costs reflect the 1985 price base.

The PL 566 cost-share rate will be 80 percent. Either the actual cost, not to exceed established average ~~cost or~~ the average cost, will be used to determine payment per practice. Cost-share payments to landusers will be made by SCS after a planned eligible practice in the contract has been completed and certified. Payment will be based on cost-share documents prescribed by SCS. Participants must file a claim to SCS for payment.

Installation and Financing

Project practices have been planned and funds scheduled to be obligated during a 10-year period. Technical assistance is included for an additional five years to maintain contracts still in effect. The following table estimates annual obligations:

Schedule of Obligations

Year	Element	PL 566 Funds (dollars)	Other Funds (dollars)	Total (dollars)
1st	Land Treatment	63,890	15,970	79,860
	Technical Assistance	23,700	0	23,700
	Subtotal	87,590	15,970	103,560
2nd	Land Treatment	101,680	25,420	127,100
	Technical Assistance	43,100	0	43,100
	Subtotal	144,780	25,420	170,200
3rd	Land Treatment	137,460	34,370	171,830
	Technical Assistance	43,100	0	43,100
	Subtotal	180,560	34,370	214,930
4th	Land Treatment	143,280	35,820	179,100
	Technical Assistance	66,800	0	66,800
	Subtotal	210,080	35,820	245,900
5th	Land Treatment	127,840	31,960	159,800
	Technical Assistance	86,200	0	86,200
	Subtotal	214,040	31,960	246,000
6th	Land Treatment	114,270	28,570	142,840
	Technical Assistance	86,200	0	86,200
	Subtotal	200,470	28,570	229,040
7th	Land Treatment	95,860	23,970	119,830
	Technical Assistance	86,200	0	86,200
	Subtotal	182,060	23,970	206,030
8th	Land Treatment	79,390	19,850	99,240
	Technical Assistance	66,800	0	66,800
	Subtotal	146,190	19,850	166,040
9th	Land Treatment	60,010	15,000	75,010
	Technical Assistance	66,800	0	66,800
	Subtotal	126,810	15,000	141,810
10th	Land Treatment	44,630	11,150	55,780
	Technical Assistance	66,800	0	66,800
	Subtotal	111,430	11,150	122,580
11th	Land Treatment	0	0	0
	Technical Assistance	66,800	0	66,800
	Subtotal	66,800	0	66,800
12th	Land Treatment	0	0	0
	Technical Assistance	66,800	0	66,800
	Subtotal	66,800	0	66,800
13th	Land Treatment	0	0	0
	Technical Assistance	43,100	0	43,100
	Subtotal	43,100	0	43,100
14th	Land Treatment	0	0	0
	Technical Assistance	43,100	0	43,100
	Subtotal	43,100	0	43,100
15th	Land Treatment	0	0	0
	Technical Assistance	23,700	0	23,700
	Subtotal	23,700	0	23,700
GRAND TOTAL		1,847,510	242,080	2,089,590

Responsibilities

Land treatment, itemized in Table 1, will be established during the project installation period by landusers in cooperation with their soil and water conservation district. Governing bodies of these districts will arrange for meetings to promote installation of conservation practices.

Landusers will be responsible for making all necessary arrangements to assure land treatment work is started and completed in accordance with the installation schedule of the conservation plan of operations.

Technical assistance will be provided by SCS to plan and apply conservation practices.

Contracting

Conservation practices will be established during the 10-year installation period by means of long-term contracts between the SCS and participants on the land they own or control. Cost-sharing is to be based on eligible conservation practices in an approved conservation plan. The conservation plan will be used as a basis for developing the long-term contract to solve identified problems. The plan is to include a combination of conservation practices that, when installed, will provide the treatment required to solve the identified problems to the degree needed to meet the objectives of the project. Funding limitations and formulation of the contracts will follow the guidance in the SCS General Manual which is in existence at the time the contract is written.

Cultural Resources

If cultural resources that appear to be significant are discovered during application of the conservation practices, the landuser will be requested to avoid further work that might adversely affect the resource. The landuser will be requested to notify and consult with the Secretary of the Interior or the State Historic Preservation Officer to determine the significance of the resource and avoid any adverse effects on the property.

Financing

Federal assistance will be provided under authority of the Watershed Protection and Flood Prevention Act (Public Law 566, 83rd Congress, 68 Stat. 666), as amended. The balance of funds will be furnished locally.

Federal assistance is subject to the appropriation of funds for the application of project practices.

Noncost-shared management practices, such as crop residue use, contour farming, and conservation cropping systems, will be required as a condition to cost-shared assistance for other practices to achieve project objectives. Noncost-shared management practices will be installed concurrently with cost-shared enduring practices.

Operation and Maintenance

Operation is the administration, management, and performance of non-maintenance actions needed to keep a completed conservation practice safe and functioning as planned.

Maintenance includes preventing deterioration of applied conservation practices and repairing damage to, or replacement of, the practice if one or more of its components fail. Damages to completed practices caused by normal deterioration, drought, rainfall in excess of design rainfall, or vandalism is considered maintenance.

The landuser will be responsible for operation and maintenance (O&M) of installed practices. O&M requires effort and expenditures throughout the life of the practice to maintain safe conditions and assure proper functioning.

The O&M requirements will be documented in the conservation plan of operations. The cooperator must agree to a conservation plan of operations (long-term contract) which provides adequate and sound arrangements for proper operation, prompt and appropriate performance of needed maintenance, and financing the costs of operation and maintenance. The cooperators should carry out the provisions of the agreed-to plan in a manner consistent with the spirit, intent, and purpose of the plan and project. The conservation plan file should reflect the actions required and taken. After termination of the long-term contract, the cooperator is expected to continue the O&M requirements for practices in the same manner as prescribed for other conservation practices covered by the district agreement. Requirements for O&M will be incorporated in the cooperator's conservation plan of operations.

Representatives of the soil and water conservation districts will periodically inspect the conservation practices. The districts will assist landusers to perform needed maintenance, replace damaged measures, and in planning and installing new measures to maintain an adequate level of protection. Special maintenance may be necessary to repair damage from unusual storms.

Need Annual cost & B:C Tables

TABLE 1 - ESTIMATED INSTALLATION COST[1]

Installation Cost Item	Unit	Number	PL 566 Funds (dollars)	Other Funds (dollars)	Total (dollars)
Land Treatment Accelerated					
Evaluation Unit A	acres	8,250	925,680	231,420	1,157,100
Evaluation Unit B	acres	550	42,630	10,660	53,290
Subtotal			968,310	242,080	1,210,390
Technical Assistance SCS	staff years	40	879,200	0	879,200
TDTAL PROJECT			1,847,510	242,080	2,089,590

[1]Price Base: 1985

TABLE 2A - INCREMENTAL ANALYSIS OF EROSION AND SEDIMENT[1]

System and Iteration	EROSION										SEDIMENT	
	Perennial Gully		Ephemeral Gully				Sheet and Rill		Composite (Weighted Average)		Sediment Delivered to Tawakoni Lake	
			Depleted		Depreciated[2]							
	Tons Per Acre	Percent Reduction	Tons Per Acre	Percent Reduction	Tons Per Acre	Percent Reduction	Tons Per Acre	Percent Reduction	Tons Per Acre	Percent Reduction	Tons Per Acre	Percent Reduction
EVALUATION UNIT A												
Present	110.0	-	116.3	-	37.3	-	11.4	-	17.5	-	3.5	-
Future Without Project	129.2	-	130.2	-	41.6	-	12.8	-	21.9	-	4.4	-
Iteration No. 1												
Conservation Tillage	128.8	1	43.2	67	13.8	67	4.3	66	8.0	63	1.6	64
Conservation Cropping System plus Crop Residue Use	128.8	1	101.5	22	32.4	22	9.9	23	17.2	21	3.4	23
Water Disposal System	22.2	83	10.3	92	8.5	80	6.4	50	6.6	70	1.3	70
Iteration No. 2												
Conservation Cropping System, Crop Residue Use plus Water Disposal System	22.2	83	8.0	94	6.6	84	5.0	61	5.2	76	1.0	77
Conservation Tillage plus Water Disposal System	22.2	83	3.3	97	2.8	93	2.1	84	2.3	89	0.5	89

[1]All benefits and costs calculated on a per-acre basis on 1,810 acres to represent the 14,990 acres in Evaluation Unit A and 104 acres to represent 1,000 acres in Evaluation Unit B.

[2]Includes depreciated area of perennial gullies.

TABLE 2A - INCREMENTAL ANALYSIS OF EROSION AND SEDIMENT[1] (cont'd)

System and Iteration	EROSION										SEDIMENT	
	Perennial Gully		Ephemeral Gully				Sheet and Rill		Composite (Weighted Average)		Sediment Delivered to Tawakoni Lake	
			Depleted		Depreciated[2]							
	Tons Per Acre	Percent Reduction	Tons Per Acre	Percent Reduction	Tons Per Acre	Percent Reduction	Tons Per Acre	Percent Reduction	Tons Per Acre	Percent Reduction	Tons Per Acre	Percent Reduction
EVALUATION UNIT B												
Present	53.0	-	126.5	-	38.4	-	12.4	-	17.4	-	3.5	-
Future Without Project	110.0	-	145.2	-	28.4	-	13.9	-	21.0	-	4.2	-
Iteration No. 1												
Conservation Tillage	110.0	0	48.8	66	14.7	48	4.7	66	8.6	59	1.7	60
Conservation Cropping System plus Crop Residue Use	110.0	0	112.8	22	22.7	20	10.8	22	17.4	17	3.5	17
Water Disposal System	11.0	90	12.0	92	8.0	72	7.1	49	7.2	66	1.4	67
Iteration No. 2												
Conservation Cropping System, Crop Residue Use plus Water Disposal System	11.0	90	10.0	93	6.0	79	5.5	60	5.6	73	1.1	74
Conservation Tillage plus Water Disposal System	11.0	90	4.0	97	4.0	86	2.4	83	2.5	88	0.5	88

[1] All benefits and costs calculated on a per-acre basis on 1,810 acres to represent the 14,990 acres in Evaluation Unit A and 104 acres to represent 1,000 acres in Evaluation Unit B.

[2] Includes depreciated areas of perennial gullies.

TABLE 2B - INCREMENTAL ANALYSIS OF NED BENEFITS AND COSTS PER ACRE[1]

System and Iteration	Incremental Annual Cost	Incremental O&M Cost	Incremental Total Cost	Incremental Sheet and Rill Annual Benefit	Incremental Sheet and Rill Enhancement Benefit	Incremental Ephemeral Gully Annual Benefit	Incremental Ephemeral Gully Enhancement Benefit	Now Time Erosion Benefit	Incremental Benefit	Benefit-Cost Ratio	Incremental Net Benefit
EVALUATION UNIT A											
No Treatment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iteration No. 1											
Conservation Tillage	0.00	0.00	0.00	0.21	0.35	-2.04	0.00	5.48	4.00		4.00
Conservation Cropping System plus Crop Residue Use	0.00	0.00	0.00	0.52	0.20	-0.35	0.00	1.49	1.86		1.86
Water Disposal System	14.66	0.98	15.64	0.52	2.24	16.28	0.36	3.95	23.35	1.49	7.71
Iteration No. 2											
Water Disposal System	14.66	0.98	15.64	0.52	2.24	16.28	0.36	3.95	23.35	1.49	7.71
Water Disposal System plus Conservation Tillage	0.00	0.00	0.00	-0.48	-1.46	-1.61	0.34	1.50	-1.71		-1.71
Water Disposal System plus Conservation Cropping System and Crop Residue Use	0.00	0.00	0.00	0.00	0.01	-0.15	0.10	0.91	0.87		0.87

[1]All benefits and costs calculated on a per-acre basis on 1,810 acres to represent the 14,990 acres in Evaluation Unit A and 104 acres to represent 1,000 acres in Evaluation Unit B.

TABLE 28 - INCREMENTAL ANALYSIS OF NED BENEFITS AND COSTS PER ACRE[1]

System and Iteration	Incremental Annual Cost	Incremental O&M Cost	Incremental Total Cost	Incremental Sheet and Rill Annual Benefit	Incremental Sheet and Rill Enhancement Benefit	Incremental Ephemeral Gully Annual Benefit	Incremental Ephemeral Gully Enhancement Benefit	Now Time Erosion Benefit	Incremental Benefit	Benefit-Cost Ratio	Incremental Net Benefit
EVALUATION UNIT B											
No Treatment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iteration No. 1											
Conservation Tillage	0.00	0.00	0.00	-1.14	0.00	-1.88	0.00	1.43	-1.59		-1.59
Conservation Cropping System plus Crop Residue Use	0.00	0.00	0.00	-0.36	0.16	-0.57	0.00	0.56	-0.21		-0.21
Water Disposal System	10.10	0.78	10.88	0.19	1.18	13.74	0.17	1.18	16.46	1.51	5.58
Iteration No. 2											
Water Disposal System	10.10	0.78	10.88	0.19	1.18	13.74	0.17	1.18	16.46	1.51	5.58
Water Disposal System plus Conservation Tillage	0.00	0.00	0.00	-1.01	-1.18	-1.63	0.18	0.54	-3.10		-3.10
Water Disposal System plus Conservation Cropping System and Crop Residue Use	0.00	0.00	0.00	0.00	0.52	-0.24	0.15	0.39	0.82		0.82

[1] All benefits and costs calculated on a per-acre basis on 1,810 acres to represent the 14,990 acres in Evaluation Unit A and 104 acres to represent 1,000 acres in Evaluation Unit B.

EFFECTS OF RECOMMENDED PLAN

General Effects

This section describes the economic, environmental, and social effects of the recommended plan. Only those factors that received either a high or medium significance rating in the "Concerns Section" are discussed in this section.

The total cost of the project is shown on Table 1. The ratio of average annual benefits to the annual cost is shown on Table 2B.

A description of the project impacts is presented below. Appropriate baseline data have been included to establish needed perspective. Areas of impact believed to be of key importance to decision making are summarized for the alternatives in the "Summary and Comparison of Candidate Plans."

Land Management

The recommended plan consists of an accelerated conservation program with funds for technical assistance to apply management practices such as contour farming, crop residue use, and conservation cropping systems. Technical and financial assistance is provided to apply enduring practices for excess water disposal.

Assessments show that 15,990 acres of cropland in this watershed are eroding at high rates. (See section on "Erosion Problems.") This acreage is comprised of 273 fields or treatment areas.

It was determined by interviews that about 55 percent of the landusers with 8,800 acres of cropland would participate in this project.

Application of the management practices will improve the tilth, add organic matter to the surface layer, increase the soil's water and nutrient holding capacity, and help to prevent erosion. The water disposal systems, when installed and maintained in conjunction with the management practices, will reduce soil erosion to an acceptable level.

Installation of the water disposal systems will convert 176 acres from cropland to waterways. These acres will be vegetated and may be used for hay production.

The project will have a long-term impact on land management in the watershed by protecting the soil resource base and providing for continued crop production capacity.

Erosion and Sedimentation

Application of the planned management and enduring practices will significantly reduce erosion and the related sedimentation in the

watershed. The effects will be primarily on the 8,800 acres expected to be treated. This is 55 percent of the 15,990 acres identified as needing treatment.

The erosion rate will be reduced by project action from 21 tons to 6 tons per acre per year on the 8,800 acres. This is a 71 percent reduction.

The following table shows the erosion rates on the problem area (15,990 acres). The rates shown are for future (25-year) conditions without project action:

ANNUAL EROSION RATES
Future Without Project (15,990 Acres)

Erosion Type	Range in Tons Per Acre	Weighted Average
Perennial Gully Erosion		
Voided Area	21-310	134
Ephemeral Gully Erosion		
Depleted Area	6-286	135
Depreciated Area	5-115	44
Sheet-Rill Erosion	5-29	12
Weighted Average		21

The following table shows the erosion rates on the 8,800 acres expected to be treated by this project; for the remaining part of the problem area which will not be treated (7,190 acres); and for the entire problem area (15,990 acres). These rates are for future (25-year) conditions with project action.

ANNUAL EROSION RATES
NED PLAN
Future with Project (15,990 Acres)

Erosion Type	Area Treated 8,800 Acres: Range in Tons Per Acre	Area Treated 8,800 Acres: Weighted Average	Area Not Treated 7,190 Acres: Range in Tons Per Acre	Area Not Treated 7,190 Acres: Weighted Average	Total Area 15,990 Acres: Range in Tons Per Acre	Total Area 15,990 Acres: Weighted Average
Perennial Gully Erosion						
Voided Area	9 - 75	17	21 - 310	134	9 - 310	69
Ephemeral Gully Erosion						
Depleted Area	5 - 222	28	6 - 286	135	5 - 286	70
Depreciated Area	3 - 89	18	5 - 115	44	3 - 115	30
Sheet-Rill Erosion	4 - 22	5	5 - 29	12	4 - 29	9
Weighted Average		6		21		13

The following table shows the areas affected by different types of erosion on the 15,990-acre problem area under with project and without project conditions:

ACRES AFFECTED BY EROSION

Erosion Type	Future Without Project	Future with Project		
	Total Acres	Acres To Be Treated	Acres Not Treated	Total Acres
Perennial Gully Erosion Voided Area	100	40	40	80
Ephemeral Gully Erosion				
Depleted Area	590	130	270	400
*Depreciated Area	(1,210)	(90)	(540)	(630)
Sheet-Rill Erosion	15,300	8,630	6,880	15,510
Total Acres	15,990	8,800	7,190	15,990

*Oepreciated area acres included in Sheet-Rill acreage. Depreciated area subjected to "cultural erosion" and "sheet-rill" erosion.

Prime Farmland Soils

Assessments of the watershed show that about 14,400 acres of the land identified as needing treatment are classified as prime farmland soils. Without the technical and financial assistance that will be provided by this project, this land will continue to erode at a high rate.

Based on the expected 55 percent participation rate, about 8,000 acres of this prime farmland will be protected for future use.

Social and Cultural

The project is expected to create 87 person-years of employment during the installation period. The employment will be mainly related to the construction of 1,161,000 feet of terraces, 176 acres of waterways, and 78 grade stabilization structures. The economic condition of this agricultural community will be stimulated by this project. This project will benefit and affect minorities and non-minorities alike.

CONSULTATION AND PUBLIC PARTICIPATION

Planning for this watershed began as a result of interest and a need recognized by local landusers. A number of public meetings and informational meetings have been held during the project development period. The following list summarizes the efforts made to involve the public in the planning process:

June 9, 1980	Letter of Endorsement from Hunt County Commissioners Court
June 9, 1980	Letter of Endorsement from Collin County Commissioners Court
June 26, 1980	North Central Texas Council of Governments stated: "Favorable consideration of the application by the funding agency is recommended."
July 10, 1981	Texas State Soil and Water Conservation Board granted a special planning priority.
October 28, 1982	Public meeting in Caddo Mills, Texas, attended by about 60 local landusers.
December 8, 1982	Sabine River Authority stated ". . . the Authority is in support of your . . . program in the Caddo Creek watershed.

Followup meetings have been held with the project sponsors and individual landusers for information on progress of the project plan development. Other consultation was conducted as follows:

Threatened and Endangered Species Coordination - A biologist with the U.S. Fish and Wildlife Service made an assessment of the watershed and the planned project alternatives in June 1985. He concurred that the project would have minimal effect on the wildlife habitat.

The U.S. Fish and Wildlife Service was consulted on threatened and endangered species in July 1985. They reported that the Arctic peregrine falcon, southern bald eagle, and whooping crane may migrate through the watershed. There is no critical habitat for these species in the watershed.

Archeological and Historical Resources Coordination - The Hunt and Collin County Historical Commissions and the State Historic Preservation Office were consulted for known sites. No sites of concern were identified.

Comments will be requested from the following agencies and organizations:

(1) Office of the Governor
(2) Texas State Soil and Water Conservation Board
(3) State Single Point of Contact for Federal Assistance

when

(4) Environmental Protection Agency - Regional office
(5) Fish and Wildlife Service - National and regional offices
(6) Agricultural Stabilization and Conservation Service - State Office
(7) Forest Service - Regional (or area) office

LIST OF PREPARERS AND QUALIFICATIONS

USDA, Soil Conservation Service

NAME	PRESENT TITLE	EDUCATION (Degree(s))	EXPERIENCE (Title & Years in Position	OTHER (Licenses, etc.)
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Max D. Bircket	Geologist	B.S., Geology	Geologist - 18	
Joe N. Brandon	Agricultural Economist	B.S., Agricultural Economics	Agricultural Economist - 9 District Conservationist - 1 Soil Conservationist - 1	
Jerry J. Waller	State Conservation Agronomist	B.S., Agricultural Education M.S., Range Management M., Resource Administration	State Conservation Agronomist - 13 Conservation Agronomist - 6 District Conservationist - 1 Soil Conservationist - 10 Range Conservationist - 1	Certified Professional Agronomist

LIST OF PREPARERS AND QUALIFICATIONS

USDA, Soil Conservation Service

NAME	PRESENT TITLE	EDUCATION (Degree(s))	EXPERIENCE (Title & Years in Position	OTHER (Licenses, etc.)
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Billy R. Stringer	Soil Scientist	B.S., Agronomy	Soil Scientist - 26	Certified Professional Soil Scientist Certified Professional Agronomist

The technical review plan was reviewed and concurred in by state staff specialists having responsibility for engineering, soils, agronomy, biology, economics, and geology.

INOEX

The table "Example of Incremental Analyses Studies," Appendix A, shows the results of incremental analyses on an actual Treatment Area of 44.3 acres. This Treatment Area is considered to be representative of Evaluation Unit A. The table is an example of incremental analysis of various conservation practices and their effect on erosion rates, crop yields, and net monetary returns. The ERCON 4 computer program was used to make this analysis. "No Treatment" is used as the basis for comparing each conservation practice. The erosion rates and the acres affected by the two types of erosion occurring on this Treatment Area were determined using the ELT computer program. Yields of the three crops commonly grown in the watershed (cotton, wheat, and grain sorghum) were determined. Use of these three crops in rotation was the basis for all evaluations. Yields were determined for the acres affected by sheet and rill erosion for the Evaluation Unit. Crop yields on the acres affected by ephemeral gully erosion were estimated to be from zero to 50 percent of the yields on acres affected by sheet and rill erosion. Projections on future (25-year) conditions showed that the acres affected by ephemeral gully erosion increased by about 40 percent (from 9 acres to 14.8 acres). This increase occurred with no treatment or when treated with management practices alone. Treatment with water disposal systems (terraces, waterways, and grade stabilization structures) reduced the acres affected by ephemeral gully erosion by 55 percent (from 9 acres to 4 acres).

The procedure for calculating the average yield per acre for cotton for this representative Treatment Area is shown in the following example:

EXAMPLE - CALCULATION OF AVERAGE YIELD OF COTTON ON A TYPICAL TREATMENT AREA (44.3 ACRES)

NO TREATMENT

Present

	Acres	x	Yield	=	Gross Yield/Total Acres	=	Average Yield
Sheet and Rill Erosion	35.3	x	306	=	10,802		
Ephemeral Gully Erosion	9.0	x	153	=	1,377		
Total	44.3				12,179/44.3	=	275 lbs

Future W/O

	Acres	x	Yield	=	Gross Yield/Total Acres	=	Average Yield
Sheet and Rill Erosion	29.5	x	301	=	8,880		
Ephemeral Gully Erosion	14.8	x	150.5	=	2,227		
Total	44.3				11,107/44.3	=	250 lbs

WITH CONSERVATION TREATMENT

Future With

	Acres	x	Yield	=	Gross Yield/Total Acres	=	Average Yield
Sheet and Rill Erosion	40.3	x	328	=	13,218		
Ephemeral Gully Erosion	4.0	x	164	=	656		
Total	44.3				13,875/44.3	=	313 lbs

Conservation tillage was effective in reducing the erosion rate from 20.2 tons per acre to 7.9 tons and crop yields were significantly increased. It was determined that conservation tillage alone will not reduce the acres affected by ephemeral gully erosion. The remaining erosion rate of 7.9 tons per acre combined with the detrimental effect of the ephemeral gully erosion will continue to destroy the soil resource base.

This analysis concluded that management practices consisting of conservation cropping system, crop residue use, and contour farming without the support of terraces, grassed waterways, and grade stabilization structures would not meet the project goal of sustained long-term agricultural production.

Installation of the water disposal system consisting of terraces, grassed waterways, and grade stabilization structures, when supported by management practices, would lower the erosion rate to 4.6 tons per acre, reduce the acres affected by ephemeral gully erosion by 55 percent, and increase crop yields significantly. The combination of the enduring practices and the management practices of contour farming, crop residue use, and conservation cropping system would provide the highest net monetary return and would provide for sustained long-term agricultural production.

U.S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

APPENDIX B

PROJECT MAP

CADDO CREEK WATERSHED

HUNT AND COLLIN COUNTIES

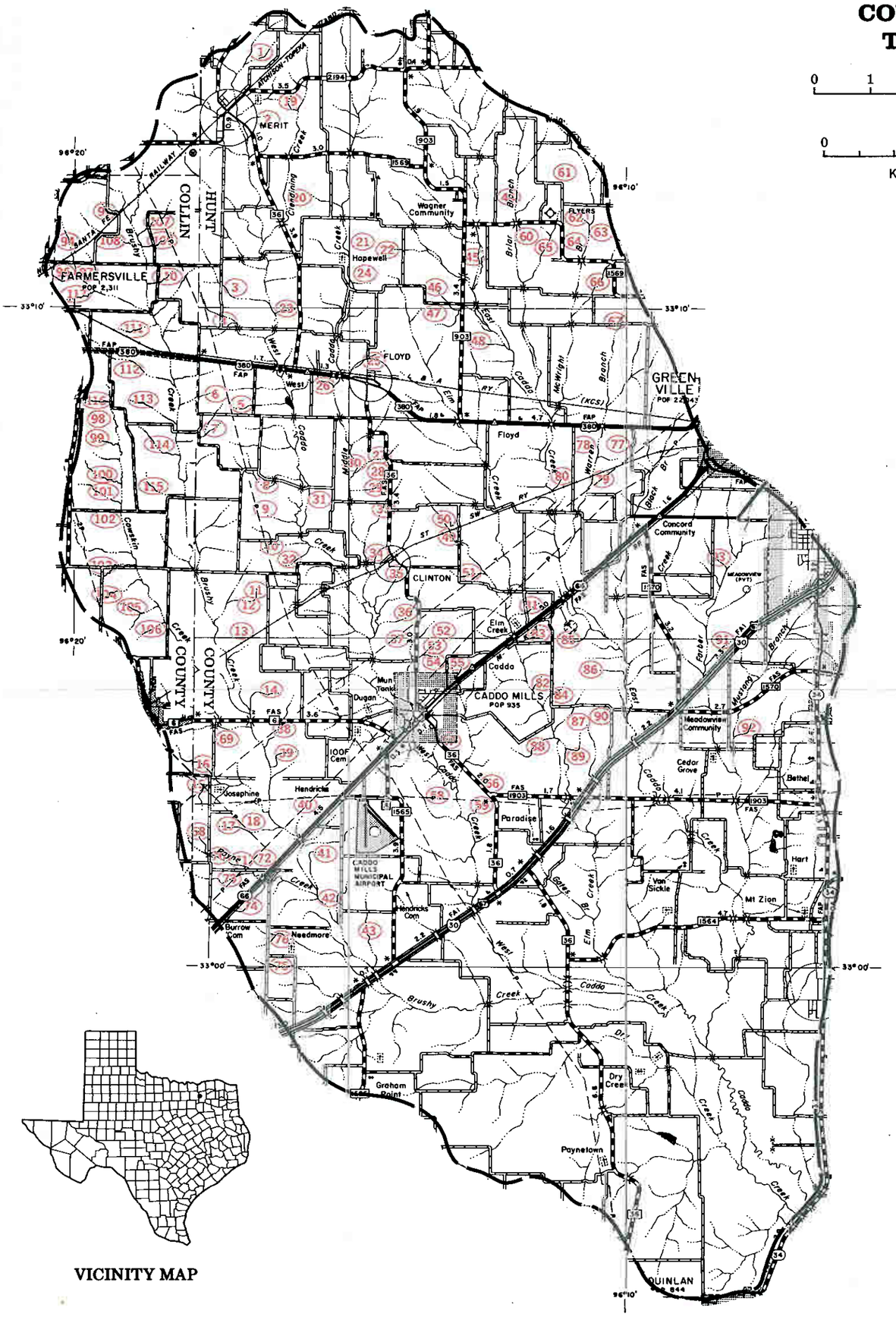
TEXAS

0 1 2 3 4

MILES

0 3 6

KILOMETERS



LEGEND

(46) PROBLEM AREA

N

VICINITY MAP

SOURCE:
BASE COMPILED FROM TEXAS GENERAL HIGHWAY MAP, POLYCONIC PROJECTION

USDA-SCS-FORT WORTH, TEXAS 1985

REV. AUGUST 1985 BASE 4-R-37435