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A Plan Of Work For The Neches-Sabine Soil Conservation District

Richard A. Moody
Prairie View A. & M. College

A PLAN OF WORK FOR THE NECHES-SABINE SOIL CONSERVATION DISTRICT

MOODY

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A PLAN OF WORK FOR THE NECHES-SABINE SOIL CONSERVATION DISTRICT

By

Richard A. Moody

A Thesis in Agricultural Education

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the Degree of

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Date Aug. 4, 1947

BIOGRAPHY

The writer was born July 6, 1914 in Lee County, Giddings, Texas.

He received his elementary and high school training in Giddings,Texas, and was graduated May 23, 1932 as Valedictorian of his class. After Completing his high school work, he entered Prairie View College in 1932 and graduated May 1937 after dropping out a year. He was awarded the Agricultural Award as most outstanding student in his class.

He begun his teaching career in the Henry T. Scott High School, Woodville, Texas, as professor of Vocational Agriculture, and remained on this job for four years. After accepting other work he taught Vocational Agriculture one year in the Furney Richardson High School, Teague, Texas. His next job was "Critic" Teacher in the Sam Schwartz High School, Hempstead, Texas.

Leaving this job, he received an appointment with the U. S. D. A. Soil Conservation Service. He was the first Negro in Texas to receive such an appointment. He now remains on this job and have been for four years.

He married July 6, 1938 and have one child, a girl, born April 16, 1940.

ACKNOWLEDGEMENT

The writer acknowledges with sincere appreciation the kind advice, cooperation and technical information provided by Dr. J. M. Coruthers, Professor of Agricultural Economics; Dr. E. M. Norris, Professor of Agricultural Education and Miss A. C. Preston, Professor of Rural Education, and Mr. G. L. Smith, Director of Agriculture, all of Prairie View A. & M. College, Prairie View, Texas.

D E D I C A T I O N

To my daughter

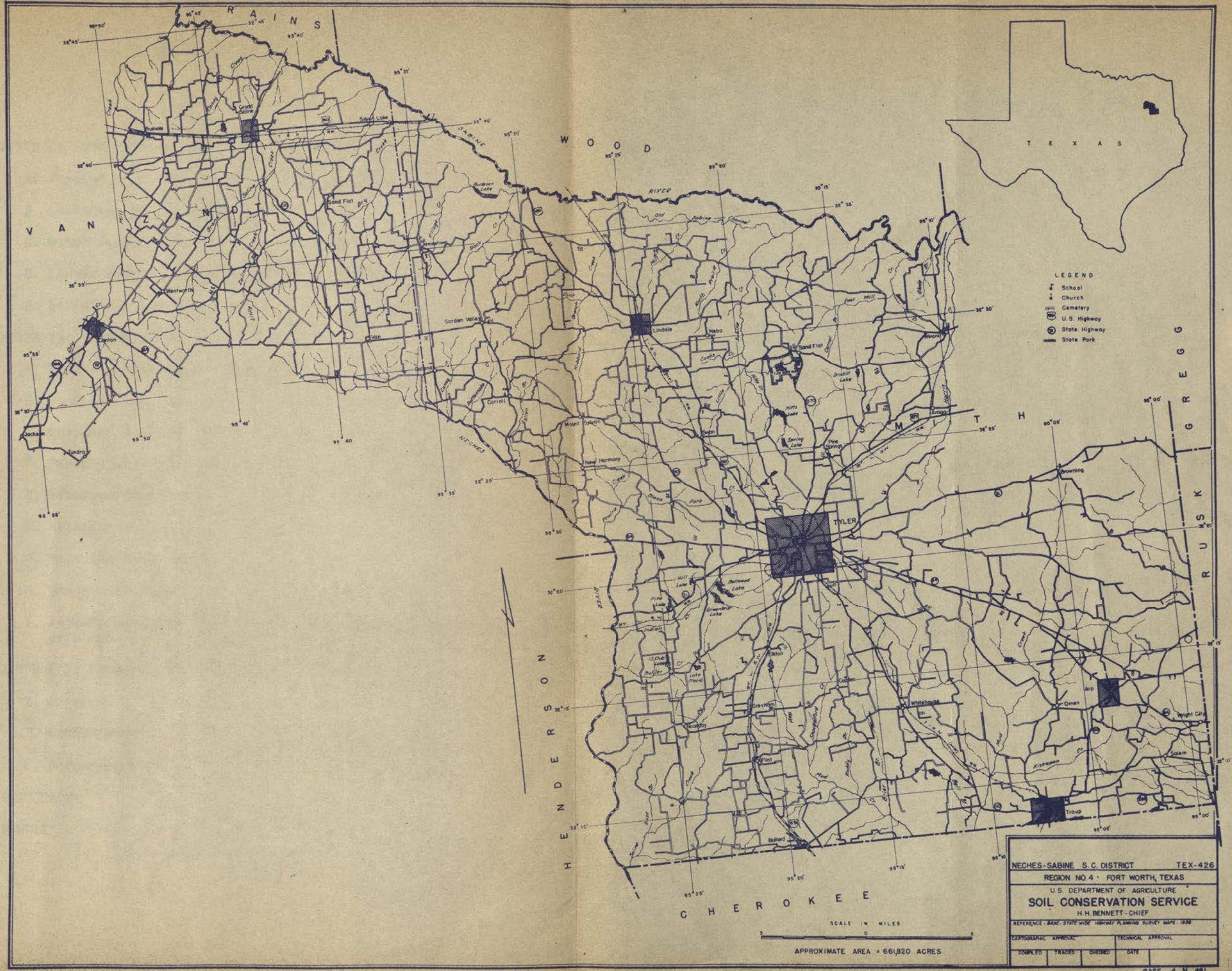
Marva Joan Moody

GENERAL DESCRIPTION OF THE DISTRICT BOUNDARIES AND APPROXIMATE SIZE

The Neches-Sabine Soil Conservation District is located in the North-eastern section of Texas and comprises a total of 661,820 acres. It is made up of the eastern one-third of Van Zandt County, containing the towns of Canton and Grand Saline, and all of the Smith County, with the exception of that portion of the North-eastern corner North of State Highway #31 and East of Harris Creek. Tyler is the location of the District Headquarters.

The original cover was pine and mixed hardwood forest much of which has in the past been cleared for farming of the 661,820 acres within the District, approximately 66,200 acres are non-farming lands and the remaining 595,620 acres are in farm or agricultural lands. Within the District, there are approximately 5,771 farm operating units.*

* See Map on following page.



NECHES-SABINE S. C. DISTRICT TEX-426

REGION NO. 4 · FORT WORTH, TEXAS

U.S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

H. H. BENNETT - CHIEF

REFERENCE - BASE - STATE WIDE HIGHWAY PLANNING SURVEY MAPS - 1939

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BASE 4-N-481

TABLE OF CONTENTS

CHAPTER I

INTRODUCTION

At the present, the increased destruction of uncontrolled erosion far exceeds the rate of establishing corrective conservation measures. It exceeds it to such a degree as to require some sober thinking and planning on the subject. In the Neches-Sabine Soil Conservation District, we now have all of the land we will ever have. Every acre destroyed by erosion, every farm abandoned because soil fertility has been destroyed by erosion, means families cheated of a fair opportunity to make an American Standard of Living.

The area was settled in 1840 when pioneers began to clear away the timber and bring the clearings under cultivation. No thought was given to erosion or its consequences. Erosion has progressively increased each year since the first settlers.

The day of reckoning has come. We now find that out of approximately two billion acres representing the total area of the country, exclusive of urban and water territory, only about a quarter of this area has escaped erosion of some kind.[1]

It will take the coordinated effort of all to solve and overcome the erosion problem. It is a challenge which must be met.

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[1] Burges, Austin Earle: Soil Erosion Control , Atlanta, Georgia; Turner E. Smith & Company 1938, pp.16

Purpose. It is the purpose of this study to :

1. To determine the extent and damage caused by erosion in the district.

2. To create an awarness or felt need on the part of farmers to adapt good farm land management.

Statement of the Problem. There exists in the Neches-Sabine Soil Conservation District a general misuse of the land. The farms are not being tilled according to their needs and adaptabilities. There is a definte need for erosion control and improved farming practices.

Other Similiar Studies. The writer was able to find very little literature dealing directly with the problem, however a limited amount of research material was found and reviewed.

Scope, Sources, and Methods of Obtaining Data.

1. This study covers all of Smith County and a portion of Van Zandt County.

2. The basic data for this study were obtained from soil survey reports, reports of the United States Weather Bureau, local experiment station, agronomy handbooks, and my personal experience as an employee in the Soil Conservation Service.

3. Field data were obtained by personal contact.

Definition of terms.

Soil Conservation is proper use and care of the land. It means using the land to produce the greatest amounts of the things most needed.

CHAPTER II

PRESENTATION AND ANALYSIS OF DATA

PHYSICAL CONDITIONS, LAND USES AND TREATMENT

CLIMATE

The average annual rainfall for the past 36 years at the Tyler Experiment Station is 43.0 inches and is well distributed throughout the year. The distribution of rainfall in inches by months was as follows:

January	3.45	July	3.33
February	3.31	August	2.45
March	3.83	September	2.41
April	4.71	October	3.14
May	4.69	November	4.03
June	2.90	December	4.75

The average annual rainfall is sufficient for the production of the crops that are grown in the District, when distributed according to the rainfall.[1] March, April and May have a relatively high rainfall, which sometimes delay preparation of land and often retards planting on bottom land and poorly drained upland. August, September and October have a relatively light rainfall. Long periods of drought are usually rare during the growing season, but short dry spells when accompanied by hot winds cause damage to feed crops, Winter rains, due to their volume, and Summer rains, due to their terrential nature, cause destructive erosion on cultivated fields, over grazed pastures and improperly managed weeds. The average annual temperature is 66.0°F. The Winter extremes range from 4° below zero to 82° above, and the Summer extremes from 52° to 112°F. The average date of the last killing

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1 Johnson, P. R., Farming With Rainfall, Tyler Experiment Station Review, Vol. II, No. 4, December, 1945, pp. 36-42.

frost in the Spring is March 15, and that of the first in the fall is November 16. This gives an average growing season of 244 days. The latest killing frost in the Spring recorded was on April 25, and the earliest recorded in the Fall was on October 23. The growing season, varying from 186 to 300 days, is sufficiently long for Summer crops but often Winter cover crops planted on the deep sandy soils are damaged by freezing, about once each four years. Extreme freezes that kill Winter vegetation on all soil tyles occur about once every ten years. Plantings in this district of the mere hardy Winter legume cover crops, such as vetch and giant southern bur clover are grown successfully and are effective in increasing crop yields.

SOILS

The principle soils of this area are red and yellow soils, belonging to the large group known as Rolling Sandy Lands of the Coastal Plain and have been developed from deep beds of sandy clays, clays and shales under a cover of pine and hardwood forest. As these soils developed in an area of rather warm climate and moderately high rainfall, they are generally light in color, acid in reaction, low in content of organic matter and contain only a moderate amount of a available plant food due to their highly leached condition.[1]

Since the soils and slopes in this district vary as widely in Agricultural possibilities, general characteristics, degree of erosion, and soil and water conservation practices needed, it is considered advisable to place those having the same general characteristics and agricultural possibilities in separate groups. Using this grouping the accompanying map has been prepared showing the approximate extent and location of the five groups into which the soils of this district have been divided. These groups have been listed on the following pages with a description of each, their productivity, resistance to erosion, their location as to the lay of the land, and their suitability for cropland, pasture land and woodland.

Group 1

Rolling Sandy Soils with Sandy Clay or Clay or Clay Subsoil--
This area comprises approximately 481,000 acres or 73% of the district, is by far the largest group of soils within the district, and is widely distributed over the entire area. The surface soils range from gray

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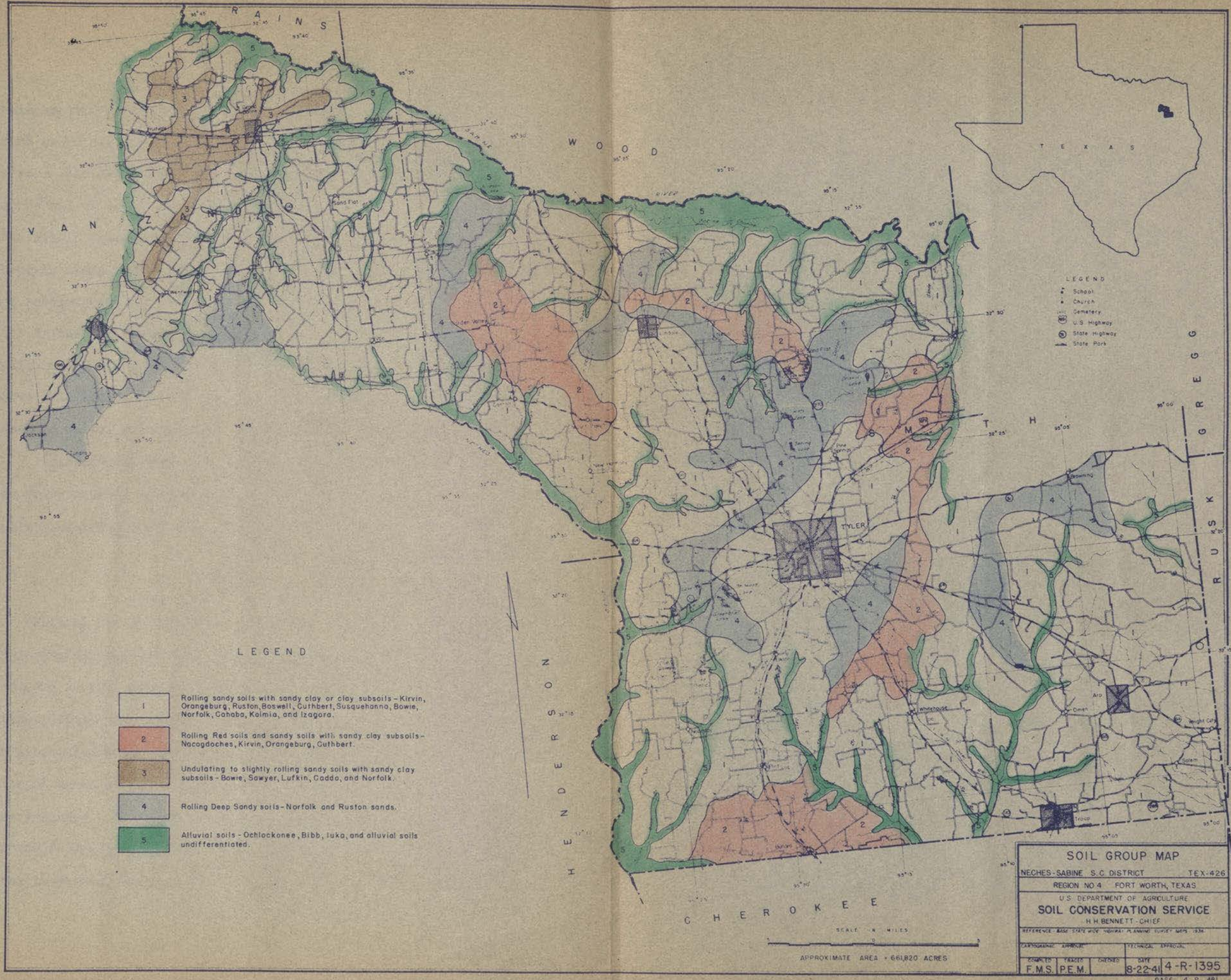
[1] Middleton, H. E., Physical and Chemical Characteristics of Soils, U. S. Dept. Agri. Tech. Bul. 316, 1933, pp. 15-60.

to brown in color and are usually fine sandy loam in texture, low in organic matter and acid in reaction. The subsoils are friable sandy clays to clays which range in color from yellow, yellowish red to dark red. The principal types are Boswell, Cuthbert, Kirvin, Rusten, Orangeburg, Susquehanna, Bowie, Norfolk, Cahaba, Kalmia, and Izagora. This group is rather broad in that it includes Boswell and Susquehanna with heavy plastic subsoils while the other soils of the group have a more friable sandy clay subsoil. The more steeply rolling portion of this area occurs along the banks into the major streams, the Sabine River on the North and Mill Creek and the Neches River along the West. In the extreme Northwestern portion of the district. In Van Zandt County, slopes of 12 to 20 percent frequently occur. Since most of the soils occuring on these steep slopes have rather heavy, slowly premeable, clay subsoils, water absoption is slow and a high percent of runoff, has resulted in severe erosion. Much of this area now being cultivated is undesirable for cultivation. Many steep slopes in cultivation should be established in pasture while the mere severely eroded steep slopes should be returned to timber.

Along the wider inter-stream divides in the eastern and South Central portion of the district, the slopes are mere gently rolling, with some steeply rolling areas along the streams. Here the soils in general have mere friable sandy clay subsoils; a greater percent of the area is in cultivation and erosion is less severe.

These soils are easily tilled and moderately productive when a rotation providing adequate leguminous green manure and cover crop is maintained and commercial fertilizers applied, but cash farming has greatly reduced yields on much of this area. Cotton, corn, and sor-



LEGEND

1	Rolling sandy soils with sandy clay or clay subsoils – Kirvin, Orangeburg, Ruston, Boswell, Cuthbert, Susquehanna, Bowie, Norfolk, Cahaba, Kolmia, and Izagora.
2	Rolling Red soils and sandy soils with sandy clay subsoils – Nacogdoches, Kirvin, Orangeburg, Cuthbert.
3	Undulating to slightly rolling sandy soils with sandy clay subsoils – Bowie, Sawyer, Lufkin, Caddo, and Norfolk.
4	Rolling Deep Sandy soils – Norfolk and Ruston sands.
5	Alluvial soils – Ochlockonee, Bibb, Iuka, and alluvial soils undifferentiated.

APPROXIMATE AREA = 661,820 ACRES

SOIL GROUP MAP

NECHES-SABINE S.C. DISTRICT TEX-426

REGION NO. 4 FORT WORTH, TEXAS

U.S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

H.H. BENNETT - CHIEF

REFERENCE - BASE STATE WIDE HIGHWAY PLANNING SURVEY MAPS 1936

CARTOGRAPHIC APPROVAL			TECHNICAL APPROVAL	
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BASE 4-R-481

ghums are the principal crops grown with considerable acreages of truck crops and special crops like roses and blackberries being planted in some sections. With proper development practices, good pastures can be had on these soils.

Within this group of soils cultivation of slopes of 8 percent or above in clean tilled crops creates such an erosion hazard that it is not recommended.

In the mere broken portion of this area the farms as a rule are small, and since a rather high percentage of the acreage has a slope above this limit, it will be difficult to maintain these farms as economic units when these steep slopes are retired to pasture or timber.

Included with this group are small areas of deep sandy soils occurring usually on the higher ridges and some small areas of "red soils" occurring most often on steep slopes adjacent to streams.

Group 2

Rolling Red Soils and Sandy Soils with Sandy Clay Subsoils--Approximately 55,000 acres or 3 percent of the entire district is included in this group. The red soils of this group occur chiefly on steep slopes, are scattered rather widely over the district and are so associated with sandy soils having sandy clay subsoils that separation of areas of red soils is impractical and some soils of Group 1 are included. One small area in the Southern part of Smith County around Bullard is made up almost entirely of red soils, and in this area they occur on more gentle slopes.

The surface soils range from grayish brown to red in color and vary from fine sandy loam to clay in texture. The subsoil of the true red soils is in all cases definitely red in color, though it may vary from dark red to yellowish red, and is a crumply sandy clay. Soils included in this group are Nacogdoches, Kirvin, Orangeburg, and Cuthbert.

The red soils of this group are possibly the most inherently productive of the upland soils of the district. When they occur on slopes gentle enough for cultivation, they are usually fine sandy loam in texture, easily cultivated and respond readily to proper treatment and fertilization. These soils are slightly higher in potassium than the mere sandy soils. Where the Nacogdoches soils occur on steep slopes they are usually clay loam to clay in texture, are less productive and more difficult to cultivate.

One characteristic of these soils is the presence of pebbles composed of fragments of sandstone cemented together with iron compounds and commonly called "Ironstone gravel". This material is often present in sufficient quantity to hamper cultivation and is often scraped off to be used in surfacing roads. As these soils usually occur on rolling topography and have subsoils that do not allow water to percolate downward rapidly, they are very susceptible to gullying when water is concentrated. Many of the steeper slopes are still in timber, but due to the high natural fertility a great many slopes too steep for stabilization of erosion while in clean tilled crops have been put into cultivation. Many of these are so severely eroded that they have been abandoned. These as well as other slopes too steep for cultivation should be retired to pasture, a use to which these soils are well adapted because of

their adaptability to the growth of Bermuda and Legumes, or allowed to return to timber.

Group 3

Undulating to Slightly Rolling Sandy Soils with Sandy Clay Subsoils - This group includes approximately 11,000 acres or 2 percent of the total acreage of the districts. The surface soils are grayish color, generally fine sandy loam in texture, acid and rather low in organic matter. Most members of this group have rather deep surface soils (10 to 15 inches) due partially to the fact that they occur on rather gentle slopes and have not been subject to severe erosion. The subsoils are friable sandy clays which are quite permeable and retain moisture well. An exception to this is the Lufkin soil that has a heavy plastic subsoil which is very slowly permeable and droughty. These subsoils range in color from yellow mottled with red and gray to light gray in the case of Lufkin and Caddo soils. These soils have free surface and internal drainage with the exception of Caddo and Lufkin which have a moderate to slow surface and slow internal drainage. The principal soils types are Bowie, Sawyer, Lufkin, Caddo and Norfolk.[2]

Most of these soils occur on gentle slopes of one to four percent and this together with the permeable nature of the subsoils have prevented excessive run-off with the result that erosion is perhaps less on this group than any other. These soils are less leached than the deep sands, are easily tilled and under a good system of management and fertilization good yields of general crops have been maintained for

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2 Ibid

a long period of time. These soils are adapted to a variety of crops including cotton, corn, oats, grain, sorghum, peas, potatoes, fruits and vegetables. With proper development practices, good pastures can be had on these soils. Caddo and Lufkin soils are in most instances too poorly drained and infertile for cultivated crops but do produce fair pastures if developed. Most of these two soils are still in timber, a use to which they are well adapted.

Group 4

Rolling Deep Sandy Soils - This area comprises approximately 80,000 acres or 12 percent of the entire district. The soils are characterized by having deeply developed layers or horizons. The surface soils usually are not over 15 inches deep. The subsoils are loose fine sands. The surfaces are gray or light brownish gray in color and the subsurface layers or subsoils, are grayish yellow to light yellowish brown in color. The sandy material usually rests directly on Sandy clay material at a depth of several feet that ranges from yellow to gray in color or may be uniformly mottled red, yellow and gray. The principal types are Norfolk and Rusten fine sands. These soils occur on gentle rolling to steeply rolling topography and have surface and internal drainage. Due to the excessive movement of water in these soils they are highly leached. These soils are easily cultivated but are low in fertility and require large amounts of fertilizer and carefully planned rotation, including a great many leguminous green manure and cover crops to maintain the fertility. The soils

are adapted to a variety of crops including peas, peanuts, melons, and sweet potatoes. The yields are low as the soils are low in fertility but when large applications of fertilizer are applied and proper rotation followed, fair yields are obtained. They are not adapted to pasture use, due to their droughty nature, low organic content, and inadaptability to growth of lespedeza and other legumes. The soils are not subject to severe sheet erosion but where water is concentrated they gully easily. Due to the loose single grain structure of the soils of this group, gullying is an especially serious form of erosion. Gullies once started soon cut deep into friable lower subsoil and are difficult to control. Due to the difficulty in establishing Bermuda grass and other pasture grasses and legumes on these soils, steep slopes that are ordinarily used for pasture should be returned to forest if excessive erosion is to be prevented. Many moderate to steep slopes that are ordinarily used for pasture should be returned to forest if excessive erosion is to be prevented. Many moderate to steep slopes being used for pasture in the area at present do not have adequate cover to control erosion. Included in this area are small areas of B owie and Sawyer soils occuring on gentle slopes at the foot of steeper slopes and on some broad flat divides. Some Cuthbert and Boswell soils occur on steeper slopes.

Group 5

Alluvial Soils--This group comprises approximately 35,000

acres or 5 percent of the district. Alluvial or bottomland soils derived from sandy deposits are to be found throughout the district with the exception of a portion of the upper flood plain of the Sabine River where some dark heavy bottomland of the Kaufman series are found. The principal soil types are Ochlockenee, Bibb, Iuka and Alluvial soils undifferentiated with some small areas of Kaufman and Hannahatchee. These will be discussed separately because of their great variation in characteristics and use adaptabilities.

Ochleckenee series: These soils are well drained, fertile and extensively cultivated. They have a grayish brown to brown fine sandy loam to clay loam surface and grayish brown to yellowish brown sandy clay or clay subsoils. These soils are adapted to a wide variety of crops including cotton, corn, sorghum, sugar cane, vegetables, etc., and when properly cared for, they support excellent pasture.

Bibb series: These soils are poorly drained. The surface is gray to dark gray in color with somemottlings of brown and are chiefly fine sandy loam in texture. The subsoils are similar except that the gray is a much lighter shade. These are strongly acid forested soils that are generally too poorly drained for crop use, but support fair pasture and timber.

Iuka series: These soils are intermediate in drainage between Ochleckenee and Bibb soils. The surface is like that of Ochleckenee but over lies brown and gray mottled material at 16 inches or less in depth. They have slow surface and under drainage but are suffi-

ciently well drained for cultivated crops and are largely farmed where not too frequently over-flowed... These soils are adapted to about the same crops as Ochleckenee and support excellent pastures and timber growth.

Alluvial soils undifferentiated: This soil usually occurs along small streams and is composed of a mixture of soils materials washed from the adjoining uplands. These soils are frequently over flowed and are periodically receiving new deposits of soil material of such recent and mixed origin that they have no definite profile characteristics. They areusually rather poorly drained, mottled gray, yellow and brown in color and friable in texture. These soils are profitably cultivated in some areas where sufficiently w ell drained and not subject to too severe overflow, but in most instances are better suited to pasture for which they are well adapted.

Kaufman series: The surface soil is dark brownish gray clay loam to clay and the sub soil is similar in texture but lighter in color. The soils are very sticky when wet and hard when dry, making cultivation difficult but they are extensively cultivated when not subject to too frequent overflow because of their high fertility. These soils are non-calcareous and derived from mixed material from the Blackland Prairie and Sandy Coastal Plains soils.

The proper use of alluvial soils would be to leave Bibb in Timber or pasture as well as the alluvial soils undifferentiated when too poorly drained for cultivation, and the other series when too frequently overflowed. Proper rotations are needed to maintain fertility.

EROSION, FLOOD AND SILTATION DAMAGE

The kinds of erosion which occur in this district are sheet and gully erosion caused by run-off from excessive rains and wind erosion caused by the soil blowing action of high winds. Although sheet erosion is not as evident as gully erosion, it affects practically all the sloping cultivated land inthe district and is probably the most serious type of erosion. Gullies which usually occur on the steeper slopes of the cultivated fields and poorly managed pastures, are much more noticeable than the sheet washing resulting from sheet erosion; they are rather common over the entire district. Wind erosion on the deep sands is a hazard to young crops during the early Spring but it does not present as serious a problem as does the erosion resulting from run-off water. Severe erosion is less prevalent in the undulating to slightly rolling sandy soils with sandy clay subsoils than in the other groups due to the permeable nature of the subsoils and the lack of steep slopes in this group. It will be noted however, that moderate erosion is mere prevalent than might be expected. This is possibly due partially to the fact that the rather gentle slopes have caused sheet and gully erosion to beslower and less glaringly evident than on steeper slopes of other areas and thus has encouraged straight row cultivation and neglect of terracing or running of rows across the terraces.

The following information is from a report prepared by the Trinity River Improvement Association , "Within the last 30 to 40 years there has been an increase in the frequency and extent of overflows

causing flood and siltation damages in an increasing degree. As a result, springs are drying up, the normal flow of creeks and branches is decreasing and silt and other debris are filling them. Informed persons state that all this is the result of erosion of cultivated or overgrazed lands which were originally in timber grass. The excess run-off water has lowered the underground water level from 3 to 5 feet, according to statements made by farmers. There is very little fish life in most of the streams at present.[1] Similar condition were found to exist in a study made along the Neches River and same is true of the soil and water losses on eroded land are much more rapid than where very little erosion has taken place." From this it can be readily seen that much of the land in this district contributes more water and silt to the making of floods and the resulting damage than could be possible if the conservation problem did not exist. Also the conservation problem is an important factor in the annual depreciation of land values and the decreased annual productivity of the land; based on experiment station data and observations, the value and productivity of the land in this district has been materially reduced by sheet erosion, gully erosion, and deposition of infertile subsoil on fertile bottom lands.

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[1] Trinity River Improvement Association; Floods and Siltation, Vol. 1, No. 2. January 1944. pp. 22.

MANAGEMENT AND PROTECTION OF WOODLAND

A majority of the woodland in the district is under private ownership, therefore, the plan of woodland management and protection will be confined to private ownership, whether small or large.

Woodland management is the procedure used to produce and harvest woodland products in such a manner as to give the largest possible repeated returns and keep the woodland continually growing a maximum quantity of high quality timber.

General management plans will be developed at the time of planning of farms by the farm planners and the farmers.

The following practices will be included in the preparation of general management plans and the execution of these plans: (1) Restricted or regulated grazing. Grazing will be controlled to the extent that desirable species will not be damaged and sufficient vegetative cover will be left to provide for erosion control. Hogs, sheep and goats will be excluded from small wood lots; restricted grazing or light grazing by horses, mules or cattle, when woodlands are allowed to be grazed, should be practiced; (2) Fire Prevention---Woodlands should not be burned. The district will encourage individual and community effort and the organization of fire fighting units. Detailed management plans in addition to the above practices will include:

1. Cutting practices

(a) Practice selective cutting by removing deformed poor risk trees and by proper thinning.
(b) Removal of diseased and insect infested trees
(c) Cut not to exceed growth
(d) Practice individual tree selection.

2. Close utilization

(a) Stumps 12 inches maximum height
(b) Utilize tops, deformed trees and material unsuitable for other products for fuelwood.

3. Mark and estimate volume in all trees to be cut.

4. Market timber on a unit of measure basis rather than by bulk or area basis.

5. Practice game management.[1]

These detailed forestry plans will be worked out with the farmers by the Soil Conservation Service technical or Texas Forest Service representatives.

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1 Agronomy Handbook, Woodland Management , Soil Conservation Service, January, 1944. pp.40-61

REFORESTATION

Wherever reforestation can be brought about by natural reproduction when properly managed and protected and there are sufficient seed trees to provide for satisfactory reproduction, this will be the method of reforestation used.

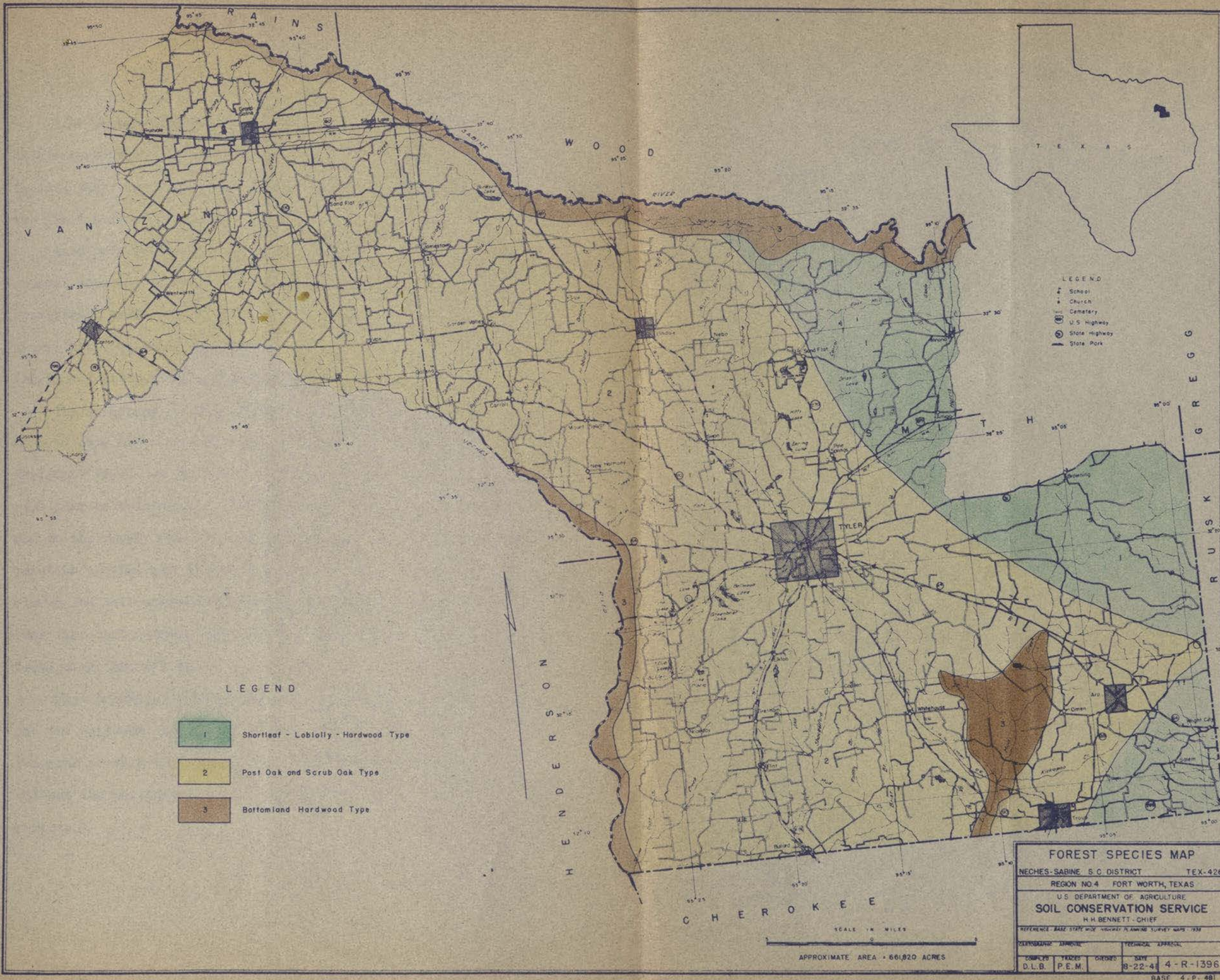
Some areas, especially new areas, will have to be planted by planting either seedlings or seed. The use of seedlings will be encouraged by the district.

The species of trees to be used forplanting land retired to woodland or for improving existing stands by interplanting, will be those best adapted and most needed to supplement existing woodlands.

Farmer-District agreements will provide for the farmer to plant or for the district to assist him in planting adapted species of trees when the planned land use in woodland and tree plantings are to be made.

The following hardwood species are recommended for planting in the district, to be used mainly for fence post production and for erosion control:

1. Black Locust - on fair to good well-drained soils with moderate fertility.
2. Osage Orange (boid d'arc) on good well-drained terrace and bottom land soils.
3. Catalpa on well-drained soils of good fertility.
4. Red Mulberry - on good well-drained terrace and bottomland soils.


FOREST SPECIES MAP
NECHES-SABINE S.C. DISTRICT
TEX-426
REGION NO.4 FORT WORTH, TEXAS
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
H.H. BENNETT - CHIEF
CARTOGRAPHIC APPROVAL
TECHNICAL APPROVAL
COMPILED D.L.B.
TRACED P.E.M.
CHECKED
DATE 8-22-41
4-R-1396
BASE 4-P-481
LEGEND
1 Shortleaf - Loblolly - Hardwood Type
2 Post Oak and Scrub Oak Type
3 Bottomland Hardwood Type
LEGEND
School
Church
Cemetery
U.S. Highway
State Highway
State Park
TEXAS
SCALE IN MILES
APPROXIMATE AREA - 661,820 ACRES
RAINS
WOOD
VAN ZANDT
SMITH
GREGG
RUSK
HENDERSON
CHEROKEE
SABINE RIVER
NECHES
TYLER
Grand Saline
Canton
Wentworth
Sand Flat
Garden Valley
Galena
Carroll
Mount Sylvan
New Harmony
Lindale
Nebo
Swan
Pine Springs
Winona
Browning
Whitehouse
Omen
Arp
Wright City
Salem
Troup
Bullard
Flint
Noonday
Elkton
Jamestown
Jackson
Van

T he better hardwood species are more exacting in their site requirements than are the pines. When used for reforesting retired fields, they should be planted in mellow soil and cultivated during the first season for best results.

Land preparation for hardwood species may be performed by several methods, such as, flat breaking the entire field following approximate contours; flat breaking land in 3 feet strips, following approximate contours, leaving 3 feet strips of unplowed land between the plowed strips; or by contour ridging.

The advantage of flat breaking the entire area is that peas, corn or some other row crop can be planted between the rows of trees the first year. At the time these row crops are cultivated, the trees will also be cultivated. This is especially desirable the first year and on the poorer soils. The bad feature of this type of land preparation is that all of the land to be retired to trees will be plowed and left unprotected during the season of heavy rains, until such time that natural vegetation or the trees will afford protection against erosion.

Flat breaking on the contour in strips will require less work and the unplowed strips will retard erosion. This is the method recommended when it is known that the trees will be cultivated, without the necessity for the growing of row crops to accomplish this purpose.

Contour ridges will be used on the steeper slopes and in severely gullied fields when planting are to be made. Where pine is adapted the short leaf or slash pine species will be recommended for plantings to be made on land to be reforested. No land preparation will be necessary unless competing vegetation is present. When this condition occurs, the preparation will consist of eliminating the vegetation without necessarily providing a tillage of the soil. This may be done by streaking with a Georgia stock, shovel plow, small middlebuster, or by scalping with hoe. This preparation should be done just as soon as moisture conditions permit plowing in the fall so that the furrows will partially fill by silting before trees are planted.

The season for planting trees extends from the time they become dormant in the fall until the earliest vegetation begins to appear in the spring. The planting season for the district will usually begin about December 15 and end about March 15.

The recommended spacing or number of trees required to plant one acre will depend on the species and erosion conditions. Spacing will vary from 6 x 6 feet to 8 x 8 feet spacing which would require 1,210 and 680 trees respectively. A spacing of 6 x 8 feet will require approximately 1,000 trees per acre and will be the recommended spacing for most plantings.

Holes for planting can be made by using a mattock or dibble. The mattock is preferred for most hardwoods, especially if the stock is rather large.

New plantings would be fenced and grazing restricted when plantings are made on areas not protected from grazing.

ADDITIONAL MEASURES SUGGESTED TO FACILITATE PROPER WOODLAND

Practices

1. Additional fire protection.

2. Control of insects and disease infestations.

3. Facilities to furnish woodland owners with information on how to manage their woodlands.

4. Develop markets for woodland products.

5. Recognize improvements of existing woodlands as a part of the farm development and economy.

6. Develop cooperative organizations to develop woodland program, especially from fire control and marketing standpoints.

7. Initiate study of methods of taxing woodland properities.

8. Additional facilities for research and experimentation in woodland activities.

CROPLAND

Crop Rotation

Definite cropping systems or rotations have not come into general use in the district. Definite, well planned rotations are badly needed. Most of the upland soils are deficient in plant food and organic matter. For this reason leguminous soil-improving crops are recommended and included in the cropping system wherever practicable to supply organic matter and nitrogen.

All available manure from barns and feed lots should be utilized. As a rule winter legumes may be used to better advantage for soil improvement than summer legumes because they may be green at the time when the land is not occupied by a cash crop such as cotton, sweet potatoes, truck crops or by row feed crops, such as corn, and they do not take moisture from the soil when it is needed by other crops.

The relative value and importance of crops may influence the sequences or order of crops in the rotation. For instance, cotton usually has a relatively high value per acre as compared with corn and for this reason it should follow a soil improving crop such as vetch, bur clover, or winter peas. Corn will follow the second year. Especially is this true until the soil fertility has been increased. Then the choice of crops or sequence might well change in some instances in order that as much of the land as possible will be under some kind of protective cover. For example, cotton may follow vetch

and corn follow the cotton the second year. Crop sequence is effective not only in amending crop yields and soil erosion, but in the control of plant disease and insects.

Corn is adapted to most soils in the district, but yields are restricted by low soil fertility and poor seed. On the poorer upland soils, especially the deep sands, corn is not recommended unless the soil has been improved by growing legumes as green manure crops. Although the application of complete fertilizers have not been generally profitable on corn, the application of 20 to 25 lbs. per acre of nitrogen in any suitable form of nitrogenous fertilizers may be applied either before or after planting and the practice will increase yields and prove to be profitable.

Although it does not seem feasible to recommend a definite crop rotation for the district, at this time, a rotation should generally include a cash crop, one or more feed crops, and a soil building or improving crop. Such a rotation might consist of a two-year rotation of a cash crop or a feed crop and a winter legume for soil improvement. For instance, the rotation may begin with hairy vetch for soil improvement, to be followed by cotton the first year and corn the second year.

A three-year rotation may consist of (first year) fall sown oats or other adapted small grains for grazing and for feed, followed by cowpeas or soybeans for hay, or for soil improvement; (second year) winter legumes for soil improvement followed by cotton; and (third year) corn or other feed crops. Summary of Crop Rotation Principles:

1. As a general rule no crop should succeed itself on the

same land.

2. A rotation should include a cash crop, one or more feed crops, and a soil improving crop.

3. Deep rooted or tap rooted crops should usually follow shallow rooted or fibrous rooted crops; for example, cotton after corn and cowpeas instead of sorghum following oats.

4. Truck crops require a four-year rotation for best results.

5. Each rotation should include a legume at least once in three or four years.[2]

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2 Ibid

WINTER COVER AND SOIL IMPROVING CROPS

The acreage of winter cover crops for soil protection and soil improvement should be greatly increased in the district. It is the plan of the district to work out plans with the cooperating farmers wherby the acres planted to winter cover crops will be increased. One method is to get each farmer to plant small acreages of winter cover and soil improving crops the first year and gradually increase this acreage year by year. Some of these small acreages will be used as seed plots to furnish a supply of seed for use on other land on the farm.

It would be desirable in general to have at least one fourth of the acreage of the cultivated land, especially on upland farms, planted to winter legumes and soil improving crops each year.

The following winter cover and soil improving crops are recommended for use in the district.

Vetch--Hairy vetch is the most dependable and most winter hardy legume for the district as a whole, and especially for the more sandy soils. Mixtures of hairy, smooth and common vetch have proved to be satisfactory.

The following factors influence the success and production of vetch:

1. Rate of seeding 20 to 25 pounds per acre.
2. Inoculation--recommended for all the vetches
3. Date of seeding--September 15 to November 15.
4. Depth of seeding--Cover 1½ to 3 inches deep.

5. Fertilizing - minimum of 200 to 250 pounds of 20 percent superphosphate or its equivalent.

Austrian Winter Peas - Austrian Winter Peas are adapted to medium to good fertile soil only. The recommended seeding date is from September 15 to November 1. From 25 to 30 pounds of seed are planted per acre. Importance ofproper inoculation, depth of planting, and fertilizing will be the same as for vetch.

Bur Clover - The California and the early giant strain of Southern bur clover adapted t most soils in the district except the deep sands and the poorly drained bottomland.

The best results have been obtained from the following method of seeding but clover.

Use 10 pounds of burs with one ton of manure and 50 pounds of 20 percent superphosphate or its equivalent. After a wagon is loaded with a 6 inch layer of manure, the fertilizer is spreaded over the manure evenly and cut in with a shovel until thoroughly mixed; the seed is then spreaded over the manure and mixed thoroughly. It is best to mix every 6 inches in order to get a better distribution of seed throughout the manure. The following factors are to be considered in planting bur clover:

1. Land preparation not always necessary but good results are obtained by running out the middles with a middle buster prior to seeding.

2. Rate of planting 50 pounds of clover in the bur mixed with approximately 5 tons of manure; 8 to 10 pounds of hulled

seed when mixed with manure is sufficient per acre.

3. Inoculation - If seed in bur is used, inoculation is not necessary, but if hulled seed is used, inoculation is necessary. Follow directions on the can.

4. Date of planting - From September 1 until September 15.

5. Depth of planting- Spread mixture of seed, manure and fertilizer on the ground, preferably on beds to allow for drainage. Do not cover.

6. Fertilizing - Use 150 to 200 pounds of 20 percent superphosphate or its equivalent per acre.[3]

The establishment of seed multiplication plots will be encouraged by the district and will be planned with the farmer by the farm planners.

Winter legumes should not be grazed if used for soil improvement.

Small grains are recommended for use as cover and soil improvement crops. Oats and barley are adapted to the more heavy soils, while rye is better adapted to the sandy soils. Fall seeding gives best results. Good results are obtained by top dressing the small grains in early spring, with 50 to 100 pounds of nitrate or some other nitrogen fertilizer, if the crop is to be used for hay or grain.

Small grains are adapted to regulated or controlled winter and early spring grazing.

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3 Ibid

SUMMER COVER AND SOIL IMPROVING CROPS

The following summer cover and soil improving crops are recommended for use in the district.

Cowpeas

Cowpeas are adapted to all the soil types and are he most widely used and dependable summer legumes. Brabham, clay iron and whipperwill are varieties recommended. The Brabham and iron varieties are resistant to nematodes and wilt.

1. Rate of seeding - 50 to 60 pounds per acre, if seeded broadcast or one-fourth this rate if planted in alternate rows of corn.

2. Fertilizing - For best results a minimum of 100 to 150 pounds of 20 percent superphosphate or its equivalent should be used.

Soybeans

Soybeans are less productive on light soils than the cowpeas. On the good soils the better varieties of soybeans are as productive as the cowpeas in vegetative growth.

The best varieties for the district are the Laredo and Otootan. The Laredo is the most resistant to nematodes and is subject to less damage by rabbits. The rate and date of planting and the inoculation, fertilization, etc., is the same for cowpeas.

Velvet Beans

Velvet beans are recommended as a soil improving crop for this district. The best varieties to use are the early speckled esceola, and bunch. The factors that are taken into consideration in planting cowpeas are applicable for planting velvet beans.

Crotalaria

The early strain of this plant is adapted to this district. It is not suitable for forage but makes a considerable vegetative growth useful for soil improvement. Crotalaria may be planted broadcast, in rows or in rows with corn. If planted broadcast, the rate of planting is 15 to 20 pounds per acre; if planted in rows the rate is 8 to 12 pounds per acre. The time of planting, fertilization, method of land preparation are the same as for cowpeas.

STRIP CROPPING

The cover and soil improving crops listed above are also recommended for strip crops. Sudan grass, red top sorghum, annual and perennial lespedeza are the other crops recommended.

Strip crops will be recommended to preserve terrace lines that have been laid off so that terrace construction can proceed when the crop planted between the terraces is not yet ready to harvest. These strips should have a width of 24 to 30 feet. On terraced land strip crops are recommended to be planted on the terraces the first year the terraces are constructed. The strips will assist in preventing silting and filling up of the terrace channel and will protect the newly constructed terraces until they have become settled.

Strips are recommended to be planted in combination with terraces after the terraces have settled when cover crops are not planted and crop residues or weed growth is inadequate to secure vegetative control.

Point rows may be included in the stripped area. The strips on terraced land may be moved up or down the slope each year to allow for a rotation of crops and provide protective cover. Where cover crops are planted, they will take the place of strip crops.

Border strips of erosion resistant crops will be recommended for field borders, above diversion terraces, along side of terraces outlet channels, etc.

USE OF CROP RESIDUES

Where a winter cover crop is not planted on cultivated land, the district will recommend that the grazing of crop residues, including grass, be controlled in order that some vegetative cover might remain on the land during the winter and early spring, the seasons of heavy rainfall.

USE OF FERTILIZERS

Although fertilizers have been used in the production of cash crops such as cotton, very little use has been made of fertilizers in connection with the growing of leguminous soil improving crops. The District will encourage the use of proper fertilizers with all legumes and some of the non-legumes which are grown for the purpose of improving the soil.

RETIREMENT OF STEEP OR SEVERELY ERODED LAND

The Tyler Experiment Station has shown that the cost of establishing and maintaining erosion control practices on steep or severely eroded land when it is left in cultivation is excessive, and also that it is not possibe economically to maintain this type of land in a good state of production.

The district will recommend that steep or severely eroded land that is washing and gullying or land that cannot be economically cultivated due to soil , slope, or erosion characteristics should be established in some land use other than cultivated land, such as pastures, woodland, permanent cover or wild life areas.

TEMPORARY PASTURES

Provision will be made by the farm planners in working out plans with the farmers for adequate temporary pastures in both winter and summer to supplement permanent pastures in which will assist in preventing harmful grazing or woodlands and will prevent over grazing of permanent pastures.

Supplementary or temporary winter pastures are most needed from date of killing frost in the fall until permanent pasture clover and grasses reach sufficient size in he spring to afford grazing. Pastures for supplementary winter grazing should, therefore, become available as soon as possible after the first killing frost in the fall.

Small grains, including oats, rye and barley or a combination of any of these are recommended as best suited for temporary pastures in this district. Application of fertilizer to the small grains is recommended, especially on the lighter soils which are not particularly adapted to these crops.

Bur clover and other winter legumes may be grazed lightly after they have attained sufficient growth, but the grazing of winter legumes is not recommended when the legumes are to be turned under for green manure and soil improvement. Temporary pastures for summer are recommended to furnish supplementary grazing particularly during the late summer and early fall. Cowpeas will furnish supplementary pasture on average upland soils; grazing should be re-

gulated. Sudan grass is adapted to the heavier and more fertile soils and is recommended for use in addition to cowpeas.

CONTOUR CULTIVATION AND TILLAGE PRACTICES

All plowing and cultivation of crops, except in some instances of overflow bottom land and areas with poor drainage should be done on the contour.

Contour guide lines will be run on land that does not need terracing so that crop rows will be on the contour. When land is terraced or lines are run for strip crops, the farmer will be shown how to lay off rows parallel to the terraces and strips.

The practice of flat culture will be encouraged insofar as possible on terrace ridges to avoid pocketing of water in the furrows on terrace ridges which often causes breaks. Bedding of land on the terrace ridge tends to tear down terraces.

When land is bedded in the fall, farmers will be encouraged to break the land deep and bed the land on the contour and to plant a winter cover crop on land bedded in the fall.

TERRACING

The district will assist the farmer in the planning and establishing of a complete terrace system where such treatment is necessary.

Two types of terraces are recommended for the district, the channel of Nichols terraces and the ridge or mangum terrace. Major emphasis, however, will be placed on the construction and use of channel type terrace as it is more applicable to areas of high rainfall, such as is common throughout the district.

The channel type terrace is constructed almost entirely from the upper side by moving the soil downhill. The soil is used there in the form of a low ridge which is blended with the slopes of the land. The channel is so excuvated that it results in a broad flat channel with most of the water carrying capacity being below the average ground line. The channel terrace will be more economical to sonstruct where there is available sufficient heavy power equipment. V-drags and long winged plows, fresnos, small terracing units, etc., but the power equipment is more adapted to this type of terrace construction than other smaller types of equipment.

The ridge type terrace is recommended where equipment is light and available power is small such as plows and V-drags with small teams for power. This ridge terrace can then be changed into a channel type terrace by proper maintenance.

This maintenance plowing consists of plowing the channel as one land and leaving the dead furrows in the water line of the channel. The back side of terrace is then plowed with the land below, gradually eliminating the steepness of the lower side of the terrace. Three plowings are usually necessary to change the terrace into a channel type terrace.

It is recommended that a variable grade of from zero to 3 inches per 100 feet be used on all terraces in the district other than diversion terraces; that all terraces in the district be constructed to have 18 inches effective settled height; that the ridge type terraces have a minimum base width of 20 feet; that the channel type terrace have a channel capacity of from 12 to 15 square feet, depending on the length of the terrace; that the maximum length of flow in one direction not exceed 2,000 feet and that sufficient drop of from 6 to 8 inches be allowed in addition to regular grade on the last 50 feet of the outlet end of the terrace for grader out. This drop is recommended for both types of terraces.

Where diversion terraces are needed it is recommended that they have a variable grade of from 5 to 12 inches per 100 feet and not to exceed 12 inches; that they have a minimum effective settled height of 24 inches and capacity large enough to carry the water; that they be seeded and fenced in with pasture whenever possible; and that a grader cut of about 20 inches be allowed on the outlet and in addition to the regular grade. The channel should usually have a flat bottom where a large amount of water is being carried.

TERRACE OUTLETS

Well protected areas are necessary for terrace outlets protection in order for the terrace system to function satisfactorily. Protection at the outlet end of the terrace is primarily to prevent erosion and gullying and to stablize the grade line of the terrace.

Where practical, terrace systems will be so planned that the terraces may outlet individually upon well sodded pastures or meadow, or into unburned, ungrazed woodland of moderate slope. If conditions are unfavorable for this method, it will ordinarily be practical to develop a meadow or pasture strip for outlet protection and control. The individual terrace outlets are recommended providing the water is not allowed to concentrate in a great volume from several terraces.

Where terraces are to empty on pasture or meadow which has a poor cover the area affected should be flat broken, fertilized and sod established prior to terrace construction. Sufficient time should be allowed for the grass to become well established before water is allowed to discharge into the outlet. The pasture and meadow areas can often be planned and located where they will serve a dual purpose, that of a terrace outlet and for grazing or hay.

Where it becomes necessary to use an outlet channel or a road ditch, the channel or road ditch should be well protected with vegetation before discharging the terrace water into the channel or road ditch. Bermuda grass affords the best protection. The channel or

road ditch should be constructed to a sufficient size to carry the maximum amount of expected runoff. It should have a flat bottom with relatively falt side slopes. The flat side slopes are an aid in affording protection and in mowing.

The district will work out plans for roadside erosion control with the highway agency concerned and the landowners whose places are being affected by the road ditch erosion. Cooperative agreements covering these plans will be signed by the farmer, highway agency, and the district.

A minimum width of 3 feet is recommended for the terrace channel at the outlet end, this width being gradually decreased to regular terrace channel width back up the terrace.

DRAINAGE

The drainage and protection from overflow will probably be limited to cultivated land, or land that would be suitable for cultivated land if properly drained, when such drained land is needed for tillage purposes to properly balance the farm setup. Drainage should consist of well planned drainage systems to drain the cultivated land adequately within a 24 to 36 hour period at the time of the year when young crops are likely to be damaged. Adequate and properly located outlet ditches will need to be planned and constructed as well as the lateral field ditches.

The outlet ditches in many instances can be located where they will be connected to pastures and grazed. This is the cheapest and possibly the easiest way of keeping weeds, brush, sprouts, willows, etc., from clogging the channels. Where the outlets cannot be grazed, the cooperative effort of the landowners can provide labor and the maintenance can be carried on regularly as needed. Maintenance of field ditches will, of course, be he responsibility of the land owners being benefited.

PASTURE LAND

General - The district will assist the farmers in planning for and establishing improved permanent pastures as a part of the conservation plan. Individual pasture conditions will be studied and recommendations may be made on the following considerations if necessary:

1. Increase acreage to meet livestock requirements or vice versa.
2. Provide additional pasture fence to permit rotation grazing.
3. Increase carrying capacity of existing pasture by weed control, fertilizing and overseeding.
4. Provide a variety of plants by over seeding.
5. Provide supplementary pastures and feeds.

It will be recommended that livestock be withheld from permanent pastures in the spring until the early clovers, hop, bur, white dutch, black medic, are well along in growth, which usually will be about March 1 to 15. Feed supplements including silage will be stored for use during periods of drought and the winter months.

FACTORS INFLUENCING THE ESTABLISHMENT OF PASTURES

1. Practically the same seed bed preparation is essential for the establishment of a good permanent pasture on land being retired from crop land as is necessary for cultivated crops.

2. It is recommended that intensive treatment be given to small areas rather than to large areas in the beginning.

3. Sometimes it is difficult to establish pasture on deep upland sandy soils. Favorable weather conditions and fertilization, however, aid materially in getting a good growth of grass established.

4. Undesirable weeds and brush are detrimental to good pastures. Pasture improvement in the district should be limited to those areas where woods and brush can be controlled.

5. The base grasses, bermuda or carpet should be established on all pasture areas before seeding additional grasses and clovers.

6. The establishment of pasture on areas that are extremely steep and very badly eroded is often unjustified and is not feasible.

7. Erosion, siltation and drainage problems are to be considered wh en selecting areas for pasture improvement.

8. Location of water supply, proximity to present pastures of farmstead, will need to be considered.

9. Crops used and method of farming.

10. Need for water conservation.

RECOMMENDATIONS FOR ESTABLISHING AND MAINTAINING PASTURES, BOTTOMLAND AND UPLAND

1. Clear undesirable weeds, brush, shrubs, stumps, etc.

2. Prepare adequate seed bed. There is no substitute for a clean, firm seed bed in aiding the establishment of grass and clover seeds.

3. Provision for sufficient fertility. Grow a crop of peas or some legume crop and turn under to improve the soil. Make application of manure or superphosphate, or both.

4. Methods of establishing Bermuda Grass.

There are several methods that can be used to good advantage under variable conditions of soil type, moisture, present land use, equipment available, etc. Some of the methods recommended are as follows:

1. On old pasture land or idle land where some vegetation such as weeds, crab grass, etc., exists, it is usually best to prepare a good seed bed by flat breaking, followed by harrowing the entire area before planting the grass. The grass may be planted by dropping small chunks or sprigs of sod approximately 3 feet apart in furrows that have been opened with middle buster or small turning plow on approximately 3 or 4 feet horizontal intervals, and the sod may be covered by back furrowing or harrowing cross wise of the plowed furrows; or the sod chunks or sprigs may be placed approximately 3 to 4 feet apart over the entire area and then covered by disking or re-breaking, and harrowing which will aid mowing.

2. On retired cultivated land the grass may be planted in chunks or sprigs prior to flat breaking. In this way considerable time and labor are saved as the land preparation and planting are accomplished by the one operation. The flat broken area should then be harrowed to level the planted area. Sod chunks or sprigs are dropped approximately 3 feet apart and are covered by flat breaking. The land should be flat broken across the slope as near to the contour as possible so that

the dead furrows will be on the approximate contour rather than up and down the slope. Modified contour furrows or ridges can be constructed by breaking strips in narrow lands on the contour.

3. A method of sodding pasture land where a considerable acreage needs sodding over a period of years is that of sodding in alternate strips. The area is flat broken and sodded in strips which may vary in width from 18 to 36 feet leaving a similar strip of unplowed land between the plowed strips. In succeeding years several rounds each year may be plowed to sodden strip to cultivate and allow the grass to spread. Harrowing cross wise will assist in spreading the grass roots. The unplowed strip will under this method, eventually become plowed and sodded, the grass spreading as the plowing continues. This method does not cause the entire field to be plowed at one time and subjected to so much erosion during the time the grass is beginning to grow, especially the first year, and is also economical for farmers who do not have equipment and labor to sod large acreages at one time. The grass may be sodded using sprigs either before flat breaking or afterwards, depending on the type and amount of plant cover present at the time of sodding.

The following pasture mixtures are recommended for bottomland and upland pastures per acre respectively, in most cases to be planted after the base grass had become established.

Bottomland

3 to 4 lbs. white dutch clover
2 to 3 lbs. hop clover or black medic
5 to 8 lbs. dallis grass
10 lbs. common lespedeza

Upland

10 lbs. California bur clover in the bur, or 4 lbs. hulled seed
2 to 3 lbs. hop clover or black medic
10 lbs. dallis grass
10 lbs. common lespedeza

Method of mixing and Seeding (a) Plant on firm compact seed bed that

has been prepared a month or two before seeding; (b) Inoculate hulled clover seed according to directions on inoculation container; (c) Mix seed for seeding one acre with one wagon load of manure and 50 pounds of 20 percent superphosphate or its equivalent and distribute on one acre after land has been harrowed and disked lightly; and (d) Seeding date: October 15 to November 15 except lespedeza which may be seeded in early spring after February 15.

Mowing

The development and maintenance of a continuous high quality pasture depends largely on keeping the weeds and brush under control and keeping the growth young and succulent. In order to maintain this condition, mowing of pastures is recommended; to keep the growth young and tender and an even growth, the pastures should be mowed at least twice during the growing season or as often as is necessary to keep down the weeds and brush and to keep grass at uniform growth over the entire pasture.

The first mowing should be rather high and the second mowing low in order to cut all the weeds to keep them from reseeding.

Fertilizing Permanent Pastures

Barnyard manure and proper commercial fertilizers when applied to pastures under good management greatly benefit the pasture. Without weed and brush control, added fertilizer only increase the growth of undesirable vegetation. Twenty percent superphosphate or its equivalent should be used to increase growth of clovers and grasses

at the rate of 200 to 400 pounds per acre. A mixed fertilizer applied will prove beneficial in getting basic grass established on upland pastures. Mixed fertilizer should be applied at the rate of 150 to 200 pounds per acre.

Cultivation of Permanent Pastures

Bermuda grass responds readily to cultivation. Cultivation by plowing or disking will be recommended to aid in establishing base grass. Cultivation should be done during the fall and spring when there is sufficient moisture. After base grass has become well established and pastures have been overseeded with additional grasses and clovers, harrowing, mowing, and application of fertilizer with occasional disking will give sufficient cultivation. This will also aid in the scattering of manure and seed.

Fencing

Many of the pastures are poorly fenced with very little provision being made for controlled or rotated grazing. The farmer District Agreement will include plans for the building and relocating of pasture fences in such a manner as to permit controlled grazing and rotated grazing where adapted which should result in an earlier and better stand of grass and clover and a better utilization of the forage.

Fire Prevention and Control

Burning of pasture land will be discouraged. Plans will be made to encourage farmers not to burn off their pastures and they will be

encouraged to cooperate in fighting fires which will aid in controlling fires on all lands.

Recommendations for Gully Control

Recommended methods for controlling gullies are as follows: (a) Narrow or wide shallow gullies can be plowed in and sodded as a part of the regular pasture sodding operation which consists of dropping sod in the open furrow. Streaks horizontally across the wide, shallow gullies may be used in the treatment of some gullies; (b) The deeper and larger gullies generally require a combination of different treatments. Acres that are badly gullied can be often treated economically by diverting the water out of the gullies by means of diversion terraces or by use of contour ridges. The gullies are then left to heal by nature through the growth of natural vegetation, sodded with Bermuda grass or planted trees ; and (c) When outside water comes into the head of a gully a sod flume or ramp with a slope of at least two to one is necessary. All sod flumes should be fertilized, preferably with barnyard manure before placing the Bermuda grass.

Gully sodding will be done during the growing season when sufficient moisture is available. Care should be exercised in doing this type of work since serious damage and loss of time and labor may result if done during the wrong seasons of the year, such as in the late fall, winter, or early spring months, a time when the grass will be dormant and the heavy rains are to be expected. This is especially true of the larger gullies.

Stock Water

Where live streams or springs are not available, the district will recommend that stock ponds be constructed, if location and soil types are suitable for stock pond construction. Wells in some instances with auxiliary storage tanks can be provided.

The following factors should be considered in the selection and development of water supplies: (a) Make use of live streams whenever possible; (b) Springs- all springs should be developed according to standard practices of enclosing the spring with a rock concrete, brick, or in some cases, a clay wall, and piping the water to a suitable watering trough below. This type of development is economical and practical and will furnish a better and cleaner water supply than will either streams or ponds. The springs selected for development will be hose which will flow during the summer months as this is the time that the most urgent need for water occurs. Springs should be developed during the summer since the excess water during excavation will not be such a problem during this time of the year; and (c) In many instances it will be necessary to construct some type of storage, either a dug tank or a dam to create a pond or a combination of the two types for storage of water. The type will depend on the topography, soil type and availability or proper location of sites.

In areas where the topography is somewhat level or slightly rolling, it is usually necessary to dig a pond or tank large enough to

hold sufficient water to carry the livestock through the summer months. On other areas where the topography is suitable such as the more rolling areas where draws and valleys are prevalent, and the soil type is suitable, the construction of earth dams will perhaps be the most applicable. The earth dams if properly located should impound more water than the dug ponds, and therefore, should be more economical per volume of storage. The following fundamental principles should be observed, for either type of storage: (1) The soil type of the proposed location should be such that it will not allow excessive loss of water by percolation, i.e., it should contain a large content of clay; (2) The dam should be so constructed that water will not seep through or under the embankment and endanger the dam; (3) The water shed above should be protected and the area immediately above the reservoir, should be sodded to prevent excessive silting and loss of storage; (4) The reservoir should be fenced to prevent wading, trampling, drinking and contamination by the livestock. The dug pond should be fenced and drinking allowed at only one suitable location, which should be deep enough to prevent wading and contamination; (5) The water should be piped through the dam if possible to a water trough below and the flow controlled by a float calve in he trough. Collars of cement or clay should be placed aroung the pipe in the center of the dam to prevent seepage. It will not be possible to pipe water from the dug pond in many instances; and (6) The spillway should be large enough to pass all excessive storm water during heavy rains and should be sodded to prevent scouring and erosions.

PERMANENT HAY LAND

The district will encourage the establishment of permanent hay land on suitable soils for the production of forage and for erosion control. Suitable sites will be confined to bottomland, water concentration points such as meadow waterway, for terrace outlet water, depressions, seepy areas, and along intermittent stream sources.

Due consideration will be given to the farm needs for hay, need for erosion control, possible locations, and other factors when assisting the farmer in planning a complete soil and moisture conservation farming system.

Seeding, Sodding and Fertilizing

Bermuda grass or some other suitable grass will be used as the base grass to establish the meadows. Bermuda grass sprigs of sod will be broadcast and covered by flat breaking or disking. Light cultivation with a disk harrow is recommended for the grass and the weeds should be clipped to facilitate rapid spread of the grass the first year. Fertilizing with barnyard manure or a complete fertilizer is recommended on the poorer soils.

The meadow should be overseeded then with adapted grasses, lespedeza or clovers at the beginning of the second year. In addition, 200 pounds of superphosphate per acre to facilitate the growth of legumes will be recommended on all meadows after the first season of establishment.

When the meadow is to be established by seeding, the land should be flat broken, harrowed and allowed to settle for at least one month before seeding the desired grass or clover seeds.

Additional harrowing may be necessary to control the weeds. The seed should then be broadcast by hand, sown with a cyclone seeder, or a regular drill with seeder attachment. The seed should be distributed evenly and should be covered very lightly by harrowing or rolling. The harrowing should be done on the approximate contour whenever possible.

Application of superphosphate every year or two will prove beneficial.

Adapted grass and legume seed will be recommended, such as the following: Bermuda grass, varieties of lespedeza (preferred varieties: Kebe and Tenn. 76), carpet grass, dallis grass, hop clover, white dutch clover and redtop grass.

Management

Weeds will be clipped at frequent intervals during the first season to improve the stand of meadow plants. After the first season, clipping of meadows to control weeds will be done when necessary. Early clipping of meadows in May to check weed growth will be recommended for new meadows. One cutting of hay will be secured from Bermuda grass and lespedeza meadows, usually in August to facilitate reseeding of the lespedeza.

Native meadows will be protected and more than one cutting may

be made, depending on the soil and season.

Permanent hay lands will not be grazed as a general practice. Controlled grazing may be done at the time livestock are allowed to graze (good) crop residue on the cultivated land.

Permanent hay land should be protected from fire at all times. The borders of the meadows should be kept free of debris which would prevent a fire hazard. Bermuda grass meadows will not require cultivation after they ha ve become established.

The appearance of certain species of weeds at intervals may necessitate the adoption of special procedures for eradication.

WILDLIFE AREAS

Due to lack of sufficient control of hunting and fishing and to lack of wildlife management in this district, the wild game resources have been depleted far below the present carrying capacity.

The protection and management of quail will receive high priority in planning for establishment and maintenance of wildlife areas.

Some of the factors and practices which, if carried out by landowners and others interested in wildlife would greatly improve the wildlife conditions in the District are listed as follows: (1) Control fires on the entire farm; (2) Control hunting and trapping to insure a sufficient population of birds and other wildlife

species to allow for normal reproduction; and (3) Do not unnecessarily destroy natural vegetation, special wildlife areas of field size:

1. Protect from livestock grazing and fires.
2. For quail cover, develop and maintain a mixture of shrubbery and herbaceous vegetation.
3. For quail feed, disk or plow small patches on contour strips to encourage growth and native legumes and other food producing plants.
4. For quail nesting areas encourage the growth of tall grasses.
5. For fur bearing animals and other forest wildlife, develop hardwood forest according to good woodland management practices.[4]

IDLE LAND

All idle land will be put to some productive land use, based upon physical and economic conditions involved.

GARDEN AND ORCHARDS

The district recommends that careful consideration be given by farmers in the location of garden sites. Gardens can usually be located near the farmstead on relatively gentle slopes if proper forethought is given at he time of location thus minimizing the erosion problem.

It is recommended that new orchards be located on land that can be properly protected from erosion by such conservation practices as planting of cover crops, terracing, and contour cultivation. Terraces should be constructed prior to tree planting in new orchards and the trees should be located approximately parallel to the terraces

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[4] Ibid

in order that contour cultivation will be possible.

On old orchards it is recommended that proper conservation practices be established as soon as practical, even though it might be necessary to remove a few trees where terraces are needed. Where it is not practical to construct terraces through orchards, due to having to remove a great many trees, it is recommended that cover crops be used during the winter for protection until such time as the trees need replanting at which time all needed conservation measures will be established. The district will, through its cooperating agricultural agencies, offer technical assistance to farmers on orchard improvement. All orchards should be protected in such a manner that they will not endanger the erosion control measures on adjacent lands.

FARMSTEADS

Where farmsteads are causing an erosion problem due to the unvegetated areas adjacent to the buildings, it is sometimes necessary to recommend the use of small well sodded diversion terraces to direct the water causing the trouble. These terraces can quite often be used to direct the water causing the trouble. These terraces can quite often be used to direct the water from the road leading to the farmstead where the road ditches are washing. The road ditches as well as other areas around the farmstead can be sodded with Bermuda grass.

FARM ROADS

Most farm roads have been located without regard to slope, soil type and the possibility of erosion, therefore, this problem will be given careful consideration in each individual conservation farm plan.

Farm roads will be located with as low a gradient as possible. Where possible, they will be located where minimum protection from erosion will be necessary, and where they will serve their purpose to the fullest extent. The ditches should be protected by sodding w when the grade of the ditches is such that erosion will take place.

Field roads should be so located that they will not cross over terraces on the outlet end; that is, they should either cross on the upper end of the terrace or on the dividing point if the terrace carries water in both directions. If possible, the farm roads should follow the available ridge lines to prevent excessive culverts for cross drainage and excessive water in the ditches.

STATE AND COUNTY ROADS

Where the road ditches of either the state or country roads are damaging farmlands and where the treatment of the road ditches will work in well with the farm conservation plan, consideration will be given to this treatment.

It will be necessary at times to utilize the road ditches for terrace outlets for water, however, whenever possible the terrace

water will not be discharged into the ditches.

Where road ditches are used for outlets the District will cooperate with the county and state road officials in designing and constructing the ditches so that the side slopes will be relatively flat, the ditches adequate for carrying run-off water, and sodded for protection from erosion. Land owners should allow the road departments sufficient right-of-way to back slope the ditches adjacent to their lands properly so as to prevent damage by gullying.

Proper permission will be obtained from county and state officials by the landowners before discharging water into the ditches, and the farmer should assist in any way possible to help establish erosion control measures for this purpose.

CONTROL OF RODENTS

The district will cooperate with the farmers and various agencies in the control of rodents, insects and diseases through its educational program. Cooperative action among farmers will be encouraged.

The controlling of rodents is not only a problem for the individuals but for the district as a whole. Due to the ability of rodents to travel great distances, it is the plan of the supervisors to carry on educational demonstration program with 4-H and N. F. A. Clubs and farmers in order that a concentrated effort will be made in controlling rodents throughout the district. This control is necessary if certain conservation measures are maintained.

The following methods of controlling rodents are recommended: (a) Pocket Gopher - Controlled by use of poisoned grain or poisoned potatoes; (b) Moles - Use of poison bait in run or burrow; and (c) Rats or Mice - by using concrete foundations or constructing all buildings with considerable clearance off the ground and by poisoning or trapping.

SIZE OF FARM

Approximately 40 percent of the farms in the district contain less than 50 acres. In certain cases the small farm is at a disadvantage in doing conservation work because of the limited income, but this need not necessarily be true in all instances because of the adaptation of this area to a wide diversification of enterprises. The supervisors with the assistance of all agencies and with the cooperation of the landowners will endeavor to work out farm programs and plan to use the lands for which they are best adapted and to provide for more intense use of the cultivated land in order to secure a greater net income per acre.

TYPES OF FARMING

Most farmers in the district practices some kind of rotation. It is not according to any fixed plan but seldom are the same fields used to grow the same crop in successive years. The most important crops are cotton and nursery stock--but produced with clean cultivation. One particular need in a conservation program on lands thus planted is the use of more winter cover crops. Some few rose growers for the four or five years have used a fall planting of Abruzza rye on fields from which the rose bushes were being harvested with highly satisfactory results.

LIVESTOCK

More emphasis will be placed on the development and improvement of permanent pastures and providing in so far as possible an adequate feed supply for home needs. The quality of all classes of livestock has been considerable improved during the past ten years. However, in proportion to the possibilities in this direction only a good start has been made. More purebred sires are needed in all classes of livestock and in many instances good foundation females are needed. The average age of the work stock is 12 years or more. Not nearly enough young work animals are being produced to supply the need. There is adefinite need for more and better quality of poultry.

FARM EQUIPMENT AND POWER

As mentioned above the age of workstock in this district renders many of them incapable of doing the needed work. There is less than an average of 2 head per farm and many are in poor flesh. Many farmers are turning to tractors for power which in some instances are not only replacing workstock but tenants and hired help. More terracing and mowing machines are neededto mow undesirable weed growth in pastures and to do conservation work.

LANDOWNER-TENANT RELATIONS

The practice of making written lease or rental agreements between landowners and tenants will be encouraged. The conservation

program will be greatly strengthened thereby because in this manner there will be a clearer understanding of respective persons obligations with respect to the initation and maintenance of conservation work. Landowner-tenant relations could be greatly improved by the making of long term (more than one year) agreements. This will be recommended, however, only after a one year or two year relationship and both have had an opportunity to determine whether they could work together under a long time contract.

MARKETS

The supervisors will encourage the development of more market outlets such as canning plants to utilize farm products and to furnish employment. One variety cotton communities are recommended to improve local prices through the standardization of type and quality. Cooperative marketing organizations to market such produce as melons, berries, fruits and vegetables are to be encouraged. A step in this direction would be made by the development of concentration points for these products and then making the supply known to truck operators and other dealers. Some attention will be given to the very grave possibility of the widespread of infectious animal diseases through public auction barns in which no sanitary precautions are taken.

CHAPTER III

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

Summary. A review of the data in the foregoing chapters gives the reader an idea of how important it is to properly care for the soil. It was revealed that all land is not alike. Each field or acre must be used for things it is best suited to produce, and protected according to its needs.

It was pointed out that all measures that help keep the land productive are tools of conservation. Good farmers must consider not only the earth itself, but other things: soil types, slopes, fertility, rainfall, and temperature.

In making this study the writer surveyed other literature that is related to this problem, however, it was found that only a limited amount of research material could be secured.

Conclusions. Using the foregoing facts as a basis, the writer has reached several conclusions regarding the principles and practices of soil conservation. In other words, soil conservation includes any and all measures that will make the land produce more without damaging it.

Some of the soil troubles that conservation helps prevent are:

1. Top soil washing or blowing away.
2. Covering good land with erosion debris.
3. Exhaustion of plant food.
4. Too much water
5. Lack of water
6. Improper cultivation

Recommendations . A permanent agriculture can be maintained in the district by the use of a complete conservation program on each farm. The writer feel that the following practices are essential in a good land management program:

1. Erosion control
2. Plant food additions
3. Organic matter replenishment
4. Crop rotation
5. Crop selection
6. Drainage
7. Reforestation
8. Tillage
9. Water Conservation

The organization of the data is designed to encourage farmers and farm boys to adopt improved practices.

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APPENDICES

APPENDIX A

EXHIBIT OF EDUCATIONAL AND INFORMATIONAL WORK

EDUCATIONAL OR INFORMATION WORK

Procedure

It is believed that within this district, the greater part of the waste due to the washing away of the land and its fertility is because the farmers operating the land do not realize the extent of this damage, the effectiveness of erosion control practices and economic benefits from these practices. This is the situation as it has developed in the past and new methods for informing people to get numerous complete demonstrations and all assistance possible are planned. The district further plan to remedy the situation by starting and continuing an active educational and informational program, using and requesting the existing agricultural educational agencies take this leadership. To arouse more interest and make the farm operators know they have a part in the program, it is planned that the district supervisors will call the farmers together for community meetings in cooperation with these agencies, and conduct and preside over these meetings. The assistance needed at these meetings will be guest speakers, charts, maps, legal advice, reports from experiment stations and other such aids.

The district supervisors plan to hold some of these educational meetings in the field on sample farms. To display and discuss enlarged maps of the farms as they are at present. The present farm set-up as to acreage in different crops, amount of livestock, work stock,

available markets, etc. Enlarged maps of the farms presented which have been colored so as to show how much or how little is needed to stop the land washing and to conserve the rainfall. The proper land use, the suggested conservation measures necessary, the adapted crops, fertilizers, and pasture seed and other similar points discussed. Finally, the enlarged maps of the farms as planned for future development will be displayed. Each of the conservation measures explained, their benefits brought out and instructions given as to how they are installed. The plan compared with the farm set-ups in regard to labor and power available, feed and pasture available, cash crops, soil building crops, etc. After all questions have been answered or noted for answering later, it is planned that each farm operator be given a small map of his farm properly colored to show soil capabilities similiar to the second map presented to the group. The farm operators will be requested to go over their own farms with their maps in hand and determine if any changes are necessary in their present farm plan and later review these changes with a specialized farm planner, who will also assist in making final and complete plans on these farms.

APPENDIX B

EXHIBIT OF FARM PLANNING

PROCEDURE FOR INDIVIDUAL FARM PLANNING

Interest is worked up by some key farmer, teacher, county agent or some other person interested in the Soil Conservation program. Each farmer will sign an application to the district supervisors, requesting the technical assistance of the Soil Conservation Service. Care is made in trying to get as many farms in a group as possible comprising 1,000 to 1,500 acres.

If the applications are approved, the soil surveyor will walk the farm over classifying land according to texture, the slope, and the degree and nature of erosion damage. The farm planner or some other technician will hold a group planning meeting with the farmers discussing the capability classes. There are usually 8 classes. In this meeting much can be done toward planning farms for the highest sustained production. Cultivated crops can be put on the best land, where they will produce more with least damage to the soil. Close growing crops and pastures can be put on the lands that are less suitable for row crops. Lands that are not suited for row crops or pasture can be put to still less intensive uses; astimber or wild life production. At the conclusion of the planning meeting, make planning dates with each applicant present.

The farmer and planner will go over the farm, field by field (including the farm woods) and decide how best to meet the erosion problem on each acre of land, basing their decisions on crop needs for the farm, surveys previously made as to slope, soil type, and degree of erosion, and personal experience with each field.

Other factors noted are:

1. Land use capabilities

2. Fence construction and removal

3. Production of various crops, possibility for increasing.

4. Farmers business set-up.

5. Tools and equipment and labor available.

6. Alternate practices and the farmers selection of practices.

7. Lead the farmer as far as possible on this initial trip to arriving at a complete, coordinated program of proper land use and soil and water conservation and select practices on which work will first begin.

8. Make a pencil sketch of the farm conservation plan map and write out for the farmer the practices he has selected.

9. If the planning is complete at this time, present the agreement farm to the farmer for signature.

10. If planning is not complete, secure necessary surveys or information to complete plan as soon after this first trip to the farm as possible.

11. Have the cooperative agreement types, assembled and checked.

12. The farm planner that planned the farm deliver the plan to the farmer and review in detail with the farmer on the ground.

13. Before the farm planner leaves the farm after delivering the agreement, review with him the list of the jobs he will establish during the first year.

14. Make arrangement for giving him assistance on the first job he is to do. Have him understand this is a five year plan.

Note: No farm should be planned unless the owner or operator attends a group planning meeting except as follows:

1. Large ranches, plantations and farms.

2. Change of ownership of farms in priority groups.

3. Isolated farm in timbered or range areas.

4. Absentee landowners who cannot attend group meetings.

5. Farmers in old priority groups.

Considerably more time and work will be necessary with the owners or operators who do not attend group planning meetings.