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SOIL SURVEY FOR
BIG THICKET

NATIONAL PRESERVE / TEXAS

USDI – NATIONAL PARK SERVICE – USDA – SOIL CONSERVATION SERVICE
TEXAS AGRICULTURAL EXPERIMENT STATION

SOIL SURVEY OF
BIG THICKET

ERRATA

1. The numerals 11, 12, 40, 41, and 47 do not appear on the soil maps or in the text. Therefore, there are only 46 soil mapping units in the soil survey, although some numerals are greater than 46.

2. Page 4, paragraph 3, sentence 1 - The acreage figure of 84,530 acres should be changed to 84,550 acres. This figure differs from that shown on Table A following page 12 because of minor boundary modifications during the course of the survey and the method of measuring acreage on each soil survey map.

3. Table A, Big Sandy Creek Unit, Soil No. 24, change 255 acres to 225 acres.

   Table A, Neches Bottom and Jack Gore Baygall Unit, Soil No. 25, add 624 acres. Remove 624 acres from Soil No. 26.

   Table A, Soil 44 Total, change 3,306 acres to 3,606 acres.

4. On all tables following pages 68, 72, 78, 82, 84, 85, 93, 94, and 98 - Change Fausse soil symbol from 46 to 43. Add symbol 46 to same line as symbol 45, Urbo.

This is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and the Texas Agricultural Experiment Station. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in the period 1976-1977. Soil names and descriptions were approved in 1978. Unless otherwise indicated, statements in the publication refer to conditions in the survey area in 1978. This survey was made cooperatively by the Soil Conservation Service, National Park Service and the Texas Agricultural Experiment Station. It is part of the technical assistance furnished to the Coastal, Jasper-Newton, Lower Trinity, Lower Neches, Longleaf, and Polk-San Jacinto Soil and Water Conservation Districts.

Soil maps in this survey may be copied without permission, but any enlargement of these maps can cause misunderstanding of the detail of mapping and result in erroneous interpretations. Enlarged maps do not show small areas of contrasting soils that could have been shown at a larger mapping scale.

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INDEX TO SOIL MAPPING UNITS

Map Symbol	Mapping Unit
1	Acadia fine sandy loam
2	Darden fine sand, 1 to 5 percent slopes
3	Aldine very fine sandy loam
4	Annona fine sandy loam, 1 to 5 percent slopes
5	Beaumont clay
6	Bernaldo fine sandy loam, 5 to 12 percent slopes
7	Bernaldo loamy very fine sand, 0 to 3 percent slopes
8	Bibb sandy loam, frequently flooded
9	Bienville loamy fine sand, 1 to 5 percent slopes
10	Boswell Variant fine sandy loam, 5 to 12 percent slopes
13	Cuthbert Variant-Ruston complex, 5 to 12 percent slopes
14	Dallardsville loamy very fine sand, 0 to 2 percent slopes
15	Besner fine sandy loam, 1 to 3 percent slopes
16	Attoyac fine sandy loam, 0 to 3 percent slopes
17	Gallime fine sandy loam, 1 to 5 percent slopes
18	Gallime-Alazan complex
19	Guyton silt loam
20	Otanya fine sandy loam, 1 to 5 percent slopes
21	Otanya-Kirbyville complex
22	Jasco silt loam
23	Landman loamy fine sand
24	Briley loamy fine sand, 1 to 5 percent slopes

Map Symbol	Mapping Unit
25	Mantachie loam, frequently flooded
26	Mantachie loam, occasionally flooded
27	Midland silty clay loam
28	Ozan fine sandy loam, sandy substratum
29	Plank silt loam
30	Rentzel loamy fine sand, 0 to 3 percent slopes
31	Bowie fine sandy loam, 0 to 3 percent slopes
32	Bowie fine sandy loam, 3 to 8 percent slopes
33	Bowie loamy fine sand, 1 to 5 percent slopes
34	Udults, graded
35	Sorter silt loam
36	Kirbyville fine sandy loam
37	Tonkawa fine sand, 1 to 5 percent slopes
38	Vamont clay
39	Waller silt loam
42	Betis loamy fine sand, 1 to 5 percent slopes
43	Fausse clay
44	Iuka fine sandy loam, frequently flooded
45	Urbo silty clay, undulating
46	Urbo silty clay, frequently flooded
48	Angelina loam
49	Hatliff fine sandy loam, frequently flooded
50	Spurger loam
51	Crevasse fine sand, frequently flooded

SUMMARY OF TABLES

Acreage of the soils (Table A)

Beech Creek Unit. Upper Neches River Corridor Unit. Neches Bottom and Jack Gore Baygall Unit. Lower Neches River Corridor Unit. Beaumont Unit. Little Pine Island Bayou Corridor Unit. Lance Rosier Unit. Loblolly Unit. Big Sandy Creek Unit. Menard Creek Corridor Unit. Hickory Creek Savannah Unit. Turkey Creek Unit.

Building site development (Table M)

Shallow excavations. Dwellings without basements. Dwellings with basements. Small commercial buildings. Local roads and streets.

Classification of the soils (Table O1)

Soil name. Family or higher taxonomic class.

Construction materials (Table N)

Roadfill. Sand. Gravel. Topsoil.

Engineering properties and classifications (Table H)

Depth. USDA texture. Classification-Unified, AASHTO. Fragments greater than 3 inches. Percentage passing sieve number-4, 10, 40, 200. Liquid limit. Plasticity index.

Physical and chemical properties of soils (Table J)

Depth. Permeability. Available water capacity. Soil reaction. Shrink-swell potential. Erosion factors-K, T.

Recreational development (Table G)

Camp areas. Picnic areas. Playground. Paths and trails.

Sanitary facilities (Table L)

Septic tank absorption fields. Sewage lagoon areas. Trench sanitary landfill. Area sanitary landfill. Daily cover for landfill.

Soil and water features (Table K)

Hydrologic group. Flooding-Frequency, Duration, Months. High water table-Depth, Kind, Months. Subsidence-Initial, Total. Risk of corrosion-Uncoated steel, Concrete.

Wildlife habitat potentials (Table F)

Potential for habitat elements-Grain and seed crops, Grasses and legumes, Wild herbaceous plants, Hardwood trees, Coniferous plants, Shrubs, Wetland plants, Shallow-water areas. Potential as habitat for-Openland wildlife, Woodland wildlife, Wetland wildlife.

Woodland management and productivity (Table E)

Ordination symbol. Management concerns-Erosion hazard, Equipment limitation, Seedling mortality, Plant competition. Potential productivity-Common trees, Site index, Trees to plant.

Woodland understory vegetation (Table D)

Total production-Kind of year. Dry weight. Characteristic vegetation. Composition.

The Soil Survey of the Big Thicket National Preserve contains much information useful in any land-planning program. Of prime importance are the predictions of soil behavior for selected land uses. Also highlighted are limitations or hazards to land uses that are inherent in the soil, improvements needed to overcome these limitations, and the impact that selected land uses will have on the environment.

This soil survey has been prepared for many different users, but especially for individuals involved in management of the soil resources of the Big Thicket Preserve. Foresters can use it to determine the potential of the soil and the management practices required for wood and pulp production. Planners, community officials, engineers, and builder can use it to plan land use, select sites for construction, develop soil resources, or identify any special practices that may be needed to insure proper performance. Conservationists, scientists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the soil survey to help them understand, study, protect, and enhance the environment.

Great differences in soil properties can occur even within short distances. Soils may be seasonally wet or subject to flooding, to which some plants are not adapted. They may be too unstable to be used as a foundation for buildings or roads. Very clayey or wet soils will not support certain plants and are poorly suited to septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. The location of each kind of soil is

shown on detailed soil maps. Each kind of soil in the survey area is described, and much information is given about each soil for specific uses. Additional information or assistance in using this publication can be obtained from the local office of the Soil Conservation Service or the National Park Service.

This soil survey can be useful in the conservation, development, protection, and preservation of soil, water, and other resources.

George C. Marks

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State Conservationist
Soil Conservation Service

SOIL SURVEY OF BIG THICKET NATIONAL PRESERVE

By Jesse D. Deshotels, Soil Conservation Service

Soils surveyed by Jack D. Crout, Jesse D. Deshotels, Kirby Griffith, Nathan L. McCaleb, Harry F. McEwen, and Conrad L. Neitsch.

United States Department of Agriculture, Soil Conservation Service, in cooperation with the National Service and the Texas Agricultural Experiment Station.

GENERAL NATURE OF THE AREA

The Big Thicket National Preserve is located in the southeast portion of Texas in Hardin, Polk, Liberty, Orange, Jasper, Jefferson, and Tyler Counties. It is mostly in the Flatwoods portion of the East Texas Timberland Resource Area.

The preserve is split up into twelve different widely scattered units, all of which are irregular in shape. Two of the larger units, Big Sandy and Lance Rosier, are several thousand acres in size while Hickory Creek Savannah is but a few hundred acres in size. Some units are long and narrow such as the Upper Neches unit in Tyler and Jasper Counties.

The preserve covers 132 square miles, or 84,530 acres. The land surface is nearly level in the southern part to gently rolling in the northern part of Big Sandy unit and Beech Creek unit. Elevation at the lower part of the Beaumont unit is five feet. The elevation rises generally in a northerly and westerly direction to 365 feet at the northern tip of the Big Sandy unit and 215 feet at the northern edge of the Beech Creek unit. Most of the drainage flows south in the Neches River, southeast in Village Creek, and east in the Pine Island Bayou and Little Pine Island Bayou. Minor amounts are drained toward the southwest to the Trinity River by Menard Creek.

The Big Thicket National Preserve will be used for nature study, scientific research, and recreational pursuits, such as boating, hiking, and horseback riding. It is about 91 percent woodland, 4 percent water,

3 percent open land around oil well sites, 1 percent farmsteads, and 1 percent pasture. Woodland is primarily a mixture of pine and hardwood; however, both timber types exist in fairly pure stands in a few areas.

The soils in the survey area formed under forest. They are dominantly light colored and loamy. Some are wet, and a few are ponded. Some clayey soils are found along the Neches River. Erosion is a minor problem.

Agriculture

Prior to purchase by the National Park Service, the area was primarily used for the production of sawlog timber and pulpwood. In the past, selective cutting was common, but clear cutting was being used more during recent years. The clear cut areas were then planted to pine plantations.

Many of the forested areas were used for seasonal livestock grazing. It was generally a cow-calf type of operation.

Most of the area was also leased to hunting, primarily for deer and squirrel.

Natural resources

Soil is one of the most important resources in the survey area. The variety of soils support the various unique plant communities that make the "Big Thicket."

The "Big Thicket" is known for its unique plant community and its variety of vegetation. This variety includes many species of trees, shrubs, vines, grasses, forbs, mosses, lichens, and fungi. Many rare or threatened species of plants can still be found in the area.

Oil and gas is produced from many wells in parts of the survey area. Many of the wells are very productive.

Water that is in bayous and streams is also an important resource. They provide water for wildlife. If the water body is large enough, it is used for boating and swimming and to catch game fish, primarily catfish.

Wildlife native to the area include such important game species as deer, squirrel, quail, turkey, various species of waterfowl, in addition to numerous furbearing mammals. An abundance of bird species, both resident and transient, occur within the area. These wildlife forms collectively provide an important resource.

Climate (4)

In winter the average temperature is 55 degrees F. and the average daily minimum temperature is 42 degrees. In summer the average temperature is 84 degrees, and the average daily maximum temperature is 93 degrees.

The area has a total annual precipitation of about 54 inches. About 23 inches, or 44 percent, usually falls in April through September, which includes the most active part of the growing season.

Snowfall is rare; in 80 percent of the winters, there is no measureable snowfall. In 18 percent of the winters, it is more than 1 inch but usually of short duration. The heaviest 1-day snowfall on record was less than 11 inches.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The percentage of possible sunshine is 60 in summer and 40 in winter. The prevailing wind is from the southeast.

HOW THIS SURVEY WAS MADE

Soil scientists made this survey to learn what kinds of soils are in the survey area, where they are, and how they can be used. The soil scientists went into the area knowing they likely would locate many soils they already knew something about and perhaps identify some they had never seen before. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material, which has been changed very little by leaching or by the action of plant roots.

The soil scientists recorded the characteristics of the profiles they studied, and they compared those profiles with others in counties nearby and in places more distant. Thus, through correlation, they classified and named the soils according to nationwide, uniform procedures.

After a guide for classifying and naming the soils was worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, roads, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from aerial photographs.

The areas shown on a soil map are called soil map units. Some map units are made up of one kind of soil, others are made up of two or more kinds of soil. Map units are discussed in the section "Soil maps for detailed planning."

While a soil survey is in progress, samples of soils are taken as needed for laboratory measurements and for engineering tests. The soils are field tested, and interpretations of their behavior are modified as necessary during the course of the survey. New interpretations are added to meet local needs, mainly through field observations of different kinds of soil in different uses under different levels of management. Also, data are assembled from other sources, such as test results, records, field experience, and information available from state and local specialists.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it is readily available to different groups of users, among them managers of woodland, engineers, planners, builders, and those seeking recreation.

SOIL MAPS FOR DETAILED PLANNING

The map units shown on the detailed soil maps at the back of this publication represent the kinds of soil in the survey area. They are described in this section. The descriptions together with the soil maps can be useful in determining the potential of a soil and in managing it for food and fiber production; in planning land use and developing soil resources; and in enhancing, protecting, and preserving the environment. More information for each map unit, or soil, is given in the section "Use and Management of the Soils."

Preceding the name of each map unit is the symbol that identifies the soil on the detailed soil maps. Each soil description includes general facts about the soil and a brief description of the soil profile. In each description, the principal hazards and limitations are indicated, and the management concerns and practices needed are discussed.

The map units on the detailed soil maps represent an area on the landscape made up mostly of the soil or soils for which the unit is named. Most of the delineations shown on the detailed soil map are phases of soil series.

Soils that have a profile that is almost alike make up a *soil series*. Except for allowable differences in texture of the surface layer or of the underlying substratum, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement in the profile. A soil series commonly is named for a town or geographic feature near the place where a soil of that series was first observed and mapped. The Plank series, for example, was named for the sawmill of Plank in Hardin County.

Soils of one series can differ in texture of the surface layer or in the underlying substratum and in slope, erosion, wetness, or other characteristics that affect their use. On the basis of such differences, a soil series is divided into phases. The name of a soil phase commonly indicates a feature that affects use of management. For example, Urbo silty clay, undulating, is one of several phases within the Urbo series.

Some map units are made up of two or more dominant kinds of soil. Such map units are called soil complexes.

A soil complex consists of areas of two or more soils that are so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area includes some of each of the two or more dominant soils, and the pattern and proportion are somewhat similar in all areas. Otanya-Kirbyville complex is an example.

Most map units include small, scattered areas of soils other than those that appear in the name of the map unit. Some of these soils have properties that differ substantially from those of the dominant soil or soils and thus could significantly affect use and management of the map unit. These soils are described in the description of each map unit.

The acreage and proportionate extent of each map unit are given in table A, and additional information on properties, limitations, capabilities, and potentials for many soil uses is given for each kind of soil in other tables in this survey. (See "Summary of Tables.") Many of the terms used in describing soils are defined in the Glossary.

TABLE A -- Acreage of the Soils

Soil No.	Beech Creek Unit	Upper Neches River Corridor Unit	Neches Bottom & Jack Gore Baygall Unit	Lower Neches River Corridor Unit	Beaumont Unit	Little Pine Island Bayou Corridor Unit	Lance Rosier Unit	Loblolly Unit	Big Sandy Creek Unit	Menard Creek Corridor Unit	Hickory Creek Savannah Unit	Turkey Creek Unit	Total
1					94		1,566						1,660
2												220	220
3						23		174		56			253
4									163	93			256
5							1,761						1,761
6									28				28
7									259				259
8			40		855	624	1,330		697	849			4,395
9			785		35	15						1,391	2,226
10						149			169	10			328
13			303									36	339
14									657				657
15									42				42
16			1,126	34								85	1,245
17												912	912
18	3,375		1,632										5,007

TABLE A -- Acreage of the Soils

Soil No.	Beech Creek Unit	Upper Neches River Corridor Unit	Neches Bottom & Jack Gore Baygall Unit	Lower Neches River Corridor Unit	Beaumont Unit	Little Pine Island Bayou Corridor Unit	Lance Rosier Unit	Loblolly Unit	Big Sandy Creek Unit	Menard Creek Corridor Unit	Hickory Creek Savannah Unit	Turkey Creek Unit	Total
19								208					208
20	244		260			15	1,497					1,014	3,030
21										195	452		647
22											250		250
23												30	30
24									255	304			529
25	1,114	192		626	1,731	374			2,590	6		2,468	9,725
26			624			50						277	327
27							620					178	798
28												77	77
29							1,078						1,078
30										267			267
31									9,140	350		302	9,792
32												50	50
33										49			49
34									83				83

TABLE A -- Acreage of the Soils

Soil No.	Beech Creek Unit	Upper Neches River Corridor Unit	Neches Bottom & Jack Gore Baygall Unit	Lower Neches River Corridor Unit	Beaumont Unit	Little Pine Island Bayou Corridor Unit	Lance Rosier Unit	Loblolly Unit	Big Sandy Creek Unit	Menard Creek Corridor Unit	Hickory Creek Savannah Unit	Turkey Creek Unit	Total
35							6,829			48			6,877
36			10		92	119	8,511		45	37		72	8,886
37												86	86
38						46	691	165		161			1,063
39	198		486			30	755	5		41		592	2,107
42									249	28			277
43			151	59	652								862
44		2,295	314	510		487							3,306
45			6,118	23	91	89							6,321
46		1,792	720	1,139	2,734	42							6,427
48			592										592
49										1,286			1,286
50		101	89	17		96							303
51		358	73	124	12								567
Water							50						50
Total	4,931	4,738	13,323	2,532	6,296	2,159	24,688	552	14,347	3,780	702	7,790	85,838

NOTES

Soil descriptions

The 46 kinds of soil (mapping units) in the Big Thicket National Preserve are described in the following pages.

MAP SYMBOL: 1

MAPPING UNIT: Acadia fine sandy loam

This nearly level, somewhat poorly drained soil occurs as broad, nearly level convex ridges. Some areas are irregular in shape while others are nearly oval. They are from about 4 to several hundred acres in size.

Typically the upper part of the surface soil is dark grayish brown fine sandy loam about 5 inches thick. The next layer is a grayish brown fine sandy loam about 4 inches thick. The upper part of the subsoil is a brownish yellow silty clay loam with a few gray mottles and is about 14 inches thick. The lower portion of the subsoil is a gray clay with common red mottles.

Acadia soils are somewhat poorly drained. Runoff is slow. Permeability is very slow. During the cool season a water table forms on top of the subsoil in most years.

Included in this soil in mapping are small depressional areas of Midland and Beaumont soils. These soils make up less than 15 percent of the unit.

Woodland Suitability Group: 2w

The overstory vegetation is dominantly shortleaf pine, loblolly pine, water oak, willow oak, sweetgum, and southern magnolia. The understory consists mainly of red maple, flowering dogwood, yaupon, yellow jasmine, blackberry, greenbriar, longleaf uniola, low paspalums, and low panicums.

MAP SYMBOL: 2

MAPPING UNIT: Darden fine sand, 1 to 5 percent slopes

This unit is gently sloping sandy terrace soils. Areas of this soil are irregular in shape. Typically areas of this soil are less than 100 acres in size.

Typically the surface layer is a brown and dark yellowish brown fine sand about 14 inches thick. The subsoil, which extends to 80 inches, is a brown loamy fine sand that becomes strong brown.

The Darden soils are excessively drained. It has very slow runoff. The permeability is rapid.

Included with the soil in mapping are small areas of Bowie soils and some small areas with mottled loamy subsoils within 40 inches of the surface. Included areas make up less than 15 percent of any one soil area.

Woodland Suitability Group: 3s

The overstory vegetation is dominantly shortleaf pine, loblolly pine, water oak, white oak, and hickory. The understory consists mainly of redbay, sweetbay, American beautyberry, blackberry, greenbriar, longleaf uniola, and a few yaupon.

MAP SYMBOL: 3

MAPPING UNIT: Aldine very fine sandy loam

This nearly level, somewhat poorly drained soil occurs as nearly level, broad slightly convex low ridges. Most areas are irregular in shape. They range from 15 to several hundred acres in size.

Typically the surface layer is a dark grayish brown very fine sandy loam that becomes grayish brown. The next layer, which begins at 10 inches, is a yellowish brown loam mixed with grayish brown loam. The next layer, which begins at a depth of about 19 inches, consists of gray clay. The next layer, beginning at 50 inches, is a light gray clay loam that becomes less mottled with depth.

Aldine soils are somewhat poorly drained. Runoff is slow. The permeability is very slow. During the cool season, a water table forms on top of the subsoil in most years. It normally disappears with the start of the spring growing season.

Included with this soil in mapping are small areas of Midland and Beaumont soils. These soils make up less than 20 percent of the unit.

Woodland Suitability Group: 2w

The overstory vegetation is dominantly shortleaf pine, loblolly pine, water oak, willow oak, sweetgum, and southern magnolia. The understory consists of red maple, flowering dogwood, yaupon, yellow jasmine, blackberry, greenbriar, longleaf uniola, low paspalums, and low panicums.

MAP SYMBOL: 4

MAPPING UNIT: Annona fine sandy loam, 1 to 5 percent slopes

This deep, gently sloping soil occurs as side slopes into creeks and drains in the more northern portions of the Big Sandy and Menard Creek areas. Most areas are long and narrow. They range from about 40 to several hundred acres in size.

Typically the surface layer to a depth of 5 inches is a dark grayish brown fine sandy loam. The next layer is a light yellowish brown fine sandy loam to 10 inches. The subsoil is a dark red clay to 18 inches that becomes a mottled gray and red clay at 18 inches. At 40 inches, it is a yellowish brown clay that becomes mottled with gray at 59 inches.

Annona soils are somewhat poorly drained. Surface runoff is slow. It has very slow permeability.

Included with this soil in mapping are small areas of Boswell Variant and Vamont soils. These inclusions make up less that 20 percent of the unit.

Woodland Suitability Group: 3c

The overstory vegetation is dominantly shortleaf pine, longleaf pine, loblolly pine, white oak, southern red oak, post oak, sweetgum, and southern magnolia. The understory consists mainly of yaupon, yellow jasmine, American beautyberry, blackberry, greenbriar, and Japanese honeysuckle.

MAP SYMBOL: 5

MAPPING UNIT: Beaumont clay

This nearly level, poorly drained soil occurs as broad, irregular shaped flat areas. They are several hundred acres in size.

Typically this soil has a surface layer that is dark gray clay 22 inches thick with yellowish brown mottles. The next layer, about 26 inches thick, is dark gray clay that has brownish yellow mottles. The underlying material is mottled gray clay that extends to a depth of 72 inches.

Beaumont soils are poorly drained. Permeability is very slow, and the soil is saturated much of the time. Some winters, water stands on the surface.

Included with the soil in mapping are a few, small slightly elevated areas of silty soils that have low, sandy, circular mounds in places. Also included are small areas of the clayey Vamont soils. Inclusions make up less than 10 percent of the mapping unit.

Woodland Suitability Group: 2w

The overstory vegetation is dominantly loblolly pine, willow oak, water oak, and hickory. The sparse understory consists mainly of hawthorn, blackberry, greenbriar, longleaf uniola, dwarf palmetto, and a few May hawthorn.

MAP SYMBOL: 6

MAPPING UNIT: Bernaldo fine sandy loam, 5 to 12 percent slopes

The Bernaldo soils consist of deep, acid, loamy soils on sloping to strongly sloping areas, adjacent to flood plains and local streams. They formed in loamy, acid unconsolidated sediments under pine trees.

Typically the surface layer is fine sandy loam about 14 inches thick. It is brown in the upper part and pale brown in the lower part. The next layer is a strong brown sandy clay loam to a depth of 47 inches. Below this is a yellowish brown loam.

Bernaldo soils are well drained. They are moderately permeable and have slow runoff.

Included with this soil in mapping are a few small areas of Otanya, Besner, and Kirbyville soils. Also included are small areas of eroded Bernaldo soil which occur in long narrow bands near the tops of slopes. The surface soil may be 4 or less inches thick in these eroded areas. All inclusions occupy less than 20 percent of the mapping unit.

Woodland Suitability Group: 2o

The overstory vegetation is dominantly shortleaf pine, loblolly pine, white oak, southern red oak, swamp chestnut oak, and southern magnolia. The understory consists mainly of red maple, yaupon, yellow jasmine, American beautyberry, blackberry, greenbriar, Japanese honeysuckle, and pinehill bluestem.

MAP SYMBOL: 7

MAPPING UNIT: Bernaldo loamy very fine sand, 0 to 3 percent slopes

The Bernaldo soils of the mapping unit consist of deep, acid, loamy very fine sand on nearly level to gently sloping areas adjacent to flood plains and small streams. They are formed in loamy, acid unconsolidated sediments under pine trees.

Typically the surface layer is loamy very fine sand about 14 inches thick. It is brown in the upper part and pale brown in the lower part. The next layer is a strong brown sandy clay loam to a depth of 47 inches. Below this is a yellowish brown loam.

Bernaldo soils are well drained. They are moderately permeable and have slow runoff.

Included with this soil in mapping are a few small areas of Otanya, Besner, and Kirbyville soils. Also included are small areas of Bernaldo soils on steeper slopes. All inclusions occupy less than 20 percent of the mapping unit.

Woodland Suitability Group: 2o

The overstory vegetation is dominantly shortleaf pine, loblolly pine, white oak, southern red oak, swamp chestnut oak, and southern magnolia. The understory consists mainly of red maple, yaupon, yellow jasmine, American beautyberry, blackberry, greenbriar, Japanese honeysuckle, and pinehill bluestem.

MAP SYMBOL: 8

MAPPING UNIT: Bibb sandy loam, frequently flooded

This deep, nearly level, frequently flooded unit occurs on bottomlands of the smaller drainageways in the survey area and in small low wet areas in the Neches River and Pine Island Bayou bottomlands. They range from 5 to several hundred acres in size.

Typically the surface layer is a brown sandy loam in the upper 4 inches and mottled gray and grayish brown sandy loam to a depth of 12 inches. The next layer is a gray sandy loam and silt loam that is stratified.

Bibb soils are generally flooded several times each year. The soils are poorly drained. Surface runoff is very slow. The permeability is moderate. The water table is close to the surface during the winter months.

Included with the soil in mapping are small areas with a surface texture of clay loam and some small areas with a sandy overwash. Also included are small areas of Mantachie soils. These inclusions make up less than 15 percent of the soil area.

Woodland Suitability Group: 2w

The overstory vegetation is dominantly loblolly pine, willow oak, water oak, blackgum, sweetgum, sassafras, hickory, water tupelo, and bald cypress. The understory consists mainly of white fringetree, swamp cyrilla, blackberry, greenbriar, wild azalea, and sedges.

MAP SYMBOL: 9

MAPPING UNIT: Bienville loamy fine sand, 1 to 5 percent slopes

This soil is nearly level to gently sloping and excessively drained. It occurs as irregular to rounded low sandy ridges on terraces. Areas range from about 15 to several hundred acres in size.

Typically the soil is a loamy fine sand throughout. The surface layer is dark grayish brown about 7 inches thick. The next layer is brown to 20 inches. The next layer is strong brown mixed with very pale brown to 48 inches. The next layer is brown mixed with finer material to 72 inches. The next layer is reddish yellow.

Bienville soils are somewhat excessively drained. They have slow surface runoff. The permeability is rapid. In the cool season a water table is present above 6 feet for short periods.

Included with this soil in mapping are small areas of Bernaldo soils. Spurger soils are also included in some areas. Inclusions make up less than 15 percent of any one soil area.

Woodland Suitability Group: 2s

The overstory vegetation is dominantly shortleaf pine, longleaf pine, loblolly pine, water oak, white oak, southern red oak, post oak, sweetgum, and southern magnolia. The understory consists mainly of American holly, flowering dogwood, common sassafras, yaupon, yellow jasmine, American beautyberry, southern wax-myrtle, blackberry, greenbriar, Japanese honeysuckle, longleaf uniola, and pinehill bluestem.

MAP SYMBOL: 10

MAPPING UNIT: Boswell Variant fine sandy loam, 5 to 12 percent slopes

This is a deep, sloping to very strongly sloping soil that breaks into river bottoms and creek bottoms in the northern portion of the area. Most areas are long, narrow, and somewhat dissected by small side stream channels. They range from about 25 to about 150 acres in size. This unit, as mapped in the survey area, is a variant to Boswell because it has montmorillonitic mineralogy. In this respect, it is outside the range of the Boswell series. The morphology and behavior are, however, similar to the Boswell series.

Typically the surface layer is dark grayish brown or yellowish brown fine sandy loam to a depth of 5 inches. The surface layer rests abruptly on a red clay which becomes mottled with depth. The clay is gray and mottled at a depth of 40 inches.

Boswell soils are moderately well drained. Runoff is rapid. The permeability is very slow.

Included with this soil in mapping are small areas of Bernaldo soils. Some areas have included soils that have red and gray mottled subsoils at 10 inches. Included areas make up less than 15 percent of the mapping unit.

Woodland Suitability Group: 3c

The overstory vegetation is dominantly shortleaf pine, loblolly pine white oak, southern red oak, swamp chestnut oak, hickory, and a few water oak. The understory consists mainly of flowering dogwood, common sassafras, yaupon, American beautyberry, blackberry, greenbriar, longleaf uniola, and pinehill bluestem.

MAP SYMBOL: 13

MAPPING UNIT: Cuthbert Variant-Ruston complex, 5 to 12 percent slopes

The Cuthbert Variant-Ruston complex is on sloping to strongly sloping areas directly above terraces of major streams. The soils formed in acid stratified loamy and clayey sediments. The composition of this mapping unit consists of 50 to 70 percent Cuthbert soils and 40 to 25 percent Ruston soils and from 5 to 10 percent other soils. The Cuthbert, as mapped in the survey area, is considered as a variant to Cuthbert because it lacks sandstone and shale in the lower part of the soil. In this respect, it is outside the range of the Cuthbert series. The morphology and behavior of the solum is, however, similar to the Cuthbert series.

Cuthbert Variant soils have very dark gray fine sandy loam surfaces about 8 inches thick and very strongly acid brown and red clay subsoils and lower horizons of stratified material. Ruston soils have a brown fine sandy loam surface layer about 16 inches thick and a yellowish red sandy clay loam and fine sandy loam subsoil.

Soils of this mapping unit are well drained. The surface runoff is medium to rapid. The permeability is moderate to moderately slow.

Included with this unit in mapping are areas of Otanya and Boswell Variant soils. Some areas are eroded with frequent shallow gullies. There are also some small areas with slopes as low as 2 percent and as high as 15 percent. All inclusions make up less than 20 percent of the mapping unit.

Woodland Suitability Group: 3c

The overstory vegetation is dominantly loblolly pine, water oak, southern red oak, sweetgum, southern magnolia, and a few shortleaf pine. The understory consists mainly of American holly, yaupon, American beautyberry, blackberry, dewberry, greenbriar, longleaf uniola, and pinehill bluestem.

MAP SYMBOL: 14

MAPPING UNIT: Dallardsville loamy very fine sand, 0 to 2 percent slopes

This nearly level somewhat poorly drained soil occurs as broad convex ridges in the flatwoods portion of the survey area. Some areas are irregular in shape while others are nearly oval, and a few are long and narrow. Areas of this soil range from 20 to several hundred acres in size.

Typically the surface layer is grayish brown and pale brown loamy very fine sand to a depth of 19 inches. The subsoil is light gray loamy very fine sand and very fine sandy loam to 33 inches, becoming loam and clay loam to a depth of 70 inches.

Dallardsville soils are somewhat poorly drained. The soils are saturated with water two to four months most years. They have slow runoff, moderately slow permeability, and slow internal drainage.

Included with this soil in mapping are small areas of Sorter and Kirbyville soils. Inclusions occupy less than 15 percent of any one soil area.

Woodland Suitability Group: 3w

The overstory vegetation is dominantly shortleaf pine, longleaf pine, loblolly pine, willow oak, water oak, southern red oak, ash, sweetgum, sassafras, hickory, southern magnolia, and persimmon. The understory consists mainly of flowering dogwood, common sassafras, yaupon, yellow jasmine, American beautyberry, grape, blackberry, greenbriar, Japanese honeysuckle, wild azalea, and longleaf uniola.

MAP SYMBOL: 15

MAPPING UNIT: Besner fine sandy loam, 1 to 3 percent slopes

This soil consists of deep, acid terrace soils. They occur on gently sloping areas. Besner soils have formed in old alluvial deposits that have been reworked by wind and water.

Typically the surface layer is a dark grayish brown fine sandy loam that becomes pale brown with depth. The subsoil, from 38 to 80 inches, is a reddish yellow loam that is mixed with brown or gray coarser-textured material.

Besner soils are moderately well drained. Runoff is slow to medium. Permeability is moderate. The depth to a perched water table is about 36 to 72 inches for brief periods during winter months.

Inclusions consist of small areas of Bernaldo, Kirbyville, and Otanya soils. Included soils consist of less than 20 percent of any one soil area.

Woodland Suitability Group: 2o

The overstory vegetation is dominantly shortleaf pine, longleaf pin loblolly pine, white oak, southern red oak, swamp chestnut oak, and post oak. The understory consists mainly of red maple, yaupon, American beautyberry, grape, blackberry, greenbriar, wild azalea, longleaf uniola and pinehill bluestem.

MAP SYMBOL: 16

MAPPING UNIT: Attoyac fine sandy loam, 0 to 3 percent slopes

This nearly level to gently sloping, well drained soil occurs as low ridges on the Neches River terrace. Areas are oblong to long broad areas. They are from 6 to several hundred acres in size.

The surface is a reddish brown fine sandy loam about 9 inches thick. The next layer is a dark red fine sandy loam to 17 inches. The subsoil is a red sandy clay loam to about 75 inches.

Attoyac soils are well drained with slow runoff. The permeability is moderate.

Included with this soil in mapping are small areas of Otanya and Aldine soils. These inclusions make up less than 25 percent of the area.

Woodland Suitability Group: 1o

The overstory vegetation is dominantly shortleaf pine, loblolly pine, white oak, southern red oak, sweetgum, southern magnolia, and a few water oak. The understory consists mainly of American holly, flowering dogwood, common sassafras, yaupon, American beautyberry, blackberry, greenbriar, longleaf uniola, and pinehill bluestem.

MAP SYMBOL: 17

MAPPING UNIT: Gallime fine sandy loam, 1 to 5 percent slopes

These gently sloping, slightly acid upland soils are on low ridges on terraces. Most areas are irregular in shape. They range from about 10 to over 1,500 acres in size.

Typically the surface layers are brown and light yellowish brown fine sandy loam about 28 inches thick. The next layer is a yellowish brown sandy clay loam to a depth of 47 inches. Below this is a mottled sandy clay loam containing about 15 percent uncoated sand in the lower part.

Gallime soils are well drained. Runoff is medium and permeability is moderate.

Included with this soil in mapping are small areas of Besner, Bernaldo, and Briley soils. Included soils make up less than 20 percent of any one soil area.

Woodland Suitability Group: 2o

The overstory vegetation is dominantly shortleaf pine, longleaf pine, loblolly pine, water oak, southern red oak, swamp chestnut oak, ash, and sweetgum. The understory consists mainly of American holly, flowering dogwood, common sassafras, yaupon, American beautyberry, blackberry, greenbriar, wild azalea, longleaf uniola, pinehill bluestem, and a few southern wax-myrtle.

MAP SYMBOL: 18

MAPPING UNIT: Gallime-Alazan complex

This unit occupies broad mounds and ridges in undulating areas. Gallime soils in the complex occur on the peaks of mounds and low lying ridges. Gallime soils comprise 50 to 70 percent of the complex. Alazan soils occur on the lower edges of mounds, small ridges and drains. They comprise 25 to 40 percent of the complex. Other soils comprise 5 to 10 percent of the mapping unit.

Gallime soils have brown and yellowish brown fine sandy loam surface layer about 28 inches thick and yellowish brown sandy clay loam subsoils. Alazan has a dark grayish brown to light yellowish brown fine sandy loam surface about 15 inches thick over a strong brown and light yellowish brown sandy clay loam subsoil.

The Gallime soils in this unit are well drained. The runoff is medium. The permeability is moderate. The Alazan portion of this complex is somewhat poorly drained. It has slow runoff. The permeability is moderate.

Included in this complex in mapping are small areas of coarse textured soils that occur on some of the mounds and ridges. Similar soils to Gallime are also on some of the side slopes. Sand textured alluvium is in the small creek channels. Inclusions comprise less than 20 percent of the mapping unit.

Woodland Suitability Group: 2o

The overstory vegetation is dominantly shortleaf pine, longleaf pine, loblolly pine, willow oak, water oak, southern red oak, sweetgum, and a few white oak. The understory consists mainly of common sassafras, yaupon, yellow jasmine, American beautyberry, blackberry, greenbriar, Japanese honeysuckle, longleaf uniola, and pinehill bluestem.

MAP SYMBOL: 19

MAPPING UNIT: Guyton silt loam

This nearly level, poorly drained to somewhat ponded soil occurs as broad flats in the head of drainage patterns. Most areas are irregular to elongated in shape. Most areas are more than 100 acres in size.

Typically the surface layer is silt loam to 23 inches. The upper 6 inches is grayish brown and the lower part is light brownish gray. The subsoil is gray and grayish brown silty clay loam from 23 to 35 inches and silt loam from 35 to 70 inches.

Guyton soils are poorly drained. Runoff is slow and very slow. Permeability is slow and internal drainage is very slow. A seasonal high water table is evident during winter months.

Included with this soil in mapping are small circular mounds occupied by Aldine soils and few broad level areas occupied by Vamont soils. Inclusions make up less than 15 percent of any one mapped area.

Woodland Suitability Group: 2w

The overstory vegetation is dominantly loblolly pine, willow oak, water oak, ash, and sweetgum. The understory consists mainly of swamp cyrilla, southern wax-myrtle, blackberry, greenbriar, sedges, longleaf uniola, and dwarf palmetto.

MAP SYMBOL: 20

MAPPING UNIT: Otanya fine sandy loam, 1 to 5 percent slopes

This moderately well drained soil occurs on gently sloping areas on uplands. In the flatter portions of the survey area it occurs as low ridges. Areas of this soil are irregular, oblong, or nearly oval in shape. Areas of this soil range from 6 to several thousand acres in size.

Typically the surface layer is a very dark grayish brown fine sandy loam about 5 inches thick. The next layer, from 5 to 8 inches, is a dark grayish brown fine sandy loam. The next layer, from 8 to 18 inches, is a brownish yellow fine sandy loam. The next layer, which extends to 60 inches, is a reddish yellow sandy clay loam and contains about 15 percent plinthite.

Otanya soils are moderately well drained. The surface runoff is slow. The permeability is moderately slow. Internal drainage is medium above the layers containing plinthite.

Included with the soil in mapping are a few small areas of Kirbyville, Gallime, and Sorter soils. Inclusions make up less than 15 percent of any one soil area.

Woodland Suitability Group: 2o

The overstory vegetation is dominantly shortleaf pine, longleaf pine, loblolly pine, white oak, southern red oak, swamp chestnut oak, sweetgum, southern magnolia, and a few hickory. The understory consists mainly of American holly, flowering dogwood, yaupon, yellow jasmine, American beautyberry, blackberry, greenbriar, Japanese honeysuckle, and pinehill bluestem.

MAP SYMBOL: 21

MAPPING UNIT: Otanya-Kirbyville complex

The Otanya-Kirbyville complex consists of soils occupying level to nearly level upland areas. The areas are moundy. Otanya soils occur on mounds in the unit and comprise 50 to 70 percent of the complex. Kirbyville soils occur in the intermounds and at the edge of small drains. They comprise 25 to 40 percent of the complex. Other soils comprise 5 to 10 percent of the unit. Areas of this soil are irregular in shape. This unit ranges from more than 50 to less than 1,000 acres in size.

Otanya soils have a very dark grayish brown and grayish brown fine sandy loam surface about 8 inches thick. The next 10 inches is a brownish yellow fine sandy loam. The subsoil is a reddish yellow sandy clay loam that contains about 15 percent plinthite. Kirbyville soils in the mapping unit have a grayish brown to very pale brown fine sandy loam surface about 18 inches thick over a light yellowish brown and strong brown sandy clay loam subsoil.

Soils in this mapping unit are moderately well drained to somewhat poorly drained. They have slow runoff and have moderately slow to moderate permeability.

Included in this complex in mapping are small areas of Gallime soils that occur on some of the lower mounds. Also, some areas of Waller soils occupy depressed areas. Inclusions comprise less than 15 percent of the mapping unit.

Woodland Suitability Group: 2w

The overstory vegetation is dominantly shortleaf pine, longleaf pine, loblolly pine, white oak, southern red oak, swamp chestnut oak, sweetgum, southern magnolia, and a few hickory. The understory consists mainly of sweetbay, southern wax-myrtle, American holly, flowering dogwood, yaupon, yellow jasmine, American beautyberry, blackberry, greenbriar, Japanese honeysuckle, and pinehill bluestem.

MAP SYMBOL: 22

MAPPING UNIT: Jasco silt loam

This is a nearly level, very poorly drained soil which occurs as a broad to somewhat narrow level flat. Some areas are nearly oval in shape while others are elongated and others are irregular in shape. They range from about 4 to several hundred acres in size.

Typically the surface is a brown silt loam for 4 inches. The next layer, from 4 to 23 inches, is a grayish brown silt loam. The subsoil, from 23 to 44 inches, is a grayish brown loam and contains a fragipan. Below 44 inches, the soil is brownish yellow and light brownish gray silty clay loam mixed with very fine sandy loam.

Jasco soils are very poorly drained. Surface runoff is very slow. The permeability is very slow. A water table is at or near the surface 6 to 9 months out of the year.

Included with this soil in mapping are small areas of Waller soils, and some small depressed areas are occupied by a gray loamy sand. Inclusions make up less than 20 percent of the mapping unit.

Woodland Suitability Group: 5w

The overstory vegetation is dominated by longleaf pine. The understory consists mainly of longleaf uniola.

MAP SYMBOL: 23

MAPPING UNIT: Landman loamy fine sand

This is a nearly level sandy soil that occurs on sandy terraces along streams. Most areas of this soil are elongated and rather narrow. They range from about 20 to about 70 acres in size.

Typically the surface layer is very dark grayish brown loamy fine sand to a depth of 7 inches. The next layer, to a depth of 74 inches, is light yellowish brown loamy fine sand. The subsoil, from 74 to 80 inches, is mottled grayish brown, yellowish brown, and red sandy clay loam and contains plinthite.

Landman soils are moderately well drained with little or no runoff. It has rapid permeability above the horizon containing plinthite and moderately slow in the horizons containing plinthite. Perched water tables are common in the winter months.

Included with this soil in mapping are small areas of Tonkawa, Otanya, and Kirbyville soils. Inclusions make up less than 15 percent of the mapping unit.

Woodland Suitability Group: 2s

The overstory vegetation is dominantly shortleaf pine, loblolly pine, white oak, southern red oak, sweetgum, hickory, and southern magnolia. The understory consists mainly of American holly, flowering dogwood, yaupon, yellow jasmine, American beautyberry, St. Andrewscross, grape, blackberry, greenbriar, Japanese honeysuckle, and longleaf uniola.

MAP SYMBOL: 24

MAPPING UNIT: Briley loamy fine sand, 1 to 5 percent slopes

This gently sloping, well drained soil occurs in upland areas. Most areas are oval to somewhat irregular in shape. They range from 6 to about 25 acres in size.

Typically the surface layer is brown loamy fine sand to a depth of 17 inches. The next layer is a pale brown loamy fine sand to 23 inches. The subsoil is a yellowish red sandy clay loam to a depth of 72 inches.

Briley soils are well drained. Surface runoff is slow. The permeability is moderate.

Included with this soil in mapping are small areas of Bienville and Otanya soils. Inclusions make up less than 15 percent of the mapping unit.

Woodland Suitability Group: 2s

The overstory vegetation is dominantly shortleaf pine, longleaf pine, loblolly pine, southern red oak, sweetgum, and southern magnolia. The understory consists mainly of American holly, flowering dogwood, common sassafras, yaupon, yellow jasmine, American beautyberry, blackberry, greenbriar, Japanese honeysuckle, longleaf uniola, and pinehill bluestem.

MAP SYMBOL: 25

MAPPING UNIT: Mantachie loam, frequently flooded

This nearly level, somewhat poorly drained unit occurs as nearly level areas on floodplains next to major drainageways. These soils developed in sediments washed from loamy, acid soils. Areas are long and narrow in shape and are adjacent to the stream channel itself and will flood several times a year. Areas range from about 3 to over 200 acres in size.

Typically the surface layer is dark grayish brown loam for 5 inches, and mottled brown and grayish brown fine sandy loam to 11 inches. The subsoil consists of mottled grayish brown and gray loam to a depth of 61 inches.

Mantachie soils are somewhat poorly drained. Runoff is slow and permeability is moderate. The soils are frequently flooded and the water table is high during the winter months.

Included with this soil in mapping are small, less flooded areas of Mantachie and small areas of Bibb soils. Inclusions make up less than 20 percent of the mapping unit.

Woodland Suitability Group: 1w

The overstory vegetation is dominantly willow oak, water oak, blackgum, sweetgum, water tupelo, and baldcypress. The understory consists mainly of swamp cyrilla, southern wax-myrtle, blackberry, greenbriar, sedges, pitcher plant, and longleaf uniola.

MAP SYMBOL: 26

MAPPING UNIT: Mantachie loam, occasionally flooded

This nearly level, somewhat poorly drained soil occurs as broad level areas in the bottomlands of major streams. These areas flood once in three to ten years. These soils developed in sediments washed from loamy, acid soils. Areas of this soil range from about 7 to as much as 300 acres in size.

Typically the surface layer is dark grayish brown loam for 5 inches and mottled brown and grayish brown fine sandy loam to 11 inches. The subsoil consists of mottled grayish brown and gray loam to a depth of 61 inches.

Mantachie soils are somewhat poorly drained. Runoff is slow and permeability is moderate. The soils are occasionally flooded and the water table is high during the winter months.

Included with this soil in mapping are small areas of frequently flooded Mantachie and some areas of Bibb soils. Inclusions make up less than 20 percent of the mapping unit.

Woodland Suitability Group: 1w

The overstory vegetation is dominantly willow oak, water oak, south red oak, post oak, ash, blackgum, sweetgum, southern magnolia, American beech, and a few hickory. The understory consists mainly of blue beech, sweetbay, southern wax-myrtle, blackberry, greenbriar, and longleaf unio

MAP SYMBOL: 27

MAPPING UNIT: Midland silty clay loam

This poorly drained unit occurs as broad level areas in the more clayey portions of the survey area. Areas of this soil are irregular in shape and may occupy from as little as 6 to as much as 600 acres.

Typically the surface layer is dark grayish brown silty clay loam about 7 inches thick. The next layer, from 7 to 17 inches, is a dark gray silty clay. The next layer, from 17 to 60 inches, is a gray silty clay.

Midland soils are poorly drained. Surface runoff is very slow. Internal drainage is very slow. Permeability is very slow.

Included with this soil in mapping are a few small areas of Acadia, Sorter, and Waller soils. Inclusions comprise less than 15 percent of any one soil area.

Woodland Suitability Group: 2w

The overstory vegetation is dominantly loblolly pine, willow oak, water oak, and ash. The understory consists mainly of blue beech, sweetbay, southern wax-myrtle, blackberry, greenbriar, longleaf uniola, and dwarf palmetto.

MAP SYMBOL: 28

MAPPING UNIT: Ozan fine sandy loam, sandy substratum

This unit consists of poorly drained depressional terraces. Most areas are rounded to somewhat irregular in shape. These areas range from about 20 to 40 acres in size. This soil, as mapped in the survey area, is a taxadjunct to the Ozan because it has strata of fine and medium sand below 30 inches and the soil is slightly wetter than typical for the series.

Typically the surface layer of this soil is light brownish gray fine sandy loam about 15 inches thick that becomes light gray. The next layer, from 15 to 72 inches, is a light gray loam.

Ozan soils are poorly drained. The surface runoff is slow. The permeability is slow. The soil is saturated with water for extended periods.

Included with this soil in mapping are small areas of Otanya, Midland, Waller, and Kirbyville soils. Also included in a few areas are low sandy circular mounds. The inclusions make up less than 10 percent of the mapping unit.

Woodland Suitability Group: 2w

The overstory vegetation is dominantly water oak, willow oak, ash, water tupelo, and baldcypress. The understory consists mainly of sweet-bay, swamp cyrilla, southern wax-myrtle, blackberry, greenbriar, and sedges.

MAP SYMBOL: 29

MAPPING UNIT: Plank silt loam

This nearly level to depressional, acid, silty soil occurs on broad flats. These areas are generally irregular or elongated in shape. Areas of this soil range from about 40 to more than 200 acres in size.

Typically, the upper 5 inches is a grayish brown silt loam. The next layer, from 5 to 13 inches, is a light brownish gray silt loam. The next layer, from 13 to 42 inches, is a light brownish gray silt loam mixed with light brownish gray heavy silt loam. The next layer, from 42 to below 62 inches, is a grayish brown heavy silt loam mixed with pale brown silt loam. Most areas of this soil have a high concentration of salts or high pH below 60 inches.

Plank soils are poorly drained. The surface runoff is very slow. The permeability is very slow in the horizon containing the fragipan. A perched water table is present during winter months.

Included with this soil in mapping are small areas of Otanya and Kirbyville soils which occupy some circular or slightly raised areas in the unit. Inclusions make up less than 20 percent of the mapping unit.

Woodland Suitability Group: 5w

The overstory vegetation is dominantly shortleaf pine, longleaf pine, loblolly pine, and sweetgum. The understory consists mainly of flowering dogwood, yaupon, blackberry, and longleaf uniola.

MAP SYMBOL: 30

MAPPING UNIT: Rentzel loamy fine sand, 0 to 3 percent slopes

This deep, nearly level to gently sloping, somewhat poorly drained soil generally occurs on the lower slopes in upland areas. Most areas are somewhat elongated in shape. They range from 5 to about 100 acres in size.

Typically the upper 5 inches is a grayish brown loamy fine sand. The next layer, from 5 to 12 inches, is a brown loamy fine sand. The next layer, from 12 to 29 inches, is pale brown loamy fine sand that becomes very pale brown. The next layer, from 29 to 50 inches, is mottled with strong brown, light brownish gray and red sandy clay loam. The next layer, from 50 to 75 inches, is a light gray sandy clay loam.

Rentzel soils are somewhat poorly drained. Surface runoff is slow. The permeability is moderately slow. A high water table is present duri the winter months.

Included with this soil in mapping are small areas of Betis, Landma and Otanya soils. Inclusions make up less than 15 percent of the mappin unit.

Woodland Suitability Group: 2w

The overstory vegetation is dominantly shortleaf pine, loblolly pir willow oak, water oak, ash, sweetgum, and southern magnolia. The under- story consists mainly of yaupon, southern wax-myrtle, blackberry, green- briar, longleaf uniola, and a few swamp cyrilla and American beautyberry

MAP SYMBOL: 31

MAPPING UNIT: Bowie fine sandy loam, 0 to 3 percent slopes

This nearly level to gently sloping, moderately well drained soil occurs on broad and low convex ridges. Areas are irregular in shape while others are nearly oval. They range in size from about 4 to several thousand acres.

Typically, the surface layer is dark grayish brown fine sandy loam about 6 inches thick. The next layer is pale brown fine sandy loam that extends to a depth of about 12 inches. The next layer is yellowish brown sandy clay loam. At about 42 inches the friable sandy clay loam becomes mottled with red and contains about 15 percent plinthite.

Bowie soils are moderately well drained. Surface runoff is slow to medium. Internal drainage in the layers having plinthite is moderately slow. Permeability is moderately slow.

Included with this soil in mapping are small areas of Besner and Briley soils. Also included are small areas of Ozan and Waller soils. These inclusions comprise less than 20 percent of the mapping unit.

Woodland Suitability Group: 2o

The overstory vegetation is dominantly shortleaf pine, longleaf pine, loblolly pine, water oak, southern red oak, swamp chestnut oak, sweetgum, and southern magnolia. The understory consists mainly of American holly, flowering dogwood, yaupon, American beautyberry, blackberry, greenbriar, wild azalea, longleaf uniola, and pinehill bluestem.

MAP SYMBOL: 32

MAPPING UNIT: Bowie fine sandy loam, 3 to 8 percent slopes

This gently sloping to sloping soil occurs as breaks into larger size streams within the area. Most areas are long and fairly narrow. They range from about 6 to over 100 acres in size.

Typically, the surface layer is very dark grayish brown fine sandy loam about 6 inches thick. The next layer is pale brown fine sandy loam that extends to a depth of about 12 inches. The next layer is yellowish brown sandy clay loam. At about 42 inches the friable sandy loam becomes mottled with red and contains about 15 percent plinthite.

Bowie soils are moderately well drained. Surface runoff is medium. Internal drainage in the layer having plinthite is moderately slow. Permeability is moderately slow.

Included with the soil in mapping are small areas of Kirbyville soils. Also included in depressed areas are areas of Ozan soils. These inclusions comprise less than 15 percent of the mapping unit.

Woodland Suitability Group: 2o

The overstory vegetation is dominantly shortleaf pine, longleaf pine, loblolly pine, white oak, southern red oak, swamp chestnut oak, sweetgum, and southern magnolia. The understory consists mainly of American holly, flowering dogwood, yaupon, American beautyberry, blackberry, greenbriar, wild azalea, longleaf uniola, and pinehill bluestem.

MAP SYMBOL: 33

MAPPING UNIT: Bowie loamy fine sand, 1 to 5 percent slopes

This gently sloping, moderately well drained soil occurs as broad, nearly level convex ridges. Some areas are irregular in shape while others are nearly oval. They commonly occur as ridge tops in the highest part of the soil landscape. They range from about 20 to nearly a thousand acres in size. In some areas the surface soil contains considerable amounts of gravel.

Typically, the surface layer is very dark grayish brown loamy fine sand about 6 inches thick. The next layer is pale brown loamy fine sand that extends to a depth of about 12 inches. The next layer is yellowish brown sandy clay loam. At about 42 inches the friable sandy clay loam becomes mottled with red and contains about 15 percent plinthite.

Bowie soils are moderately well drained. Surface runoff is slow to medium. Internal drainage in the layers having plinthite is moderate. Permeability is moderately slow.

Included with this soil in mapping are small areas of Briley and Rentzel soils. Also included are small areas of Bowie fine sandy loam and Waller soils. These inclusions comprise less than 15 percent of the mapping unit.

Woodland Suitability Group: 2o

The overstory vegetation is dominantly shortleaf pine, longleaf pine, southern red oak, post oak, and a few loblolly pine. The understory consists mainly of flowering dogwood, yaupon, American beautyberry, blackberry, greenbriar, and pinehill bluestem.

MAP SYMBOL: 34

MAPPING UNIT: Udults, graded

The Udults, graded consists of soils occupying level to strongly sloping areas that have, for the most part, been graded for ironstone gravel or fill material. Areas of this unit are irregular in shape. They range from about 3 to 4 acres in size up to 25 acres.

Typically, areas of this soil have had the surface layer removed. The subsoil is a brownish yellow sandy clay loam that extends to a depth of more than 60 inches. Red and yellow mottling and plinthite are common below a depth of about 36 inches. In some areas the red mottling may come to the surface.

This unit is moderately well drained. It has slow runoff. Internal drainage is moderate above the horizon containing plinthite and slow in the horizon having plinthite. Permeability is slow.

There are inclusions of undisturbed soils consisting mainly of Bowie soils. Inclusions comprise less than 20 percent of the area.

Woodland Suitability Group: 5s

The native vegetation on this soil has been destroyed because of the grading. When overstory vegetation is present, it is dominated by slash pine which has been planted. The understory consists mainly of threeawns and pinehill bluestem.

MAP SYMBOL: 35

MAPPING UNIT: Sorter silt loam

This nearly level to somewhat depressed, poorly drained loamy soil occurs on broad, nearly level flats in the flatwoods portion of the area. Areas are irregular to elongated in shape. They range from about 10 to more than 500 acres in size.

Typically the surface layer to 3 inches is gray silt loam. The next layer to 19 inches is a light brownish gray silt loam. The subsoil, from 19 to 68 inches, is light brownish gray silt loam with mottles of yellowish brown.

Sorter soils are poorly drained. Runoff is very slow. Permeability is slow, and the soils are saturated for long periods during the winter months.

Included with this soil in mapping are small areas of Waller, Kirbyville, and Otanya soils. Inclusions make up less than 15 percent of the mapping unit.

Woodland Suitability Group: 2w

The overstory vegetation is dominantly loblolly pine, willow oak, water oak, ash, blackgum, and southern magnolia. The understory consists mainly of blue beech, yaupon, southern wax-myrtle, blackberry, greenbriar, and sedges.

MAP SYMBOL: 36

MAPPING UNIT: Kirbyville fine sandy loam

This is a nearly level, somewhat poorly drained soil that occurs as broad, nearly level low ridges in the flatwoods portion and as foot-slope positions in the more rolling areas of the survey area. Most areas are oblong and oval in shape, but many are irregular and are mixed with delineations of other soils. Areas of this soil range from about 5 to over 1,500 acres in size.

Typically, the upper 5 inches is grayish brown fine sandy loam. The next layer, from 5 to 18 inches, is a very pale brown fine sandy loam. The next layer, from 18 to 35 inches, is a light yellowish brown sandy clay loam. The next layer, from 35 to 65 inches, is a strong brown sandy clay loam. All layers from 18 inches are mixed with some brown or gray fine sandy loam.

These soils are somewhat poorly drained. Surface runoff is slow. The permeability is moderate. During late winter and spring a water table at about 2 feet is apparent.

Included in mapping are small areas of Sorter, Waller, Otanya, and Plank soils. Inclusions make up less than 25 percent of the mapping uni

Woodland Suitability Group: 1w

The overstory vegetation is dominantly shortleaf pine, longleaf pin loblolly pine, willow oak, water oak, white oak, southern red oak, ash, and sweetgum. The understory consists mainly of American holly, floweri dogwood, common sassafras, arrowwood virburnum, yaupon, American beauty-berry, southern wax-myrtle, blackberry, greenbriar, Japanese honeysuckle wild azalea, and longleaf uniola.

MAP SYMBOL: 37

MAPPING UNIT: Tonkawa fine sand, 1 to 5 percent slopes

This gently sloping unit occurs on raised ridges on the east side of Village Creek. Areas of this soil are oval in shape to somewhat elongated. Areas of this soil range from about 40 to 200 acres in size.

Typically, the upper 5 inches is dark grayish brown fine sand. The next layer is yellowish brown fine sand to 12 inches. The upper part of the subsoil, from 12 to 22 inches, is brownish yellow fine sand. The layer from 22 to 37 inches is yellow fine sand. From 37 inches to 80 inches it is very pale brown fine sand.

Tonkawa soils are excessively drained. They have very slow runoff and have rapid permeability.

Included with this soil in mapping are small areas of Dardin, Betis, and Ozan soils. Inclusions make up less than 15 percent of the mapping unit.

Woodland Suitability Group: 5s

The overstory vegetation is dominantly shortleaf pine, longleaf pine, and sandjack oak. The understory consists mainly of yaupon, sandhill bluestem, and prickly pear.

MAP SYMBOL: 38

MAPPING UNIT: Vamont clay

This nearly level, somewhat poorly drained soil occurs on broad, level flat areas. Most areas are irregular in shape. Areas of this soil range from 6 to more than 200 acres in size.

Typically, the surface layer is very dark grayish brown clay about 8 inches thick. The next layer is a mottled yellowish brown and gray clay to 24 inches. The next layer is a grayish brown clay to 70 inches. The next layer is gray clay.

This soil is somewhat poorly drained. Water enters the soil rapidly when it is cracked, but very slow when wet. Surface runoff is slow to rapid. Internal drainage is slow to very slow. Permeability is very slow.

Included with this soil in mapping are small areas of Beaumont, Midland, and Aldine soils. Inclusions comprise less than 10 percent of any one delineation.

Woodland Suitability Group: 2w

The overstory vegetation is dominantly shortleaf pine, loblolly pin water oak, white oak, southern red oak, swamp chestnut oak, sweetgum, an southern magnolia. The understory consists mainly of American holly, yaupon, blackberry, greenbriar, longleaf uniola, and dwarf palmetto.

MAP SYMBOL: 39

MAPPING UNIT: Waller silt loam

This poorly drained soil occurs on broad, level flats in the flatwoods portion of the area. Areas of this soil are irregular to somewhat elongated in shape. Areas of this soil range from 2 to over 1,000 acres in size.

Typically, the surface soil is grayish brown silt loam in the upper 4 inches and light gray silt loam from 4 to 34 inches. The subsoil, from 34 to 60 inches, is gray clay loam.

Waller soils are poorly drained. They have slow to ponded surface runoff and are moderately permeable. Water stands on the surface for a long period of time, and the soil is saturated during winter and spring. The water table is within 6 feet during the summer.

Included with this soil in mapping are small areas of Otanya, Sorter, Plank, and Kirbyville soils. Inclusions make up less than 15 percent of the mapping unit.

Woodland Suitability Group: 2w

The overstory vegetation is dominantly shortleaf pine, loblolly pine, willow oak, ash, and sweetgum. The understory consists mainly of blue beech, redbay, sweetbay, southern wax-myrtle, blackberry, greenbriar, sedges, and dwarf palmetto.

MAP SYMBOL: 42

MAPPING UNIT: Betis loamy fine sand, 1 to 5 percent slopes

The Betis soils are deep, strongly acid, sandy upland soils. They occur on gently sloping areas. The soils developed in thick sandy marine or fluvial sediments. They are rounded to irregular in shape and are mostly less than 100 acres in size.

Typically, the upper 37 inches is a brown loamy fine sand. The next layer is a strong brown loamy fine sand to 57 inches. The next layer is very pale brown loamy fine sand mixed with yellowish brown fine sandy loam 80 inches.

Betis soils are somewhat excessively drained. Runoff is very slow. Permeability of the subsoil is rapid.

Included with this soil in mapping are small areas of Darden, Rentzel and Otanya soils. Inclusions make up less than 15 percent of the mapping unit.

Woodland Suitability Group: 3s

The overstory vegetation is dominantly shortleaf pine, longleaf pine, loblolly pine, southern red oak, and post oak. The understory consists mainly of American holly, yaupon, American beautyberry, longleaf uniola, pinehill bluestem, and bluebonnets.

MAP SYMBOL: 43

MAPPING UNIT: Fausse clay

This unit is in depressed, ponded swamp areas in the Neches River bottom. Some areas are long and narrow and others are irregular in shape. They range from 4 to over 2,000 acres in size.

Typically the soil has a thin dark brown muck surface over dense massive gray clay with shades of green, blue, and brown.

Fausse soils are ponded. Water table is from six inches to four feet above the surface twelve months of the year.

Permeability is very slow and surface runoff is ponded.

Included with this soil in mapping are small areas of the Urbo and Mantachie soils. Also included are small areas adjacent to streams that are sandy throughout. Inclusions make up less than 20 percent of the mapping unit.

Woodland Suitability Group: 2w

The overstory vegetation is dominantly baldcypress and water tupelo. The understory consists mainly of swamp cyrilla and southern wax-myrtle.

MAP SYMBOL: 44

MAPPING UNIT: Iuka fine sandy loam, frequently flooded

Iuka soils are loamy bottomland soils on old natural levees along the major streams of the survey area. These soils formed in loamy and sandy alluvial sediments under forest vegetation.

Typically the surface layer is a brown fine sandy loam about 13 inches thick. The next layer is a light yellowish brown fine sandy loam with a few thin loamy sand strata to 22 inches. The next layer is mottled gray and yellowish brown sandy loam with strata of loamy fine sand and loam.

Iuka soils are moderately well drained. Surface runoff is slow, and the permeability is moderate. The soil is commonly flooded several times each year. A seasonal water table is present at about 2 feet.

Included with this soil in mapping are small areas of Bibb, Mantachie, and Urbo soils. These soils make up less than 15 percent of the unit.

Woodland Suitability Group: 1w

The overstory vegetation is dominantly willow oak, water oak, sweet-gum, and southern magnolia. The understory consists mainly of blue beech blackberry, greenbriar, and sedges.

MAP SYMBOL: 45

MAPPING UNIT: Urbo silty clay, undulating

The Urbo soils consist of deep, undulating, clayey soils on low flood plains of the Neches River and Pine Island Bayou. The areas are widely dissected with numerous 4 to 12 feet deep vegetated channels. The low lying parts of this unit flood several times each year and the higher parts flood only once a year.

Typically the surface layer is a dark grayish brown silty clay for about 5 inches. The next layer is a grayish brown silty clay to 9 inches. The next layer is a grayish brown silty clay that extends to 71 inches. The soils are grayer in the channels that dissect the area.

Urbo soils are somewhat poorly drained. Permeability is very slow. Runoff is slow.

Included in mapping are small areas of Mantachie, Bibb, Crevasse, Bernaldo, and Fausse soils. Inclusions make up less than 15 percent of the mapping unit.

Woodland Suitability Group: 1w

The overstory vegetation is dominantly willow oak, water oak, ash, blackgum, sweetgum, hickory, water tupelo, and baldcypress. The understory consists mainly of blue beech, blackberry, greenbriar, and sedges.

MAP SYMBOL: 46

MAPPING UNIT: Urbo silty clay, frequently flooded

The Urbo soils consist of deep, nearly level, acid, clayey soils on broad, level flood plains of the Neches River and Pine Island Bayou. These areas are near the main stream channel and are subject to frequent flooding. They formed in thick clayey deposits recently laid down by the Neches River under hardwood timber.

Typically the surface layer is a dark grayish brown silty clay for about 5 inches. The next layer is a grayish brown silty clay to 9 inches. The next layer is a grayish brown silty clay that extends to 71 inches. The soils are grayer in the occasional channels that dissect the area.

Urbo soils are somewhat poorly drained. Permeability is very slow. Runoff is slow.

Included with Urbo soils are small areas of Mantachie, Bibb, Crevasse, and Fausse soils. Inclusions make up less than 15 percent of the mapping unit.

Woodland Suitability Group: 1w

The overstory vegetation is dominantly willow oak, water oak, ash, blackgum, sweetgum, hickory, water tupelo, and baldcypress. The understory consists mainly of blue beech, blackberry, greenbriar, and sedges.

MAP SYMBOL: 48

MAPPING UNIT: Angelina loam

Angelina soils consist of mucky swamp soils that occur in old meanders on the terrace of the Neches River. They formed in organic and loamy sediments of the Neches River. This unit, as mapped in the survey area, is a taxadjunct to the Angelina series because it grows mainly trees and has a woody understory instead of having grass-like vegetation.

Typically, the surface is a brown mucky loam about 3 inches thick. The next 23 inches is a light gray sandy clay loam. The next horizon is a mottled light gray, red, and strong brown clay loam to 60 inches. Areas of deeper mucky surfaces are common.

Angelina soils are very poorly drained. The water table is at the surface at least 11½ months of the year. Many months two or more feet of water stand on the surface. Permeability is slow and internal drainage is poor.

Included with this soil in mapping are small areas of Fausse and Urbo soils. These inclusions make up less than 15 percent of the mapping unit.

Woodland Suitability Group: 5w

The overstory vegetation is dominantly baldcypress and water tupelo. The understory consists mainly of swamp cyrilla, redbay, sweetbay, and a few blackberry.

MAP SYMBOL: 49

MAPPING UNIT: Hatliff fine sandy loam, frequently flooded

Hatliff soils are deep, loamy, nearly level bottomland soils. They typically occur on narrow bottomlands associated with smaller streams in the area.

Typically the surface layer has about 5 inches of dark brown fine sandy loam. The next 56 inches is stratified brown fine sandy loam and loamy fine sand.

Hatliff soils are moderately well drained. They have slow runoff and have moderately rapid permeability. This unit normally floods several times each year.

Included with this soil in mapping are small areas of Mantachie and Bibb soils. These inclusions make up less than 20 percent of the unit.

Woodland Suitability Group: 2w

The overstory vegetation is dominantly willow oak, water oak, ash, sweetgum, American beech, and a few loblolly pine. The understory consists mainly of American beautyberry, blackberry, and longleaf uniola.

MAP SYMBOL: 50

MAPPING UNIT: Spurger loam

This nearly level to slightly undulating soil occurs on terraces of the Sabine and Neches Rivers. Most areas are 20 to 40 feet above the present river level. Soil areas range from about 50 acres to 200 acres in size.

Spurger soils have very dark grayish brown loam surface layers about 9 inches thick that become brown. The next layer is a dark red clay to 36 inches. The next layer, from 36 to 65 inches, is a yellowish red sandy clay loam that becomes brownish yellow with depth. It has gray or brown mottles throughout.

These soils are moderately well drained. The surface runoff is slow. The permeability is slow.

Included in mapped areas of this soil are Bernaldo, Bienville, Iuka, Mantachie, and Urbo soils. These inclusions make up less than 20 percent of the unit.

Woodland Suitability Group: 1w

The overstory vegetation is dominantly loblolly pine, willow oak, water oak, white oak, southern red oak, and ash. The understory consists mainly of red maple, American holly, flowering dogwood, yaupon, yellow jasmine, American beautyberry, grape, blackberry, greenbriar, Japanese honeysuckle, sedges, longleaf uniola, and pinehill bluestem.

MAP SYMBOL: 51

MAPPING UNIT: Crevasse fine sand, frequently flooded

This deep, sandy, nearly level to gently sloping alluvial soil occurs on sand bars on the Neches River. This soil is regularly reworked and shifted by the fluctuating river levels and changing currents.

Typically the surface layer is a dark grayish brown fine sand about 4 inches thick. The next layer, from 4 to 60 inches, is a grayish brown fine sand that becomes dark grayish brown.

Crevasse soils are excessively drained. Permeability is rapid. Surface runoff is slow. These units are flooded several times each year. A permanent water table is at the elevation of the river.

Included with this soil in mapping are small areas of Iuka, Mantachie, and Urbo soils. These inclusions make up less than 25 percent of the unit.

Woodland Suitability Group: None

Because this area is being constantly reworked by the river, it contains very little vegetation. Some areas have some common bermudagrass.

USE AND MANAGEMENT OF THE SOILS

The soil survey is a detailed inventory and evaluation of the most basic resource of the survey area-the soil. It is useful in adjusting land use to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in use of the land.

While a soil survey is in progress, soil scientists, foresters, conservationists, engineers, and others keep extensive notes about the nature of the soils and about unique aspects of behavior of the soils. These notes include data on erosion, flooding, and other factors affecting the productivity, potential, and limitations of the soils under various uses and management. In this way, field experience and measured data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section is useful in planning use and management of soils for woodland; as sites for buildings, highways and other transportation systems, sanitary facilities, and parks and other recreation facilities; and for wildlife habitat. From the data presented, the potential of each soil for specified land uses can be determined, soil limitations to these land uses can be identified, and costly failures in structures, caused by unfavorable soil properties, can be avoided. A site where soil properties are favorable can be selected, or practices that will overcome the soil limitations can be planned.

Planners and others using the soil survey can evaluate the impact of specific land uses on the overall productivity of the survey area or other broad planning area and on the environment. Productivity and the environment are closely related to the nature of the soil. Plans should maintain or create a land-use pattern in harmony with the natural soil.

Contractors can find information that is useful in locating sources of sand and gravel, roadfill, and topsoil, and oil well sites. Other information indicates wetness or very firm soil horizons that cause difficulty in excavation.

Health officials, highway officials, engineers, and many other specialists also can find useful information in this soil survey. The safe disposal of wastes, for example, is closely related to properties of the soil. Pavements, sidewalks, campsites, playgrounds, lawns, and trees and shrubs are influenced by the nature of the soil.

Engineering

This section provides information about the use of soils for building sites, sanitary facilities, construction material, and water management. Among those who can benefit from this information are engineers, land managers, builders, and contractors.

The ratings in the engineering tables are based on test data and estimated data in the "Soil Properties" section. The ratings were determined jointly by soil scientists and engineers of the Soil Conservation Service using known relationships between the soil properties and the behavior of soils in various engineering uses.

Among the soil properties and site conditions identified by a soil survey and used in determining the ratings in this section were grain-size distribution, liquid limit, plasticity index, soil reaction, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure or aggregation, in-place soil density, and geologic origin of the soil material. Where pertinent, data about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of absorbed cations were also considered.

On the basis of information assembled about soil properties, ranges of values can be estimated for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, shear strength, compressibility, slope stability, and other factors of expected soil behavior in engineering uses. As appropriate, these values can be applied to each major horizon of each soil or to the entire profile.

These factors of soil behavior affect construction and maintenance of roads, airport runways, pipelines, foundations for small buildings, ponds and small dams, sewage and refuse disposal systems, and other engineering works. The ranges of values can be used to (1) select potenti residential, commercial, and recreational uses; (2) make preliminary estimates pertinent to construction in a particular area; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for location of sanitary lar fills, onsite sewage disposal systems, and other waste disposal facilities (5) plan detailed onsite investigations of soils and geology; (6) find sources of gravel, sand, clay, and topsoil; (7) relate performance of structures already built to the properties of the kinds of soil on which they are built so that performance of similar structures on the same or a similar soil in other locations can be predicted; and (8) predict the trafficability of soils for cross-country movement of vehicles and constru tion equipment.

Data presented in this section are useful for land-use planning and for choosing alternative practices or general designs that will overcome unfavorable soil properties and minimize soil-related failures. Limitatic to the use of these data, however, should be well understood. First, the data are generally not presented for soil material below a depth of 5 or 6 feet. Also, because of the scale of the detailed map in this soil survey, small areas of soils that differ from the dominant soil may be included in mapping. Thus, these data do not eliminate the need for onsite investigations, testing, and analysis by personnel having expertise in the specific use contemplated.

The information is presented mainly in tables. Table M shows, for each kind of soil, the degree and kind of limitations for building site development and table L, for sanitary facilities. Table N shows the suitability of each kind of soil as a source of construction materials.

The information in the tables, along with the soil map, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations and to construct interpretive maps for specific uses of land.

Some of the terms used in this soil survey have a special meaning in soil science. Many of these terms are defined in the Glossary.

Building site development

The degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets are indicated in table M. A slight limitation indicates that soil properties generally are favorable for the specified use; any limitation is minor and easily overcome. A moderate limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design. A severe limitation indicates that one or more soil properties or site features are so unfavorable or difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For some soils rated severe, such costly measures may not be feasible.

Shallow excavations are made for pipelines, sewerlines, communications and power transmission lines, basements, and open ditches. Such digging or trenching is influenced by soil wetness caused by a seasonal high water table; the texture and consistence of soils; the tendency of soils to cave in or slough; and the presence of very firm, dense soil layers. In addition, excavations are affected by slope of the soil and the probability of flooding. Ratings do not apply to soil horizons below a depth of 6 feet unless otherwise noted.

In the soil series descriptions, the consistence of each soil horizon is given, and the presence of very firm or extremely firm horizons usually difficult to excavate, is indicated.

Dwellings and small commercial buildings referred to in table M are built on undisturbed soil and have foundation loads of a dwelling no more than three stories high. Separate ratings are made for small commercial buildings without basements and for dwellings with and without basements. For such structures, soils should be sufficiently stable that cracking or subsidence of the structure from settling or shear failure of the foundation does not occur. These ratings were determined from estimates of the shear strength, compressibility, and shrink-swell potential of the soil. Soil texture, plasticity and in-place density, soil wetness, and depth to a seasonal high water table were also considered. Soil wetness and depth to a seasonal high water table indicate potential difficulty in providing adequate drainage for basements, lawns, and gardens. Slope is also an important consideration in the choice of sites for these structures and was considered in determining the ratings. Susceptibility to flooding is a serious hazard.

Local roads and streets referred to in table M have an all-weather surface that can carry light to medium traffic all year. They consist of a subgrade of the underlying soil material; a base of gravel, crushed rock fragments, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. The roads are graded with soil material at hand, and most cuts and fills are less than 5 feet deep.

TABLE M.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definit "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
1----------------- Acadia	Severe: wetness, too clayey.	Severe: shrink-swell, low strength, wetness.	Severe: shrink-swell, low strength, wetness.	Severe: shrink-swell, low strength, wetness.	Severe: shrink-swell, low strength.
3----------------- Aldine	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: shrink-swell.
48---------------- Angelina	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.
4----------------- Annona	Severe: wetness, too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength, wetness.	Severe: shrink-swell, low strength, wetness.	Severe: shrink-swell, low strength.
16---------------- Attoyac	Slight---------	Slight---------	Slight---------	Slight---------	Moderate: low strength.
5----------------- Beaumont	Severe: wetness, too clayey.	Severe: wetness, low strength, shrink-swell.	Severe: wetness, low strength, shrink-swell.	Severe: wetness, corrosive, shrink-swell.	Severe: wetness, low strength, shrink-swell.
7----------------- Bernaldo	Moderate: wetness.	Moderate: low strength.	Moderate: low strength, wetness.	Moderate: low strength, wetness.	Moderate: low strength.
6----------------- Bernaldo	Moderate: wetness.	Moderate: low strength.	Moderate: low strength, wetness.	Severe: slope.	Moderate: low strength.
15---------------- Besner	Moderate: wetness.	Moderate: low strength.	Moderate: low strength, wetness.	Moderate: low strength, wetness.	Moderate: low strength.
42---------------- Betis	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------
8----------------- Bibb	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.
9----------------- Bienville	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------
10---------------- Boswell	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: slope, shrink-swell.	Severe: shrink-swell, low strength.
33---------------- Bowie	Slight---------	Slight---------	Slight---------	Slight---------	Moderate: low strength.
31, 32------------ Bowie	Slight---------	Slight---------	Slight---------	Slight---------	Moderate: low strength.
24---------------- Briley	Slight---------	Slight---------	Slight---------	Slight---------	Moderate: low strength.
51---------------- Crevasse	Severe: floods, cutbanks cave.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
13*:					
Cuthbert	Severe: too clayey.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Severe: low strength.
Ruston	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength.
14 Ballardsville	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: low strength, wetness.
2 Darden	Severe: cutbanks cave.	Slight	Slight	Slight	Slight
46 Fausse	Severe: floods, too clayey, wetness.	Severe: floods, wetness, shrink-swell.	Severe: floods, wetness, shrink-swell.	Severe: floods, wetness, shrink-swell.	Severe: floods, wetness, shrink-swell.
17 Gallime	Moderate: wetness, too clayey.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, wetness, low strength.	Moderate: shrink-swell, low strength.	Moderate: low strength.
18*:					
Gallime	Moderate: wetness, too clayey.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, wetness, low strength.	Moderate: shrink-swell, low strength.	Moderate: low strength.
Alazan	Severe: wetness.	Moderate: wetness, low strength.	Severe: wetness.	Severe: low strength.	Severe: low strength.
19 Guyton	Severe: floods, wetness, cutbanks cave.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.
49 Hatliff	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.
44 Iuka	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods.
22 Jasco	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.
36 Kirbyville	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: low strength.
23 Landman	Severe: too sandy.	Slight	Moderate: wetness.	Slight	Slight
26, 25 Mantachie	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.
27 Midland	Severe: too clayey, wetness.	Severe: shrink-swell, low strength, wetness.	Severe: shrink-swell, low strength, wetness.	Severe: shrink-swell, low strength, wetness.	Severe: shrink-swell, low strength, wetness.
20 Otanya	Moderate: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: low strength.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
21*:					
Otanya	Moderate: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: low strength.
Kirbyville	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: low strength.
28 Ozan	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
29 Plank	Severe: wetness, ponding.	Severe: wetness, ponding, floods.	Severe: wetness, ponding, floods.	Severe: wetness, ponding, floods.	Severe: wetness, ponding.
30 Rentzel	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
35 Sorter	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness.
50 Spurger	Severe: too clayey.	Moderate: wetness, shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: wetness, shrink-swell.	Severe: low strength.
37 Tonkawa	Severe: cutbanks cave.	Slight	Slight	Slight	Slight
34*. Udults					
45, Urbo	Severe: floods, wetness, too clayey.	Severe: floods, wetness, shrink-swell.	Severe: floods, wetness, shrink-swell.	Severe: floods, corrosive, wetness.	Severe: floods, shrink-swell.
38 Vamont	Severe: too clayey, wetness.	Severe: shrink-swell, low strength.	Severe: wetness, shrink-swell, low strength.	Severe: corrosive, low strength, shrink-swell.	Severe: low strength, shrink-swell.
39 Waller	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, corrosive.	Severe: wetness, low strength.

* See description of the map unit for composition and behavior characteristics of the map unit.

NOTES

The load supporting capacity and the stability of the soil as well as the quantity and workability of fill material available are important in design and construction of roads and streets. The classifications of the soil and the soil texture, density, and shrink-swell potential, are indicators of the traffic supporting capacity used in making the ratings. Soil wetness, flooding, slope, and depth to hard rock or very compact layers affect stability and ease of excavation.

Sanitary facilities

Favorable soil properties and site features are needed for proper functioning of septic tank absorption fields, sewage lagoons, and sanitary landfills. The nature of the soil is important in selecting sites for these facilities and in identifying limiting soil properties and site features to be considered in design and installation. Also, those soil properties that affect ease of excavation or installation of these facilities will be of interest to contractors and local officials. Table L shows the degree and kind of limitations of each soil for such uses and for use of the soil as daily cover for landfills. It is important to observe local ordinances and regulations.

If the degree of soil limitation is expressed as _slight_, soils are generally favorable for the specified use and limitations are minor and easily overcome; if _moderate_, soil properties or site features are unfavorable for the specified use, but limitations can be overcome by special planning and design; and if _severe_, soil properties or site features are so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance is required. Soil suitability is rated by the terms _good_, _fair_, or _poor_, which, respectively, mean about the same as the terms _slight_, _moderate_, and _severe_.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into the natural soil. Only the soil horizons between depths of 18 to 72 inches are evaluated for this use. The soil properties and site features considered are those that affect the absorption of the effluent and those that affect the construction of the system.

Properties and features that affect absorption of the effluent are permeability, depth to seasonal high water table, and susceptibility to flooding. Excessive slope can cause lateral seepage and surfacing of the effluent. Also, soil erosion and soil slippage are hazards if absorption fields are installed on sloping soils.

In some soils, loose sand and gravel is less than 4 feet below the tile lines. In these soils the absorption field does not adequately filter the effluent, and ground water in the area may be contaminated.

On many of the soils that have moderate or severe limitations for use as septic tank absorption fields, a system to lower the seasonal water table can be installed or the size of the absorption field can be increased so that performance is satisfactory.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons have a nearly level floor and cut slopes or embankments of compacted soil material. Aerobic lagoons generally are designed to hold sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Soils that are very high in content of organic matter are not suitable.

Unless the soil has very slow permeability, contamination of ground water is a hazard where the seasonal high water table is above the level of the lagoon floor. In soils where the water table is seasonally high, seepage of ground water into the lagoon can seriously reduce the lagoon's capacity for liquid waste. Slope and susceptibility to flooding also affect the suitability of sites for sewage lagoons or the cost of construction. Shear strength and permeability of compacted soil material affect the performance of embankments.

Sanitary landfill is a method of disposing of solid waste by placing refuse in successive layers either in excavated trenches or on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil material. Landfill areas are subject to heavy vehicular traffic. Risk of polluting ground water and trafficability affect the suitability of a soil for this use. The best soils have a loamy or silty texture, have moderate to slow permeability, are deep to a seasonal water table, and are not subject to flooding. Clayey soils are likely to be sticky and difficult to spread. Sandy or gravelly soils generally have rapid permeability, which might allow noxious liquids to contaminate ground water. Soil wetness can be a limitation, because operating heavy equipment on a wet soil is difficult. Seepage into the refuse increases the risk of pollution of ground water.

Ease of excavation affects the suitability of a soil for the trench type of landfill. If the seasonal water table is high, water will seep into trenches.

TABLE L.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definition "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily co for landfi
1 Acadia	Severe: percs slowly, wetness.	Slight	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey.
3 Aldine	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Poor: thin layer.
48 Angelina	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.
4 Annona	Severe: percs slowly, wetness.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey.
16 Attoyac	Slight	Moderate: seepage.	Slight	Slight	Good.
5 Beaumont	Severe: percs slowly, wetness.	Moderate: excess humus.	Severe: wetness, too clayey.	Severe: wetness.	Poor: wetness, too clayey.
7 Bernaldo	Moderate: wetness.	Moderate: seepage.	Severe: wetness.	Moderate: wetness.	Good.
6 Bernaldo	Moderate: wetness, slope.	Severe: slope.	Severe: wetness.	Moderate: wetness.	Fair: slope.
15 Besner	Moderate: wetness.	Moderate: wetness, seepage.	Severe: wetness.	Moderate: wetness.	Good.
42 Betis	Slight	Severe: seepage.	Severe: too sandy, seepage.	Severe: seepage.	Fair: too sandy.
8 Bibb	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.
9 Bienville	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too sandy.
10 Boswell	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
33, 31, 32 Bowie	Severe: percs slowly.	Moderate: seepage.	Slight	Slight	Good.
24 Briley	Slight	Moderate: seepage.	Slight	Slight	Fair: too sandy.
51 Crevasse	Severe: floods.	Severe: floods.	Severe: floods, seepage, wetness.	Severe: floods, seepage.	Poor: seepage, too sandy.
13*: Cuthbert	Severe: percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock.	Moderate: slope.	Poor: thin layer.

See footnote at end of table.

TABLE L.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
13*:					
Euston	Slight	Moderate: seepage, slope.	Slight	Slight	Good.
14: Dallardsville	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
2: Darden	Slight	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy.
46: Fausse	Severe: floods, percs slowly, wetness.	Severe: floods.	Severe: floods, wetness, too clayey.	Severe: floods, wetness.	Poor: too clayey, wetness.
17: Gallime	Moderate: wetness.	Severe: seepage.	Severe: wetness.	Severe: seepage.	Good.
18*:					
Gallime	Moderate: wetness.	Severe: seepage.	Severe: wetness.	Severe: seepage.	Good.
Alazan	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Good.
19: Guyton	Severe: floods, wetness, percs slowly.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.
49: Hatliff	Severe: floods, wetness.	Severe: floods, wetness, seepage.	Severe: floods, wetness, seepage.	Severe: floods, wetness, seepage.	Fair: too sandy.
44: Iuka	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Good.
22: Jasco	Severe: wetness, percs slowly, floods.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
36: Kirbyville	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.
23: Landman	Severe: percs slowly, wetness.	Severe: seepage.	Severe: wetness.	Moderate: wetness.	Fair: too sandy.
26, 25: Mantachie	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Good.
27: Midland	Severe: percs slowly, wetness.	Slight	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey, wetness.
20: Otanya	Severe: percs slowly, wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Fair: wetness.

See footnote at end of table.

TABLE L.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cov for landfi
21*:					
Otanya	Severe: percs slowly, wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Fair: wetness.
Kirbyville	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.
28 Ozan	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness.
29 Plank	Severe: wetness, percs slowly, ponding.	Severe: wetness, ponding.	Severe: wetness, ponding.	Severe: wetness, ponding.	Severe: wetness, ponding.
30 Rentzel	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too sandy.
35 Sorter	Severe: wetness, percs slowly, floods.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
50 Spurger	Severe: percs slowly, wetness.	Severe: wetness.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey.
37 Tonkawa	Slight	Severe: seepage.	Severe: too sandy, seepage.	Severe: seepage.	Poor: too sandy.
34*. Udults					
45, Urbo	Severe: percs slowly, floods, wetness.	Severe	Severe: too clayey, wetness, floods.	Severe: floods, wetness.	Poor: too clayey, wetness, thin layer.
38 Vamont	Severe: wetness, percs slowly.	Slight	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey.
39 Waller	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

NOTES

Unless otherwise stated, the limitations in table L apply only to the soil material within a depth of about 6 feet. If the trench is deeper, a limitation of slight or moderate may not be valid. Site investigation is needed before a site is selected.

Daily cover for landfill should be soil that is easy to excavate and spread over the compacted fill in wet and dry periods. Soils that are loamy or silty are better than other soils. Clayey soils may be sticky and difficult to spread; sandy soils may be subject to soil blowing.

The soils selected for final cover of landfills should be suitable for growing plants. Of all the horizons, the A horizon in most soils has the best workability, more organic matter, and the best potential for growing plants. Thus, for either the area- or trench-type landfill, stockpiling material from the A horizon for use as the surface layer of the final cover is desirable.

Where it is necessary to bring in soil material for daily or final cover, thickness of suitable soil material available and depth to a seasonal high water table in soils surrounding the sites should be evaluated. Other factors to be evaluated are those that affect reclamation of the borrow areas. These factors include slope, erodibility, and potential for plant growth.

Construction materials

The suitability of each soil as a source of roadfill, sand, gravel, and topsoil is indicated in table N by ratings of good, fair, or poor. The texture, thickness, and organic-matter content of each soil horizon are important factors in rating soils for use as construction materials. Each soil is evaluated to the depth observed, generally about 6 feet.

Roadfill is soil material used in embankments for roads. Soils are evaluated as a source of roadfill for low embankments, which generally are less than 6 feet high and less exacting in design than high embankments. The ratings reflect the ease of excavating and working the material and the expected performance of the material where it has been compacted and adequately drained. The performance of soil after it is stabilized with lime or cement is not considered in the ratings, but information about some of the soil properties that influence such performance is given in the descriptions of the soil series.

The ratings apply to the soil material between the A horizon and a depth of 5 to 6 feet. It is assumed that soil horizons will be mixed during excavation and spreading. Many soils have horizons of contrasting suitability within their profile. The estimated engineering properties in Table H provide specific information about the nature of each horizon. This information can help determine the suitability of each horizon for roadfill.

Soils rated good are coarse grained. They have low shrink-swell potential. They are at least moderately well drained and have slopes of 15 percent or less. Soils rated fair have a plasticity index of less than 15 and have other limiting features, such as moderate shrink-swell potential, moderately steep slopes, or wetness. If the thickness of suitable material is less than 3 feet, the entire soil is rated poor.

Sand and gravel are used in great quantities in many kinds of construction. The ratings in table N provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated good or fair has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material, such as shale and siltstone, are not considered to be sand and gravel. Fine-grained soils are not suitable sources of sand and gravel.

The ratings do not take into account depth to the water table or other factors that affect excavation of the material. Descriptions of grain size, kinds of minerals, reaction, and stratification are given in the soil series descriptions and in table H.

Topsoil is used in areas where vegetation is to be established and maintained. Suitability is affected mainly by the ease of working and spreading the soil material in preparing a seedbed and by the ability of the soil material to support plantlife. Also considered is the damage that can result at the area from which the topsoil is taken.

The ease of excavation is influenced by the thickness of suitable material, wetness, and slope. The ability of the soil to support plant-life is determined by texture, structure, and the amount of soluble salts or toxic substances. Organic matter in the A1 or Ap horizon greatly increases the absorption and retention of moisture and nutrients. Therefore, the soil material from these horizons should be carefully preserved for later use.

Soils rated good have at least 16 inches of friable loamy material at their surface. They are low in content of gravel, and have gentle slopes. They are low in soluble salts that can limit or prevent plant growth. They are naturally fertile or respond well to fertilizer. They are not so wet that excavation is difficult during most of the year.

Soils rated fair are loose sandy soils or firm loamy or clayey soils in which the suitable material is only 8 to 16 inches thick or soils that have appreciable amounts of gravel, or soluble salt.

Soils rated poor are very sandy soils and very firm clayey soils; soils with suitable layers less than 8 inches thick; soils having large amounts of gravel; steep soils; and poorly drained soils.

Although a rating of good is not based entirely on high content of organic matter, a surface horizon is generally preferred for topsoil because of its organic-matter content. This horizon is designated as A1 or Ap in the soil series descriptions. The absorption and retention of moisture and nutrients for plant growth are greatly increased by organic matter.

TABLE N.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions "good," "fair," and "poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
1----------------------- Acadia	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
3----------------------- Aldine	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
48---------------------- Angelina	Poor: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
4----------------------- Annona	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
16---------------------- Attoyac	Fair: low strength.	Poor: excess fines.	Unsuited: excess fines.	Good.
5----------------------- Beaumont	Poor: low strength, wetness, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness, too clayey.
7, 6-------------------- Bernaldo	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
15---------------------- Besner	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
42---------------------- Betis	Fair: low strength.	Poor: excess fines.	Unsuited: excess fines.	Fair: too sandy.
8----------------------- Bibb	Poor: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
9----------------------- Bienville	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
10---------------------- Boswell	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
33---------------------- Bowie	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too sandy, thin layer.
31, 32------------------ Bowie	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
24---------------------- Briley	Fair: low strength.	Poor: excess fines.	Unsuited: excess fines.	Fair: too sandy.
51---------------------- Crevasse	Good------------------	Fair: excess fines.	Unsuited: excess fines.	Poor: too sandy.
13*:				
Cuthbert----------------	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
Ruston------------------	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
14---------------------- Dallardsville	Fair: low strength, wetness.	Improbab : excess fines.	Improbab : excess fines.	Fair: too sandy.

See footnote at end of table.

TABLE 8.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
2------------------- Darden	Good-------------	Fair: excess fines.	Unsuited: excess fines.	Poor: too sandy.
46------------------ Fausse	Poor: wetness, low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, wetness.
17------------------ Gallime	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
18*:				
Gallime-------------	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
Alazan--------------	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
19------------------ Guyton	Poor: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
49------------------ Hatliff	Good-------------	Fair: excess fines.	Unsuited: excess fines.	Poor: too sandy.
44------------------ Iuka	Fair: low strength.	Poor: excess fines.	Unsuited: excess fines.	Good.
22------------------ Jasco	Poor: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
36------------------ Kirbyville	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
23------------------ Landman	Good-------------	Poor: excess fines.	Unsuited: excess fines.	Poor: too sandy.
26, 25-------------- Mantachie	Fair: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
27------------------ Midland	Poor: shrink-swell, low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
20------------------ Otanya	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
21*:				
Otanya--------------	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Kirbyville----------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
28------------------ Ozan	Poor: wetness.	Poor: excess fines.	Unsuited: excess fines.	Poor: wetness.
29------------------ Plank	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
30------------------ Rentzel	Fair: wetness.	Poor: excess fines.	Unsuited: excess fines.	Poor: too sandy.
35------------------ Sorter	Poor: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.

See footnote at end of table.

TABLE ¥.—CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
50. Spurger	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
37. Tonkawa	Good	Fair: excess fines.	Unsuited: excess fines.	Poor: too sandy.
34*. Udults				
45. Urbo	Poor: shrink-swell, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: wetness, too clayey.
36. Vamont	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
39. Waller	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

NOTES

Recreation

The soils of the survey area are rated in table G according to limitations that affect their suitability for recreation uses. The ratings are based on such restrictive soil features as flooding, wetness, slope, and texture of the surface layer. Not considered in these ratings, but important in evaluating a site, are location and accessibility of the area, size and shape of the area and its scenic quality, the ability of the soil to support vegetation, access to water, potential water impoundment sites available, and either access to public sewerlines or capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited, in varying degree, for recreation use by the duration and intensity of flooding and the season when flooding occurs. Onsite assessment of height, duration, intensity and frequency of flooding is essential in planning recreation facilities.

The degree of the limitation of the soils is expressed as slight, moderate, or severe. Slight means that the soil properties are generally favorable and that the limitations are minor and easily overcome. Moderate means that the limitations can be overcome or alleviated by planning, design, or special maintenance. Severe means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table G can be supplemented by information in other parts of this survey. Especially helpful are interpretations for septic tank absorption fields, given in table L and interpretations for dwellings without basements and for local roads and streets, given in table M.

Camp areas require such site preparation as shaping and leveling for tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils for this use have mild slopes and are not wet or subject to flooding during the period of use. The surface absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes can greatly increase the cost of constructing camping sites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for use as picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes that will increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is firm after rains, and is not dusty when dry. If shaping is required to obtain a uniform grade, the depth of the soil over hardpan should be enough to allow necessary grading.

Paths and trails for walking, horseback riding, bicycling, and other uses should require little or no cutting and filling. The best soils for this use are those that are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once during the annual period of use. They should have moderate slopes.

TABLE G.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definition "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
1 Acadia	Moderate: percs slowly, wetness.	Moderate: wetness.	Moderate: wetness, percs slowly.	Moderate: wetness.
3 Aldine	Severe: wetness, percs slowly.	Moderate: wetness.	Severe: wetness, percs slowly.	Moderate: wetness.
48 Angelina	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.
4 Annona	Severe: percs slowly.	Moderate: wetness.	Severe: percs slowly, wetness.	Moderate: wetness.
16 Attoyac	Slight	Slight	Slight	Slight
5 Beaumont	Severe: wetness, too clayey, percs slowly.	Severe: wetness, too clayey.	Severe: wetness, too clayey, percs slowly.	Severe: wetness, too clayey.
7 Bernaldo	Slight	Slight	Slight	Slight
6 Bernaldo	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight
15 Besner	Slight	Slight	Moderate: slope.	Slight
42 Betis	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy, slope.	Moderate: too sandy.
8 Bibb	Severe: floods, wetness.	Severe: wetness.	Severe: floods, wetness.	Severe: floods, wetness.
9 Bienville	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy, slope.	Moderate: too sandy.
10 Boswell	Severe: percs slowly.	Moderate: slope.	Severe: slope, percs slowly.	Slight
33 Bowie	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy, slope.	Slight
31 Bowie	Slight	Slight	Slight	Slight
32 Bowie	Slight	Slight	Moderate: slope.	Slight
24 Briley	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.
51 Crevasse	Severe: floods, too sandy.	Severe: too sandy.	Severe: floods.	Moderate: floods.

See footnote at end of table.

TABLE G.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
13*:				
Cuthbert	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Ruston	Slight	Slight	Severe: slope.	Slight.
14 Dallardsville	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
2 Darden	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
46 Fausse	Severe: floods, wetness, too clayey.	Severe: floods, wetness, too clayey.	Severe: floods, wetness, too clayey.	Severe: floods, wetness, too clayey.
17 Galline	Slight	Slight	Moderate: slope.	Slight.
18*:				
Galline	Slight	Slight	Slight	Slight.
Alazan	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Slight.
19 Guyton	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.
49 Hatliff	Moderate: wetness, too sandy.	Moderate: wetness, too sandy.	Severe: floods.	Moderate: floods.
44 Iuka	Severe: floods.	Moderate: wetness, floods.	Severe: floods.	Slight.
22 Jasco	Severe: wetness, percs slowly, floods.	Severe: wetness.	Severe: wetness, percs slowly, floods.	Severe: wetness.
36 Kirbyville	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
23 Landman	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.
26 Mantachie	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
25 Mantachie	Severe: floods.	Moderate: wetness.	Severe: floods.	Moderate: wetness.
27 Midland	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, percs slowly.	Severe: wetness.
20 Otanya	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight.
21*:				
Otanya	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Slight.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
21*: Kirbyville	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
28: Ozan	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
29: Plank	Severe: ponding, wetness, floods.	Severe: wetness, ponding.	Severe: wetness, ponding.	Severe: wetness, ponding.
30: Rentzel	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
35: Sorter	Severe: wetness, floods, percs slowly.	Severe: wetness.	Severe: wetness, floods, percs slowly.	Severe: wetness.
50: Spurger	Moderate: percs slowly, wetness.	Moderate: percs slowly, wetness.	Moderate: percs slowly.	Severe: erodes easily.
37: Tonkawa	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
34*. Udults				
45: Urbo	Severe: floods, wetness, percs slowly.	Moderate: wetness, floods, too clayey.	Severe: floods, percs slowly, wetness.	Moderate: wetness, floods, too clayey.
38: Vamont	Severe: too clayey, percs slowly.	Severe: too clayey.	Severe: too clayey, percs slowly.	Severe: too clayey.
39: Waller	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

NOTES

Wildlife habitat

Soils directly affect the kind and amount of vegetation that is available to wildlife as food and cover, and they affect the construction of water impoundments. The kind and abundance of wildlife that populate an area depend largely on the amount and distribution of food, cover, and water. If any one of these elements is missing, is inadequate, or is inaccessible, wildlife either are scarce or do not inhabit the area.

If the soils have the potential, wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by helping the natural establishment of desirable plants.

In table F , the soils in the survey area are rated according to their potential to support the main kinds of wildlife habitat in the area. This information can be used in planning for parks, wildlife refuges, natu study areas, and other developments for wildlife; selecting areas that are suitable for wildlife; selecting soils that are suitable for creating, improving, or maintaining specific elements of wildlife habitat; and determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of good means that the element of wildlife habitat or the kind of habitat is easily created, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected if the soil is used for the designated purpose. A rating of fair means that the element of wildlife habitat or kind of habitat can be created, improved, or maintained in most places. Moderately intensive management is required for

satisfactory results. A rating of poor means that limitations are severe for the designated element or kind of wildlife habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of very poor means that restrictions for the element of wildlife habitat or kind of wildlife are very severe, and that unsatisfactory results can be expected. Wildlife habitat is impractical or even impossible to create, improve, or maintain on soils having such a rating.

The elements of wildlife habitat are briefly described in the following paragraphs.

Grain and seed crops are seed-producing annuals used by wildlife. The major soil properties that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, and flood hazard. Soil temperature and soil moisture are also considerations.

Grasses and legumes are domestic perennial grasses and herbaceous legumes that are planted for wildlife food and cover. Major soil properties that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, flood hazard, and slope. Soil temperature and soil moisture are also considerations.

Wild herbaceous plants are native or naturally established grasses, forbs and weeds, that provide food and cover for wildlife. Major soil properties that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, and flood hazard. Soil temperature and soil moisture are also considerations.

Hardwood trees and the associated woody understory provide cover for wildlife and produce nuts or other fruit, buds, catkins, twigs, bark, or foliage that wildlife eat. Examples include trees such as oak, ash, hickory, and walnut. Major soil properties that affect growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness.

Coniferous plants are cone-bearing trees, shrubs, and ground cover plants that furnish habitat or supply food in the form of browse, seeds, or fruitlike cones. Pine and cypress are the main plants. Soil properties that have a major effect on the growth of coniferous plants are depth of the root zone, available water capacity, and wetness.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, or foliage used by wildlife or that provide cover and shade for some species of wildlife. Examples include holly, yaupon, bay, cyrilla, and buttonbush. Major soil properties that affect the growth of shrubs are depth of the root zone, available water capacity, and moisture.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites, exclusive of submerged or floating aquatics. They produce food or cover for wildlife that use wetlands as habitat. Major soil properties affecting wetland plants are texture of the surface layer, wetness, reaction, and slope.

Shallow water areas are bodies of water that have an average depth of less than 5 feet and that are useful to wildlife. They can be natural wet areas, or may be created by dams or levees or by water-control structures in streams or drainageways. Major soil properties affecting shallow water areas are wetness, slope, and permeability. The availability of a dependabl water supply is important if water areas are to be developed.

Openland habitat consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. There is very little openland within the confines of the Big Thicket Preserve, but some of the surrounding areas have some openland.

Woodland habitat consists of areas of hardwoods or pines, or a mixture of both, and associated grasses, legumes, and wild herbaceous plants.

Wetland habitat consists of open, or wooded, marshy or swampy, shallow water areas where water-tolerant plants grow.

TABLE P.--WILDLIFE HABITAT POTENTIALS

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that t soil was not rated]

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
1-----------------Acadia	Fair	Good	Good	---	Good	---	Fair	Fair	Good	Good	Fair
3-----------------Aldine	Fair	Good	Good	Good	Good	---	Fair	Fair	Good	Good	Fair
48----------------Angelina	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Good	Good	Very poor.	Very poor.	Good
4-----------------Annona	Fair	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
16----------------Attoyac	Good	Good	Good	---	Good	---	Poor	Very poor.	Good	Good	Very poor.
5-----------------Beaumont	Fair	Fair	Poor	Fair	Fair	---	Fair	Good	Fair	Fair	Fair
7-----------------Bernaldo	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
6-----------------Bernaldo	Fair	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
15----------------Besner	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
42----------------Betis	Poor	Fair	Fair	Fair	Fair	---	Very poor.	Very poor.	Fair	Fair	Very poor.
8-----------------Bibb	Poor	Fair	Fair	Fair	Fair	---	Good	Good	Fair	Fair	Good
9-----------------Bienville	Fair	Fair	Fair	---	Fair	---	Very poor.	Very poor.	Fair	Fair	Very poor.
10----------------Boswell	Fair	Fair	Good	Good	---	Good	Very poor.	Very poor.	Fair	Good	Very poor.
33, 31------------Bowie	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
32----------------Bowie	Fair	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
24----------------Briley	Poor	Fair	Good	Good	Good	---	Poor	Very poor.	Fair	Good	Very poor.
51----------------Crevasse	Poor	Fair	Fair	Poor	Poor	---	Poor	Very poor.	Fair	Poor	Very poor.
13*:											
Cuthbert----------	Good	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
Ruston------------	Fair	Good	Good	---	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
14----------------Dallardsville	Fair	Good	Good	Good	Good	---	Fair	Fair	Fair	Good	Fair
2-----------------Darden	Poor	Fair	Fair	Poor	Poor	---	Very poor.	Very poor.	Fair	Poor	Very poor.

See footnote at end of table.

TABLE F.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
46----------------- Fausse	Very poor.	Very poor.	Very poor.	Poor	---	---	Good	Good	Very poor.	Poor	Good
17----------------- Gallime	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
18*:											
Gallime------------	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
Alazan-------------	Fair	Good	Good	Good	Good	---	Fair	Fair	Good	Good	Fair
19----------------- Guyton	Poor	Fair	Fair	Fair	---	---	Good	Good	Poor	Fair	Good
49----------------- Hatliff	Fair	Fair	Fair	Good	Good	---	Fair	Poor	Fair	Good	Poor
44----------------- Iuka	Poor	Fair	Fair	Good	Good	---	Poor	Poor	Fair	Good	Poor
22----------------- Jasco	Very poor.	Poor	Poor	Poor	Poor	---	Good	Good	Poor	Poor	Good
36----------------- Kirbyville	Fair	Good	Good	Good	Good	---	Fair	Fair	Good	Good	Fair
23----------------- Landman	Poor	Fair	Fair	Fair	Fair	---	Poor	Poor	Fair	Fair	Poor
26----------------- Mantachie	Fair	Good	Good	Good	---	---	Fair	Fair	Good	Good	Fair
25----------------- Mantachie	Poor	Fair	Fair	Good	---	---	Fair	Fair	Fair	Good	Fair
27----------------- Midland	Poor	Fair	Fair	Fair	---	---	Good	Good	Fair	Fair	Good
20----------------- Otanya	Good	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor
21*:											
Otanya-------------	Good	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor
Kirbyville---------	Fair	Good	Good	Good	Good	---	Fair	Fair	Good	Good	Fair
28----------------- Ozan	Poor	Fair	Fair	Fair	Fair	---	Good	Good	Fair	Fair	Good
29----------------- Plank	Poor	Fair	Fair	Fair	Fair	---	Good	Fair	Fair	Fair	Fair
30----------------- Rentzel	Poor	Fair	Good	Good	Good	---	Fair	Fair	Fair	Good	Fair
35----------------- Sorter	Poor	Fair	Fair	Fair	Fair	---	Good	Good	Fair	Fair	Good
50----------------- Spurger	Good	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor
37----------------- Tonkawa	Poor	Poor	Fair	Poor	---	---	Very poor.	Very poor.	Poor	Poor	Very poor.
34*. Udults											

See footnote at end of table.

TABLE F.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat f[or]: Openland wildlife	Woodland wildlife	Wetland wildlife
45, Orbo	Poor	Fair	Fair	Good	---	Fair	Fair	Fair	Fair	Fair	Fair
38 Vamont	Fair	Fair	Poor	Fair	Fair	---	Fair	Good	Fair	Fair	Fair
39 Waller	Poor	Fair	Fair	Good	Fair	---	Good	Good	Fair	Good	Good

* See description of the map unit for composition and behavior characteristics of the map unit.

NOTES

Woodland management and productivity

Table E contains information useful to forest managers planning use of soils for wood crops. Mapping unit symbols for soils suitable for wood crops are listed, and the ordination (woodland suitability) symbol for each soil is given. All soils bearing the same ordination symbol require the same general kinds of woodland management and have about the same potential productivity.

The first part of the ordination symbol, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter w indicates excessive water in or on the soil; c, clay in the upper part of the soil; and s, sandy texture. The letter o indicates insignificant limitations or restrictions. If a soil has more than one limitation, priority in placing the soil into a limitation class is in the following order: w, c, s.

In table E the soils are also rated for a number of factors to be considered in management. Slight, moderate, and severe are used to indicate the degree of major soil limitations.

Ratings of the erosion hazard indicate the risk of loss of soil in well managed woodland. The risk is slight if the expected soil loss is small, moderate if some measures are needed to control erosion during logging and road construction, and severe if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of equipment limitation reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in

woodland management or harvesting. A rating of slight indicates that use of equipment is not limited to a particular kind of equipment or time of year; moderate indicates a short seasonal limitation or a need for some modification in management or equipment; severe indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree that the soil affects expected mortality of planted tree seedlings. Plant competition is not considered in the ratings. Seedlings from good planting stock that are properly planted during a period of sufficient rainfall are rated. A rating of slight indicates that the expected mortality of the planted seedlings is less than 25 percent; moderate, 25 to 50 percent; and severe, more than 50 percent.

Ratings of plant competition indicate the degree to which undesirable plants are expected to invade or grow if openings are made in the tree canopy. The invading plants compete with native plants or planted seedlings by impeding or preventing their growth. A rating of slight indicates little or no competition from other plants; moderate indicates that plant competition is expected to hinder the development of a fully stocked stand of desirable trees; severe means that plant competition is expected to prevent the establishment of a desirable stand unless the site is intensively prepared, weeded, or otherwise managed for the control of undesirable plants.

TABLE E.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Trees to plant
1----------------- Acadia	2w	Slight	Moderate	Slight	---------	Loblolly pine-------	86	Loblolly pine, sl
						Slash pine----------	86	pine.
						Longleaf pine-------	70	
						Sweetgum------------	80	
						Water oak-----------	80	
3----------------- Aldine	2w	Slight	Moderate	Slight	Severe	Loblolly pine-------	86	Loblolly pine, sla
						Sweetgum------------	86	pine.
						Southern red oak----	76	
48---------------- Angelina	5w	Slight	Severe	Severe	Severe		---	
4----------------- Annona	3c	Slight	Moderate	Slight	Slight	Loblolly pine-------	80	Loblolly pine, sla
						Shortleaf pine------	70	pine.
						Southern red oak----	75	
16---------------- Attoyac	1o	Slight	Slight	Slight	Slight	Loblolly pine-------	100	Loblolly pine, sla
						Longleaf pine-------	90	pine, American
						Sweetgum------------	100	sycamore, black
						Southern red oak----	90	walnut.
5----------------- Beaumont	2w	Slight	Severe	Severe	Severe	Loblolly pine-------	90	Loblolly pine, sla
						Southern red oak----	80	pine.
7, 6-------------- Bernaldo	2o	Slight	Slight	Slight	Slight	Loblolly pine-------	90	Loblolly pine, sla
						Shortleaf pine------	80	pine, sweetgum.
						Sweetgum------------	---	
						Southern red oak----	---	
15---------------- Besner	2o	Slight	Slight	Slight	Slight	Loblolly pine-------	90	Loblolly pine, sla
						Shortleaf pine------	80	pine, sweetgum.
						Sweetgum------------	---	
						Southern red oak----	---	
42---------------- Betis	3s	Slight	Moderate	Severe	Slight	Shortleaf pine------	71	Loblolly pine, sla
						Loblolly pine-------	80	pine.
						Longleaf pine-------	70	
8----------------- Bibb	2w	Slight	Severe	Severe	Severe	Loblolly pine-------	90	Eastern cottonwood
						Sweetgum------------	90	loblolly pine,
						Water oak-----------	90	sweetgum, yellow-
								poplar.
9----------------- Bienville	2s	Slight	Moderate	Moderate	---------	Loblolly pine-------	90	Loblolly pine, sla
						Longleaf pine-------	80	pine.
						Shortleaf pine------	85	
10---------------- Boswell	3c	Slight	Moderate	Moderate	Slight	Loblolly pine-------	80	Loblolly pine,
						Shortleaf pine------	70	shortleaf pine.
33, 31, 32-------- Bowie	2o	Slight	Slight	Slight	Slight	Loblolly pine-------	93	Loblolly pine, sla
						Shortleaf pine------	84	pine, shortleaf
24---------------- Briley	2s	Slight	Slight	Moderate	Moderate	Loblolly pine-------	86	Loblolly pine, sla
						Shortleaf pine------	70	pine.
						Longleaf pine-------	70	
						Slash pine----------	---	
51---------------- Crevasse	2s	Slight	Moderate	Severe	Slight	Loblolly pine-------	90	Loblolly pine, eas
						Sweetgum------------	90	cottonwood.
						White oak-----------	90	
						Eastern cottonwood--	100	

See footnote at end of table.

TABLE E.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Trees to plant
13*:								
Cuthbert	4c	Moderate	Slight	Slight	Slight	Loblolly pine	70	Loblolly pine, shortleaf pine.
						Shortleaf pine	60	
Ruston	2o	Slight	Slight	Slight	---------	Loblolly pine	91	Loblolly pine, slash pine, longleaf pine.
						Slash pine	91	
						Longleaf pine	76	
14 Dallardsville	3w	Slight	Moderate	Moderate	Moderate	Loblolly pine	80	Loblolly pine, slash pine.
						Shortleaf pine	70	
						Water oak	90	
						Sweetgum	---	
						Southern red oak	---	
2 Darden	3s	Slight	Moderate	Severe	Slight	Loblolly pine	80	Loblolly pine, slash pine.
						Shortleaf pine	70	
46 Fausse	4w	Slight	Severe	Severe	---------	Green ash	70	Baldcypress.
						Baldcypress	---	
						Water hickory	---	
						Water tupelo	---	
17 Gallime	2o	Slight	Slight	Slight	Slight	Loblolly pine	90	Loblolly pine, slash pine.
						Shortleaf pine	80	
						Sweetgum	---	
						Southern red oak	---	
18*:								
Gallime	2o	Slight	Slight	Slight	Slight	Loblolly pine	90	Loblolly pine, slash pine.
						Shortleaf pine	80	
						Sweetgum	---	
						Southern red oak	---	
Alazan	2w	Slight	Moderate	Slight	Severe	Loblolly pine	90	Loblolly pine, slash pine, sweetgum.
						Shortleaf pine	80	
						Sweetgum	---	
						Southern red oak	---	
19 Guyton	2w	Slight	Severe	Moderate	---------	Loblolly pine	90	Loblolly pine, sweetgum.
						Slash pine	90	
						Sweetgum	---	
						Green ash	---	
						Southern red oak	---	
						Water oak	---	
49 Hatliff	2w	Slight	Moderate	Moderate	Moderate	Loblolly pine	95	Loblolly pine, slash pine, eastern cottonwood.
						Slash pine	---	
						Sweetgum	---	
						Water oak	---	
						Willow oak	---	
44 Iuka	1w	Slight	Moderate	Moderate	Severe	Loblolly pine	100	Loblolly pine, eastern cottonwood, yellow-poplar.
						Sweetgum	100	
						Eastern cottonwood	105	
						Water oak	100	
22 Jasco	5w	Slight	Severe	Severe	Severe	Shortleaf pine	40	
						Loblolly pine	50	
36 Kirbyville	1w	Slight	Moderate	Slight	Severe	Loblolly pine	101	Slash pine, loblolly pine.
						Shortleaf pine	89	
						Slash pine	102	
						Longleaf pine	79	
23 Landman	2s	Slight	Moderate	Moderate	Slight	Loblolly pine	90	Loblolly pine, slash pine.
						Shortleaf pine	77	
						Southern red oak	---	
						White oak	---	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Trees to plan
26----------------- Mantachie	1w	Slight	Severe	Moderate	Severe	Green ash-----------	80	Green ash, easter
						Eastern cottonwood--	90	cottonwood,
						Cherrybark oak------	100	cherrybark oak,
						Loblolly pine-------	98	loblolly pine,
						Sweetgum------------	95	sweetgum, yellow-
						Yellow-poplar-------	95	poplar.
25----------------- Mantachie	1w	Slight	Severe	Severe	Severe	Green ash-----------	80	Green ash, easter
						Eastern cottonwood--	90	cottonwood,
						Cherrybark oak------	100	cherrybark oak,
						Loblolly pine-------	98	loblolly pine,
						Sweetgum------------	95	sweetgum, yellow-
						Yellow-poplar-------	95	poplar.
27----------------- Midland	2w	Slight	Severe	Moderate	--------	Green ash-----------	---	Eastern cottonwoo
						Water oak-----------	90	
						Sweetgum------------	90	
						Eastern cottonwood--	---	
20----------------- Otanya	1o	Slight	Slight	Slight	Moderate	Loblolly pine-------	98	Loblolly pine, sla
						Longleaf pine-------	77	pine, sweetgum.
						Shortleaf pine------	---	
						Sweetgum------------	---	
						Southern red oak----	---	
21*:								
Otanya------------	1o	Slight	Slight	Slight	Moderate	Loblolly pine-------	98	Loblolly pine, sla
						Longleaf pine-------	77	pine, sweetgum.
						Shortleaf pine------	---	
						Sweetgum------------	---	
						Southern red oak----	---	
Kirbyville--------	1w	Slight	Moderate	Slight	Severe	Loblolly pine-------	101	Slash pine, loblol
						Shortleaf pine------	89	pine.
						Slash pine----------	102	
						Longleaf pine-------	79	
28----------------- Ozan	2w	Slight	Severe	Severe	Severe	Loblolly pine-------	95	Loblolly pine, Shu
						Shortleaf pine------	---	oak, sweetgum,
						Sweetgum------------	90	American sycamore
						Water oak-----------	90	eastern cottonwoo
						Cherrybark oak------	---	
						Shumard oak---------	---	
						Eastern cottonwood--	---	
29----------------- Plank	5w	Slight	Severe	Severe	Moderate	Loblolly pine-------	53	Slash pine.
						Shortleaf pine------	42	
						Longleaf pine-------	42	
30----------------- Bentzel	2w	Slight	Moderate	Moderate	Moderate	Loblolly pine-------	92	Loblolly pine.
						Shortleaf pine------	81	
35----------------- Sorter	2w	Slight	Severe	Severe	Moderate	Loblolly pine-------	91	Loblolly pine, sla
						Shortleaf pine------	80	pine, sweetgum.
						Longleaf pine-------	80	
						Water oak-----------	90	
						Southern red oak----	80	
						Sweetgum------------	90	
50----------------- Spurger	1w	Slight	Moderate	Slight	Moderate	Loblolly pine-------	95	Loblolly pine, sla
						Shortleaf pine------	90	pine.
						Southern red oak----	---	
						Sweetgum------------	---	
37----------------- Tonkawa	5s	Slight	Moderate	Severe	Slight	Shortleaf pine------	55	Loblolly pine, sl
						Loblolly pine-------	---	pine.
						Longleaf pine-------	---	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordi-nation symbol	Management concerns: Erosion hazard	Equip-ment limita-tion	Seedling mortal-ity	Plant competi-tion	Potential productivity: Common trees	Site index	Trees to plant
45. Urbo	1w	Slight	Severe	Moderate	---------	Green ash Eastern cottonwood Cherrybark oak Sweetgum	93 108 99 98	Eastern cottonwood, loblolly pine, sweetgum, American sycamore, yellow-poplar.
38 Vamont	2w	Slight	Severe	Severe	Severe	Loblolly pine Southern red oak	90 80	Loblolly pine, slash pine.
39 Waller	2w	Slight	Severe	Severe	Severe	Loblolly pine Water oak Sweetgum Shortleaf pine Longleaf pine	80 80 80 70 70	Loblolly pine, slash pine.

* See description of the map unit for composition and behavior characteristics of the map unit.

The potential productivity of merchantable or important trees on a soil is expressed as a site index. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Important trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suitable for commercial wood production and that are suited to the soils.

Woodland understory vegetation

Understory vegetation consists of grasses, forbs, shrubs, and other plants. Some types of forest, under proper management, can produce enough understory vegetation to support grazing of livestock or wildlife, or both.

The quantity and quality of understory vegetation vary with the kind of soil, the age and kind of trees, the density of the canopy, and the depth and condition of the forest litter. The density of the forest canopy affects the amount of light that understory plants receive during the growing season.

Table D shows, for each soil suitable for woodland, the potential for producing understory vegetation. The table also lists the common names of the characteristic vegetation that grows on a specified soil and the percentage composition, by air-dry weight, of each kind of plant. The kind and percentages of understory plants listed in the table are those to be expected where canopy density is most nearly typical of forests that yield the highest production of wood crops.

The total production of understory vegetation is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year the soil moisture is above average during the optimum part of the growing season; in a normal year soil moisture is average; and in an unfavorable year it is below average.

A great variety of woodland understory vegetation is found within the Big Thicket. The vegetation is largely influenced by the soil and its characteristics relating to water holding capacity, soil drainage and water table.

The droughty dry type of vegetation, which is common in excessively drained soils, is characterized as a sparse open grassy understory. It consists mainly of sandhill bluestem, threeawns, prickly pear, and a few small yaupon. An example of a soil with this type of vegetation is Tonkawa fine sand.

Other areas that are not so dry, which is common in somewhat excessively drained soils, have considerably more vegetation. Understory vegetation would be thicker and more varied. Expected vegetation would by yaupon, holly, American beautyberry, greenbriar, blackberry, sandhill bluestem, pinehill bluestem, and dewberry. An example of soils with this type of vegetation are Betis and Bienville.

Other areas that are well drained to somewhat poorly drained have the thickest understory. Most areas are covered with yaupon, American beautyberry, American holly, red maple, chinquapin, elm, wild azalea, greenbriar, blackberry, dewberry, longleaf uniola, and pinehill bluestem. An example of soils with this type of vegetation are Otanya and Kirbyville.

Poorly drained and other wet areas have sparser understory. Commonly found plants are southern wax-myrtle, swamp cyrilla, sweetbay, greenbriar, redbay, red maple, huckleberry, blackberry, longleaf uniola, and low panicums. An example of this type of soil is Waller.

Some areas are ponded and water stands at the surface yearlong. These areas are locally known as "baygalls". Understory vegetation normally is a dense growth of swamp cyrilla, redbay, sweetbay, blackberry, and longleaf uniola. A few areas have some pitcher plants.

Some areas in the river bottoms are swamp and have virtually no understory under the baldcypress and water tupelo overstory.

TABLE D.--WOODLAND UNDERSTORY VEGETATION

[Only the soils suitable for production of commercial trees are listed]

Soil name and map symbol	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
		Lb/acre		Pct
3: Aldine	Favorable	2,750	Little bluestem	20
	Normal	2,000	Beaked panicum	15
	Unfavorable	1,500	Longleaf uniola	10
			Purpletop	5
			Brownseed paspalum	5
			Indiangrass	5
48: Angelina	Favorable	5,000	Southern wildrice	30
	Normal	4,000	Maidencane	30
	Unfavorable	3,500	Common buttonbush	10
			Black willow	10
			Hazel alder	10
4: Annona	Favorable	2,500	Little bluestem	15
	Normal	2,000	Brownseed paspalum	15
	Unfavorable	1,000	Panicum	15
			Indiangrass	10
			Longleaf uniola	10
			Purpletop	5
16: Attoyac	Favorable	3,000	Pinehill bluestem	15
	Normal	2,000	Beaked panicum	15
	Unfavorable	1,500	Longleaf uniola	10
			Panicum	10
			Indiangrass	5
			Purpletop	5
5: Beaumont	Favorable	3,000	Little bluestem	24
	Normal	2,000	Rustyseed paspalum	10
	Unfavorable	1,500	Hairy wildrye	10
			Indiangrass	5
			Brownseed paspalum	5
7, 6: Bernaldo	Favorable	2,500	Pinehill bluestem	20
	Normal	2,000	Beaked panicum	20
	Unfavorable	1,500	Longleaf uniola	20
			Panicum	10
			Purpletop	5
15: Besner	Favorable	3,000	Pinehill bluestem	15
	Normal	2,000	Beaked panicum	15
	Unfavorable	1,500	Longleaf uniola	10
			Indiangrass	10
			Sedge	10
			Common carpetgrass	10
			Purpletop	5
			Brownseed paspalum	5
			Paspalum	5
42: Betis	Favorable	3,000	Pinehill bluestem	15
	Normal	2,000	Arrowfeather threeawn	15
	Unfavorable	1,200	Longleaf uniola	15
			Broomsedge bluestem	10
			Beaked panicum	5
			Purpletop	5
			Indiangrass	5
8: Bibb	Favorable	1,500	Pinehill bluestem	25
	Normal	1,200	Cutover muhly	17
	Unfavorable	900	Longleaf uniola	17
			Grassleaf goldaster	13
			Beaked panicum	7

TABLE 8.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
		Lb/acre		Pct
9	Favorable	1,500	Pinehill bluestem	20
Bienville	Normal	1,100	Little bluestem	20
	Unfavorable	750	Panicum	20
			Longleaf uniola	10
			Threeawn	10
10	Favorable	1,200	Pinehill bluestem	32
Boswell	Normal	1,000	Longleaf uniola	32
	Unfavorable	700	Beaked panicum	15
24	Favorable	3,000	Longleaf uniola	15
Briley	Normal	2,300	Pinehill bluestem	15
	Unfavorable	1,500	Broomsedge bluestem	10
			Beaked panicum	5
			Panicum	5
			Purpletop	5
			Indiangrass	5
			Arrowfeather threeawn	5
51	Favorable	3,000	Little bluestem	50
Crevasse	Normal	2,000	Indiangrass	10
	Unfavorable	1,200	Crinkleawn	7
			Brownseed paspalum	5
13*:				
Cuthbert	Favorable	2,500	Pinehill bluestem	20
	Normal	2,000	Beaked panicum	20
	Unfavorable	1,250	Longleaf uniola	10
			Panicum	10
			Big bluestem	5
			Purpletop	5
			Indiangrass	5
Ruston	Favorable	1,500	Longleaf uniola	50
	Normal	1,200	Pinehill bluestem	15
	Unfavorable	1,000	Beaked panicum	10
			Panicum	10
14	Favorable	2,000	Pinehill bluestem	20
Dallardsville	Normal	1,500	Virginia wildrye	10
	Unfavorable	1,000	Beaked panicum	10
			Sedge	10
			Yaupon	10
			Southern bayberry	10
			Vaseygrass	5
			Longleaf uniola	5
			Silver plumegrass	5
			Florida paspalum	5
			Giant cane	5
2	Favorable	3,000	Broomsedge bluestem	20
Darden	Normal	2,000	Pinehill bluestem	15
	Unfavorable	1,200	Little bluestem	10
			Purpletop	10
			Panicum	10
			Indiangrass	5
			Arrowfeather threeawn	5
			Bluejack oak	5
			Blackjack oak	5
			Post oak	5

See footnote at end of table.

TABLE D.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Compositi
		Lb/acre		Pct
17 Galline	Favorable	3,000	Pinehill bluestem	20
	Normal	2,500	Beaked panicum	20
	Unfavorable	2,000	Longleaf uniola	20
			Purpletop	5
			Panicum	5
			American beautyberry	5
			Sassafras	5
			Greenbrier	5
18*:				
Galline	Favorable	3,000	Pinehill bluestem	20
	Normal	2,500	Beaked panicum	20
	Unfavorable	2,000	Longleaf uniola	20
			Purpletop	5
			Panicum	5
			American beautyberry	5
			Sassafras	5
			Greenbrier	5
Alazan	Favorable	2,500	Longleaf uniola	20
	Normal	2,000	Pinehill bluestem	15
	Unfavorable	1,500	Beaked panicum	15
			Purpletop	5
			Panicum	5
			Dogwood	5
			Southern bayberry	5
			Carolina jessamine	5
			American holly	5
19 Guyton	Favorable	2,100	Pinehill bluestem	50
	Normal	1,800	Chalky bluestem	15
	Unfavorable	1,500	Silver plumegrass	15
49 Iatliff	Favorable	3,000	Hairy panicum	15
	Normal	2,000	Virginia wildrye	15
	Unfavorable	1,500	Rustyseed paspalum	15
			Longleaf uniola	10
			American beautyberry	5
			Peppervine	5
			Muscadine grape	5
22 Jasco	Favorable	3,000	Sedge	45
	Normal	2,000	Broomsedge bluestem	10
	Unfavorable	1,500	Panicum	10
			Rush	10
			Pinehill bluestem	5
			Beaked panicum	5
			Virginia wildrye	5
			Southern bayberry	5
36 Kirbyville	Favorable	1,800	Pinehill bluestem	20
	Normal	1,500	Beaked panicum	15
	Unfavorable	900	Longleaf uniola	15
			Southern bayberry	10
			Switchgrass	5
			Flowering dogwood	5
			Purpletop	5
			Honeysuckle	5
			Carolina jessamine	5
			Tickclover	5
			Sedge	5

See footnote at end of table.

TABLE D.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		Lb/acre		Pct
23 Landman	Favorable	2,000	Pinehill bluestem	20
	Normal	1,500	Panicum	15
	Unfavorable	1,000	Longleaf uniola	15
			Purpletop	10
			American beautyberry	10
			Indiangrass	5
			Sedge	5
26, 25 Bantachie	Favorable	2,300	Longleaf uniola	35
	Normal	2,000	Pinehill bluestem	20
	Unfavorable	1,800		
20 Otanya	Favorable	1,800	Pinehill bluestem	15
	Normal	1,200	Beaked panicum	15
	Unfavorable	800	Longleaf uniola	15
			Indiangrass	10
			Panicum	10
			Purpletop	5
			Paspalum	5
			Sedge	5
			American holly	5
			Southern bayberry	5
			Flowering dogwood	5
21*:				
Otanya	Favorable	1,800	Pinehill bluestem	15
	Normal	1,200	Beaked panicum	15
	Unfavorable	800	Longleaf uniola	15
			Indiangrass	10
			Panicum	10
			Purpletop	5
			Paspalum	5
			Sedge	5
			American holly	5
			Southern bayberry	5
			Flowering dogwood	5
Kirbyville	Favorable	1,800	Pinehill bluestem	20
	Normal	1,500	Beaked panicum	15
	Unfavorable	900	Longleaf uniola	15
			Southern bayberry	10
			Switchgrass	5
			Flowering dogwood	5
			Purpletop	5
			Honeysuckle	5
			Carolina jessamine	5
			Tickclover	5
			Sedge	5
28 Ozan	Favorable	3,000	Beaked panicum	29
	Normal	2,200	Bluestem	22
	Unfavorable	1,000	Panicum	11
			Switchgrass	8
			Velvet panicum	8
			Uniola	8
29 Plank	Favorable	1,500	Pinehill bluestem	15
	Normal	1,000	Virginia wildrye	15
	Unfavorable	500	Paspalum	15
			Sedge	15
			Beaked panicum	10
			Silver plumegrass	5
			Giant cane	5
			Southern bayberry	5

See footnote at end of table.

TABLE D.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
		Lb/acre		Pct
30 Rentzel	Favorable	2,000	Broomsedge bluestem	20
	Normal	1,700	Pinehill bluestem	15
	Unfavorable	1,400	Longleaf uniola	15
			Beaked panicum	10
			Purpletop	10
35 Sorter	Favorable	3,500	Virginia wildrye	15
	Normal	2,500	Pinehill bluestem	10
	Unfavorable	1,500	Beaked panicum	10
			Silver plumegrass	10
			Longleaf uniola	10
			Sedge	10
			Giant cane	10
			Florida paspalum	5
50 Spurger	Favorable	1,300	Pinehill bluestem	50
	Normal	1,200	Brownseed paspalum	10
	Unfavorable	1,000	Pineywoods dropseed	5
			Sedge	5
			Beaked panicum	5
			Switchgrass	5
37 Tonkawa	Favorable	3,000	Broomsedge bluestem	20
	Normal	2,000	Pinehill bluestem	20
	Unfavorable	1,200	Arrowfeather threeawn	15
			Panicum	10
			Indiangrass	10
38 Vamont	Favorable	3,000	Little bluestem	25
	Normal	2,000	Virginia wildrye	15
	Unfavorable	1,500	Rustyseed paspalum	10
			Indiangrass	5
39 Waller	Favorable	3,000	Beaked panicum	30
	Normal	2,000	Virginia wildrye	20
	Unfavorable	1,500	Sedge	20
			Pinehill bluestem	10

* See description of the map unit for composition and behavior characteristics of the map unit.

NOTES

SOIL PROPERTIES

Extensive data about soil properties are summarized on the following pages. The two main sources of these data are the many thousands of soil borings made during the course of the survey and the laboratory analyses of selected soil samples from typical profiles.

In making soil borings during field mapping, soil scientists can identify several important soil properties. They note the seasonal soil moisture condition or the presence of free water and its depth. For each horizon in the profile, they note the thickness and color of the soil material; the texture, or amount of clay, silt, sand, and gravel or other coarse fragments; the structure, or the natural pattern of cracks and pores in the undisturbed soil; and the consistence of the soil material in place under the existing soil moisture conditions. They record the depth of plant roots and determine the pH or reaction of the soil.

Samples of soil material are analyzed in the laboratory to verify the field estimates of soil properties and to determine all major properties of key soils, especially properties that cannot be estimated accurately by field observation. Laboratory analyses are not conducted for all soil series in the survey area, but laboratory data for many soil series not tested are available from nearby survey areas.

Engineering properties

Table H gives estimates of engineering properties and classifications for the major horizons of each soil in the survey area.

Most soils, have within the upper 5 or 6 feet, horizons of contrasting properties. Table H gives information for each of these contrasting horizons in a typical profile. Depth to the upper and lower boundaries of each horizon is indicated. More information about the range in depth and about other properties in each horizon is given for each soil series in the section "Soil series and morphology."

Texture is described in table H in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. ""Loam,'' for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 25 percent sand. If a soil contains gravel or other particles coarser than sand, an appropriate modifer is added, for example, ""gravelly loam.'' Other texture terms are defined in the Glossary.

The two systems commonly used in classifying soils for engineering use are the Unified Soil Classification System (Unified) (2) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO) (1).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter, plasticity index, liquid limit, and organic-matter content. Soils are grouped into 15 classes; eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes have a dual classification symbol, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect their use in highway construction and maintenance. In this system a mineral soil is classified in one of seven basic groups ranging from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines. At the other extreme, in group A-7, are fine-grained soils. Highly organic soils are classified in group A-8 on the basis of visual inspection.

When laboratory data are available, the A-1, A-2, and A-7 groups are further classified as follows: A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, and A-7-6. As an additional refinement, the desirability of soils as subgrade material can be indicated by a group index number.

These numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The estimated classification, without group index numbers, is given in table H. Also in table H the percentage, by weight, of rock fragments more than 3 inches in diameter is estimated for each major horizon. These estimates are determined mainly by observing volume percentage in the field and then converting that, by formula, to weight percentage.

Percentage of the soil material less than 3 inches in diameter that passes each of four sieves (U.S. standard) is estimated for each major horizon. The estimates are based on tests of soils that were sampled in the survey area and in nearby areas and on field estimates from many borings made during the survey.

Liquid limit and plasticity index indicate the effect of water on the strength and consistence of soil. These indexes are used in both the Unified and AASHTO soil classification systems. They are also used as indicators in making general predictions of soil behavior. Range in liquid limit and plasticity index are estimated on the basis of test data from the survey area or from nearby areas and on observations of the many soil borings made during the survey.

In some surveys, the estimates are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterburg limits extend a marginal amount across classification boundaries (1 or 2 percent), the classification in the marginal zone is omitted.

TABLE H.--ENGINEERING PROPERTIES AND CLASSIFICATIONS

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not esti

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit
	In				Pct					Pct
1------------------ Acadia	0-9	Fine sandy loam	ML, CL-ML	A-4	0	100	100	95-100	85-100	<30
	9-19	Silt loam, silty clay loam.	CL	A-6	0	100	100	95-100	85-100	30-40
	19-50	Clay, silty clay	CH, CL	A-7-6	0	100	100	95-100	90-100	42-70
	50-70	Clay, silty clay, silty clay loam.	CH, CL	A-7-6, A-6	0	100	100	95-100	85-100	35-65
3------------------ Aldine	0-10	Very fine sandy loam.	ML, CL, CL-ML	A-4	0	98-100	98-100	95-100	70-90	<30
	10-19	Very fine sandy loam, loam, sandy clay loam.	CL	A-6, A-4	0	98-100	98-100	95-100	75-95	25-40
	19-60	Clay, silty clay	CH, CL	A-7-6	0	98-100	98-100	98-100	75-100	41-60
48----------------- Angelina	0-4	Loam-------------	CL-ML, SM-SC, SC, CL	A-2-4, A-4	0	100	100	80-100	30-55	18-25
	4-60	Sandy clay loam, clay loam, loam.	CL	A-6	0	100	100	80-100	55-70	26-40
4------------------ Annona	0-10	Fine sandy loam	SM, ML, SM-SC, CL-ML	A-4	0	95-100	95-100	75-95	45-70	<30
	10-40	Clay, clay loam	CH	A-7	0	95-100	95-100	90-100	75-95	51-70
	40-95	Clay, clay loam	CH, CL	A-7	0	95-100	95-100	90-100	75-95	41-55
16----------------- Attoyac	0-9	Fine sandy loam	SM-SC, CL-ML, ML, SM	A-4	0	98-100	90-100	70-100	40-65	<23
	9-75	Sandy clay loam, loam, fine sandy loam.	CL, SC	A-4, A-6	0	98-100	90-100	80-100	45-75	23-40
5------------------ Beaumont	0-20	Clay-------------	CH	A-7	0	100	85-100	65-75	60-70	55-65
	20-40	Clay, silty clay	CH	A-7	0	100	90-100	70-80	65-75	60-80
	40-60	Clay, silty clay	CH	A-7	0	100	90-100	75-90	70-90	75-90
7------------------ Bernaldo	0-14	Loamy fine sand	ML, SM, CL-ML, SM-SC	A-4	0	100	95-100	90-100	45-65	<25
	14-47	Loam, sandy clay loam, clay loam.	CL	A-6	0	100	100	90-100	51-75	28-40
	47-65	Fine sandy loam, loam, sandy clay loam.	CL, SC	A-4, A-6	0	100	95-100	90-100	45-65	25-40
6------------------ Bernaldo	0-14	Fine sandy loam	ML, SM, CL-ML, SM-SC	A-4	0	100	95-100	90-100	45-65	<25
	14-47	Loam, sandy clay loam, clay loam.	CL	A-6	0	100	100	90-100	51-75	28-40
	47-65	Fine sandy loam, loam, sandy clay loam.	CL, SC	A-4, A-6	0	100	95-100	90-100	45-65	25-40
15----------------- Besner	0-38	Fine sandy loam	SM, ML, CL-ML, SM-SC	A-4	0	100	95-100	90-100	45-70	<25
	38-80	Loam-------------	CL-ML, CL	A-4	0	100	95-100	90-100	55-80	18-30

TABLE 8.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
42----------------- Betis	0-37	Loamy fine sand	SM, SP-SM	A-2	0	100	97-100	90-100	10-35	---	NP
	37-60	Loamy fine sand, fine sandy loam.	SM	A-2, A-4	0	100	97-100	90-100	25-50	---	NP
8----------------- Bibb	0-37	Sandy loam-------	SM, SM-SC, ML, CL-ML	A-2, A-4	0-5	95-100	90-100	60-90	30-60	<25	NP-7
	37-60	Sandy loam, loam, silt loam.	SM, SM-SC, ML, CL-ML	A-2, A-4	0-10	60-100	50-100	40-100	30-90	<30	NP-7
9----------------- Bienville	0-48	Loamy fine sand	SM	A-2-4, A-4	0	100	100	90-100	25-50	---	NP
	48-72	Loamy fine sand, fine sandy loam.	SM, ML	A-2-4, A-4	0	100	100	90-100	30-55	<25	NP-3
10----------------- Boswell	0-5	Fine sandy loam	SM, ML	A-4	0	100	100	60-85	40-55	---	NP
	5-70	Clay, silty clay, silty clay loam.	CH, MH	A-7	0	100	100	90-100	75-95	50-70	25-40
33----------------- Bowie	0-12	Loamy fine sand	SM	A-2-4	0	100	98-100	50-75	13-35	<25	NP-3
	12-42	Sandy clay loam, clay loam, fine sandy loam.	SC, CL	A-4, A-6	0	90-100	90-100	85-100	40-55	20-40	8-22
	42-78	Sandy clay loam, clay loam, fine sandy loam.	SC, CL	A-4, A-6	0	80-100	70-100	65-100	36-65	20-40	8-20
31, 32------------- Bowie	0-12	Fine sandy loam	SM, SM-SC, ML	A-2-4, A-4	0	98-100	98-100	95-100	35-55	<25	NP-6
	12-42	Sandy clay loam, clay loam, fine sandy loam.	SC, CL	A-4, A-6	0	90-100	90-100	85-100	40-55	20-40	8-22
	42-78	Sandy clay loam, clay loam, fine sandy loam.	SC, CL	A-4, A-6	0	80-100	70-100	65-100	36-65	20-40	8-20
24----------------- Briley	0-23	Loamy fine sand	SM	A-2-4, A-4	0	97-100	95-100	80-98	17-45	<25	NP-4
	23-65	Fine sandy loam, sandy clay loam.	SC, CL	A-4, A-6	0	95-100	95-100	85-98	36-55	22-39	8-22
51----------------- Crevasse	0-10	Fine sand-------	SP-SM, SM	A-2-4, A-3	0	100	95-100	50-100	5-20	---	NP
	10-60	Sand, loamy sand, loamy fine sand.	SP-SM, SM	A-2, A-3	0	100	95-100	50-100	5-20	---	NP
13*: Cuthbert----------	0-8	Fine sandy loam	SM, SM-SC, ML	A-4	0-1	5-100	75-100	65-100	36-60	<30	NP-7
	8-29	Clay-------------	CH, MH, CL, ML	A-7	0	90-100	85-100	85-100	51-98	45-60	20-40
	29-69	Weathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 11.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
13*:											
Ruston	0-16	Fine sandy loam	SM, ML	A-4, A-2-4	0	85-100	78-100	65-100	30-75	<20	NP-
	16-41	Sandy clay loam, loam, clay loam.	SC, CL	A-6	0	85-100	78-100	70-100	36-75	30-40	11-
	41-47	Fine sandy loam, sandy loam.	SM, ML, CL-ML, SM-SC	A-4, A-2-4	0	85-100	78-100	65-100	30-75	<27	NP-
	47-80	Sandy clay loam, loam, clay loam.	SC, CL	A-6	0	85-100	78-100	70-100	36-75	30-40	11-
14 Dallardsville	0-5	Loamy very fine sand	SM, ML, SM-SC, CL-ML	A-4	0	100	98-100	70-95	40-65	<20	NP-
	5-33	Fine sandy loam, loamy fine sand, loamy very fine sand.	SM, ML	A-4	0	100	98-100	70-95	40-65	<20	NP-
	33-45	Sandy clay loam, loam, fine sandy loam.	SM-SC, SC, CL-ML, CL	A-4, A-6	0	100	98-100	80-95	36-75	20-35	5-
	45-70	Clay loam, sandy clay, sandy clay loam.	CL, CL-ML, SC, SM-SC	A-4, A-6, A-7	0	100	98-100	85-98	45-80	20-42	5-
2 Darden	0-14	Fine sand	SM, SP-SM	A-2, A-3	0	100	100	90-100	5-35	---	NP
	14-80	Loamy fine sand	SM, SP-SM	A-2	0	100	100	90-100	11-35	---	NP
46 Fausse	0-10	Clay	CH, OH, MH	A-7-6, A-7-5	0	100	100	100	95-100	60-100	30-
	10-46	Clay	CH, MH	A-7-6, A-7-5	0	100	100	100	95-100	60-105	30-
	46-60	Clay, silty clay, silty clay loam.	CH, MH, CL, ML	A-7-6, A-7-5	0	100	100	100	95-100	45-105	15-
17 Gallime	0-28	Fine sandy loam	SM, SC, CL, ML	A-4	0	95-100	95-100	90-100	45-65	15-28	NP-
	28-80	Sandy clay loam, clay loam, loam.	CL, SC	A-6, A-4	0	95-100	95-100	90-100	45-80	25-40	10-
18*:											
Gallime	0-28	Fine sandy loam	SM, SC, CL, ML	A-4	0	95-100	95-100	90-100	45-65	15-28	NP-
	28-80	Sandy clay loam, clay loam, loam.	CL, SC	A-6, A-4	0	95-100	95-100	90-100	45-80	25-40	10-
Alazan	0-16	Fine sandy loam	ML, CL-ML	A-4	0	100	96-100	90-100	51-80	<25	NP-
	16-72	Loam, sandy clay loam.	CL	A-6, A-4	0	100	96-100	90-100	51-85	25-40	8-
19 Guyton	0-23	Silt loam	ML, CL-ML	A-4	0	100	100	95-100	65-90	<27	NP-
	23-46	Silt loam, silty clay loam, clay loam.	CL, CL-ML	A-6, A-4	0	100	100	94-100	75-95	22-40	6-
	46-80	Silt loam, silty clay loam, clay loam.	CL, CL-ML, ML	A-6, A-4	0	100	100	95-100	51-95	<40	NP-

See footnote at end of table.

TABLE [illegible].--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
49------------------ Hatliff	0-10	Fine sandy loam	SM-SC, CL, CL-ML, SC	A-4	0	100	95-100	65-95	40-75	20-30	4-9
	10-80	Stratified fine sandy loam to sand.	SP-SM, SM, SC, SM-SC	A-2-4, A-4	0	100	95-100	50-90	5-45	<30	NP-9
44------------------ Iuka	0-13	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-4	0	95-100	90-100	70-95	45-75	12-30	NP-7
	13-22	Fine sandy loam, loam, sandy loam.	SM, SM-SC, ML, CL-ML	A-4	0	95-100	85-100	65-100	36-71	12-30	NP-7
	22-60	Sandy loam, fine sandy loam, loam.	SM, ML	A-2, A-4	0	95-100	90-100	70-100	25-55	12-30	NP-5
22------------------ Jasco	0-23	Silt loam-------	ML	A-4	0	100	100	90-100	80-97	23-31	2-8
	23-44	Silt loam, loam	CL-ML, CL	A-4, A-6	0	100	100	90-100	65-95	21-34	4-14
	44-65	Silty clay loam, clay loam, loam.	CL	A-4, A-6, A-7-6	0	100	100	90-100	65-90	28-45	8-22
36------------------ Kirbyville	0-18	Fine sandy loam	CL-ML, ML, CL	A-4	0	95-100	95-100	95-100	51-80	<25	NP-8
	18-75	Sandy clay loam, loam.	CL	A-6, A-4, A-7-6	0	95-100	95-100	90-100	51-85	25-42	8-25
23------------------ Landman	0-74	Loamy fine sand	SM, SM-SC	A-2-4	0	95-100	95-100	85-100	14-35	<25	NP-7
	74-80	Sandy clay loam, fine sandy loam.	CL, SC, CL-ML, SM-SC	A-4, A-6	0	95-100	90-100	80-100	36-55	23-40	6-20
26, 25-------------- Mantachie	0-11	Loam------------	CL-ML, SM-SC, SM, ML	A-4	0-5	95-100	90-100	60-85	40-60	<20	NP-5
	11-61	Loam, clay loam, sandy clay loam.	CL, SC, SM-SC, CL-ML	A-4, A-6	0-5	95-100	90-100	80-95	45-80	20-40	5-15
27------------------ Midland	0-7	Silty clay loam	CL	A-6, A-7-6	0	100	100	100	95-100	30-42	12-22
	7-60	Silty clay, clay, silty clay loam.	CH, CL	A-7-6	0	100	100	100	95-100	41-65	20-40
20------------------ Otanya	0-13	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-4	0	95-100	90-100	70-85	36-55	<25	NP-7
	13-26	Fine sandy loam, sandy clay loam, clay loam.	SC, CL	A-6, A-4	0	80-100	80-100	70-100	40-60	20-35	8-20
	26-72	Sandy clay loam, clay loam.	SC, CL	A-6, A-4	0	8[illegible]-100	80-100	70-100	40-70	22-40	8-26
21*: Otanya------------	0-13	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-4	0	95-100	90-100	70-85	36-55	<25	NP-7
	13-26	Fine sandy loam, sandy clay loam, clay loam.	SC, CL	A-6, A-4	0	80-100	80-100	70-100	40-60	20-35	8-20
	26-72	Sandy clay loam, clay loam.	SC, CL	A-6, A-4	0	90-100	80-100	70-100	40-70	22-40	8-26

See footnote at end of table.

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit
			Unified	AASHTO		4	10	40	200	
	In				Pct					Pct
21*:										
Kirbyville	0-18	Fine sandy loam	CL-ML, ML, CL	A-4	0	95-100	95-100	95-100	51-80	<25
	18-75	Sandy clay loam, loam.	CL	A-6, A-4, A-7-6	0	95-100	95-100	90-100	51-85	25-42
28 Ozan	0-15	Fine sandy loam	SM, ML	A-4	0	95-100	95-100	90-100	40-75	<20
	15-38	Loam, sandy loam	ML, CL-ML, CL	A-4	0	95-100	95-100	90-100	51-80	<30
	38-72	Loam, sandy clay loam, sandy loam.	CL, CL-ML, ML	A-4, A-6	0	95-100	95-100	90-100	51-85	<35
29 Plank	0-13	Silt loam	ML, CL-ML	A-4	0	100	98-100	90-100	70-95	<30
	13-42	Silt loam, loam.	ML, CL-ML	A-4	0	100	98-100	90-98	60-95	<30
	42-62	Silt loam, loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	98-100	90-98	60-95	20-35
30 Rentzel	0-29	Loamy fine sand	SM	A-2-4, A-4	0	97-100	95-100	75-98	15-40	<25
	29-75	Sandy clay loam, fine sandy loam.	SC, CL, SM-SC, CL-ML	A-6, A-4	0	95-100	90-100	75-98	36-55	20-39
35 Sorter	0-19	Silt loam	ML, CL-ML	A-4	0	100	95-100	95-100	51-80	<20
	19-79	Silt loam, loam, very fine sandy loam.	ML, CL-ML	A-4	0	100	95-100	95-100	51-80	<20
50 Spurger	0-9	Loam	SM, ML, CL-ML, SM-SC	A-4	0	95-100	90-100	70-95	40-75	<20
	9-36	Clay, clay loam	CH, CL	A-7-6	0	95-100	95-100	90-100	70-95	45-70
	36-65	Sandy clay loam, clay loam, loam.	CL, SC, SM-SC, CL-ML	A-4, A-6	0	95-100	90-100	80-100	45-80	20-40
	65-80	Variable	---	---	---	---	---	---	---	---
37 Tonkawa	0-84	Fine sand	SP-SM, SP	A-3, A-2	0	100	97-100	90-100	2-12	<30
34*. Udults										
45 Urbo	0-71	Clay	CL, CH	A-7	0	100	100	95-100	80-98	44-62
38 Vamont	0-8	Clay	CH	A-7	0	100	85-100	65-75	60-70	58-66
	8-70	Clay, silty clay	CH	A-7	0	100	90-100	70-80	65-75	62-76
	70-80	Clay, silty clay	CH	A-7	0	100	90-100	75-90	80-90	62-76
39 Waller	0-4	Silt loam	ML, CL-ML	A-4	0	100	98-100	95-100	51-75	<25
	4-34	Loam, silt loam, very fine sandy loam.	CL, CL-ML	A-4, A-6	0	100	98-100	95-100	60-90	18-30
	34-80	Loam, silty clay loam, clay loam.	CL, CL-ML	A-4, A-6	0	100	98-100	95-100	70-90	20-40

* See description of the map unit for composition and behavior characteristics of the map unit.

NOTES

Physical and chemical properties

Table J shows estimated values for several soil characteristics and features that affect behavior of soils in engineering uses. These estimates are given for each major horizon, at the depths indicated, in the typical pedon of each soil. The estimates are based on field observations and on test data for these and similar soils.

Permeability is estimated on the basis of known relationships among the soil characteristics observed in the field; particularly soil structure porosity, and gradation or texture that influence the downward movement of water in the soil. The estimates are for vertical water movement when the soil is saturated. Not considered in the estimates is lateral seepage or such transient soil features as plowpans and surface crusts. Permeability of the soil is an important factor to be considered in planning and designing drainage systems, in evaluating the potential of soils for septic tank systems and other waste disposal systems, and in many other aspects of land use and management.

Available water capacity is rated on the basis of soil characteristics that influence the ability of the soil to hold water and make it available to plants. Important characteristics are content of organic matter, soil texture, and soil structure. Shallow-rooted plants are not likely to use the available water from the deeper soil horizons. Available water capacity is an important factor in the choice of plants that can be grown in designated areas.

Soil reaction is expressed as a range in pH values. The range in pH of each major horizon is based on many field checks. For many soils, the values have been verified by laboratory analyses. Soil reaction is important in selecting the ornamental plants, or other plants to be grown; in evaluating soil amendments for fertility and stabilization; and in evaluating the corrosivity of soils.

Shrink-swell potential depends mainly on the amount and kind of clay in the soil. Laboratory measurements of the swelling of undisturbed clods were made for many soils. For others the swelling was estimated on the basis of the kind and amount of clay in the soil and on measurements of similar soils. The size of the load and the magnitude of the change in soil moisture content also influence the swelling of soils. Shrinking and swelling of some soils can cause damage to building foundations, basement walls, roads, and other structures unless special designs are used. A high shrink-swell potential indicates that special design and added expense may be required if the planned use of the soil will not tolerate large volume changes.

Erosion factors are used to predict the erodibility of a soil and its tolerance to erosion in relation to specific kinds of land use and treatment. The soil erodibility factor (K) is a measure of the susceptibility of the soil to erosion by water. Soils having the highest K values are the most erodible. K values range from 0.10 to 0.64.

TABLE J.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entir profile. Entries under "Wind erodibility group" apply only to the surface layer. Absence of an en indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/in	pH			
1---------------- Acadia	0-9	0.6-2.0	0.16-0.23	4.5-6.0	Low------------	0.43	4
	9-19	0.6-2.0	0.16-0.22	4.5-5.5	Moderate-------	0.32	
	19-50	<0.06	0.15-0.18	4.5-6.0	High-----------	0.32	
	50-70	<0.2	0.15-0.20	4.5-7.8	High-----------	0.32	
3---------------- Aldine	0-10	0.6-2.0	0.13-0.20	4.5-6.0	Low------------	0.43	5
	10-19	0.2-0.6	0.13-0.20	4.5-6.0	Moderate-------	0.43	
	19-60	<0.06	0.15-0.20	4.5-6.5	High-----------	0.32	
48--------------- Angelina	0-4	0.6-2.0	0.11-0.15	4.5-5.5	Low------------	0.28	5
	4-60	0.06-0.2	0.12-0.17	4.5-5.5	Low------------	0.28	
4---------------- Annona	0-10	0.6-2.0	0.13-0.18	4.5-6.5	Low------------	0.43	5
	10-40	<0.06	0.12-0.18	4.5-6.0	High-----------	0.32	
	40-95	<0.06	0.12-0.18	5.6-8.4	High-----------	0.28	
16--------------- Attoyac	0-9	2.0-6.0	0.11-0.15	5.1-6.5	Low------------	0.24	5
	9-75	0.6-2.0	0.12-0.17	5.1-6.5	Low------------	0.32	
5---------------- Beaumont	0-20	0.06-0.2	0.15-0.20	4.5-6.0	High-----------	0.32	5
	20-40	<0.06	0.15-0.20	4.5-5.5	High-----------	0.32	
	40-60	<0.06	0.15-0.20	5.1-7.8	High-----------	0.32	
7, 6------------- Bernaldo	0-14	2.0-6.0	0.11-0.15	5.1-6.5	Low------------	0.32	5
	14-47	0.6-2.0	0.15-0.20	4.5-6.5	Moderate-------	0.32	
	47-65	0.6-2.0	0.15-0.20	4.5-6.5	Low------------	0.32	
15--------------- Besner	0-38	2.0-6.0	0.11-0.15	4.5-6.5	Low------------	0.24	5
	38-60	0.6-2.0	0.15-0.20	4.5-6.5	Low------------	0.32	
42--------------- Betis	0-37	6.0-20	0.05-0.09	4.5-6.0	Low------------	0.17	5
	37-80	6.0-20	0.08-0.11	4.5-6.0	Low------------	0.17	
8---------------- Bibb	0-37	0.6-2.0	0.12-0.18	4.5-5.5	Low------------	0.20	5
	37-60	0.6-2.0	0.12-0.20	4.5-5.5	Low------------	0.37	
9---------------- Bienville	0-48	2.0-6.0	0.08-0.11	4.5-6.5	Low------------	0.20	5
	48-72	2.0-6.0	0.08-0.13	4.5-6.0	Low------------	0.20	
10--------------- Boswell	0-5	0.6-2.0	0.15-0.20	4.5-5.5	Low------------	0.37	5
	5-70	<0.06	0.14-0.18	4.5-5.5	High-----------	0.32	
33--------------- Bowie	0-12	6.0-20	0.07-0.09	5.1-6.5	Low------------	0.28	5
	12-42	0.6-2.0	0.15-0.20	4.5-5.5	Low------------	0.32	
	42-73	0.2-0.6	0.15-0.20	4.5-5.5	Low------------	0.28	
31, 32----------- Bowie	0-12	2.0-6.0	0.10-0.15	5.1-6.5	Low------------	0.32	5
	12-42	0.6-2.0	0.15-0.20	4.5-5.5	Low------------	0.32	
	42-75	0.2-0.6	0.15-0.20	4.5-5.5	Low------------	0.28	
24--------------- Briley	0-23	6.0-20	0.07-0.11	4.5-6.5	Low------------	0.20	5
	23-65	0.6-2.0	0.13-0.17	4.5-6.0	Low------------	0.24	
51--------------- Crevasse	0-10	6.0-20	0.02-0.06	5.6-8.4	Low------------	0.15	5
	10-60	6.0-20	0.02-0.06	5.6-8.4	Low------------	0.15	
13*: Cuthbert--------	0-8	2.0-6.0	0.11-0.15	4.5-6.5	Low------------	0.32	3
	8-29	0.2-0.6	0.12-0.18	3.6-5.5	Moderate-------	0.32	
	29-69	---	---	---	---------------	----	

See footnote at end of table.

TABLE J.—PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T
	In	In/hr	In/in	pH			
13*:							
Buston----------	0-16	0.6-2.0	0.09-0.16	5.1-6.5	Low-----------	0.32	5
	16-41	0.6-2.0	0.12-0.17	4.5-6.0	Low-----------	0.28	
	41-47	0.6-2.0	0.12-0.15	4.5-6.0	Low-----------	0.32	
	47-80	0.6-2.0	0.12-0.17	4.5-6.0	Low-----------	0.28	
14-------------- Dallardsville	0-5	2.0-6.0	0.11-0.20	3.6-5.5	Low-----------	0.37	5
	5-33	2.0-6.0	0.07-0.15	3.6-5.5	Low-----------	----	
	33-45	0.6-2.0	0.11-0.20	3.6-5.0	Low-----------	----	
	45-70	0.2-0.6	0.12-0.20	3.6-5.0	Moderate------	----	
2--------------- Darden	0-14	6.0-20	0.05-0.09	4.5-7.3	Low-----------	0.15	5
	14-80	6.0-20	0.05-0.09	4.5-7.3	Low-----------	0.15	
46-------------- Fausse	0-10	<0.06	0.18-0.20	5.6-7.3	Very high-----	0.20	5
	10-46	<0.06	0.18-0.20	6.6-8.4	Very high-----	0.24	
	46-60	<0.2	0.18-0.22	6.6-8.4	Very high-----	0.24	
17-------------- Galline	0-28	2.0-6.0	0.11-0.15	5.1-7.3	Low-----------	0.32	5
	28-80	0.6-2.0	0.12-0.17	4.5-6.5	Moderate------	0.43	
18*:							
Galline---------	0-28	2.0-6.0	0.11-0.15	5.1-7.3	Low-----------	0.32	5
	28-80	0.6-2.0	0.12-0.17	4.5-6.5	Moderate------	0.43	
Alazan----------	0-16	2.0-6.0	0.11-0.15	4.5-6.0	Low-----------	0.32	5
	16-72	0.6-2.0	0.15-0.20	4.5-7.3	Low-----------	0.28	
19-------------- Guyton	0-23	0.6-2.0	0.20-0.23	3.6-6.0	Low-----------	0.49	3
	23-46	0.06--.2	0.15-0.22	3.6-6.0	Low-----------	0.37	
	46-80	0.06-2.0	0.15-0.22	3.6-8.4	Low-----------	0.37	
49-------------- Hatliff	0-10	2.0-6.0	0.11-0.15	5.1-7.3	Low-----------	0.24	5
	10-80	2.0-6.0	0.05-0.11	5.1-7.3	Low-----------	0.24	
44-------------- Iuka	0-13	0.6-2.0	0.10-0.15	5.1-6.0	Low-----------	0.24	5
	13-22	0.6-2.0	0.10-0.15	4.5-5.5	Low-----------	0.28	
	22-60	0.6-2.0	0.10-0.15	4.5-5.5	Low-----------	0.20	
22-------------- Jasco	0-23	0.6-2.0	0.12-0.22	3.6-5.5	Low-----------	0.43	3
	23-44	<0.06	0.-0.05	3.6-5.5	Low-----------	0.37	
	44-65	0.06-0.2	0.-0.05	3.6-5.5	Low-----------	0.37	
36-------------- Kirbyville	0-18	2.0-6.0	0.11-0.15	4.5-6.0	Low-----------	0.32	5
	18-75	0.6-2.0	0.15-0.20	4.5-5.5	Low-----------	0.28	
23-------------- Landman	0-74	6.0-20	0.05-0.10	5.1-6.5	Very low------	0.17	5
	74-80	0.2-0.6	0.10-0.15	4.5-6.5	Low-----------	0.24	
26, 25---------- Mantachie	0-11	0.6-2.0	0.16-0.20	4.5-5.5	Low-----------	0.28	5
	11-61	0.6-2.0	0.14-0.20	4.5-5.5	Low-----------	0.28	
27-------------- Midland	0-7	0.06-0.2	0.20-0.22	5.1-6.5	Moderate------	0.37	4
	7-60	<0.06	0.18-0.20	5.6-8.4	High----------	0.32	
20-------------- Otanya	0-13	2.0-6.0	0.10-0.15	4.5-6.5	Low-----------	0.32	5
	13-26	0.6-2.0	0.15-0.20	4.5-5.5	Low-----------	0.32	
	26-72	0.2-0.6	0.15-0.20	4.5-5.5	Low-----------	0.32	
21*:							
Otanya----------	0-13	2.0-6.0	0.10-0.15	4.5-6.5	Low-----------	0.32	5
	13-26	0.6-2.0	0.15-0.20	4.5-5.5	Low-----------	0.32	
	26-72	0.2-0.6	0.15-0.20	4.5-5.5	Low-----------	0.32	
Kirbyville------	0-18	2.0-6.0	0.11-0.15	4.5-6.0	Low-----------	0.32	5
	18-75	0.6-2.0	0.15-0.20	4.5-5.5	Low-----------	0.28	

See footnote at end of table.

TABLE 3.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T
	In	In/hr	In/in	pH			
28---------------- Ozan	0-15	0.6-2.0	0.14-0.17	4.5-6.0	Low------------	0.32	5
	15-38	0.06-0.2	0.15-0.18	4.5-6.0	Low------------	0.43	
	38-72	0.06-0.2	0.15-0.18	4.5-6.0	Low------------	0.43	
29---------------- Plank	0-13	0.6-2.0	0.15-0.20	3.6-6.0	Low------------	0.43	5
	13-42	2.0-0.6	0.15-0.20	4.5-6.0	Low------------	0.43	
	42-62	0.06-0.2	0.15-0.20	5.1-7.3	---------------	0.43	
30---------------- Sentzel	0-29	6.0-20	0.07-0.11	5.1-6.5	Low------------	0.17	5
	29-75	0.2-0.6	0.12-0.17	3.6-5.5	Low------------	0.32	
35---------------- Sorter	0-19	0.6-2.0	0.15-0.20	5.6-7.3	Low------------	0.43	5
	19-79	0.06-0.2	0.15-0.20	4.5-6.0	Low------------	0.49	
50---------------- Spurger	0-9	0.6-2.0	0.11-0.20	4.5-5.5	Low------------	0.43	5
	9-36	0.06-0.2	0.12-0.18	4.5-5.5	Moderate------	0.32	
	36-65	0.2-0.6	0.12-0.17	4.5-5.5	Low------------	0.32	
	65-80	---	---	---	---------------	---	
37---------------- Tonkawa	0-84	6.0-20	0.04-0.08	4.5-6.5	Low------------	0.15	5
34*. Udults							
45*. Urbo	0-71	0.06	0.18-0.20	4.5-5.5	Moderate---------	---	---
38---------------- Vamont	0-8	0.06-0.2	0.15-0.2	4.5-7.3	High-----------	0.32	5
	8-70	<0.06	0.15-0.2	5.1-7.3	High-----------	0.32	
	70-80	<0.06	0.15-0.2	5.6-7.8	High-----------	0.32	
39---------------- Waller	0-4	0.6-2.0	0.15-0.20	4.5-6.0	Low------------	0.43	5
	4-34	0.6-2.0	0.15-0.20	4.5-6.0	Low------------	0.43	
	34-80	0.6-2.0	0.15-0.20	5.6-7.3	Low------------	0.37	

* See description of the map unit for composition and behavior characteristics of the map unit.

NOTES

To estimate annual soil loss per acre, the K value of a soil is modified by factors representing plant cover, grade and length of slope, management practices, and climate. The soil-loss tolerance factor (T) is the maximum rate of soil erosion, whether from rainfall or soil blowing, that can occur without reducing crop production or environmental quality. The rate is expressed in tons of soil loss per acre per year.

Soil and water features

Table K contains information helpful in planning land uses and engineering projects that are likely to be affected by soil and water features.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are placed in one of four groups on the basis of the intake of water after the soils have been wetted and have received precipitation from long-duration storms.

The four Hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist chiefly of deep, well drained to excessively drained sands or gravels. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils that have a layer that impedes the downward movement of water or soils that have moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clay soils that have a high shrink-swell potential, soils that have a permanent high water table, and soils that have a claypan or clay layer at or near the surface. These soils have a very slow rate of water transmission.

Flooding is the temporary covering of soil with water from overflowing streams, with runoff from adjacent slopes, and by tides. Water standing for short periods after rains is not considered flooding, nor is water in swamps and marshes. Flooding is rated in general terms that describe the frequency and duration of flooding and the time of year when flooding is most likely. The ratings are based on evidence in the soil profile of the effects of flooding, namely thin strata of gravel, sand, silt, or, in places, clay deposited by floodwater; irregular decrease in organic-matter content with increasing depth; and absence of distinctive soil horizons that form in soils of the area that are not subject to flooding.

The generalized description of flood hazards is of value in land-use planning and provides a valid basis for land-use restrictions. The soil data are less specific, however, than those provided by detailed engineerin surveys that delineate flood-prone areas at specific flood frequency levels

High water table is the highest level of a saturated zone more than 6 inches thick for a continuous period of more than 2 weeks during most years. The depth to a seasonal high water table applies to undrained soils. Estimates are based mainly on the relationship between grayish colors or mottles in the soil and the depth to free water observed in many borings made during the course of the soil survey. Indicated in table K are the depth to the seasonal high water table; the kind of water table, that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. Only saturated zones above a depth of 5 or 6 feet are indicated.

Information about the seasonal high water table helps in assessing the need for specially designed foundations, the need for specific kinds of drainage systems, and the need for footing drains to insure dry basements. Such information is also needed to decide whether or not construction of basements is feasible and to determine how septic tank absorption fields and other underground installations will function. Also, a seasonal high water table affects ease of excavation.

Subsidence is the settlement of organic soils or of soils containing semifluid layers. Initial subsidence generally results from drainage. Total subsidence is initial subsidence plus the slow sinking that occurs over a period of several years as a result of the oxidation or compression of organic material.

TABLE K.--SOIL AND WATER FEATURES

[The definitions of "flooding" and "water table" in the Glossary explain terms such as "rare," "brief," "apparent," and "perched." The symbol < means less than; > means more than. Absence of an entry indica that the feature is not a concern]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Subsidence		Risk of corro	
		Frequency	Duration	Months	Depth	Kind	Months	Initial	Total	Uncoated steel	Conc
					Ft			In	In		
1 Acadia	D	None	---	---	0.5-1.5	Perched	Dec-Apr	---	---	High	High
3 Aldine	D	None	---	---	1.5-2.5	Perched	Nov-May	---	---	High	High
48 Angelina	D	Common	Very long	Oct-Jun	0-3.0	Apparent	Oct-Jun	---	---	High	High
4 Annona	D	None	---	---	2.0-4.0	Apparent	Dec-Feb	---	---	High	Mode
16 Attoyac	B	None	---	---	>6.0	---	---	---	---	Moderate	Mode
5 Beaumont	D	Rare	---	---	0-2.0	Apparent	Nov-Mar	---	---	High	Mode
7, 6 Bernaldo	B	None	---	---	4.0-6.0	Apparent	Nov-Feb	---	---	Moderate	Mode
15 Besner	B	None	---	---	4.0-6.0	Apparent	Jan-Feb	---	---	Low	Mode
42 Betis	A	None	---	---	>6.0	---	---	---	---	Low	Mode
8 Bibb	C	Frequent	Brief	Dec-May	0.5-1.5	Apparent	Dec-Apr	---	---	High	Mode
9 Bienville	A	None to rare	Brief	Dec-Jun	4.0-6.0	Apparent	Dec-Apr	---	---	Low	Mode
10 Boswell	D	None	---	---	>6.0	---	---	---	---	High	Mode
33, 31, 32 Bowie	B	None	---	---	>6.0	---	---	---	---	Moderate	High
24 Briley	B	None	---	---	>6.0	---	---	---	---	Moderate	High
51 Crevasse	A	Frequent	Brief	Oct-Mar	3.5-6.0	Apparent	Nov-Mar	---	---	Low	Mode
13*: Cuthbert	C	None	---	---	>6.0	---	---	---	---	High	High
Ruston	B	None	---	---	>6.0	---	---	---	---	Moderate	Mode
14 Dallardsville	C	None	---	---	1.0-2.0	Perched	Dec-Apr	---	---	High	High
2 Darden	A	None	---	---	>6.0	---	---	---	---	Low	High
46 Fausse	D	Common	Brief to long.	Jan-Dec	+1.-1.5	Apparent	Jan-Dec	---	---	High	Low.
17 Gallime	B	None	---	---	4.0-6.0	Apparent	Dec-Mar	---	---	Moderate	Mode
18*: Gallime	B	None	---	---	4.0-6.0	Apparent	Dec-Mar	---	---	Moderate	Mode

See footnote at end of table.

TABLE K.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Subsidence: Initial	Subsidence: Total	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In	In		
18*:											
Alazan	B	None	---	---	1.5-2.5	Apparent	Jan-Apr	---	---	High	Moderate.
19 Guyton	D	Frequent	Very brief to long.	Jan-Dec	0-1.5	Perched	Dec-May	---	---	High	Moderate.
49 Hatliff	C	Frequent	Brief	Nov-May	0-2.0	Apparent	Nov-Mar	---	---	Low	Moderate.
44 Iuka	C	Frequent	Brief	Dec-Apr	1.0-3.0	Apparent	Dec-Apr	---	---	Moderate	High.
22 Jasco	D	Common	Long	Nov-May	0-3.0	Perched	Sep-May	---	---	High	High.
36 Kirbyville	B	None	---	---	1.5-2.5	Apparent	Jan-Mar	---	---	High	Moderate.
23 Landman	B	None	---	---	4.0-6.0	Perched	Oct-May	---	---	Low	Moderate.
26 Mantachie	C	Occasional	Brief	Jan-Mar	1.0-1.5	Apparent	Dec-Mar	---	---	High	High.
25 Mantachie	C	Frequent	Brief	Jan-Mar	1.0-1.5	Apparent	Dec-Mar	---	---	High	High.
27 Midland	D	None	---	---	0.5-3.0	Apparent	Dec-Apr	---	---	High	Moderate.
20 Otanya	B	None	---	---	2.0-3.0	Perched	Dec-Apr	---	---	High	High.
21*:											
Otanya	B	None	---	---	2.0-3.0	Perched	Dec-Apr	---	---	High	High.
Kirbyville	B	None	---	---	1.5-2.5	Apparent	Jan-Mar	---	---	High	Moderate.
28 Ozan	D	None	---	---	1.0-2.5	Perched	Dec-May	---	---	High	Moderate.
29 Plank	D	Rare	---	---	+0.-2.5	Perched	Oct-May	---	---	High	High.
30 Rentzel	C	None	---	---	1.5-2.5	Apparent	Jan-Mar	---	---	Moderate	High.
35 Sorter	D	Common	Brief	Oct-May	+.5-2.5	Perched	Oct-May	---	---	High	High.
50 Spurger	C	None	---	---	2.5-3.5	Perched	Dec-Feb	---	---	High	High.
37 Tonkawa	A	None	---	---	>6.0	---	---	---	---	Low	Moderate.
34*. Udults											
45 Urbo	D	Frequent	Brief to long.	Jan-Mar	1.0-2.0	Apparent	Jan-Mar	---	---	High	High.
38 Vamont	D	None	---	---	0-2.0	Apparent	Nov-Mar	---	---	High	Moderate.
39 Waller	B/D	None	---	---	0-2.5	Apparent	Nov-Jun	---	---	High	Moderate.

* See description of the map unit for composition and behavior characteristics of the map unit.

Risk of corrosion pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to soil moisture, particle-size distribution, total acidity, and electrical conductivity of the soil material. The rate of corrosion of concrete is based mainly on the sulfate content, texture, and acidity of the soil. Protective measures for steel or more resistant concrete help to avoid or minimize damage resulting from the corrosion. Uncoated steel intersecting soil boundaries or soil horizons is more susceptible to corrosion than an installation that is entirely within one kind of soil or within one soil horizon.

FORMATION OF THE SOILS

In this section the factors of soil formation are discussed and related to the soils in the survey area. In addition, the processes of soil formation are described.

Factors of Soil Formation

Soil is formed by the action of soil-forming processes on material deposited or accumulated by geological agencies. The characteristics of a soil at any given point depend on (1) the physical and mineralogical composition of the parent material, (2) the climate under which the soil material has accumulated and has existed since accumulation, (3) the plant and animal life on and in the soil, (4) the relief or lay of the land, and (5) the length of time the forces of soil development has acted on the soil material.

Generally soil formation is expressed as the alteration of the soil material that was originally laid down. In this survey area, soil development is most evident by the accumulation of clay size particles in some subhorizon in the soil.

All five of these factors are important in the genesis of every soil; some have had more influence than others in different locations. The factors are discussed in the following paragraphs.

Parent material (3)

Parent material is the unconsolidated mass from which a soil is formed. It determines the limits of the chemical and mineralogical composition of the soil. The soils of the Big Thicket National Preserve have developed from parent materials of Pleistocene and Recent materials.

Pleistocene age materials influenced the soils in all of the survey area except those near major streams. Pleistocene materials include those of the Beaumont, Montgomery, Bentley, and Willis Formations. Bentley, Montgomery, and Willis Formations consist of loamy and silty materials. They are broad level flats dissected by broad gently sloping ridges. The flats are siltier than the ridges. The Beaumont Formation consists of clays and some loamy materials and is nearly level.

Recent materials occur as Deweyville and Alluvium Formations. These materials were laid down by major streams that dissect the survey area. Deweyville consists of sands, silts, and clays. It has thinner developed soils than other formations in the area. It is nearly level to gently sloping. Alluvium occurs adjacent to major streams in the area. It is clay with some loam along the Neches River. Along the lesser streams it is more loamy.

Climate

The climate of the Big Thicket National Preserve is humid. It has had a definite affect on soil formation. Rainfall, evaporation, and temperature are the main influencing factors of climate. The plentiful rainfall in the survey area has accelerated soil development by leaching soil minerals and particles to lower depths within the soil where they have accumulated.

Although evaporation is most active during the summer months, some evaporation occurs throughout the year because of the mild winters.

The high summer temperatures and mild winters promote plant growth for most of the year. It also causes soil organisms to be active most of the year which limits the accumulation of organic matter in the soil.

Plant and animal life

Plants, micro-organisms, earthworms, insects, and animals, including man, have contributed to the development of soils. These can either promote or retard soil development by: changes that they cause in organic matter and soil fertility, changes in soil structure and porosity; and changes in the distribution of soil particles.

Plants, such as hardwoods and grasses, generally retard soil development somewhat because they bring some exchangeable soil bases from the subsoil back to the surface. Other plants, such as pines, do not return as many of these bases to the surface.

Plants also retard soil development if they become uprooted. Some of the soil material that was several feet in the soil clings to the roots and is added to the top of the soil.

Organic matter is added to the soil from dead plants, or portions of plants, which increases the natural fertility of the soil which, in turn, affects soil development. Organic matter is added at different rates, depending on the type of plant. For instance, trees do not add all of the above ground portion to the soil, whereas grasses do.

Small animals have affected the soil to a great degree. The wetter areas have been affected greatly by the mixing of the soil by crawfish. Armadillos and other small animals burrow into the soil and mix different parts of the soil together. Earthworms also cause mixing. Earthworms, bacteria, and fungi accelerate the decay of organic matter in the upper few inches of the soil.

Man has also had an important impact on soil development in several ways. In timbered areas, man has harvested the wood to make lumber and

paper. This has decreased the amount of organic matter that has been, or would be, added to the soil. The native plant community has also been changed when harvesting occurred. The understory has also been altered as land was fenced, fire was controlled, and trees were harvested. Some timber operations, especially ones using heavy machinery, can severely compact the soil which will impede the movement of water and air into the soil.

Relief

Relief or topography influences soil development through its effect on drainage and runoff. The topography of the Big Thicket National Preserve is generally nearly level or gently sloping although there are a few steeper areas. Generally, the less sloping the area is, the more developed the soil is.

The degree of soil development depends on the amount of water that enters the soil, the depth of water penetration into the soil, and the rate at which water moves through the soil. Nearly level soils absorb more moisture and usually have more developed profiles. In gently sloping areas, some of the water is lost because it runs off as surface runoff rather than enter the soil. In many of the steeper areas, much of the water is lost as surface runoff and therefore the soil shows less development. These steeper areas also tend to lose soil as fast as soil development takes place due to erosion.

With the exception of the stream terraces and bottomlands, all of the soils in the Big Thicket are deeply developed.

Time

A great length of time is required for the formation of soils. The differences in the length of time that parent materials have been in place are generally reflected in the degree of development of the soil profile. Generally, the longer a soil is exposed, the more developed it becomes.

The soils of the Big Thicket National Preserve range from many tens of thousands of years old to the young soils in the flood plains of present streams that are still being added to by floods. The young soils show little change from what they looked like when the sediments were laid down. Examples include the Mantachie and Urbo soils, which are bottomland soils. The older soils, such as Bienville, have been in place long enough so that distinct soil horizons have developed.

Some of the older soils in the area have developed long enough that many of the bases have been leached from the soil. These soils are acid and also have well developed profiles. Otanya and Kirbyville are examples.

CLASSIFICATION OF THE SOILS

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965. Readers interested in further details about the system should refer to "Soil Taxonomy" (5).

The system of classification has six categories. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. In this system the classification is based on the different soil properties that can be observed in the field or those that can be inferred either from other properties that are observable in the field or from the combined data of soil science and other disciplines. The properties selected for the higher categories are the result of soil genesis or of factors that affect soil genesis. In table Q1, the soils of the survey area are classified according to the system. Categories of the system are discussed in the following paragraphs.

ORDER. Ten soil orders are recognized as classes in the system. The properties used to differentiate among orders are those that reflect the kind and degree of dominant soil-forming processes that have taken place. Each order is identified by a word ending in sol. An example is Entisol.

SUBORDER. Each order is divided into suborders based primarily on properties that influence soil genesis and are important to plant growth or that are selected to reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquent (Aqu, meaning water, plus ent, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of expression of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and a prefix that suggests something about the properties of the soil. An example is Fluvaquents (*Fluv*, meaning flood plain, plus *aquent*, the suborder of Entisols that have an aquic moisture regime).

SUBGROUP. Each great group may be divided into three subgroups: the central (typic) concept of the great groups, which is not necessarily the most extensive subgroup; the intergrades, or transitional forms to other orders, suborders, or great groups; and the extragrades, which have some properties that are representative of the great groups but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceeding the name of the great group. The adjective *Typic* identifies the subgroup that is thought to typify the great group. An example is Typic Fluvaquents.

FAMILY. Families are established within a subgroup on the basis of similar physical and chemical properties that affect management. Among th properties considered in horizons of major biological activity below plow depth are particle-size distribution, mineral content, temperature regime, thickness of the soil penetrable by roots, consistence, moisture equivalent, soil slope, and permanent cracks. A family name consists of the nam of a subgroup and a series of adjectives. The adjectives are the class na for the soil properties used as family differentiae. An example is coarse loamy, siliceous, acid, thermic, Typic Fluvaquents.

SERIES. The series consists of soils that formed in a particular kind of material and have horizons that, except for texture of the surface soil or of the underlying substratum, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineral and chemical composition. An example is Bibb.

TABLE Q1.--CLASSIFICATION OF THE SOILS

[An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series]

Soil name	Family or higher taxonomic class
Acadia	Fine, montmorillonitic, thermic Aeric Ochraqualfs
Alazan	Fine-loamy, siliceous, thermic Aquic Glossudalfs
Aldine	Fine-silty over clayey, siliceous, thermic Aeric Glossaqualfs
*Angelina	Fine-loamy, siliceous, acid, thermic Typic Fluvaquents
Annona	Fine, montmorillonitic, thermic Vertic Paleudalfs
Attoyac	Fine-loamy, siliceous, thermic Typic Paleudalfs
Beaumont	Fine, montmorillonitic, thermic Entic Pelluderts
Bernaldo	Fine-loamy, siliceous, thermic Glossic Paleudalfs
Besner	Coarse-loamy, siliceous, thermic Glossic Paleudalfs
Betis	Sandy, siliceous, thermic Psammentic Paleudults
Bibb	Coarse-loamy, siliceous, acid, thermic Typic Fluvaquents
Bienville	Sandy, siliceous, thermic Psammentic Paleudalfs
Boswell	Fine, mixed, thermic Vertic Paleudalfs
Bowie	Fine-loamy, siliceous, thermic Plinthic Paleudults
Briley	Loamy, siliceous, thermic Arenic Paleudults
Crevasse	Mixed, thermic Typic Udipsamments
Cuthbert	Clayey, mixed, thermic Typic Hapludults
Dallardsville.	Coarse-loamy, siliceous Aquic Paleudults
Darden	Thermic, coated Typic Quartzipsamments
Fausse	Very-fine, montmorillonitic, nonacid, thermic Typic Fluvaquents
Gallime	Fine-loamy, siliceous, thermic Glossic Paleudalfs
Guyton	Fine-silty, siliceous, thermic Typic Glossaqualfs
Hatliff	Coarse-loamy, mixed, nonacid, thermic Aquic Udifluvents
Iuka	Coarse-loamy, siliceous, acid, thermic Aquic Udifluvents
Jasco	Coarse-silty, siliceous, thermic Typic Fragiaqualfs
Kirbyville	Fine-loamy, siliceous, thermic Plinthaquic Paleudults
Landman	Loamy, siliceous, thermic Grossarenic Paleudalfs
Mantachie	Fine-loamy, siliceous, acid, thermic Aeric Fluvaquents
Midland	Fine, montmorillonitic, thermic Typic Ochraqualfs
Otanya	Fine-loamy, siliceous, thermic Plinthic Paleudults
*Ozan	Coarse-loamy, siliceous, thermic Typic Glossaqualfs
Plank	Coarse-silty, siliceous, thermic Typic Glossaqualfs
Rentzel	Loamy, siliceous, thermic Arenic Plinthaquic Paleudults
Ruston	Fine-loamy, siliceous, thermic Typic Paleudults
Sorter	Coarse-loamy, siliceous, thermic Typic Ochraqualfs
Spurger	Fine, mixed, thermic Albaquultic Hapludalfs
Tonkawa	Thermic, coated Typic Quartzipsamments
Urbo	Fine, mixed, acid, thermic Aeric Haplaquepts
Vamont	Fine, montmorillonitic, thermic Aquentic Chromuderts
Waller	Fine-loamy, siliceous, thermic Typic Glossaqualfs

NOTES

SOIL SERIES AND MORPHOLOGY

In this section, each soil series recognized in the survey area is described in detail. The descriptions are arranged in alphabetic order by series name.

Characteristics of the soil and the material in which it formed are discussed for each series. Then a pedon, a small three-dimensional area of soil that is typical of the soil series in the survey area, is described. The detailed descriptions of each soil horizon follow standards in "Soil Taxonomy" (5). Unless otherwise noted, colors described are for moist soil.

Following the pedon description is the range of important characteristics of the soil series in this survey area. Phases, or mapping units, of each soil series are described in the section "Soil Maps for Detailed Planning."

Acadia Series

The Acadia series is a member of the fine, montmorillonitic, thermic family of Aeric Ochraqualfs. These soils have dark grayish brown silt loam A horizons, brownish yellow mottled silty clay loam B1 horizons, gray silty clay B2tg horizons mottled with red, and gray mottled silty clay C horizons.

Ap--0 to 5 inches; dark grayish brown (10YR 4/2) silt loam; many fine very dark brown streaks and mottles; moderate medium granular structure; friable; few medium black concretions; medium acid; abrupt wavy boundary.

A2--5 to 9 inches; grayish brown (2.5Y 5/2) silt loam; few medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; medium acid; abrupt wavy boundary.

B1--9 to 19 inches; brownish yellow (10YR 6/6) silty clay loam; common medium distinct light brownish gray (2.5Y 6/2), and few medium faint yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; few fine roots; few fine black concretions; very strongly acid; clear wavy boundary.

B2tg--19 to 30 inches; light gray (10YR 6/1) silty clay; common medium distinct yellowish brown (10YR 5/6) and few fine prominent red mottles; weak medium subangular blocky structure that parts to moderate very fine angular blocky structure; firm, plastic; thin patchy clay films; very strongly acid; clear wavy boundary.

B3g--30 to 50 inches; light gray (10YR 6/1) silty clay; common medium distinct light yellowish brown (10YR 6/4), and few medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; firm, plastic; very strongly acid; clear wavy boundary.

Cg--50 to 70 inches; light gray (10YR 6/1) silty clay; many medium distinct yellowish brown (10YR 5/8) mottles; massive; firm; slightly acid.

Solum thickness ranges from 30 to 60 inches. Depth to the fine textured Bt horizon ranges from 10 to 20 inches.

The A1 or Ap horizon is dark grayish brown (10YR 4/2), dark gray (10YR 4/1), grayish brown (10YR 5/2), dark brown (10YR 4/3), or brown (10YR 5/3) silt loam, loam, or very fine sandy loam. It is very strongly acid through medium acid. The A2 horizon is grayish brown (10YR 5/2; 2.5Y 5/2), light brownish gray (10YR 6/2), pale brown (10YR 6/3), or light yellowish brown (10YR 6/4). It is silt loam, loam, or very fine sandy loam and very strongly acid through medium acid.

The B1 horizon is yellowish brown (10YR 5/4, 5/6, 5/8), light yellowish brown (10YR 6/4), or brownish yellow (10YR 6/6, 6/8) silt loam or silty clay loam with grayish mottles. It is very strongly acid or strongly acid. Some pedons have interfingers of albic material in the lower part of the B1 horizon or upper part of the B2tg horizon.

The B2tg horizon is gray (10YR 5/1, 6/1: 5Y 5/1), grayish brown (10YR 5/2; 2.5Y 5/2), or light brownish gray (10YR 6/2; 2.5Y 6/2) clay or silty clay with red and yellowish mottles. It ranges from very strongly acid through medium acid. The clay content of the upper 20 inches of the argillic horizon averages between 35 and 55 percent.

The C horizon has the same color range as the Bt horizon. It is clay, silty clay, or silty clay loam. The reaction ranges from very strongly acid through mildly alkaline.

Alazan Series

The Alazan series consists of deep, somewhat poorly drained, moderately permeable soils that formed in loamy sediments. These nearly level and gently sloping soils are on fluvial and marine terraces. They have a water table near the surface during winter and early spring. Slopes are dominantly 1 to 2 percent but range from 0 to 4 percent.

A11--0 to 4 inches; dark gray (10YR 4/1) very fine sandy loam; weak medium granular structure; soft, very friable; many fine and medium roots; strongly acid; clear smooth boundary.

A12--4 to 9 inches; mottled brown (10YR 5/3) and dark gray (10YR 4/1) very fine sandy loam; weak medium granular structure; soft, very friable; many fine and medium roots; very strongly acid; gradual wavy boundary.

A2--9 to 16 inches; pale brown (10YR 6/3) very fine sandy loam; common medium faint light brownish gray (10YR 6/2) and common medium distinct yellowish brown (10YR 5/6) mottles; weak medium granular structure; soft, very friable; common medium and coarse roots; very strongly acid; gradual wavy boundary.

B21t&A2--16 to 37 inches; yellowish brown (10YR 5/6) loam; common medium distinct light gray (10YR 6/2) mottles; about 40 percent tongues of light brownish gray (10YR 6/2); weak medium subangular blocky structure; slightly hard, friable; common medium and fine roots; common fine and medium pores; strongly acid; gradual wavy boundary.

B22t&A2--37 to 58 inches; mottled strong brown (7.5YR 5/6) and yellowish brown (10YR 5/6) loam; about 20 percent tongues of light gray (10YR 7/2); moderate medium prismatic structure parting to weak medium subangular blocky; slightly hard, friable; about 8 to 10 percent of B2 material is brittle; strongly acid; gradual wavy boundary.

B23t--58 to 72 inches; mottled yellowish red (5YR 5/8), strong brown (7.5YR 5/6) and light brownish gray (10YR 6/2) sandy clay loam; weak medium subangular blocky structure; hard, firm; medium acid.

The solum thickness ranges from 60 to more than 80 inches. The A horizon is very fine sandy loam, fine sandy loam, or loam. Reaction is very strongly acid to medium acid. The A1 horizon has a hue of 10YR, values of 4 or 5, and chroma of 1 to 3. The A2 horizon has a hue of 10YR, values of 6 or 7, and chroma of 2 to 3. It contains mottles or stains of yellowish brown (10YR 5/4, 5/6, 5/8), brownish yellow (10YR 6/6, 6/8), strong brown (7.5YR 5/6, 5/8), and yellowish red (5YR 5/6, 5/8).

The B2t&A2 horizon is loam or sandy clay loam. The upper part is very strongly acid or strongly acid, and the lower part ranges from strongly acid through slightly acid. Clay content of the upper 20 inches ranges from 18 to 25 percent with silt content ranging from 23 to 45 percent. In some pedons, 5 to 25 percent of the matrix of the B2 part is brittle. The B2t part has matrix hues of 10YR and 7.5YR, values of 5 or 6, and chroma of 4 to 8. The tongues of A2 material have a hue of 10YR, value of 6 or 7, and chroma of 1 to 3.

The lower B2t horizon has a mottled matrix. Bright colors are in hues 5YR, 7.5YR, and 10YR. They have values of 4 or 5, and chroma ranging from 4 to 8. The grayer mottles have hue of 10YR with value of 6 to 7, and chroma of 1 or 2. The reaction ranges from strongly acid to neutral.

The C horizon is variable and ranges from a loamy fine sand in thick deposits to siltstone in some thin terrace deposits. Reaction ranges from medium acid to mildly alkaline.

Aldine Series

The Aldine series is a member of the fine-silty over clayey, siliceous, thermic family of Aeric Glossaqualfs. These soils have dark grayish brown very fine sandy loam A1 horizons and grayish brown very fine sandy loam A2 horizons that tongue into yellowish brown loam upper B&A horizons. The Bt horizons are gray clay with yellowish brown and red mottles.

A1--0 to 5 inches; dark grayish brown (10YR 4/2) very fine sandy loam, grayish brown (10YR 5/2) dry; few fine faint brown mottles; moderate fine granular structure; slightly hard, friable; common tree roots; common fine grass roots; few worm casts; few 1-2 mm pockets of uncoated fine sand and silt; medium acid; abrupt smooth boundary.

A2--5 to 10 inches; grayish brown (10YR 5/2) very fine sandy loam, light brownish gray (10YR 6/2) dry; few fine faint yellowish brown mottles; weak medium subangular blocky structure; slightly hard, friable; common worm casts; common very fine pores; common 2-5 mm. pockets of uncoated fine sand; medium acid; clear wavy boundary.

B&A--10 to 19 inches; yellowish brown (10YR 5/4) loam; few medium distinct light brownish gray (10YR 6/2), brown (10YR 4/3), and yellowish brown (10YR 5/6) mottles within the bodies of B material; weak fine and medium subangular blocky structure; hard, friable; grayish brown (10YR 5/2) vertical streaks and tongues of A2 material comprises about 30 percent by volume of this horizon and surrounds the bodies of B; common streaks and pockets of uncoated pale brown (10YR 6/3) fine sand within the A2 material; few black concretions 2-5 mm in diameter; common worm casts; few fine pores; very strongly acid; clear wavy boundary.

B21tg--19 to 30 inches; gray (10YR 6/1) clay; common medium distinct yellowish brown (10YR 5/6) and common fine prominent red mottles; weak medium subangular blocky structure parting to moderate very fine angular blocky; very hard, firm, plastic; discontinuous clay films on faces of peds; thin silt and sand coatings on some ped faces; few fine roots; very strongly acid; clear wavy boundary.

B22tg--30 to 50 inches; light gray (10YR 6/1) clay; common medium distinct yellowish brown (10YR 5/6) mottles; few fine distinct brownish yellow and red mottles; mottles occupy less volume of soil mass than in horizon above; moderate medium subangular blocky structure; very hard, firm, plastic; discontinuous clay films on faces of peds; very strongly acid; clear wavy boundary.

B3g--50 to 60 inches; light gray (10YR 6/1) clay loam; common fine distinct yellowish brown and prominent red (2.5YR 4/6) mottles; mottles decrease with depth; moderate medium subangular blocky structure; very hard, firm; slightly acid.

Thickness of the solum is more than 70 inches. The A horizon is fine sandy loam, very fine sandy loam, or silt loam. It is very strongly acid through medium acid. The A1 is dark gray (10YR 4/1), dark grayish brown (10YR 4/2), gray (10YR 5/1), grayish brown (10YR 5/2) or brown (10YR 4/3, 5/3). The A2 is grayish brown (10YR 5/2), brown (10YR 5/3), light brownish gray (10YR 6/2), pale brown (10YR 6/3), light gray (10YR 7/2), or light yellowish brown (10YR 6/4).

The B&A is yellowish brown (10YR 5/4, 5/6, 5/8), brownish yellow (10YR 6/6, 6/8), brown (10YR 5/3), light yellowish brown (10YR 6/4), or pale brown (10YR 6/3). Mottles are few to common, fine to medium faint or distinct light brownish gray (10YR 6/2), light gray (10YR 7/2), brown (10YR 4/3) or any of the matrix colors. The B&A horizon is very fine sandy loam, loam, clay loam, or sandy clay loam. Clay content of this horizon is 14 to 28 percent. The B&A horizon is very strongly acid through medium acid. Tonguing of A2 material comprises 15 to 40 percent of the horizon and occurs mainly in the upper part of the B horizon as vertical streaks of uncoated very fine sand and silt that extend down between slightly more clayey isolated areas of B material. The B2t horizon is silty clay or clay, and the clay content exceeds 40 percent. It is very strongly acid through slightly acid. The matrix is dominated by gray (10YR 5/1; 5Y 5/1), light gray (10YR 6/1), grayish brown (10YR 5/2; 2.5Y 5/2), or light brownish gray (10YR 6/2; 2.5Y 6/2). Red (2.5YR 4/6, 4/8) mottles in the upper part of the B2t comprise 5 to 35 percent of the soil mass. The B2t also contains mottles of brownish yellow (10YR 6/6, 6/8), yellowish brown (10YR 5/6, 5/8), or strong brown (7.5YR 5/6, 5/8).

Angelina Series

The Angelina series consists of deep, very poorly drained, slowly permeable soils that formed in acid, stratified loamy sediments. These soils are on flood plains and are ponded for long periods of time. Slopes are less than 1 percent.

01--3 to 2 inches; leaves, stems, and other litter in various stage of decomposition.

02--2 to 0 inches; decomposing organic material with most of the original form destroyed.

Alg--0 to 4 inches; light gray (10YR 6/1) sandy clay loam; common fine distinct strong brown mottles mainly around old root channels; massive; friable; many fine roots; many fine pores; very strongly acid; clear smooth boundary.

Clg--4 to 11 inches; light gray (10YR 7/1) sandy clay loam; common fine distinct yellowish brown mottles; massive; friable; common fine roots; common fine pores; very strongly acid; clear smooth boundary.

C2g--11 to 23 inches; light gray (10YR 6/1) sandy clay loam; common medium distinct strong brown (7.5YR 5/8) mottles; massive; friable; common fine roots; common fine pores; very strongly acid; gradual smooth boundary.

C3g--23 to 32 inches; light gray (10YR 6/1) sandy clay loam; many fine and medium distinct red (2.5YR 4/8) mottles; massive; friable; few fine roots; few fine pores; very strongly acid; gradual smooth boundary.

C4g--32 to 60 inches; prominently mottled light gray (10YR 6/1), red (2.5YR 4/8), and strong brown (7.5YR 5/6) clay loam; massive; friable; few fine roots; few fine pores; very strongly acid.

The soil is strongly acid or very strongly acid. The Ag horizon is gray (10YR 5/1, 6/1), grayish brown (10YR 5/2), light brownish gray (10YR 6/2), or light gray (10YR 7/1, 7/2). It is sandy clay loam, loam, or fine sandy loam.

The Cg horizon is light gray (10YR 6/1, 7/1, 7/2; N7/ ; 5Y 7/1, 7/2), gray (10YR 5/1; N5/0, N6/0; 5Y 5/1, 6/1), or light brownish gray (10YR 6/2; 2.5Y 6/2), mottled brown, yellow, gray, and red. The 10-to 40-inch control section is sandy clay loam, clay loam, or loam, with the clay content ranging from 24 to 35 percent and more than 20 percent silt. In some pedons, pockets, lenses, or thin strata of more sandy material occur at depths of less than 50 inches below the soil surface. Krotovina are common throughout the solum.

Annona Series

The Annona series is a member of the fine, montmorillonitic, thermic family of Vertic Paleudalfs. These soils have dark grayish brown loam A1 horizons, light yellowish brown loam A2 horizons, and plastic, clay Bt horizons that are mottled in shades of red, brown, yellow, or gray, and are acid in the upper part, becoming alkaline in the lower part.

A1--0 to 5 inches; dark grayish brown (10YR 4/2) loam; few fine distinct yellowish brown mottles; weak very fine granular structure; slightly hard, very friable; common roots; few krotovinas; slightly acid; clear wavy boundary.

A2--5 to 10 inches; light yellowish brown (10YR 6/4) loam; few fine faint brownish yellow and light brownish gray mottles; weak fine subangular blocky structure; strongly acid; clear wavy boundary.

B21t--10 to 18 inches; dark red (2.5YR 3/6) clay; many medium prominent mottles of gray (10YR 6/1) and few fine prominent dark yellowish brown mottles; moderate fine subangular blocky structure; extremely hard, very firm, plastic; few fine roots; common pressure faces; few patchy clay films; few pebbles of quartz up to 1 inch in diameter; very strongly acid; gradual wavy boundary.

B22t--18 to 31 inches; mottled gray (10YR 6/1), dark red (2.5YR 3/6), and yellowish brown (10YR 5/4) clay; moderate fine blocky structure; extremely hard, very firm, plastic; few fine roots; common pressure faces; few clay films; strongly acid; gradual wavy boundary.

B23t--31 to 40 inches; mottled gray (10YR 6/1) and yellowish red (5YR 4/8) clay; moderate fine blocky structure; extremely hard, very firm, plastic; few fine roots between peds; common pressure faces; few thin clay films; cracks between a few peds contain pale brown (10YR 6/3) clean sand coatings about 1 to 3 mm thick; strongly acid; gradual wavy boundary.

B24t--40 to 59 inches; yellowish brown (10YR 5/4) clay; many fine and medium distinct gray (10YR 6/1) mottles; few streaks of very dark gray (5YR 3/1); moderate medium blocky structure; extremely hard, very firm, plastic; few fine roots between peds; few fine pitted $CaCO_3$ concretions; few pressure faces; few cracks filled with pale brown (10YR 6/3) clean sand coatings about 2 to 4 mm thick; medium acid; gradual wavy boundary.

B25t--59 to 80 inches; mottled yellowish brown (10YR 5/6) and gray (10YR 6/1) clay; moderate coarse blocky structure; extremely hard, very firm, plastic; continuous clay films; many slickensides; common medium and fine soft dark bodies; few fine pitted $CaCO_3$ concretions; few small pockets of white neutral salts; few peds coated with black (N 2/0); mildly alkaline.

The solum thickness ranges from 60 to about 100 inches.

The A horizon is loam, fine sandy loam, or very fine sandy loam. Reaction ranges from strongly to slightly acid. The A1 horizon is very dark grayish brown (10YR 3/2), dark gray through dark yellowish brown (10YR 4/1, 4/2, 4/3, 4/4), brown (10YR 5/3; 7.5YR 5/4), yellowish brown (10YR 5/4), or light yellowish brown (10YR 6/4). The A2 horizon is pale brown (10YR 6/3), light yellowish brown (10YR 6/4), gray (10YR 5/1), or light gray (10YR 7/1, 7/2). Some pedons contain a few strong brown (7.5YR 5/6), brownish yellow (10YR 6/6), light brownish gray (10YR 6/2), or yellowish brown (7.5YR 5/8) mottles. Combined thickness of the A horizons is 6 to 13 inches but commonly about 10 inches.

The B21t horizon is dark red (2.5YR 3/6), red (10R 4/6; 2.5YR 4/6, 4/8, 5/6, 5/8), yellowish red (5YR 4/8, 5/6), or reddish yellow (7.5YR 6/6) with few to many gray (10YR 6/1; 2.5Y 6/1), dark yellowish brown (10YR 4/4), strong brown (7.5YR 5/6), and yellowish brown (10YR 5/6, 5/8) mottles. It is clay or clay loam with 35 to 60 percent clay. Reaction is strongly or very strongly acid. The B22t and B23t horizons are mottled light brownish gray (10YR 6/2), gray (10YR 5/1, 6/1; 2.5Y 5/1, 6/1; 5Y 5/1, 6/1), red (2.5YR 4/6, 4/8), dark red (2.5YR 3/6), yellowish red (5YR 4/6, 4/8), yellowish brown (10YR 5/4, 5/6, 5/8), light olive brown (2.5Y 5/4), or olive yellow (2.5Y 6/6). They are clay or clay loam and are strongly or medium acid. The lower B24t and B25t horizons are mottled gray, grayish brown, light brownish gray, red, yellowish red, yellowish brown, light olive brown, and olive yellow. They are clay or clay loam and are medium acid through moderately alkaline.

Attoyac Series

The Attoyac series consists of deep, well drained, moderately permeable soils that formed in loamy old alluvial deposits. These soils are on nearly level to strongly sloping stream terraces. Slopes are dominantly less than 3 percent but range from 0 to 15 percent.

Ap--0 to 5 inches; reddish brown (5YR 4/4) fine sandy loam; weak medium granular structure; very friable; soft; common fine roots and pores; slightly acid; clear smooth boundary.

A1--5 to 9 inches; reddish brown (5YR 5/4) fine sandy loam; weak medium subangular blocky structure; very friable, soft; common fine roots and pores; slightly acid; gradual smooth boundary.

B21t--9 to 17 inches; dark red (2.5YR 3/6) fine sandy loam; weak medium subangular blocky structure; friable, soft; common fine roots and pores; few thin, patchy clay films; medium acid; gradual wavy boundary.

B22t--17 to 35 inches; dark red (2.5YR 3/6) sandy clay loam; moderate medium subangular blocky structure; friable, slightly hard; common roots and pores; common thin clay films; medium acid; diffuse boundary.

B23t--35 to 75 inches; red (2.5YR 4/8) sandy clay loam; weak medium subangular blocky structure; friable, slightly hard; common fine roots and pores; common thin clay films; few uncoated sand grains; medium acid.

Solum thickness ranges from 60 to over 100 inches. Rounded quartz and iron enriched pebbles range from 0 to 5 percent by volume throughout the soil.

The A horizon is reddish brown (5YR 4/3, 4/4, 5/4), yellowish red (5YR 4/6), brown (10YR 4/3, 5/3; 7.5YR 4/2, 4/4, 5/4), strong brown (7.5YR 5/6), yellowish brown (10YR 5/4), or dark brown (7.5YR 3/2). Where moist values are less than 3.5 and chromas of 3 or less, the horizon is less than 6 inches thick. The A horizon is fine sandy loam or sandy loam and ranges from strongly acid through slightly acid.

The upper Bt horizon is dark red (10R 3/6; 2.5YR 3/6), red (10R 4/6; 2.5YR 4/6, 4/8), or yellowish red (5YR 4/6, 5/6, 4/8, 5/8). It is sandy clay loam, loam, or fine sandy loam. In the upper 20 inches of the Bt horizon the average clay content ranges from 18 to 32 percent and silt content exceeds 20 percent.

The lower Bt horizon is red (2.5YR 4/6, 4/8, 5/8; 10R 4/6), dark red (2.5YR 3/6), yellowish red (5YR 4/8, 5/8), or strong brown (7.5YR 5/6) and has dry values of 5 or more in some parts. It is sandy loam, fine sandy loam, or loam. The Bt horizon ranges from strongly acid through slightly acid and base saturation ranges from 35 to 60 percent. Few skeletans and small pockets of uncoated sand and silt are in some pedons but comprise less than 5 percent of the mass.

Beaumont Series

The Beaumont series is a member of the fine, montmorillonitic, thermic family of Entic Pelluderts. These clayey soils have dark gray strongly acid A horizon, gray strongly acid upper ACg horizons, and mottled light gray and yellowish brown neutral lower Cg horizon. The soil has intersecting slickensides below depths of 20 inches.

Ap--0 to 8 inches; dark gray (10YR 4/1) clay, gray (10YR 5/1) dry; common fine and medium distinct yellowish brown (10YR 5/4) mottles; weak medium angular blocky structure; very hard, very firm, sticky, plastic; many fine roots; filled root channels stained dark reddish brown; few fine weakly cemented iron oxide concretions; strongly acid; abrupt smooth boundary.

A1--8 to 20 inches; dark gray (10YR 4/1) clay, gray (10YR 5/1) dry; common fine and medium distinct yellowish brown (10YR 5/4) mottles; moderate medium angular blocky structure; extremely hard, very firm, very sticky, plastic; common fine roots; filled root channels stained dark reddish brown; shiny pressure faces on many peds; few fine weakly cemented iron oxide concretions; strongly acid; gradual wavy boundary.

AC1g--20 to 40 inches; gray (10YR 5/1) clay, light gray (10YR 6/1 dry; many fine and medium distinct yellowish brown (10YR 5/4) mottles; common coarse intersecting slickensides border distinct parallelepiped that break to moderate medium angular blocky structure; extremely hard very firm, very sticky, plastic; few fine roots; shiny pressure faces; few fine weakly cemented iron oxide concretions; strongly acid; diffus wavy boundary.

AC2g--40 to 60 inches; distinctly and coarsely mottled light gray (10YR 6/1) and yellowish brown (10YR 5/6) clay; few slickensides borde distinct parallelepipeds that break to weak coarse angular blocky structure; extremely hard, very firm, very sticky, plastic; neutral.

The average annual soil temperature at 20 inches depth ranges fro 70^{o} to 72^{o} F. Undisturbed areas have a gilgai microrelief of knolls 6 to 15 inches higher than the depressions. Distance from the center of the knolls to the center of the depressions ranges from about 6 to 12 feet. Texture of the soil is clay or silty clay. The 10- to 40-inch control section contains from 45 to 60 percent clay and more than 30 percent silt. Intersecting slickensides and wedge-shaped parallelepi- peds begin at depths ranging from 20 to 30 inches below the surface. The A horizons are gray (10YR 5/1; N 5/0; 5Y 5/1), dark gray (10YR 4/1 4/0;5Y 4/1), very dark gray (10YR 3/1; N 3/0;5Y 3/1), or black (10YR 2/1; N 2/0;5Y 2/1). They are very strongly acid through medium acid.

The microdepressions of some pedons have moist value of less than 3.5 throughout, but average less than 12 inches in thickness in more than 70 percent of the horizontal dimension of the pedon. Thickness of the A horizon varies with the microrelief, ranging from 10 inches in the microknolls to as much as 25 inches in the microdepressions. The ACg horizon is dark gray (10YR 4/1; N 4/0;5Y 4/1), gray (10YR 5/1, 6/1; N 5/0;N 6/0;5Y 5/1, 6/1), or light gray (10YR 7/1; N 7/0;5Y 7/1). About 5 to 30 percent of the ACg horizon is mottled yellow, brown, or red. The AC1g horizon is very strongly acid or strongly acid. The AC2g horizon is gray (10YR 5/1, 6/1; N 5/0;N 6/0;5Y 5/1, 6/1), or light gray (10YR 7/1; N 7/0;5Y 7/1) and contains mottles of yellow and brown. In some pedons, the AC2g horizon is distinctly mottled gray, yellow, and brown. It is strongly acid through mildly alkaline, but in a few places it is calcareous above 72 inches. A few $CaCO_3$ concretions are in the AC2g horizon of some pedons.

Bernaldo Series

The Bernaldo series consists of deep, well drained, moderately permeable soils that formed in loamy old alluvial deposits. The soils are on nearly level to strongly sloping stream terraces. Slopes are dominantly less than 5 percent but range from 0 to 12 percent.

Ap--0 to 6 inches; brown (10YR 4/3) fine sandy loam; weak fine granular structure; soft, very friable; common fine roots; slightly acid; clear smooth boundary.

A2--6 to 14 inches; pale brown (10YR 6/3) fine sandy loam; massive; soft, very friable; common fine roots; slightly acid; clear wavy boundary.

B2t--14 to 47 inches; strong brown (7.5YR 5/6) sandy clay loam; weak medium subangular blocky structure; hard, friable; few fine roots; common fine and very fine pores; thin discontinuous clay films; sand grains coated and bridged; few dark concretions and soft bodies; medium acid; gradual wavy boundary.

B2t&A'2--47 to 80 inches; yellowish brown (10YR 5/6) loam; common medium distinct mottles of strong brown (7.5YR 5/6); weak coarse prismatic structure parting to weak fine subangular blocky; hard friable; few fine roots; few fine and very fine pores; few discontinuous clay films; about 10 percent of the mass is brittle; about 10 percent is light gray (10YR 6/2) vertical ped coatings that are 10 to 20 cm long and about 2 to 5 cm wide; medium acid.

The solum thickness is 60 to over 100 inches. Depth to saturated subhorizons ranges from 48 to 72 inches during the cool season in most years. The A horizons are commonly fine sandy loam but include loam, very fine sandy loam, or loamy very fine sand. They are strongly acid through slightly acid.

The A1 or Ap horizon is dark brown (7.5YR 3/2, 4/2; 10YR 3/3), very dark grayish brown (10YR 3/2), dark yellowish brown (10YR 4/4), dark grayish brown (10YR 4/2), brown (10YR 4/3, 5/3; 7.5YR 5/2), pale brown (10YR 6/3), or grayish brown (10YR 5/2). The A2 horizon is brown (10YR 5/3), grayish brown (10YR 5/2), light brownish gray (10YR 6/2), pale brown (10YR 6/3), yellowish brown (10YR 5/4), light yellowish brown (10YR 6/4), or very pale brown (10YR 7/3, 7/4).

The Bt horizon is very strongly acid through slightly acid. The B2t horizon is reddish brown (7.5YR 4/3, 4/4, 5/3, 5/4), light reddish brown (5YR 6/3, 6/4), brown (7.5YR 4/4, 5/4; 10YR 4/3, 5/3), strong brown (7.5YR 5/6), light brown (7.5YR 6/4), yellowish brown (10YR 5/4, 5/6, 5/8), light yellowish brown (10YR 6/4), brownish yellow (10YR 6/6, 6/8), or yellow (10YR 7/6). Mottles in colors and shades of brown, gray, and red occur in most pedons but mottles with chroma of 2 or less do not occur within 30 inches of the soil surface. The B2t horizon is loam, sandy clay loam, or clay loam. Clay content of the upper 20 inches ranges between 18 and 30 percent; silt content is 20 to about 45 percent. The B2t&A'2 horizon has the same range in color as the B2t horizon. The horizon consists of vertical streaks, tongues, and ped coatings that are 1 to 5 cm wide and are 5 to 30 cm long. The A'2 material comprises 5 to 15 percent of the matrix. The horizon is fine sandy loam, loam, or sandy clay loam.

Besner Series

The Besner series consists of deep, well drained, moderately permeable, loamy terrace soils. They formed in old alluvial deposits that have been reworked by wind. These soils are on broadly nearly level and gently sloping stream terraces with slopes of less than 3 percent.

A1--0 to 2 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak medium granular structure; soft, loose; many roots of all sizes; medium acid; abrupt wavy boundary.

A21--2 to 9 inches; brown (10YR 5/3) fine sandy loam; weak fine granular structure; slightly hard, loose; common medium and coarse roots; very strongly acid; clear wavy boundary.

A22--9 to 38 inches; pale brown (10YR 6/3) fine sandy loam; weak fine granular structure; slightly hard, loose; common medium and coarse roots; slightly acid; gradual wavy boundary.

B21t--38 to 55 inches; strong brown (7.5YR 5/6) loam; moderate medium subangular blocky structure; slightly hard, friable; common fine roots; common fine pores; sand grains coated and bridged with clay; upper 3 inches has ped coatings of pale brown (10YR 6/3); strongly acid; clear wavy boundary.

B22t & A'2--55 to 73 inches; reddish yellow (7.5YR 6/6) loam (B22t); few medium distinct mottles of red (2.5YR 5/8) and few ped coatings of very pale brown (10YR 7/3) (A'2); weak medium subangular blocky structure; slightly hard, friable; few fine roots; common fine pores; sand grains coated and bridged with clay; about 10 percent of the matrix is brittle and is confined to the high chroma colors; strongly acid; clear wavy boundary.

B23t & A'2--73 to 80 inches; reddish yellow (7.5YR 6/8) loam (B23t); common medium distinct mottles of yellowish brown (10YR 6/8) and very pale brown (10YR 7.3) (A'2); about 15 to 20 percent is light gray (10YR 7/2) interfingering of fine sandy loam; weak subangular blocky structure; slightly hard, friable; about 15 percent of the matrix is brittle and is confined to the high chroma colors; strongly acid.

The solum thickness ranges from 70 to more than 80 inches. Reaction ranges from very strongly acid through slightly acid throughout the profile. Clay content of the upper 20 inches of the argillic horizon ranges from 14 to 18 percent and the silt ranges from 20 to 45 percent.

The A horizon is 20 to 40 inches thick and is a fine sandy loam, very fine sandy loam, or loam in texture. The A1 horizon has hue of 10YR with colors of dark grayish brown (10YR 4/2), grayish brown (10YR 5/2), or brown (10YR 4/3, 5/3). The A2 horizon has hues of 10YR and 2.5Y with colors of brown (10YR 5/3), very pale brown (10YR 7/3), pale brown (10YR 6/3), light gray (10YR 7.2), or light yellowish brown (2.5Y 6/4).

The B2t horizon has hues of 7.5YR and 10YR with colors of yellowish brown (10YR 5/4, 5/6, 5/8), brownish yellow (10YR 6/6, 6/8), light yellowish brown (10YR 6/4), strong brown (7.5YR 5/8, 5/6), or reddish yellow (7.5YR 6/6, 6/8).

The B2t and A'2 horizons have the same matrix colors as listed for the B2t horizon and they also have hues of 2.5Y with colors of light yellowish brown (10YR 6/4) or olive yellow (2.5Y 6/6, 6/8). The B2t part has mottles of red (2.5YR 4/6, 4/8) and yellowish red (5YR 4/6, 4/8). The interfingerings of A'2 materials have hues of 10YR with colors of light gray (10YR 7/2), pale brown (10YR 6/3), or very pale brown (10YR 7/3). This horizon has from 2 to 20 percent by volume brittle bodies.

Betis Series

The Betis series consists of deep, somewhat excessively drained rapidly permeable, sandy upland soils. They formed in thick sandy sediments of marine deposits. These soils are on nearly level to sloping broad interstream divides. Slopes are dominantly 2 to 5 percent but range from 0 to 8 percent.

A11--0 to 10 inches; brown (10YR 4/3) loamy fine sand; weak fine granular structure; soft, very friable; many medium and coarse roots; strongly acid; clear smooth boundary.

A12--10 to 37 inches; brown (7.5YR 5/4) loamy fine sand; few pockets of pale brown (10YR 6/3); single grained; soft, very friable; many medium and few coarse roots; strongly acid; gradual smooth boundary.

B1--37 to 57 inches; strong brown 7.5YR 5/6) loamy fine sand that contains common small bodies of very pale brown (10YR 7/3); single grained; soft, very friable; medium acid; few coarse and fine roots; gradual smooth boundary.

A2 & B2t--57 to 80 inches; very pale brown (10YR 7/3) loamy fine sand (A2) that contains common yellowish brown (10YR 5/6) fine sandy loam (B2t) lamellae 1/4 to 3/4 inch thick; single grained; lamellae are massive; soft, very friable; lamellae have coated sand grains and some clay bridging; medium acid.

The solum thickness ranges from 60 to 80 inches. Reaction ranges from very strongly acid through medium acid throughout the profile except where lime has been added. Texture of the matrix is fine sand or loamy fine sand. Base saturation at 72 inches ranges from 20 to 35 percent. The soil is dry in some part of the moisture control section for 75 to 90 cumulative days in most years.

The A1 horizon is dark grayish brown (10YR 4/2), grayish brown (10YR 5/2), or brown (10YR 4/3, 5/3; 7.5YR 4/2, 4/4, 5/4).

The B1 horizon is strong brown (7.5YR 5/6, 5/8), yellowish brown (10YR 5/6, 5/8), and yellowish red (5YR 5/6, 5/8). Randomly distributed pockets of clean sand grains range from few to common.

The A2 portion of the A2 & B2 horizon has a hue of 10YR with colors of brown (10YR 5/3), pale brown (10YR 6/3), very pale brown (10YR 7/3, 7/4), light yellowish brown (10YR 6/4), or yellowish brown (10YR 5/4). The B2t portion (lamellae) is yellowish red (5YR 4/6, 5/6, 5/8, 4/8), strong brown (7.5YR 5/6, 5/8), or yellowish brown (10YR 5/6, 5/8). The lamellae are loamy fine sand or fine sandy loam. Their composite thickness is more than 6 inches within a depth of 2 meters. Some pedons have continuous loamy fine sand Bt horizons as opposed to lamellae.

Bibb Series

The Bibb series is a member of the coarse-loamy, siliceous, acid, thermic family of Typic Fluvaquents. These soils have sandy loam A horizons, and gray sandy loam C horizons containing thin strata that range from silt loam through loamy sand.

A11--0 to 4 inches; brown (10YR 4/3) sandy loam; weak fine granular structure; friable; strongly acid; abrupt wavy boundary.

A12g--4 to 12 inches; mottled dark gray (N 4/0) and dark grayish brown (10YR 4/2) sandy loam; weak fine granular structure; friable; common fine strong brown stains around old roots; strongly acid; clear wavy boundary.

C1g--12 to 37 inches; gray (5Y 5/1) sandy loam; massive; loose; common medium strong brown (7.5YR 5/6) stains around old roots; common thin strata of silt loam to loamy sand; some strata have bits of partially decomposed forest residues; very strongly acid; clear wavy boundary.

C2g--37 to 60 inches; gray (N 5/0) silt loam; massive; slightly sticky; common strata of sandy loam and loamy sand; common thin strata with partially decomposed forest residues; strongly acid.

All horizons range from strongly acid through very strongly acid. A few mica flakes are in some pedons. The A11 horizon is black, very dark gray, dark gray, very dark grayish brown, or brown in 10YR hue and brown or dark brown in 7.5YR hue. The A12g horizon ranges from light gray (10YR and 2.5Y 7.2) to dark gray (10YR 4/1; N 4/0) and mottles, where present, are shades of brown and yellow. The A horizon is loamy sand, sandy loam, loam, or silt loam. The C horizon is dark gray, gray, or light gray in hues of 5Y, 2.5Y or 10YR. There are few to many mottles in shades of red, yellow, and brown. The 10- to 40-inch control section is stratified with sandy loam, loam, or silt loam and averages less than 18 percent clay. The C horizon of some pedons have thin strata high in gravel or organic matter.

Bienville Series

The Bienville series is a member of the sandy, siliceous, thermic family of Psammentic Paleudalfs. These soils have loamy fine sand A horizons 15 to 40 inches thick and loamy fine sand argillic horizons.

Ap--0 to 7 inches; dark grayish brown (10YR 4/2) loamy fine sand; weak fine granular structure; very friable; slightly acid, abrupt smooth boundary.

A2--7 to 20 inches; brown (7.5YR 5/4) loamy fine sand; massive; very friable; medium acid; clear wavy boundary.

B21t & A2--20 to 48 inches; strong brown (7.5YR 5/6) loamy fine sand with common coarse distinct very pale brown (10YR 7/3) spots and streaks of uncoated sand grains; weak medium subangular blocky structure; very friable; medium acid; clear wavy boundary.

B22t--48 to 72 inches; brown (7.5YR 5/4) loamy fine sand with common medium and coarse dark yellowish brown (10YR 4/4) spots of finer material; common medium faint pale brown (10YR 6/3) spots of bleached sand grains; weak medium subangular blocky structure; very friable; few sand grains bridged with clay; medium acid, clear smooth boundary.

C--72 to 80 inches; reddish yellow (7.5YR 6/6) loamy fine sand; massive; very friable.

The solum thickness is 60 to 80 inches. Total fines (clay, silt, and very fine sand) average 30 to 50 percent in the solum. The A1 or Ap horizon is dark grayish brown (10YR 4/2), grayish brown (10YR 5/2), brown (10YR 4/3, 5/3), or yellowish brown (10YR 5/4). It is slightly acid or medium acid. The A2 horizon is brown (10YR 4/4, 5/3; 7.5YR 5/4), pale brown (10YR 6/3), light yellowish brown (10YR 6/4), yellowish brown (10YR 5/4), or dark yellowish brown (10YR 4/4). The A horizon is fine sand or loamy fine sand and medium acid through very strongly acid. The Bt horizon is yellowish brown (10YR 5/4, 5/6), dark yellowish brown (10YR 4/4), brown (7.5YR 4/4, 5/4), strong brown (7.5YR 5/6), reddish brown (5YR 4/4, 5/4), or yellowish red (5YR 4/6, 5/6). The B21t & A2 horizon has streaks of A2 material that are brown (10YR 5/3), yellowish brown (10YR 5/4), pale brown (10YR 6/3), light yellowish brown (10YR 6/4), or very pale brown (10YR 7/3), and comprise 15 to 40 percent of the horizon. In some pedons, the lower Bt horizons are in the form of lamellae and are dark reddish brown (5YR 3/3, 3/4), reddish brown (5YR 4/3, 4/4, 5/3, 5/4), or brown (7.5YR 5/6, 5/8). The Bt horizon is typically loamy fine sand but ranges to fine sandy loam below a depth of 20 inches and averages loamy fine sand in the upper 20 inches of the Bt horizon. It is medium acid through very strongly acid. The C horizon ranges from sandy loam to sand.

Boswell Series

The Boswell series is a member of the fine, mixed, thermic family of Vertic Paleudalfs. These soils have thin fine sandy loam A horizons, red clay upper B horizons that are mottled with colors of chroma 2 or less at 18 inches, and clay lower B horizons mottled in shades of red, gray, and brown.

A1--0 to 2 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; very friable; many medium and fine roots; strongly acid; abrupt wavy boundary.

A2--2 to 5 inches; yellowish brown (10YR 5/4) fine sandy loam; weak fine granular structure; very friable; many medium and fine roots; strongly acid; abrupt wavy boundary.

B21t--5 to 12 inches; red (2.5YR 4/6) clay; strong fine and medium angular and subangular blocky structure; firm, plastic and sticky; few medium roots; some cracks and root channels filled with brownish material; shiny faces on peds; strongly acid; clear wavy boundary.

B22t--12 to 18 inches; red (2.5YR 4/6) clay; many medium prominent yellowish brown (10YR 5/6) mottles; strong fine and medium angular blocky structure; firm, plastic and sticky; few fine roots; some cracks and root channels filled with brownish material; shiny faces on peds; strongly acid; clear wavy boundary.

B23t--18 to 23 inches; mottled red (10YR 4/6), light brownish gray (10YR 6/2), and yellowish brown (10YR 5/4) clay; strong fine and medium angular blocky structure; firm, very plastic and sticky; few fine roots; some cracks and root channels filled with brownish material; shiny faces on peds; strongly acid; gradual wavy boundary.

B24t--23 to 40 inches; mottled red (10R 4/6), and light brownish gray (10YR 6/2) clay; strong fine and medium angular blocky structure; firm, very plastic and sticky; few slickensides that do not intersect; shiny ped faces; strongly acid; gradual wavy boundary.

B25t--40 to 52 inches; mottled light brownish gray (10YR 6/2), red (10R 4/6), and strong brown (7.5YR 5/6) clay; strong fine and medium angular blocky structure; firm, very plastic and sticky; few slickensides that do not intersect; shiny faces on peds; strongly acid; gradual smooth boundary.

B3tg--52 to 70 inches; gray (10YR 6/1) clay; many medium prominent strong brown (7.5YR 5/6) and red (10R 4/6) mottles; strong medium angular blocky structure; firm, very plastic and sticky; few slickensides that do not intersect; shiny faces on peds; few shale fragments; strongly acid.

The solum exceeds 60 inches in thickness. Reaction of the soil is strongly or very strongly acid except where the soil has been limed. The A1 horizon is very dark grayish brown (10YR 3/2), dark grayish brown (10YR 4/2), dark brown (10YR 4/3), dark gray (10YR 4/1), or grayish brown (10YR 5/2). The Ap and A2 horizons are dark grayish brown (10YR 4/2), grayish brown (10YR 5/2), brown (7.5YR 5/4; 10YR 5/3), or yellowish brown (10YR 5/4, 5/6). Texture of the A horizon is sandy loam, fine sandy loam, silt loam, and loam. In severely eroded pedons the Ap horizon is clay loam or silty clay loam. The B21t and B22t horizons are weak red (10R 4/4, 5/4), red (10R 4/6, 5/6; 2.5YR 4/6, 5/6), reddish brown (2.5YR 5/4, 4/4; 5YR 5/4, 4/4), or yellowish red (5YR 4/6, 5/6). Mottles in shades of brown and yellow may be present. The B23t, B24t, and B25t horizons have matrix colors similar to the upper B horizons but have mottles of gray and yellow or they are mottled in shades of red, gray, and yellow. Mottles of chroma 2 or less occur below the upper 10 inches of the argillic horizon but within 30 inches of the surface. Most pedons are gray in the B3tg horizon. Texture of the B horizon is silty clay loam, clay loam, silty clay, and clay. Clay content of the Bt horizon ranges from 38 to 60 percent.

Bowie Series

The Bowie series consists of deep, moderately well drained, moderately slowly permeable soils that formed in loamy Coastal Plain sediments. These are on broad nearly level to sloping uplands. Surface runoff is slow or medium. Slopes are dominantly 1 to 5 percent but range from 0 to 8 percent.

Ap--0 to 6 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; soft, very friable; many fine roots; few wormcasts; slightly acid; clear smooth boundary.

A2--6 to 12 inches; pale brown (10YR 6/3) fine sandy loam; massive; soft, very friable; many fine roots; common fine pores; few wormcasts; slightly acid; gradual wavy boundary.

B21t--12 to 30 inches; yellowish brown (10YR 5/6) sandy clay loam; few fine and medium distinct strong brown (7.5YR 5/6) and reddish yellow (5YR 6/8) mottles; weak medium subangular blocky structure; hard, friable common fine and medium roots; common fine pores; thin patchy clay films on faces of peds and in pores; few wormcasts; few fine strongly cemented pitted brown concretions of iron oxide; strongly acid; gradual wavy boundary.

B22t--30 to 42 inches; yellowish brown (10YR 5/6) sandy clay loam; common medium prominent red (2.5YR 4/8) and yellowish red (5YR 4/8) mottles; weak medium subangular blocky structure; very hard, friable; few fine and medium roots; common fine pores; thin patchy clay films on faces of peds and in pores; 2 percent by volume of nodular plinthite; few fine strongly cemented pitted brown concretions of iron oxide; few weakly cemented concretions of iron oxide; strongly acid; diffuse wavy boundary.

B23t--42 to 60 inches; yellowish brown (10YR 5/6) sandy clay loam; ped interiors with 25 percent red mottles (2.5YR 4/8), ped surfaces have vertical oriented streaks and ped coatings of gray (10YR 6/1); moderate coarse prismatic structure parting to weak medium subangular blocky; very hard, friable; few fine roots in gray parts; thin patchy gray clay films; 25 percent by volume red mottles that range from soft to brittle; about 15 percent nodular plinthite; very strongly acid; diffuse irregular boundary.

B24t--60 to 78 inches; strong brown (7.5YR 5/6) sandy clay loam; ped interiors with 20 percent red (2.5YR 4/8) mottles, ped surfaces have light gray (10YR 6/1) vertical tongues up to 2 inches wide and light gray ped coatings; moderate coarse prismatic structure parting to weak coarse blocky; very hard, friable; few fine roots in light gray materials; few fine pores; 10 percent by volume plinthite; some strong brown and red materials are brittle; few clay films; very strongly acid.

The solum thickness ranges from 60 to more than 80 inches. Depth to horizons that contain more than 5 percent plinthite is 25 to 60 inches. Strongly cemented to indurated iron oxide concretions less than 2 cm in diameter range from 0 to 5 percent by volume throughout the profile. Base saturation at 50 inches below the top of the Bt horizon ranges from 17 to 35 percent. CEC is 8.0 to 18.0 me/100 grams of soil. The soil is dry in some part of the moisture control section for 75 to 90 days in most years.

The Ap or A1 horizon is grayish brown (10YR 5/2), dark grayish brown (10YR 4/2), very dark grayish brown (10YR 3/2), dark brown (10YR 3/3) or brown (10YR 5/3, 4/3). The A2 horizon is light brownish gray (10YR 6/2), grayish brown (10YR 5/2), brown (10YR 5/3), pale brown (10YR 6/3), very pale brown (10YR 7.3) or light yellowish brown (10YR 6/4). The A horizon is fine sandy loam or loamy fine sand and is strongly acid through slightly acid.

The B21t and B22t horizons are yellowish brown (10YR 5/4, 5/6, 5/8), brownish yellow (10YR 6/6, 6/8), strong brown (7.5YR 5/6, 5/8) or reddish yellow (7.5YR 6/8). Few to common mottles of red, yellowish red, and dark red are in most pedons. The B23t and B24t horizons have the same colors as the upper B2t horizons and also contain mottles and streaks of gray (10YR 5/1, 6/1), light gray (10YR 7/1, 7/2), light brownish gray (10YR 6/2), or grayish brown (10YR 5/2). In horizontal cross section, the colors are generally in a reticulate pattern.

The B2t horizon is fine sandy loam, clay loam, or sandy clay loam. The clay content ranges from 18 to 35 percent and the silt plus very fine sand content ranges from 25 to 40 percent. It is very strongly acid through strongly acid. The B23t and B24t horizons contain 5 to 30 percent plinthite and are brittle in 10 to 40 percent of the horizontal cross section.

Briley Series

The Briley series consists of deep, sandy, well drained, moderately permeable soils that formed in sandy and loamy Coastal Plain sediments. These soils are on gently sloping to moderately steep broad interstream divides. Slopes are dominantly 2 to 5 percent but range from 1 to 20 percent.

A1 --0 to 5 inches; brown (10YR 4/3) loamy fine sand; weak fine granular structure; soft, very friable; many roots of all sizes; medium acid; clear wavy boundary.

A21--5 to 17 inches; brown (10YR 5/3) loamy fine sandy; massive; soft, very friable; common roots of all sizes; medium acid; clear smooth boundary.

A22--17 to 23 inches; pale brown (10YR 6/3) loamy fine sand; massive; soft, very friable; common medium and coarse roots; strongly acid; gradual wavy boundary.

B21t--23 to 43 inches; yellowish red (5YR 4/8) sandy clay loam; medium fine subangular blocky structure; slightly hard, friable; few patchy clay films on faces of peds; few fine and medium roots; very strongly acid; gradual wavy boundary.

B22t--43 to 72 inches; yellowish red (5YR 5/8) sandy clay loam with common medium distinct strong brown (7.5YR 5/6) and red (2.5YR 4/6) mottles; weak subangular blocky structure; slightly hard, friable; few thin patchy clay films on faces of peds; few fine and medium roots; very strongly acid.

The solum thickness ranges from 65 to more than 80 inches. The soil is dry in some part of the moisture control section for 75 to 90 cumulative days in most years. Base saturation at 72 inches ranges from 15 to 35 percent.

The A horizon ranges from 20 to 40 inches thick. It ranges from very strongly through slightly acid. The A1 horizon is brown (10YR 4/3, 5/3; 7.5YR 4/4, 5/4), or dark grayish brown (10YR 4/2). The A2 horizon is pale brown (10YR 6/3), yellowish brown (10YR 5/4), or light yellowish brown (10YR 6/4). A loamy fine sand or fine sandy loam A3 or B1 horizon is present in some pedons. Where present, it has colors of reddish brown (7.5YR 5/4), strong brown (7.5YR 5/6), reddish yellow (7.5YR 6/6; 5YR 6/6), or yellowish red (5YR 5/6).

The B2t horizon is fine sandy loam, sandy clay loam, or loam. It ranges from very strongly through medium acid. This horizon is yellowish red (5YR 4/6, 4/8, 5/6, 5/8), or red (2.5YR 4/6, 4/8). The lower B2t horizon contains few to many strong brown (7.5YR 5/6), yellowish brown (10YR 5/6), or red (2.5YR 4/6, 5/6) mottles. Plinthite occurs in the lower solum of some pedons but constitutes less than 5 percent of any horizon. Clay content of the B2t horizon ranges from 17 to 28 percent. Some pedons have skeletons with chromas of 2 or 3 in the lower B horizon.

Crevasse Series

The Crevasse series is a member of the mixed, thermic family of Typic Udipsamments. These soils have dark grayish brown sand A horizons and grayish brown and dark grayish brown sand C horizons.

A1--0 to 4 inches; dark grayish brown (10YR 4/2) sand; single grained; loose; few fine roots; neutral; abrupt smooth boundary.

C1--4 to 20 inches; grayish brown (10YR 5/2) sand; single grained; loose; few fine roots; neutral; gradual smooth boundary.

C2--20 to 60 inches; dark grayish brown (10YR 4/2) sand; single grained; loose; neutral.

The A horizon is dark grayish brown (10YR 4/2), grayish brown (10YR 5/2), light brownish gray (10YR 6/2), very pale brown (10YR 7/3), brown (10YR 5/3), light yellowish brown (10YR 6/4) or yellowish brown (10YR 5/4, 5/6). Some pedons have thin very dark grayish brown (10YR 3/2) or very dark gray (10YR 3/1) A1 horizons. It is sand, loamy sand, loamy fine sand, silt loam, or sandy loam. The C horizon is dark grayish brown (10YR 4/2; 2.5Y 4/2), grayish brown (10YR 5/2; 2.5Y 5/2), brown (10YR 5/3, 4/3), light yellowish brown (10YR 6/4), dark yellowish brown (10YR 4/4), yellowish brown (10YR 5/4, 5/6) or brownish yellow (10YR 6/6, 6/8). It is sand, loamy fine sand, or loamy sand. Reaction ranges from medium acid through moderately alkaline in some horizons. Some pedons are calcareous.

Cuthbert Series

The Cuthbert series consists of moderately deep, well drained, loamy upland soils. They formed from old Coastal Plain sediments. These soils are on sloping to very steep areas. Slopes range from 5 to 40 percent.

A1--0 to 4 inches; very dark gray (10YR 3/1), grayish brown (10YR 5/2) dry, fine sandy loam; weak medium granular structure; soft, very friable; about 10 percent by volume of flat and angular fragments of ironstone; strongly acid; clear wavy boundary.

A2--4 to 8 inches; brown (10YR 5/3) fine sandy loam; massive; soft, very friable; about 5 percent by volume flat and angular fragments of ironstone; strongly acid; clear wavy boundary.

B21t--8 to 20 inches; dark red (2.5YR 3/6) clay; strong medium blocky structure; firm, hard; continuous clay films on surface of peds; about 1 to 2 percent flat and angular fragments of ironstone; very strongly acid; gradual smooth boundary.

B22t--20 to 29 inches; red (2.5YR 4/8) clay; common fine and medium prominent mottles of light brownish gray (10YR 6/2) and pale brown (10YR 6/3) that are arranged horizontally; strong coarse and medium blocky structure; firm, hard; continuous thin clay films on surface of peds; very strongly acid; gradual smooth boundary.

B3 & C--29 to 34 inches; partially weathered horizontal layers of red (2.5YR 4/8), strong brown (7.5YR 5/6), and grayish brown (10YR 5/2) sandy loam, soft sandstone and grayish brown (10YR 5/2) and light brownish gray (10YR 6/2) shale; weak coarse blocky structure; friable, hard; peds are coated with thick red continuous clay films; common flakes of mica; extremely acid.

Cr--34 to 60 inches; stratified red (2.5YR 4/8) and strong brown (7.5YR 5/6) soft sandstone and grayish brown (10YR 5/2) and light brownish gray (10YR 6/2) shale; strata are 1/4 to 4 inches thick; the sandy material is weakly cemented but can be easily cut with a spade; common fine flakes of mica mainly on surface of shale strata; extremely acid.

The solum thickness ranges from 20 to 40 inches. Base saturation above the paralithic contact with the C horizon ranges from 10 to 30 percent and calcium-magnesium ratio is less than 1 within the control section. The clay content of the control section ranges from 40 to 60 percent and silt content ranges from 15 to 30 percent.

The A horizon is fine sandy loam, loamy fine sand, loam, gravelly fine sandy loam, and gravelly loamy fine sand. Coarse fragments of ironstone range up to about 35 percent by volume of this horizon. Reaction ranges from very strongly acid through slightly acid. The A1 horizon is dark brown (7.5YR 3/2; 10YR 3/3), brown (7.5YR 4/2, 5/2, 4/4, 5/4; 10YR 4/3, 5/3), very dark gray (10YR 3/1), dark grayish brown (10YR 4/2), grayish brown (10YR 5/2), or pale brown (10YR 6/3). The A2 horizon is brown (7.5YR 4/4, 5/4; 10YR 4/3, 5/3), light brown (7.5YR 6.4), pale brown (10YR 6/3), yellowish brown (10YR 5/4), or light yellowish brown (10YR 6/4).

The Bt horizon is dark reddish brown (2.5YR 3/4; 5YR 3/4), reddish brown (2.5YR 4/4, 5/4; 5YR 4/4, 5/4), dark red (2.5YR 3/6), red (2.5YR 4/6, 4/8, 5/8), or yellowish red (5YR 4/6, 4/8, 5/8). Mottles of light brownish gray (10YR 6/2), pale brown (10YR 6/3), and strong brown (7.5YR 5/6) are in the lower part of many pedons. Gray colors are due to shell fragments. The Bt horizon generally contains 1 to 10 percent by volume of pebbles of angular and flat ironstone. It ranges from extremely acid through strongly acid.

The C horizon is nearly level interbedded or stratified sandy loam and shale. In most pedons the sandy material is weakly cemented or cemented, but can be cut with a spade. Flakes of mica are visible along cleavage planes between strata as well as in the sandy material of many pedons. The C horizon ranges from extremely acid through strongly acid.

Dallardsville Series

The Dallardsville series consists of deep, somewhat poorly drained, moderately slowly permeable soils that formed in thick loamy sediments on marine terraces of Pleistocene age. These soils are typically on broad nearly level areas. They have a perched water table near the surface in winter and spring. Water runs off the surface slowly. Slope is dominantly less than 1 percent but ranges up to 3 percent.

A11--0 to 2 inches; grayish brown (2.5Y 5/2) fine sandy loam, light brownish gray (2.5Y 6/2) dry; weak fine granular structure; soft, very friable; common fine and medium roots; many wormcasts; very strongly acid; abrupt smooth boundary.

A12--2 to 5 inches; pale brown (10YR 6/3) loamy very fine sand, very pale brown (10YR 7/3) dry; very weak fine granular structure; loose, very friable; many fine roots; many wormcasts; extremely acid; clear smooth boundary.

A2--5 to 19 inches; very pale brown (10YR 7/3) loamy very fine sand, very pale brown (10YR 8/3) dry; few fine faint yellow mottles; weak medium subangular blocky; soft, very friable; common fine and medium roots; common medium and fine pores; very strongly acid; gradual smooth boundary.

A & B--19 to 27 inches; light gray (10YR 7/2) loamy very fine sand, white (10YR 8/1) dry (A2); about 40 percent pale brown (10YR 6/3) very fine sandy loam containing common fine and medium distinct brownish yellow (10YR 6/6) mottles (B2); weak coarse prismatic structure parting to weak medium subangular blocky; soft, very friable; few medium and fine roots; B2 materials are vertically oriented and are extending upward from horizon below or are isolated bodies that are completely surrounded by A2 materials; extremely acid; clear irregular boundary.

B & A--27 to 33 inches; light gray (10YR 7/2) very fine sandy loam, white (10YR 8/2) dry (B2); about 30 percent tongues of loamy very fine sand 5 to 10 m.m. wide; interior of peds contain many fine distinct brownish yellow (10YR 6/6) mottles; weak medium subangular blocky structure; slightly hard, very friable; few medium and fine roots; few clay films; sand grains are bridged and coated with clay; extremely acid; gradual wavy boundary.

B21tg--33 to 45 inches; light gray (10YR 6/1) loam, light gray (10YR 7/1) dry; many medium and coarse distinct yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structures; hard, friable; few roots; thin clay films; sand grains are bridged and coated with clay; extremely acid; gradual wavy boundary.

B22tg--45 to 70 inches; light gray (2.5Y 6/1) clay loam, light gray (2.5Y 7/1) dry; many medium and coarse distinct strong brown (2.5YR 5/8) mottles; moderate medium subangular blocky structure; very hard, firm; few fine roots; thin clay films; sand grains are bridged and coated with clay; extremely acid.

The solum thickness is greater than 60 inches. Reaction ranges from strongly acid to extremely acid in the A horizons and from very strongly acid to extremely acid in the Bt horizons. The base saturation at 50 inches below the top of the Bt ranges from 15 to 35 percent.

The A1 horizon ranges from 4 to 17 inches thick. The upper part (A11) has hue of 10YR or 2.5Y, values of 3 through 5, and chroma of 1 through 3. The lower part (A12) has hue of 10YR, values of 4 through 7, and chroma of 2 through 6. Texture is fine sandy loam, very fine sandy loam, or loamy very fine sand.

The A2 horizon has hue of 10YR, values of 5 through 7, and chroma of 3 or 4. Texture is fine sandy loam, loamy very fine sand, or loamy fine sand.

The A&B horizon has hue of 10YR, values of 5 through 7, and chroma of 2 through 4. Texture is very fine sandy loam, loamy very fine sand, fine sandy loam, or loamy fine sand. Mottles range from none to few.

The B&A horizon has hue of 10YR, values of 5 through 7, and chroma of 2 through 6. Texture is fine sandy loam, loam, or very fine sandy loam. Mottles range from few to many and are within peds of B2 materials.

The B21tg has hue of 10YR, values of 6 or 7, and chroma of 1 or 2. Mottles in shades of brown, yellow, and red range from few to many. Texture is sandy clay loam, loam, and fine sandy loam. Plinthite ranges from none to 5 percent.

The B22tg has hue of 10YR, values of 6 or 7, and chroma of 1 or 2. Mottles in shades of red, yellow, or brown range from common to many. Texture is typically clay loam, but ranges to sandy clay or sandy clay loam.

Darden Series

The Darden series consists of deep, excessively drained, rapidly permeable soils formed in sandy sediments. These nearly level to moderately steep soils are on convex terraces and uplands. Slopes are dominantly 2 to 6 percent but range from 0 to 15 percent.

Ap--0 to 8 inches; brown (7.5YR 4/4) loamy fine sand; weak fine granular structure; very friable, nonsticky and nonplastic; many fine roots; slightly acid; clear smooth boundary.

A1--8 to 14 inches; dark yellowish brown (10YR 4/6) loamy fine sand; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; common fine roots; medium acid; gradual smooth boundary.

C1--14 to 42 inches; brown (7.5YR 5/4) loamy fine sand; single grained; loose, nonsticky and nonplastic; few fine roots; strongly acid; gradual smooth boundary.

C2--42 to 53 inches; strong brown (7.5YR 5/6) loamy fine sand; single grained; loose, nonsticky and nonplastic; few fine roots; strongly acid; gradual smooth boundary.

C3--53 to 80 inches; strong brown (7.5YR 5/6) loamy fine sand; single grained; loose, nonsticky and nonplastic; neutral.

The thickness of sandy horizons exceeds 80 inches. The 10- to 40-inch control section contains 10 to 25 percent silt plus clay. Reaction ranges from very strongly acid to slightly acid in the A horizon and upper C horizon and very strongly acid to neutral in the lower C horizon. The soil is dry in some part of the moisture control section for 75 to 90 cumulative days in most years. Small rounded pebbles range fron none to few.

The A horizon has hues of 7.5YR, 10YR, or 2.5Y, values of 3 to 6, and chromas of 2 to 6. Dark brown mottles range from none to few. Some pedons lack A horizons. Texture is loamy fine sand or fine sand.

The C horizon has hues of 7.5YR, 10YR, or 2.5Y, values from 4 to 8, and chromas from 3 to 8. The texture is mostly loamy fine sand, but some pedons have thin strata of fine sand, loamy sand, or sand. Mottles range from none to few in shades of brown or yellow. Thin discontinuous lamellae, below a depth of 40 inches, range from none to few. Spots or strata of clean sand with chroma of 1 or 2 occur below 40 inches in some pedons.

Fausse Series

The Fausse series is a member of the very-fine, montmorillonitic, nonacid, thermic family of Typic Fluvaquents. These soils have mucky or clayey surface layers underlain by gray and dark gray clayey subsoils.

O2--1 to 0 inch; very dark brown (10YR 2/2) muck; moderate medium granular structure; friable; many roots and partially decayed woody material; medium acid; abrupt smooth boundary.

A1--0 to 10 inches; dark gray (10YR 4/1) clay; common fine distinct dark brown mottles; weak coarse prismatic structure; very sticky; common roots; slightly acid; gradual wavy boundary.

B21g--10 to 22 inches; gray (10YR 5/1) clay; many medium and fine prominent dark brown (7.5YR 4/4) mottles; weak medium angular blocky structure that parts to weak fine angular blocky; very sticky common roots; slightly acid; gradual irregular boundary.

B22g--22 to 31 inches; dark gray (5Y 4/1) clay; many medium prominent dark brown (7.5YR 3/2) mottles; weak medium subangular blocky structure that parts to weak fine angular blocky; very sticky; few roots; shiny surface on peds; neutral; gradual irregular boundary.

B23g--31 to 46 inches; gray (5Y 5/1; N 5/0) clay; few medium prominent dark yellowish brown (10YR 3/4) mottles; weak medium subangular blocky structure that parts to weak fine angular blocky; very sticky; few roots; shiny surface on peds; neutral; gradual irregular boundary.

Cg--46 to 60 inches; gray (5Y 5/1) clay; common medium distinct light olive brown (2.5Y 5/4) mottles, few medium prominent yellowish red (5YR 4/8) mottles; massive; very sticky; few roots; shiny surfaces on peds; mildly alkaline.

The solum thickness ranges from 25 to 50 inches. The soil is saturated or above field capacity continuously in all layers below 24 inches in most years. COLE ranges from .09 to .18 in all mineral layers. N values are variable within 36 inches of the soil surface but are 0.7 or less in some subhorizons in the 8- to 20-inch section. N values of subhorizons at depths below 36 inches are less than 0.7. Cracks do not form to a depth of 20 inches below the soil surface most years.

The 02 horizon, where present, is very dark gray (10YR 3/1), dark gray (10YR 4/1; N 4/0), very dark grayish brown (10YR 3/2), black (10YR 2/1), or very dark brown (10YR 2/2) muck or mucky peat.

The A horizon is dark gray (10YR 4/1; N 4/0; 5Y 4/1), very dark gray (10YR 3/1), very dark grayish brown (10YR 3/2), or dark grayish brown (10YR 4/2) mucky clay or clay. Where the A horizon is very dark gray or very dark grayish brown it is less than 10 inches thick. The 02 and A horizons are medium acid through neutral.

The B horizon is gray (10YR 5/1; N 5/0; 5Y 5/1), dark gray (10YR 4/1; N 4/0; 5Y 4/1), greenish gray (5GY 5/1), or dark greenish gray (5GY 4/1) clay. It is neutral through moderately alkaline.

The Cg horizon is gray (5Y 5/1; N 5/0), dark gray (5Y 4/1), greenish gray (5GY 5/1; 5GB 5/1), or dark greenish gray (5BG 4/1; 5GY 4/1), clay, silty clay, or silty clay loam. It is neutral through moderately alkaline Organic carbon decreases irregularly with depth and is more than 0.2 percent at 50 inches below the soil surface.

Gallime Series

The Gallime series consists of deep, well drained, moderately permeable soils that formed in loamy, acid, unconsolidated sediments. These gently sloping soils are on terraces and uplands. The slope is dominantly less than 3 percent but ranges from 1 to 5 percent.

Ap--0 to 10 inches; brown (10YR 5/3) fine sandy loam; weak medium subangular blocky structure; soft, very friable; common fine roots; medium acid; abrupt smooth boundary.

A2--10 to 28 inches; light yellowish brown (10YR 6/4) fine sandy loam; common fine and medium distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; soft, very friable; common fine roots; many fine pores; common wormcasts; common soft black masses; few coarse rounded pebbles; slightly acid; clear smooth boundary.

B21t--28 to 47 inches; yellowish brown (10YR 5/6) sandy clay loam; common fine and medium prominent red (2.5YR 4/8) mottles; weak coarse blocky structure parting to weak fine and medium subangular blocky; slightly hard, friable; few fine roots; few medium pores; many patchy clay films on faces of peds; few concretions of ironstone up to 1.5 inches in diameter; strongly acid; gradual wavy boundary.

B22t & A'2--47 to 62 inches; yellowish brown (10YR 5/6) sandy clay loam; many coarse distinct yellowish red (5YR 5/6) and common fine and medium distinct yellow (10YR 7/8) mottles; moderate coarse subangular blocky structure; hard, firm; few medium pores; many patchy clay films on faces of peds; few vertical streaks of slightly brittle red (2.5YR 4/8) sandy loam; about 5 percent streaks and coatings of light brownish gray (10YR 6/2) uncoated sand and silt on surfaces of some peds; strongly acid; gradual wavy boundary.

B23t & A'2--62 to 80 inches; mottled red (2.5YR 4/8), light gray (10YR 7/1), and yellow (10YR 7/8) sandy clay loam; weak coarse subangular blocky structure; hard, firm; about 15 percent light brownish gray (10YR 6/2) uncoated sand and silt in streaks, pockets, and coatings on surface of peds; few patchy clay films on faces of peds; very strongly acid.

The solum ranges from 60 to over 100 inches thick. Base saturation ranges from 35 to 60 percent at 72 inches below the surface.

The A horizon is 20 to 40 inches thick. The Ap or A1 horizon is brown (10YR 5/3, 4/3), dark brown (10YR 3/3; 7.5Y 4/2), dark grayish brown (10YR 4/2), or yellowish brown (10YR 5/4). The A2 is 1 to 3 units of value lighter in color than the A1. Texture is fine sandy loam or loam. Reaction ranges from strongly acid through neutral.

The B2t horizon is yellowish brown (10YR 5/4, 5/6, 5/8), brownish yellow (10YR 6/6, 6/8), strong brown (7.5YR 5/6, 5/8), or yellowish red (5YR 5/6, 5/8). There are few to common mottles in colors and shades of red, brown, and gray but mottles with chroma of 2 or less are below a depth of 30 inches from the soil surface. Texture throughout B2t horizons is sandy clay loam, clay loam, or loam, and clay content ranges from 18 to 35 percent. Reaction throughout B2t horizons ranges from very strongly acid through slightly acid.

The B2t & A'2 horizons are mottled in colors and shades of red, brown, yellow, and gray. The A'2 soil material consists of streaks, pockets, and coatings of uncoated sand and silt grains comprising 5 to 20 percent of the horizon. The texture is sandy clay loam, clay loam, or loam. Reaction ranges from very strongly acid through medium acid.

Guyton Series

The Guyton series is a member of the fine-silty, siliceous, thermic family of Typic Glossaqualfs. These soils have grayish brown silt loam A1 horizons and light brownish gray silt loam A2 horizons that tongue into gray silty clay loam Bt horizons.

A1--0 to 6 inches; grayish brown (10YR 5/2) silt loam; common medium distinct mottles of dark yellowish brown (10YR 4/4); weak medium subangular blocky structure; friable; strongly acid; clear smooth bounda

A21g--6 to 11 inches; light brownish gray (10YR 6/2) silt loam; common medium distinct dark yellowish brown (10YR 4/4) mottles; weak medium subangular blocky structure; friable; few fine soft brown bodies; strongly acid; clear wavy boundary.

A22g--11 to 23 inches; light brownish gray (2.5Y 6/2) silt loam; common medium distinct dark yellowish brown (10YR 3/4) and dark brown (10YR 4/3) mottles; weak medium subangular blocky structure; compact and brittle; many fine pores which have dark gray stains; tongues about 3 inches wide extend to 35 inches below the surface; very strongly acid; clear irregular boundary.

B & A--23 to 35 inches; gray (10YR 5/1) silty clay loam; common medium distinct strong brown (7.5YR 5/6) mottles; weak coarse subangular blocky structure; friable; thick discontinuous clay films on vertical faces of coarse blocks, few thin and patchy clay films on faces of peds and in pores; the strong brown areas are slightly brittle; tongues of light brownish gray (10YR 6/2) silt loam make up about 15 percent of horizons; very strongly acid; clear wavy boundary.

B2tg--35 to 46 inches; grayish brown (10YR 5/2) silt loam; common medium distinct strong brown (7.5YR 5/6) mottles; weak coarse and medium subangular blocky structure; slightly compact, friable; few thin clay films; very strongly acid; clear smooth boundary.

B3tg--46 to 70 inches; gray (10YR 6/1) clay loam surrounding pockets of brittle strong brown (7.5YR 5/6) clay loam; weak coarse subangular blocky structure; firm; few thin clay films on horizontal faces of ped and few to many thick clay films on walls of vertical cracks; few fine brown concretions; few pockets of clay loam and sandy clay which tend to be vertically oriented; very strongly acid; abrupt smooth boundary.

Cg--70 to 80 inches; light olive gray (5Y 6/2) sandy clay loam; common medium distinct strong brown (7.5YR 5/6) mottles; massive; firm, hard and compact; very strongly acid.

The solum thickness ranges from 52 to 80 inches. Sand content throughout the solum ranges from about 15 to 40 percent with less than 15 percent coarser than very fine sand. These soils lack natric horizons, but exchangeable sodium ranges from about 10 to 40 percent in the lower part of the solum. The A1 and Ap horizons are brown (10YR 5/3, 4/3), grayish brown (10YR 5/2), light brownish gray (10YR 6/2; 2.5Y 6/2), or dark grayish brown (10YR 4/2). It is silt loam or very fine sandy loam and from medium acid through very strongly acid. The A2g horizons are gray (10YR 5/1, 6/1), light gray (10YR 7/1, 7/2), or light brownish gray (10YR 6/2; 2.5Y 6/2). Mottles in the A2 are few to common and range in color from yellowish brown (10YR 5/4, 5/6), to strong brown (7.5YR 5/6).

Texture ranges from silt loam to very fine sandy loam and reaction ranges from strongly acid to very strongly acid. The lower boundary is clear irregular to abrupt irregular with tongues of A2 extending into the Bt horizon. Combined thickness of the A horizons ranges from 16 to 30 inches. B2tg horizons are gray (10YR 5/1, 6/1), light brownish gray (10YR 6/2; 2.5Y 6/2), or grayish brown (10YR 5/2). The dominant mottles are strong brown (7.5YR 5/6, 5/8), or yellowish brown (10YR 5/4, 5/6, 5/8). Texture is silt loam, silty clay loam, loam, or clay loam. Reaction ranges from medium to very strongly acid in the B2tg horizon. The B3 and C horizons have the same texture and color range as the B2t horizons. They are strongly acid through moderately alkaline.

Hatliff Series

The Hatliff series is a member of the coarse-loamy, mixed, nonacid, thermic family of Aquic Udifluvents. These soils have dark brown and brown loamy A horizons and yellowish brown and very pale brown fine sandy loam and loamy fine sand C horizons with strata of finer texture.

Ap--0 to 5 inches; dark brown (10YR 4/3) loam, pale brown (10YR 6/3) dry; few fine faint dark gray mottles; common fine distinct strong brown stains in root channels and on ped surfaces; weak fine subangular blocky structure; hard, friable; common fine and medium roots; few worm casts; medium acid; abrupt smooth boundary.

A1--5 to 10 inches; brown (10YR 5/3) fine sandy loam, very pale brown (10YR 7/3) dry; common fine faint dark gray and common fine distinct strong brown mottles; few strong brown stains in root channels; weak fine subangular blocky structure; hard, friable; common fine and medium roots; strongly acid; abrupt smooth boundary.

C1--10 to 26 inches; yellowish brown (10YR 5/4) fine sandy loam; few medium distinct strong brown (7.5YR 5/8) and few fine faint light brownish gray mottles; few strong brown stains in root channels; common strata 1 to 5 cm. in thickness of light yellowish brown (10YR 6/4) loamy fine sand, bedding planes evident; massive; very friable; strongly acid; abrupt smooth boundary.

C2--26 to 38 inches; very pale brown (10YR 7/4) loamy fine sand; few fine faint brownish yellow (10YR 6/6) mottles; few strata 5 to 10 mm. in thickness of brown (10YR 5/3) fine sandy loam; single grained; loose; very friable; medium acid; abrupt smooth boundary.

C3--38 to 70 inches; very pale brown (10YR 7/4) loamy fine sand; common strata 1 to 3 cm. in thickness of light brownish gray (10YR 6/2) fine sandy loam; fine sandy loam strata contain few fine distinct yellowish brown (10YR 5/6) mottles and strong brown stains in root channels; single grained; very friable; slightly acid; abrupt smooth boundary.

C4--70 to 80 inches; very pale brown (10YR 7/4) sand; common fine distinct brownish yellow (10YR 6/6) mottles; single grained; loose; neutral.

The soil reaction ranges from strongly acid through neutral but are medium acid through neutral in some part of the control section. Bedding planes are evident and strata of contrasting textures are throughout the soil. Mottles of chroma 2 or less are within 20 inches of the surface. The A horizon is loam, fine sandy loam, sandy loam, or loamy fine sand. It is very dark gray (10YR 3/1), dark gray (10YR 4/1), gray (10YR 5/1), very dark grayish brown (10YR 3/2), dark grayish brown (10YR 4/2), grayish brown (10YR 5/2), light brownish gray (10YR 6/2), dark brown (10YR 3/3, 4/3), brown (10YR 5/3), or pale brown (10YR 6/3). Where color values are less than 3.5 the thickness is less than 7 inches.

In some pedons the matrix chroma is 3 and A horizon contains fine faint mottles with chroma of 1 or 2. The A horizon also contains strong brown (7.5YR 5/6, 5/8) or yellowish brown (10YR 5/6, 5/8) mottles or stains in the root channels. Clay content in the 10- to 40- inch control section ranges from 8 to 18 percent. The C horizon is grayish brown (10YR 5/2), light brownish gray (10YR 6/2), light gray (10YR 7/2), white (10YR 8/2), brown (10YR 4/3), 5/3), pale brown (10YR 6/3), very pale brown (10YR 7/3, 7/4, 8/3, 8/4), yellowish brown (10YR 5/4), or light yellowish brown (10YR 6/4). The chroma 2 colors are due to uncoated sand grains. Mottles are grayish brown (10YR 5/2), brownish gray (10YR 6/2), dark gray (10YR 4/1), dark grayish brown (10YR 4/2), strong brown (7.5YR 5/6. 5/8), yellowish brown (10YR 5/6, 5/8), brownish yellow (10YR 6/6) or any of the above C horizon colors. In some pedons the C horizon below a depth of 40 inches has a matrix color of gray (10YR 5/1) or light gray (10YR 6/1, 7/1). The C horizon is fine sandy loam, sandy loam, loamy fine sand, loamy sand, fine sand, or sand.

Iuka Series

The Iuka series is a member of the coarse-loamy, siliceous, acid, thermic family of Aquic Udifluvents. These soils are on flood plains and have brown fine sandy loam A horizons, light yellowish brown fine sandy loam upper C horizons mottled with grayish-brown and strong brown and mottled gray and yellowish brown sandy loam lower C horizons.

Ap--0 to 7 inches; brown (10YR 4/3) fine sandy loam; weak medium granular structure; friable; fine pebbles of chert and quartzite; medium acid; abrupt smooth boundary.

A1--7 to 13 inches; brown (10YR 5/3) fine sandy loam; single grained; friable; very strongly acid; gradual wavy boundary.

C1--13 to 22 inches; light yellowish brown (10YR 6/4) fine sandy loam and few thin strata of loamy sand; common medium distinct strong brown (7.5YR 5/6) and grayish brown (10YR 5/2) mottles; massive; friable; very strongly acid; gradual wavy boundary.

C2g--22 to 60 inches; coarsely mottled gray (10YR 6/1) and yellowish brown (10YR 5/4) sandy loam and lenses of loamy sand and loam; massive; friable; few soft dark colored bodies in lower part; very strongly acid.

The soil is strongly acid or very strongly acid except for surface layers that are limed. Thin bedding planes of contrasting textures are common in most pedons. The A horizon has colors of brown (10YR 4/3, 5/3 7.5YR 4/2, 4/4), yellowish brown (10YR 5/4, 5/6), dark grayish brown (10YR 4/2), dark yellowish brown (10YR 4/4), or light yellowish brown (10YR 6/4; 2.5Y 5/4).

The A horizon is fine sandy loam, sandy loam, loamy sand, or loam. The C1 horizon has colors of light yellowish brown (10YR 6/4; 2.5Y 6/4), yellowish brown (10YR 5/4, 5/6, 5/8), pale brown (10YR 6/3), brown (10YR 4/3, 5/3; 7.5YR 4/4, 5/4), light olive brown (2.5Y 5/4, 5/6), olive yellow (2.5Y 6/6), or dark grayish brown (10YR 4/2). Mottles with chroma 2 or less are within 20 inches of the surface. It is sandy loam, fine sandy loam, loam, or silt loam. The C2 horizon may have colors as described for the C1 or it may lack a matrix color and be mottled with shades of gray and brown, or it may be dominantly gray with many brown and yellow mottles. It is sandy loam, fine sandy loam, loam, silt loam, or loamy sand. Clay content of the 10- to 40-inch control section is 10 to 18 percent. Some pedons have thin gravelly or sandy strata, and some pedons have textures of sandy clay loam or clay loam at depths below 40 inches. A few mica flakes and soft dark colored bodies or fine black and brown concretions are allowed in the C horizons. Some pedons have buried A horizons at depths below 20 inches.

Jasco Series

The Jasco series consists of deep, very poorly drained, very slowly permeable soils that formed in unconsolidated loamy Coastal Plain sediments. These soils are in low, depressional areas, on uplands. Slopes are less than one percent.

A1--0 to 4 inches; brown (10YR 5/3) silt loam; few fine distinct strong brown (7.5YR 5/6) mottles; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky; common fine roots; many fine and medium vesicular pores; strongly acid; clear smooth boundary.

A2g--4 to 23 inches; light brownish gray (10YR 6/2) silt loam, common medium distinct strong brown (7.5YR 5/6) and common medium faint brown (10YR 5/3) mottles; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, friable; few medium and fine roots; common fine pores; very strongly acid; clear irregular boundary.

Bx--23 to 44 inches; grayish brown (10YR 5/2) loam; many coarse distinct strong brown (7.5YR 5/6) and few fine distinct yellowish brown (10YR 5/6) mottles; moderate coarse prismatic structure parting to weak coarse platy; very hard, firm; brittle in 80 percent of cross-section; indistinct polygonal veins of friable grayish silt; crayfish krotovinas and tongues of silt loam comprise 35 percent of the horizon, about 50 percent of tongues are brittle; thin coatings of clean sand grains occur on some vertical ped surfaces; common fine vesicular pores; very strongly acid; abrupt irregular boundary.

B2t&A'2--44 to 65 inches; mottled brownish yellow (10YR 6/6) and light brownish gray (10YR 5/2) silty clay loam; moderate medium subangular blocky structure; very hard, very firm; about 20 percent tongues and krotovinas of very fine sandy loam, few brittle bodies in tongues; thin coatings of clean sand grains occur on some vertical ped surfaces; very strongly acid.

The solum thickness ranges from 60 to more than 80 inches. Depth to fragipan ranges from 15 to 30 inches. Reaction ranges from strongly acid through extremely acid throughout the pedon.

The A horizon is 15 to 30 inches thick and is silt loam or loam. The A1 horizon has hue of 10YR, values of 3 to 5, and chroma of 1 to 3. The A2 horizon has hues of 10YR and 7.5YR, values of 5 to 7, and chroma of 1 or 2. Brownish mottles range from few to common.

The Bx horizon has hues of 7.5YR and 10YR, values of 5 to 7, and chroma of 1 or 2. Brownish mottles range from few to many. The tongues of A2 material have textures of silt loam or very fine sandy loam and have hues of 10YR, values of 6 or 7, and chroma of 2 to 4. The tongues constitute about 35 percent of the horizon. This horizon is very firm and brittle in 60 to 95 percent of the cross-section.

The B2 t&A'2 horizon has hues of 10YR and 7.5YR, values of 5 to 7, and chroma of 2 to 8. Some pedons have mottles of brownish gray (10YR 6/2) and red (2.5YR 4/6) in this layer. The tongues of A'2 material have hues of 10YR, with values of 5 to 7, and chroma of 2 to 4. The tongues constitute about 20 percent of the horizon. This horizon is very firm and brittle in 15 to 30 percent of the cross-section.

Kirbyville Series

The Kirbyville series consists of deep, somewhat poorly drained, moderately permeable soils that formed in loamy coastal plain sediments of Pleistocene Age. These nearly level to gently sloping soils are on uplands. They have a water table near the surface during winter and early spring. Slopes are dominantly 1 to 2 percent but range from 0 to 4 percent.

A1--0 to 5 inches; grayish brown (10YR 5/2) fine sandy loam; weak medium subangular blocky structure; soft, friable, slightly sticky and nonplastic; many fine and medium roots, few coarse roots; medium acid; clear smooth boundary.

A2--5 to 18 inches; very pale brown (10YR 7/4) fine sandy loam; common medium faint light gray (10YR 7/2) mottles; weak medium subangular blocky structure; soft, friable, nonsticky and nonplastic; many fine and medium roots, few coarse roots; few rounded ironstone pebbles about 5 to 10 mm in size; strongly acid; clear irregular boundary.

B21t&A2--18 to 35 inches; light yellowish brown (10YR 6/4) sandy clay loam; common medium faint brownish yellow (10YR 6/6) mottles in ped interior; 20 percent of the horizon is tongues of very pale brown (10YR 7.3) fine sandy loam; common medium faint light gray (10YR 7.2) mottles on surfaces of peds; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and medium roots, few coarse roots; few patchy clay films; few rounded ironstone pebbles about 5 to 10 mm in size; strongly acid; clear irregular boundary.

B22t&A--35 to 56 inches; strong brown (7.5YR 5/8) sandy clay loam; common medium prominent red (2.5YR 4/6) mottles; 35 percent of the horizon is tongues of light gray (10YR 7/2) fine sandy loam; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few patchy clay films; 8 percent plinthite; strongly acid; clear irregular boundary.

B23t&A--56 to 75 inches; brownish yellow (10YR 6/6) sandy clay loam; common medium faint red (2.5YR 4/6) mottles, coatings on faces of peds is light gray (10YR 6/1); 40 percent of the horizon is tongues of light gray (10YR 7.1) fine sandy loam; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, few patchy clay films; 8 percent plinthite; very strongly acid.

Thickness of the solum ranges from 60 to more than 80 inches.

The A horizon is fine sandy loam or very fine sandy loam. Reaction is medium acid through very strongly acid. The A1 horizon has a hue of 10YR, values of 5 or 6, and chroma of 2 or 3. The A2 horizon has a hue of 10YR, value of 6 or 7, and chromas of 3 to 6. It contains mottles or stains of yellowish brown (10YR 5/4, 5/6, 5/8), brownish yellow (10YR 6/6 or 6/8), and light gray (10YR 7/1 or 7/2).

The B2&A horizon is sandy clay loam or loam. Reaction is strongly acid or very strongly acid. Clay content of the upper 20 inches is 18 to 25 percent. The B2 part has a matrix with a hue of 10YR or 7.5YR, values of 5 or 6, and chromas of 4 to 8. The tongues of A2 material have a hue of 10YR, value of 6 or 7, and chroma of 1 to 3. Tongues of A2 material comprise 15 to 40 percent by volume of these horizons. Volume of tongues increases with depth. Plinthite ranges from 5 to about 15 percent in most pedons. Mottles in shades of brown and yellow range from few to common in ped interiors. Gray mottles due to wetness range from few to common on ped exteriors.

Landman Series

The Landman series is a member of the loamy, siliceous, thermic family of Grossarenic Paleudalfs. These soils have very dark grayish brown and light yellowish brown loamy fine sand A horizons 60 to 80 inches thick, over mottled red, yellowish brown, grayish brown, and light brownish gray sandy clay loam B2t horizons that contain 5 to 25 percent plinthite by volume.

A1--0 to 7 inches; very dark grayish brown (10YR 3/2) loamy fine sand; weak fine granular structure; slightly hard, very friable; many medium and coarse roots; slightly acid; clear smooth boundary.

A21--7 to 23 inches; light yellowish brown (10YR 6/4) loamy fine sand; single grained; loose; many fine, medium, and coarse roots; few siliceous pebbles up to 1 inch in diameter; slightly acid; clear smooth boundary.

A22--23 to 43 inches; light yellowish brown (10YR 6/4) loamy fine sand; singly grained; loose; common fine, medium, and coarse roots; few fine brown slightly hard to weakly cemented bodies; few siliceous pebbles up to 1 inch in diameter; slightly acid; clear smooth boundary.

A23--43 to 74 inches; light yellowish brown (10YR 6/4) loamy fine sand; massive; friable, slightly brittle; few medium and coarse roots; few thin bands of dark brown (7.5YR 4/4) loamy material that total less than 1½ inches in thickness, bands are wavy and continuous; few siliceous pebbles up to 1 inch in diameter; few black concretions 15 mm in diameter; slightly acid; clear smooth boundary.

B21t--74 to 82 inches; mottled, grayish brown (10YR 5/2), yellowish brown (10YR 5/8), and red (2.5YR 4/8) sandy clay loam; weak medium subangular blocky structure; very hard, firm; few medium and coarse roots; common fine pores; 10 to 15 percent red surrounded by yellowish brown plinthite; strongly acid; clear smooth boundary.

B22t--82 to 90 inches; light brownish gray (2.5YR 6/2) sandy clay loam; common medium prominent red (10R 4/8) and common medium distinct strong brown (7.5YR 5/8) mottles; weak medium and coarse subangular blocky structure; very hard, firm; few medium and coarse roots; common fine pores 15 to 20 percent plinthite; very strongly acid.

The solum thickness ranges from 80 to more than 100 inches. Thickness of the Arenic epipedon, and depth to horizons containing more than 5 percent plinthite range from 60 to 80 inches. Plinthite in the B2t horizons ranges from 5 to 25 percent by volume. These horizons range from slightly acid to very strongly acid.

The A1 horizon is very dark grayish brown (10YR 3/2), dark grayish brown (10YR 4/2), grayish brown (10YR 5/2), or light brownish gray (10YR 6/2). The A21 and A22 horizons are brown (10YR 4/3, 5/3), pale brown (10YR 6/3), light brownish gray (10YR 6/2), light gray (10YR 7/2), very pale brown (10YR 7/4), light yellowish brown (10YR 6/4), or yellowish brown (10YR 5/4). The A22 horizon has few scattered bodies of brown loamy material throughout. The A23 horizon is light yellowish brown (10YR 6/4), pale brown (10YR 6/3), very pale brown (10YR 7/3), or light gray (10YR 7/2). Continuous, wavy bands of loamy material that totals les than 2 inches in thickness ranges from none to common in the A23 horizon.

The A23 horizon ranges from slightly hard to loose when moist. The A horizons are loamy fine sand, fine sand, or loamy sand. They range from slightly acid to strongly acid.

The B21t horizon ranges from mottled yellowish brown, strong brown, yellowish red, red, and light gray to matrix color of light gray (10YR 6/1) or light brownish gray (10YR 6/2) mottled brown and red. The B21t horizon ranges from sandy clay loam to fine sandy loam. The B22t horizon ranges from light gray (10YR 6/1, 7/1) or light brownish gray (2.5Y 6/2) mottled brown and red to reticulately mottled. It ranges from sandy clay loam to sandy clay. Siliceous pebbles, ironstone nodules, or black concretions range from none to common.

Mantachie Series

The Mantachie series consists of somewhat poorly drained, moderately permeable soils that formed in loamy alluvium. These soils are on nearly level flood plains. They usually flood late in winter and early spring. Slope is dominantly less than 1 percent but ranges up to 3 percent.

Ap--0 to 5 inches; dark grayish brown (10YR 4/2) loam; common fine distinct dark yellowish brown mottles; weak fine granular structure; friable; common fine roots; few fine red and brown concretions; slightly acid; abrupt smooth boundary.

A1--5 to 11 inches; mottled brown (10YR 4/3), grayish brown (10YR 5/2), and light yellowish brown (10YR 6/4) fine sandy loam; weak fine granular structure; friable; few fine roots; few fine red concretions; very strongly acid; clear wavy boundary.

B1--11 to 15 inches; mottled grayish brown (10YR 5/2), brown (10YR 4/3), and dark yellowish brown (10YR 4/4) loam; weak fine granular and subangular blocky structure; friable; few fine roots; few fine black and brown concretions; very strongly acid; clear wavy boundary.

B21--15 to 19 inches; mottled gray (10YR 5/1) and strong brown (7.5YR 5/6) loam; weak medium subangular blocky structure; friable, slightly plastic; few fine roots; very strongly acid; gradual wavy boundary.

B22g--19 to 29 inches; gray (10YR 6/1) loam; many medium distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable, slightly plastic; few fine roots; very strongly acid; gradual wavy boundary.

B23g--29 to 48 inches; gray (10YR 5/1) loam; many medium distinct strong brown (7.5YR 5/6) and few fine prominent yellowish red mottles; weak medium subangular blocky structure; friable, slightly plastic; few fine roots; very strongly acid; gradual wavy boundary.

B24g--48 to 61 inches; gray (10YR 6/1) loam; many fine and medium distinct strong brown (7.5YR 5/6) and prominent yellowish red (5YR 5/6) mottles; weak medium subangular blocky structure; friable, slightly sticky; few fine and medium red concretions; very strongly acid.

The solum thickness ranges from 30 to 65 inches. Reaction is strongly acid through very strongly acid in the A and B horizons, except for those surface layers that have been limed. Content of iron concretions ranges from none to common throughout. Some pedons have about 5 percent gravel by volume throughout the soil.

The A horizon is dark brown (10YR 4/3), dark grayish brown (10YR 4/2; 2.5Y 4/2), brown (10YR 5/3), dark yellowish brown (10YR 4/4), yellowish brown (10YR 5/4, 5/6) or is mottled in colors of brown and gray. Some pedons have thin very dark grayish brown (10YR 3/2) or very dark gray (10YR 4/1) horizons. Texture is clay loam, fine sandy loam, loam, sandy loam, or silt loam.

The upper part of the B horizon is mottled in colors of gray, brown, and yellow, or it has a matrix color of dark grayish brown (10YR 4/2; 2.5Y 4/2), grayish brown (10YR 5/2; 2.5Y 5/2), brown (10YR 5/3), or yellowish brown (10YR 5/4, 5/6) with few to many grayish mottles. The lower part of the B horizon is dark grayish brown (10YR 4/2; 2.5Y 4/2), grayish brown (10YR 5/2; 2.5Y 5/2), gray (10YR 5/1, 6/1), light gray (10YR 7/1, 7/2), or light brownish gray (10YR 6/2; 2.5Y 6/2) with few to many mottles in colors of brown and red. The B horizon is clay loam, loam, sandy loam, sandy clay loam, or silt loam. The average clay content of the 10- to 40-inch control section ranges from 18 to 34 percent.

Midland Series

The Midland series is a member of the fine, montmorillonitic, thermic family of Typic Ochraqualfs. These soils have dark grayish brown silty clay loam A horizons and gray clay Bt horizons.

Ap--0 to 4 inches; dark grayish brown (10YR 4/2) silty clay loam; massive; firm; strongly acid; abrupt smooth boundary.

A1--4 to 7 inches; dark grayish brown (10YR 4/2) silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak medium angular blocky structure; firm; medium acid; gradual smooth boundary.

B21tg--7 to 17 inches; dark gray (10YR 4/1) silty clay; common medium distinct yellowish brown (10YR 5/6) mottles; compound moderate coarse prismatic and moderate medium angular blocky structure; very firm; black (10YR 2/1) shiny ped surfaces; thin patchy clay films; few fine soft black bodies; neutral; clear wavy boundary.

B22tg--17 to 33 inches; gray (10YR 5/1) silty clay; common medium distinct yellowish brown (10YR 5/6) mottles; compound moderate coarse prismatic and moderate medium angular blocky structure; very firm; thin patchy clay films; few fine black concretions; about 3 percent medium carbonate concretions; noncalcareous matrix; moderately alkaline; gradual smooth boundary.

B23tg--33 to 42 inches; gray (5Y 6/1) silty clay; many fine distinct olive mottles; moderate medium angular blocky structure; very distinct slickensides 6 inches across; very firm; few fine black concretions; about 3 percent medium carbonate concretions; noncalcareous matrix; moderately alkaline; gradual smooth boundary.

B3g--42 to 60 inches; gray (5Y 6/1) silty clay; many fine distinct ol mottles; massive or weak coarse angular blocky structure; very firm; few slickensides; few fine soft carbonate accumulations; moderately alkaline.

The solum is from 40 to about 80 inches thick. Slickensides that do not intersect are within 40 inches of the soil surface. COLE values of the upper 20 inches of the B horizon range from about 0.06 through 0.08. The A horizon is dark grayish brown (10YR 4/2), dark gray (10YR 4/1), grayish brown (10YR 5/2), or gray (10YR 5/1) silty clay loam. It is strongly acid through slightly acid. The B horizon is dark gray (10YR 4/1), gray (10YR 5/1; 5Y 5/1, 6/1), or light olive gray (5Y 6/2) clay, silty clay, or silty clay loam. Mottles are in shades of yellow, brown, or olive. The B horizon is medium acid through moderately alkaline. Though not diagnostic, the B horizon contains about 1 to 5 percent carbonate concretions in most pedons. The C horizon has the same color, texture, and reaction range as the B horizon.

Otanya Series

The Otanya series consists of deep, moderately well drained, moderately slowly permeable soils that formed in thick beds of unconsolidated loamy coastal plain sediments of Pleistocene Age. These nearly level to gently sloping soils are on uplands. Slopes range from 0 to 5 percent.

A1--0 to 5 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine subangular blocky structure parting to weak medium granular; soft, very friable, slightly sticky and nonplastic; common fine roots, few medium and coarse roots; few rounded ironstone pebbles up to 15 mm across; strongly acid; clear smooth boundary.

A2--5 to 13 inches; brown (10YR 5/3) and grayish brown (10YR 5/2) fine sandy loam; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few fine, medium, and coarse roots; few rounded ironstone pebbles up to 15 mm across; strongly acid; clear smooth boundary.

B21t--13 to 26 inches; yellowish brown (10YR 5/6) sandy clay loam; weak medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few thin patchy clay films on faces of peds; few rounded ironstone pebbles up to 15 mm across; strongly acid; gradual smooth boundary.

B22t--26 to 36 inches; yellowish brown (10YR 5/8) sandy clay loam; common medium distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; thin patchy clay films on faces of peds; about 8 percent rounded ironstone pebbles up to 15 mm across; very strongly acid; gradual smooth boundary.

B23t--36 to 54 inches; yellowish brown (10YR 5/8) sandy clay loam; common medium prominent red (2.5YR 4/6) and yellowish red (5YR 5/6), and common medium distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; thin patchy clay films on faces of peds; about 10 percent by volume of plinthite; about 5 percent by volume of brittle masses; few rounded ironstone pebbles up to 15 mm across; very strongly acid; gradual smooth boundary.

B24t--54 to 72 inches; yellowish brown (10YR 5/8) sandy clay loam; common medium faint light yellowish brown (10YR 6/4) and brownish yellow (10YR 6/6), and few medium distinct light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; thin patchy clay films on faces of peds; about 10 percent by volume of plinthite; about 5 percent by volume of brittle masses; few small spots of uncoated sand; very strongly acid.

The solum thickness ranges from 60 to more than 80 inches. Plinthite makes up 5 to 25 percent of some subhorizon within 60 inches of the surface. Base saturation ranges from 10 to 35 percent, and CEC ranges from 5 to 10 me/100 grams of soil at 50 inches below the top of the argillic horizon. Clay content in the upper 20 inches of the argillic horizon ranges from 18 to 35 percent.

The A horizons are loam, fine sandy loam, or loamy fine sand. The A horizons range from 7 to 25 inches thick. Loamy fine sand textures are less than 20 inches thick. Ironstone pebbles range from 0 to 10 percent by volume. Reaction ranges from very strongly acid through slightly acid. The A1 horizon has hue of 10YR and 2.5Y, value of 3 through 6, and chroma of 1 through 3.

The A2 horizon has hue of 10YR and 2.5Y, value of 4 through 7, and chroma of 2 through 4.

The Bt horizons are fine sandy loam, clay loam, or sandy clay loam. Reaction is very strongly acid or strongly acid.

Ozan Series

The Ozan series is a member of the coarse-loamy, siliceous, thermic family of Typic Glossaqualfs. These soils have light brownish gray fine sandy loam A1 horizons, and light gray fine sandy loam A2 horizons tonguing into the light gray loam B horizons.

A1--0 to 6 inches; light brownish gray (10YR 6/2) fine sandy loam; common fine faint dark gray mottles; weak medium granular structure; very friable; many medium and fine roots; few fine pores; few worm holes; very strongly acid; clear smooth boundary.

A2g--6 to 15 inches; light gray (10YR 7/1) fine sandy loam; common medium faint pale brown (10YR 6/3) and common fine distinct yellowish brown mottles; weak medium subangular blocky structure; friable; many medium and fine roots; few fine pores; very strongly acid; clear irregular boundary.

B21tg--15 to 29 inches; light gray (10YR 7/1) loam; common medium distinct yellowish brown (10YR 5/4) mottles; weak medium subangular blocky structure; friable; few fine roots; few fine pores; common tongues of sandy loam extending through horizon; sand grains in the loam portion are coated and bridged with clay; very strongly acid; gradual smooth boundary.

B22tg--29 to 38 inches; light gray (10YR 7/1) loam; common medium distinct yellowish brown (10YR 5/8) and brownish yellow (10YR 6/6) mottles; moderate medium subangular blocky structure; firm; few fine roots; few fine pores; few thin patchy clay films; sand grains coated and bridged with clay; few fine black concretions; few pebbles of quartz; strongly acid; gradual smooth boundary.

B23tg--38 to 56 inches; light gray (10YR 7/1) loam; common fine distinct yellowish brown mottles; weak medium subangular blocky structure; firm; few fine pores; sand grains coated and bridged with clay; few fine black concretions; few pebbles of quartz; strongly acid; gradual wavy boundary.

B3g--56 to 72 inches; light gray (10YR 7/1) loam; common medium distinct yellowish brown (10YR 5/4) mottles; weak medium subangular blocky structure; friable; few fine pores; strongly acid.

The solum thickness ranges from 60 to 80 inches or more. Base saturation at 50 inches below the top of the B horizon is 45 to 60 percent. The soil is very strongly acid through medium acid in all horizons. The A1 horizon is light brownish gray (10YR 6/2), grayish brown (10YR 5/2), or dark grayish brown (10YR 4/2). The A2 horizon is light gray (10YR 7/1, 6/1) or light brownish gray (10YR 6/2). The A horizon is loam or any class of the sandy loams. Tongues of gray sandy loam extend as vertical tubes through the upper B horizon. They are 1 to 2 inches in diameter in the upper part and taper with depth to about 1/2 inches with the lower part surrounded by a brownish cup of clay enriched material.

The B2 horizon is light gray (10YR 7/1, 6/1), gray (10YR 5/1), or light brownish gray (10YR 6/2), distinctly mottled with shades of brown. Texture is sandy loam or loam, and some pedons have sandy clay loam or clay loam lower B horizons. The upper 20 inches of the B horizon has 10 to 18 percent clay, more than 20 percent silt, and more than 20 percent material that is coarser than very fine sand.

Plank Series

The Plank series consists of deep, poorly drained, slowly permeable soils that formed in neutral through slightly acid silty marine sediments. These soils are on broad nearly level areas on uplands. They are saturated for several months in most years. Slope is 0 to 1 percent.

A1--0 to 5 inches; grayish brown (10YR 5/2) silt loam, light grayish brown (10YR 6/2) dry; few fine distinct yellowish brown (10YR 5/6) and few fine faint light gray (10YR 7/2) mottles; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; common fine roots; extremely acid; clear smooth boundary.

A2--5 to 13 inches; light brownish gray (10YR 6/2) silt loam, light gray (10YR 7/2) dry; common fine distinct yellowish brown (10YR 5/8) and few fine faint grayish brown (10YR 5/2) mottles; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; few fine roots; few black concretions; very strongly acid; clear irregular boundary.

A&B--13 to 42 inches; about 70 percent by volume light brownish gray (10YR 6/2) silt loam; light gray (10YR 7/2) dry (A2); massive; soft, very friable, slightly sticky and slightly plastic; and about 30 percent by volume light brownish gray (10YR 6/2) silt loam, light gray (10YR 7/2) dry (B2t); common fine distinct yellowish brown (10YR 5/8) and few fine distinct strong brown (7.5YR 5/8) mottles; weak fine and medium blocky structure; few fine roots, few fine black concretions; A2 in 2 to 4 cm. wide bands surrounding the B bodies; very strongly acid; gradual irregular boundary.

B&A--42 to 62 inches; about 60 percent by volume grayish brown (10YR 5/2) silt loam, light brownish gray (10YR 6/2) dry (B2t); common fine distinct yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure parting to weak fine blocky; soft, very friable, slightly sticky and slightly plastic; about 40 percent by volume pale brown (10YR 6/3) silt loam, very pale brown (10YR 7/3) dry (A2); massive; soft, very friable, slightly sticky and slightly plastic; few medium black concretions; A2 surrounds and coats B2t bodies; medium acid.

The solum is more than 60 inches thick. The control section is silt loam or loam with less than 15 percent coarser than very fine sand and less than 18 percent clay to a depth of 48 inches. Black concretions range from few to common. Tongues of albic materials extend to 50 inches or more. The tongues consist of vertical streaks and masses of albic materials 5 mm to about 10 mm wide or masses that surround B bodies at the same thickness.

The A horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2.

The A2 horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. Where the chroma is 2 the horizon is mottled. Mottles range from none to many but make-up less than 40 percent of horizon. Reaction ranges from extremely acid through medium acid.

The A&B horizon extends to a depth of more than 40 inches. The A2 part has hue of 10YR, value of 6 or 7 and chroma of 1 or 2. The B2t part has hue of 10YR, value 5 to 7 and chroma of 1 or 2. Mottles range from few to many. Texture of the A2 part is silt loam or very fine sandy loam while texture of the B2t part is silt loam or loam. Reaction ranges from strongly acid through medium acid.

The B&A horizon typically begins at 36 to 60 inches. The B2t part has hue of 10YR, value of 5 to 7, and chroma of 1 to 6. The A2 part has hue of 10YR, value of 5 to 7, and chroma of 1 to 3. Mottles range from none to many. Texture of the B2t part is silt loam, loam, or silty clay loam, and the A2 part is silt loam or very fine sandy loam. Reaction ranges from strongly acid through neutral. Brittle masses range few to common. Below depths of 50 inches reaction ranges to moderately alkaline.

Rentzel Series

The Rentzel series consists of deep, somewhat poorly drained, moderately slowly permeable soils that formed in sandy and loamy marine deposits. These soils are on gently sloping drainageways and concave depressional areas. Slopes are dominantly 2 to 4 percent but range from 0 to 5 percent.

A11--0 to 5 inches; grayish brown (10YR 5/2) loamy fine sand; weak medium subangular blocky structure; soft, very friable; many fine and medium roots; medium acid; clear wavy boundary.

A12--5 to 12 inches; brown (10YR 5/3); loamy fine sand with common medium faint mottles of pale brown (10YR 6/3); weak medium subangular blocky structure; soft, very friable; many fine and medium roots; medium acid; clear wavy boundary.

A21--12 to 21 inches; pale brown (10YR 6/3) loamy fine sand; single grained; soft, very friable; common fine and medium roots; medium acid; clear wavy boundary.

A22--21 to 29 inches; very pale brown (10YR 7/3) and light gray (10YR 7/2) loamy fine sand; few medium faint mottles of strong brown (7.5YR 5/6); single grained; soft, very friable; common fine and medium roots; slightly acid; gradual wavy boundary.

B21t--29 to 41 inches; distinctly mottled strong brown (7.5YR 5/8), light brownish gray (10YR 6/2), and red (2.5YR 5/8) sandy clay loam; weak medium subangular blocky structure; hard, friable; few fine and medium roots; 3 to 7 percent by volume of plinthite; few thin clay films; very strongly acid; gradual wavy boundary.

B22t--41 to 50 inches; reticulately mottled yellowish brown (10YR 5/8), light brownish gray (10YR 6/2), and red (2.5YR 5/8) sandy clay loam; weak medium subangular blocky structure; very hard, firm; few fine roots; 8 to 14 percent by volume of plinthite; few patchy clay films; very strongly acid; gradual wavy boundary.

B23t--50 to 75 inches; light gray (10YR 7/2) sandy clay loam; many coarse prominent mottles of yellowish brown (10YR 5/8) and red (2.5YR 4/8); moderate medium prismatic structure; very hard, firm; few fine roots; 5 to 9 percent by volume of plinthite; about 10 percent by volume of brittle bodies; extremely acid.

The solum thickness ranges from 65 to more than 80 inches. Reaction ranges from strongly acid through slightly acid in the A horizon and from extremely acid through strongly acid in the Bt horizon. Plinthite, by volume, ranges from 5 to 20 percent in the Bt horizon. The soil is dry in some part of the moisture control section in most years for 75 to 90 days. Base saturation at 72 inches ranges from 15 to 35 percent.

The A horizon is loamy fine sand in texture and is 20 to 40 inches thick. The A1 horizon has hues of 7.5YR and 10YR with colors of grayish brown (10YR 5/2), dark grayish brown (10YR 4/2), very dark grayish brown (10YR 3/2), brown (7.5YR 4/2, 5/2; 10YR 4/3, 5/3), or dark brown (7.5YR 3/2; 10YR 3/3). The A2 horizon has hues of 7.5YR and 10YR with colors of light gray (10YR 7/2), light brownish gray (10YR 6/2), grayish brown (10YR 5/2), very pale brown (10YR 7/3, 7/4), pale brown (10YR 6/3), brown (10YR 5/3), light yellowish brown (10YR 6/4), pinkish gray (7.5YR 6/2, 7/2), or light brown (7.5YR 6/4).

The B2t horizon is fine sandy loam or sandy clay loam. The B21t horizon is mainly bright colors mottled with gray. Colors are yellowish red (5YR 4/6, 4/8, 5/6, 5/8), strong brown (7.5YR 5/6, 5/8), reddish yellow (7.5YR 6/6, 6/8), yellowish brown (10YR 5/4, 5/6, 5/8), red (2.5YR 4/6, 4/8), or brownish yellow (10YR 6/6, 6/8). The B22t horizon has similar colors but has a higher percentage of grays and yellows. The B23t horizon is mainly gray (10YR 6/1), light gray (10YR 7/1, 7/2; 2.5Y 7/2), or light brownish gray (10YR 6/2; 2.Y 6/2) with reddish and yellowish mottles. Some mottles are as red as red (2.5YR 4/6, 4/8; 10R 4/6, 4/8) and dark red (10R 3/6; 2.5YR 3/6).

Ruston Series

The Ruston series is a member of the fine-loamy, siliceous, thermic family of Typic Paleudults. These soils have brownish fine sandy loam A horizons, reddish sandy clay loam and fine sandy loam Bt horizons with appreciable silt. The sola is bisequal and more than 60 inches thick.

Ap--0 to 4 inches; brown (10YR 5/3) fine sandy loam; weak medium granular structure; friable; medium acid; clear smooth boundary.

A2--4 to 16 inches; pale brown (10YR 6/3) fine sandy loam; a few fine pockets of yellowish red (5YR 5/6) in lower part; weak medium subangular blocky structure; very friable; many fine pores; common fine streaks of uncoated sand grains; medium acid; clear smooth boundary.

B21t--16 to 27 inches; yellowish red (5YR 4/6) sandy clay loam; moderate fine subangular blocky structure; friable; thick nearly continuous dark red (2.5YR 3/6) clay films on surfaces of peds; sand grains coated and bridged with clay; strongly acid; clear wavy boundary.

B22t--27 to 41 inches; yellowish red (5YR 5/6) fine sandy loam; weak medium subangular blocky structure; friable; thin nearly continuous dark red (2.5YR 3/6) clay films on surfaces of peds; sand grains coated and bridged with clay; strongly acid; clear wavy boundary.

B & A'2--41 to 47 inches; yellowish red (5YR 5/6) fine sandy loam; weak medium subangular blocky structure; firm; common fine pores; 1/2- to 2-inch diameter pockets of somewhat brittle light yellowish brown (10YR 6/4) fine sandy loam A'2 material that makes up approximately 1/2 of the horizon; few thin patchy clay films; strongly acid; clear wavy boundary.

B'21t--47 to 67 inches; coarsely mottled yellowish red (5YR 5/6), yellowish brown (10YR 5/4), red (2.5YR 4/5), and light gray (10YR 7/2) sandy clay loam; moderate medium subangular blocky structure; firm, somewhat brittle; thin patchy clay films in upper part and thin nearly continuous clay films in lower part of horizon; strongly acid; clear wavy boundary.

B'22t--67 to 92 inches; coarsely mottled red (2.5YR 4/6), yellowish brown (10YR 5/4), and strong brown (7.5YR 5/6) fine sandy loam; moderate medium subangular blocky structure; firm and brittle; thin nearly continuous clay films in upper part and thin patchy clay films in lower part of horizon; strongly acid; clear wavy boundary.

C--92 to 96 inches; coarsely mottled red (2.5YR 4/7) and light gray (10YR 7/2) clay loam; massive; friable; very strongly acid.

The solum thickness exceeds 60 inches. The B & A'2 horizons are definitive of the series. Calcium-magnesium ratios are variable in the B2t horizons but are typically less than 1 in the B'2 horizons. The A horizon is light brownish gray (10YR 6/2), grayish brown (10YR 5/2), dark grayish brown (10YR 4/2), pale brown (10YR 6/3), light yellowish brown (10YR 6/4), yellowish brown (10YR 5/4), brown (10YR 5/3), or dark brown (10YR 4/3) fine sandy loam, sandy loam, very fine sandy loam, loamy fine sand, gravelly fine sandy loam, or gravelly sandy loam. It is slightly acid through strongly acid. The Bt horizons are reddish brown (5YR 4/4), reddish yellow (5YR 6/6, 6/8), yellowish red (5YR 4/6, 4/8, 5/6, 5/8), or red (2.5YR 4/6, 4/8, 5/6, 5/8; 10R 4/6, 4/8, 5/6, 5/8) sandy clay loam, fine sandy loam, loam, or clay loam. The B't horizon in most pedons is mottled with shades of gray and brown. Clay content of the B2t horizon averages 18 to 30 percent in the upper 20 inches and the silt content ranges from 20 to 50 percent. The Bt horizons are medium acid through very strongly acid. Up to 15 percent by volume of ironstone fragments or quartz gravel are present within the solum of some pedons. The clay content decreases from the upper Bt horizons to the Bt and A'2 horizon but increases in the B't horizons. The A'2 horizon is light yellowish brown (10YR 6/4), brown (10YR 5/3), or pale brown (10YR 6/3) fine sandy loam or sandy loam in streaks and pockets that make up to 50 percent of the horizon.

Sorter Series

The Sorter series consists of deep, poorly drained, slowly permeabl soils formed in loamy sediments. These soils are on upland flats and drainageways in coastal plains. Slopes range from 0 to 1 percent. Mean annual precipitation is about 50 inches, and mean annual temperature is about 68°F.

A1--0 to 3 inches; gray (10YR 5/1) silt loam, light gray (10YR 7/1) dry; few fine faint yellow mottles; massive; hard, friable; many fine pores; few wormcasts; many tree, shrub, grass, and sedge roots; few very fine black concretions; medium acid; clear irregular lower boundary.

A2g--3 to 19 inches; light brownish gray (10YR 6/2) silt loam, white (10YR 8/1) dry; few fine faint yellow mottles; massive; hard, very friable; many fine pores; many crayfish krotovinas; very few black concretions; many fine and medium roots; medium acid; gradual wavy boundary.

B2tg--19 to 68 inches; light brownish gray (10YR 6/2) silt loam, light gray (10YR 7/2) dry; few fine distinct yellowish brown mottles in lower part; weak very coarse prismatic structure; very hard, friable; porous, with clay films in pores; few black concretions; roots are mostly along cleavage planes; many coatings of dark gray clay up to 1 mm thick in clay cups, vertical crevices and on crayfish krotovina walls; strongly acid; diffuse wavy boundary.

B3g--68 to 79 inches; light gray (10YR 7/2) silt loam, white (10YR 8/2) dry, with common fine and medium distinct yellow and brownish yellow mottles; massive; very hard, friable; few medium roots; common fine pores; few fine black concretions; few lenses of heavy silt loam and occasional small pockets and lenses of very fine sandy loam; many dark gray clay cups at the bottom of crayfish krotovinas; slightly acid; diffuse wavy boundary.

C1g--79 to 93 inches; light gray (10YR 7/2) very fine sandy loam, white (10YR 8/2) dry, with few coarse distinct brownish yellow (10YR 6/6) mottles and irregular bodies of light sandy clay loam up to 2 or 3 inches across the longer axis; weak coarse prismatic structure with apparent very fine sand and silt coatings on outside of prisms; hard, friable; few small pockets of fine sandy loam; slightly acid; diffuse wavy boundary.

C2g--93 to 110 inches; light gray (10YR 7/2) fine sandy loam, white (10YR 8/2) dry, with a few distinct coarse brownish yellow (10YR 6/6) mottles, some of which have reddish yellow centers; few bodies of sandy clay loam up to 3 inches across the longer axis; weak coarse prismatic structure; few fine roots; friable in the fine sandy loam portion and firm in the sandy clay loam portion; occasional very fine sand pockets up to about 1-1/2 inches in diameter; slightly acid.

The solum ranges from 60 to more than 100 inches thick. Structure is weakly expressed with crayfish actively mixing the soil.

The A1 horizon is light gray (10YR 7/1, 7/2), gray (10YR 6/1), grayish brown (10YR 5/2) or light brownish gray (10YR 6/2).

The A2g horizon is white (10YR 8/1, 8/2), light gray (10YR 7/1, 7/2), or light brownish gray (10YR 6/2) with mottles of yellow, brown, brownish yellow, or reddish yellow. The texture is a silt loam, loam, or very fine sandy loam with less than 10 percent clay.

The B2tg horizon is light gray (10YR 7/1, 7/2) gray (10YR 6/1), or light brownish gray (10YR6/2) with yellow, yellowish brown, yellowish red, or brown mottles. The texture is a silt loam or loam, less than 18 percent clay, more than 40 percent silt and 15 to 30 percent sand coarser than very fine sand. The B2tg horizon ranges from medium to very strongly acid.

The Cg horizon is light gray (10YR 7/1, 7/2), gray (10YR 6/1), grayish brown (10YR 5/2), or light brownish gray (10YR 6/2) with yellow, yellowish brown, yellowish red, strong brown, or brown mottles. The Cg horizon ranges from fine sandy loam or loam to silt loam and ranges from medium acid to neutral.

Spurger Series

The Spurger series consists of deep, moderately well drained, slowly permeable soils on terraces. These nearly level to gently sloping soils formed in clayey and sandy alluvium of late Pleistocene Age. Slopes range from 0 to 5 percent

A1--0 to 5 inches; very dark grayish brown (10YR 3/2) loam; many coarse faint dark grayish brown (10YR 4/2) mottles; weak fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine and medium, few coarse roots; very strongly acid; clear smooth boundary.

A2--5 to 9 inches; brown (10YR 5/3) loam; many coarse faint pale brown (10YR 6/3) and few medium faint dark grayish brown (10YR 4/2) mottles; weak fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine and medium roots, few coarse roots; very strongly acid; clear smooth boundary.

B21t--9 to 25 inches; dark red (2.5YR 3/6) clay; few fine distinct strong brown (7.5YR 5/6) and light brownish gray (10YR 6/2) mottles in lower part; moderate medium subangular blocky structure; very hard, very firm, sticky and plastic; few medium and coarse roots; thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

B22t--25 to 36 inches; red (2.5YR 4/6) clay; common medium distinct strong brown (7.5YR 5/6) and few medium distinct light brownish gray (10YR 6/2) mottles; moderate medium angular and subangular blocky structure; very hard, very firm, sticky and plastic; few medium and coarse roots; thin patchy clay films on faces of peds; very strongly acid; gradual smooth boundary.

B23t--36 to 43 inches; yellowish red (5YR 5/6) sandy clay loam, few fine distinct red (2.5YR 4/6) and common medium distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; hard, very firm, sticky and plastic; thin patchy clay films on faces of peds; very strongly acid; gradual smooth boundary.

B3--43 to 65 inches; mottled yellowish red (5YR 5/8) and strong brown (7.5YR 5/6) sandy clay loam; few medium distinct light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; very strongly acid; gradual smooth boundary.

C--65 to 80 inches; brownish yellow (10YR 6/6) sand; few medium distinct mottles of strong brown (7.5YR 5/8); single grain; loose; very strongly acid.

The solum ranges from 40 to 70 inches thick. Reaction is strongly acid or very strongly acid except where surface layer has been limed. Base saturation ranges from 35 to 60 percent at 50 inches below the top of the Bt horizon. The texture of the A horizons is loam or fine sandy loam and ranges from 5 to 17 inches thick.

The A1 horizon has a hue of 10YR, values of 3 through 5, and chroma of 2 or 3. When values are less than 3.5, the thickness of the horizon is less than 7 inches. The A2 horizon has hues of 10YR, values of 4 through 6, and chromas of 2 through 4.

The B21t and B22t horizons have textures of clay or clay loam. The B23 horizon has texture of clay loam, sandy clay loam, or loam. The Bt horizons have hues of 2.5YR, 5YR, and 7.5YR with values of 3 to 5, chromas of 6 through 8. Mottles with chroma of 2 or less occur in the upper 10 inches of the argillic horizon. Mottles in shades of gray, brown, yellow, and red occur throughout the horizon. Some pedons have bleached sand and silt coatings or interfingering of A'2 material in the B23t.

The B3 and C horizons have hues of 5YR to 10YR, values 5 through 7, chromas 3 through 8. Mottles are in shades of gray. Textures are fine sandy loam, loamy fine sand, or sand. Thin strata of clay loam and loam occur in some pedons.

Tonkawa Series

The Tonkawa series consists of deep, excessively drained, rapidly permeable, sandy upland soils. They formed in thick sandy sediments of marine deposits. These soils are on broad, nearly level to moderately steep interstream divides. Slopes are dominantly 1 to 8 percent but range from 0 to 20 percent.

A11--0 to 5 inches; dark grayish brown (10YR 4/2) fine sand; weak medium granular structure; loose; many medium and coarse roots; extremely acid; gradual wavy boundary.

A12--5 to 12 inches; yellowish brown (10YR 5/4) fine sand; common medium distinct dark grayish brown (10YR 4/2) mottles; single grained; loose; many medium and coarse roots; few 2 to 5 mm nodules of ironstone; extremely acid; gradual wavy boundary.

C1--12 to 22 inches; brownish yellow (10YR 6/6) fine sand; single grained; loose; many medium and coarse roots; few 2 to 5 mm nodules of ironstone; extremely acid; gradual wavy boundary.

C2--22 to 37 inches; yellow (10YR 7/6) fine sand; common medium faint very pale brown (10YR 7/4) mottles; single grained; loose; common medium and coarse roots; few 2 to 5 mm nodules of ironstone; extremely acid; diffuse boundary.

C3--37 to 84 inches; very pale brown (10YR 7/4) fine sand; single grained; loose; few medium roots; few 2 to 5 mm nodules of ironstone; strongly acid.

Thickness of the sand exceeds 80 inches. The soil is sand or fine sand, and the 10- to 40-inch control section has 5 to 10 percent clay plus silt and very fine sand. The soil ranges from extremely acid through slightly acid throughout. The soil is dry in some part of the moisture control section for 125 to 150 cumulative days in most years.

The A11 horizon is dark grayish brown (10YR 4/2), very dark grayish brown (10YR 3/2), brown (10YR 4/3, 5/3), or grayish brown (10YR 5/2). The A12 horizon is brown (10YR 5/3), pale brown (10YR 6/3), light yellowish brown (10YR 6/4), or yellowish brown (10YR 5/4, 5/6).

The C horizon is yellowish brown (10YR 5/6, 5/8), brownish yellow (10YR 6/6, 6/8), yellow (10YR 7/6, 7/8), very pale brown (10YR 8/3, 8/4, 7/3, 7/4), or strong brown (7.5YR 5/6, 5/8). The lower C horizons are light gray (10YR 7/2) or white (10YR 8/1, 8/2) in a few pedons. Lamellae that lack enough thickness for an argillic horizon are in some pedons below a depth of 70 inches.

Urbo Series

The Urbo series is a member of the fine, mixed, acid, thermic family of Aeric Haplaquepts. These soils have dark grayish brown or grayish brown silty clay loam A horizons and grayish brown silty clay B horizons.

Ap--0 to 5 inches; dark grayish brown (10YR 4/2) silty clay loam; common fine faint grayish brown mottles; weak fine granular structure; friable, slightly plastic; few fine roots; few fine black concretions; strongly acid; abrupt smooth boundary.

A1--5 to 9 inches; grayish brown (2.5Y 5/2) silty clay loam, common fine faint dark grayish brown mottles; weak fine and medium subangular blocky structure; friable, plastic, slightly sticky; few fine roots; few fine black and brown concretions; very strongly acid; clear smooth boundary.

B21g--9 to 18 inches; grayish brown (2.5Y 5/2) silty clay, common fine faint dark grayish brown mottles; weak medium prismatic structure parting to moderate fine and medium angular and subangular blocky; firm, very plastic, sticky; few fine roots; few pressure faces on peds; common fine black and brown concretions; very strongly acid; clear smooth boundary.

B22g--18 to 29 inches; grayish brown (2.5Y 5/2) silty clay, common fine faint dark grayish brown and few fine distinct dark yellowish brown mottles; weak medium prismatic structure parting to moderate fine and medium angular and subangular blocky; frim, very plastic, sticky; few fine roots; few pressure faces on peds; few fine and medium black and brown concretions: verv strongly acid; clear wavy boundary.

B23g--29 to 44 inches; grayish brown (2.5Y 5/2) silty clay; common fine prominent strong brown and yellowish red mottles; moderate medium prismatic structure parting to moderate fine and medium angular blocky; firm; very plastic, sticky; few fine roots; few pressure faces on peds: common fine red and few fine black concretions; verv stronglv acid; gradual wavy boundary.

B25g--44 to 71 inches; grayish brown (2.5Y 5/2) silty clay; common fine distinct strong brown mottles; moderate medium prismatic structure parting to moderate fine and medium angular blocky; frim, very plastic, sticky; few fine roots; few pressure faces on peds; few fine slickensides that do not intersect; common fine and medium black and red concretions; very strongly acid; gradual wavy boundary.

The thickness of solum exceeds 60 inches. Reaction of the soil is strongly or very strongly acid, except for those surface layers that have been limed. The A horizon is dark grayish brown (10YR 4/2; 2/5Y 4/2), grayish brown (10YR 5/2; 2.5Y 5/2), brown (10YR 5/3), or dark yellowish brown (10YR 4/3). Some pedons have thin very dark gray (10YR 3/1), or very dark grayish brown (10YR 3/2) A horizons.

Texture is silty clay loam, silt loam, clay loam, or silty clay. Some pedons have overwashes of coarser texture less than 10 inches thick. The B21 horizon is dark grayish brown (10YR 4/2; 2.5Y 4/2), grayish brown (10YR 5/2; 2.5Y 5/2), dark yellowish brown (10YR 4/4), brown (10YR 4/3, 5/3), or olive brown (2.5Y 4/4). Most pedons have few to many mottles in shades of gray, brown, or yellow. The B22, B23, and B24 horizons are dark grayish brown (10YR 4/2; 2.5Y 4/2), grayish brown (10YR 5/2; 2.5Y 5/2), dark gray (10YR 4/1), gray (10YR 5/1, 6/1), light brownish gray (10YR 6/2; 2.5Y 6/2), or light gray (10YR 7/1, 7/2; 2.5Y 7/2). Texture of the B horizon is silty clay loam, clay loam, silty clay, or clay. The 10- to 40-inch control section ranges between 35 and 55 percent clay. A few patches of oriented clay are in pores and cracks. Black and brown concretions range from few to common throughout.

Vamont Series

The Vamont series is a member of the fine, montmorillonitic, thermic family of Aquentic Chromuderts. These clayey soils have thin clayey A horizons and prominently mottled yellowish brown, brownish yellow, and gray AC horizons. Intersecting slickensides are within 20 inches of the surface.

A1--0 to 8 inches; very dark grayish brown (10YR 3/2) clay, dark grayish brown (10YR 4/2) dry; few fine faint mottles of gray; weak fine angular and granular structure; hard, firm, very sticky and plastic; common fine roots and worm casts; medium acid; clear wavy boundary.

AC1--8 to 24 inches; prominently and coarsely mottled yellowish brown (10YR 5/4, 5/6, 5/8), gray (10YR 5/1), clay, brownish yellow (10YR 6/6, 6/8) and gray (10YR 6/1) dry; few fine distinct mottles of strong brown; moderate fine subangular blocky structure; some black charcoal masses; very hard, firm, very sticky and plastic; few intersecting slickensides at 15 inches; few 3 mm size black concretions; few fine and coarse woody roots; few worm casts; strongly acid; clear wavy boundary.

AC2--24 to 48 inches; grayish brown (10YR 5/2) clay, light brownish gray (10YR 6/2) dry; few fine distinct yellowish brown and brownish yellow mottles; moderate fine and medium angular blocky structure; very hard, very firm, very sticky and plastic; common intersecting slickensides; few 3 mm size black concretions; few fine and medium woody roots; strongly acid; clear wavy boundary.

AC3--48 to 70 inches; grayish brown (10YR 5/2) clay, light brownish gray (10YR 6/2) dry; common fine distinct yellowish brown mottles and few fine faint grayish brown mottles; common intersecting slickensides parting to moderate medium blocky structure; very hard, very firm, very sticky and plastic; few fine roots and pores; shiny pressure faces; medium acid; clear wavy boundary.

C--70 to 94 inches; gray (10YR 6/1) clay, light gray (10YR 7/1) dry; few fine distinct brownish yellow mottles and few fine prominent yellowish red mottles; coarse intersecting slickensides parting to weak medium angular blocky structure; very hard, very firm, very sticky and plastic; few fine roots; slightly acid.

The solum thickness ranges from 70 to more than 100 inches. Undisturbed areas have a gilgai microrelief of knolls 6 to 15 inches higher than the depressions. The soil is clay or silty clay. The 10- to 40-inch control section contains from 45 to 60 percent clay and more than 30 percent silt. Intersecting slickensides and wedge-shaped parallelepipeds begin at depth from 8 to 25 inches below the surface. The A horizon is very dark gray (10YR 3.1), very dark grayish brown (10YR 3/2), dark grayish brown (10YR 4/2), or brown (10YR 5/3). It is very strongly acid through neutral. The AC horizon is yellowish brown (10YR 5/4, 5/6, 5/8), brownish yellow (10YR 6/6, 6/8), light olive brown (2.5Y 5/4, 5/6), grayish brown (10YR 5/2), or yellowish red (5YR 4/6). It contains few to common gray (10YR 5/1, 6/1), yellowish brown (10YR 5/6), brownish yellow (10YR 6/8), yellowish red (5YR 5/8), and strong brown (7.5YR 5/8) mottles.

It is strongly acid through neutral. The C horizon is light gray (10YR 7/1, 7/2; N 7/0; 2.5Y 7/2), gray (10YR 5/1, 6/1; N 5/0; 6/1), or grayish brown (2.5Y 5/2). It contains brownish yellow (10YR 6/6), yellowish red (5YR 4/8), yellowish brown (10YR 5/6, 5/8), olive brown (2.5Y 4/4), or strong brown (7.5YR 5/6) mottles. It is medium acid through mildly alkaline and calcareous in some pedons. Visible $CaCO_3$ concretions, up to 2 inches in diameter, are in the C horizon of some pedons. Black concretions are none to many throughout.

Waller Series

The Waller series is a member of the fine-loamy, siliceous, thermic family of Typic Glossaqualfs. These soils have grayish brown loam A1 horizons and light gray loam A2g horizons that tongue into gray clay loam B2tg horizons.

A1--0 to 4 inches; grayish brown (10YR 5/2) loam, light gray (10YR 7/2) dry; massive; very hard, friable; many roots; few fine soft black ferromanganese deposits; strongly acid; clear smooth boundary.

A2g--4 to 34 inches; light gray (10YR 7/2) loam, white (10YR 8/1) dry; many fine distinct yellowish brown and strong brown mottles; massive; very hard, friable; few fine roots flattened along cracks; crayfish krotovinas have black staining of organic matter along the sides and are filled with very fine sand and silt; very strongly acid; gradual irregular boundary.

Bg&Ag--34 to 53 inches; gray (10YR 5/1) clay loam; many medium and coarse distinct mottles of strong brown (7.5YR 5/6); weak prismatic structure parting to moderate coarse blocky; very hard, firm; few fine roots that are flattened along the surface of the peds; few fine soft black deposits; thick silt coatings on faces of prisms and patchy clay films on the surface of the blocky peds; common tongues of silt loam and loam and common krotovinas extend through this horizon; krotovinas walls are coated with clay films up to about 1 mm. thick; medium acid; diffuse wavy boundary.

B2tg--53 to 80 inches; gray (10YR 5/1) clay loam; many medium and coarse distinct mottles of strong brown (7.5YR 5/6); weak blocky structure; firm, very hard; patchy clay films on surface of peds; few fine gypsum crystals in the lower part; common pockets and tongues of silt loam and few or common krotovinas filled with silt loam and having walls lined with clay; few fine soft black deposits; medium acid.

The thickness of the solum ranges from 60 to more than 80 inches. The A and Bg and Ag horizons are medium through very strongly acid. The B2tg horizon is medium acid through very strongly acid, but is slightly acid or neutral below 60 inches depth in some pedons. The A horizon is silt loam, loam, or very fine sandy loam. The A1 horizon is dark gray (10YR 4/1), dark grayish brown (10YR 4/2), gray (10YR 5/1, 6/1), grayish brown (10YR 5/2; 2.5Y 5/2), light brownish gray (10YR 6/2; 2.5Y 6/2), or light gray (10YR 7/1, 7/2; 2.5Y 7/2). The A2g horizon is gray (10YR 6/1), light brownish gray (10YR 6/2; 2.5Y 6/2), or light gray (10YR 7/1, 7/2; 2.5Y 7/2) with brownish or yellowish mottles in some pedons. The lower part of the A2g horizon has vertical streaks of clean sand and silt that tongue into the Btg horizons. The tongues or crayfish krotovinas are about 15 to 20 cm. apart and 2 to 10 cm. wide in the upper part of the Bg horizon and taper with depth to about 1 to 5 cm. with the lower part surrounded by a gray cup of clay enriched material. The Bg horizons are gray (10YR 5/1), light gray (10YR 6/1, 7/1, 7/2; 2.5Y 7/2), or light brownish gray (10YR 6/2; 2.5Y 6/2) with strong brown, reddish yellow, or red mottles. They are loam, clay loam, or silty clay loam with 18 to 30 percent clay and 20 to 40 percent silt, and more than 15 percent sand coarser than very fine sand. Gypsum crystals are lacking in some pedons.

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Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim. An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as --

	Inches
Very low	0 to 3
Low	3 to 6
Medium	6 to 9
High	More than 9

Base saturation. The degree to which material having base exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the exchange capacity.

Bedding planes. Fine stratifications, less than 5 millimeters thick, in unconsolidated alluvial, colian, lacustrine, or marine sediments.

Bottom land. The normal flood plain of a stream, subject to frequent flooding.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coat, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. Mineral or rock particles up to 3 inches (2 millimeters to 7.5 centimeters) in diameter.

Coarse textured (light textured) soil. Sand or loamy sand.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures is difficult.

Complex, soil. A mapping unit of two or more kinds of soil occurring in such an intricate pattern that they cannot be shown separately on a soil map at the selected scale of mapping and publication.

Compressible. Excessive decrease in volume of soft soil under load.

Concretions. Grains, pellets or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Consistence, soil. The feel of the soil and the case with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are --

Loose.--Noncoherent when dry or moist; does not hold together in a mass.

Friable.--When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.--When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.--When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.--When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.--When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.--When dry, breaks into powder or individual grains under very slight pressure.

Cemented.--Hard; little affected by moistening.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is 40 or 80 inches (1 or 2 meters).

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cutbanks cave. Unstable walls of cuts made by earthmoving equipment. The soil sloughs easily.

Depth to rock. Bedrock at a depth that adversely affects the specified use.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.--Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.--Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.--Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.--Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Gilgai. Typically, the microrelief of Vertisols--clayey soils having a high coefficient of expansion and contraction with changes in moisture content. Commonly a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope.

Gleyed soil. A soil having one or more neutral gray horizons as a result of waterlogging and lack of oxygen. The term "gleyed" also designates gray horizons and horizons having yellow and gray mottles as a result of intermittent waterlogging.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material from 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table, which is the upper limit of saturation.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Habitat. The natural abode of a plant or animal; refers to the kind of environment in which a plant or animal normally lives, as opposed to the range or geographical distribution.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows:

O horizon.--An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon.--The mineral horizon, formed or forming at or near the surface, in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon most of which was originally part of a B horizon.

A2 horizon.--A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon.--The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.--The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that from which the solum is presumed to have formed. If the material is known to differ from that in the solum the Roman numeral II precedes the letter C.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered, but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, invader plants are those that follow disturbance of the surface.

Leaching. The removal of soluble material from soil or other material by percolating water.

Light textured soil. Sand and loamy sand.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. Inadequate strength for supporting loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is greater than that of organic soil.

Moderately coarse textured (moderately light textured) soil. Sandy loam and fine sandy loam.

Moderately fine textured (moderately heavy textured) soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance--few, common, and many; size--fine, medium, and coarse; and contrast--faint, distinct, and promenent. The size measurements are of the diameter along the greatest dimension. Fine indicates less than 5 millimeters (about 0.2 inch); medium, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and coarse, more than 15 millimeters (about 0.6 inch).

Muck. Dark colored, finely divided, well decomposed organic soil material mixed with mineral soil material. The content of organic matter is more than 20 percent.

Munsell notation. A designation of color by degrees of the three single variables--hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3.

Nutrient, plant. Any element taken in by a plant, essential to its growth, and used by it in the production of food and tissue. Plant nutrients are nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps other elements obtained from the soil; and carbon, hydrogen, and oxygen obtained largely from the air and water.

Pan. A compact, dense layer in a soil. A pan impedes the movement of water and the growth of roots. The word "pan" is commonly combined with other words that more explicitly indicate the nature of the layer; for example, hardpan, fragipan, claypan, plowpan, and traffic pan.

Parent material. The great variety of unconsolidated organic and mineral material in which soil forms. Consolidated bedrock is not yet parent material by this concept.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly. The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality that enables the soil to transmit water or air, measured as the number of inches per hour that water moves through the soil. Terms describing permeability are very slow (less than 0.06 inch), slow (0.06 to 0.20 inch), moderately slow (0.2 to 0.6 inch), moderate (0.6 to 2.0 inches), moderately rapid (2.0 to 6.0 inches), rapid (6.0 to 20 inches), and very rapid (more than 20 inches).

Phase, soil. A subdivision of a soil series or other unit in the soil classification system based on differences in the soil that affects its management. A soil series, for example, may be divided into phases on the bases of differences in slope, stoniness, thickness, or some other characteristic that affects management. These differences are too small to justify separate series.

pH value. (See Reaction, soil). A numerical designation of acidity and alkalinity in soil.

Piping. Moving water forms subsurface tunnels or pipelike cavities in the soil.

Pitting. Formation of pits as a result of the melting of ground ice after the removal of plant cover.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from a semisolid to a plastic state.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents that commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on exposure to repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade, whereas ironstone cannot be cut but can be broken or shattered with a spade. Plinthite is one form of the material that has been called laterite.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Polypedon. A volume of soil having properties within the limits of a soil series, the lowest and most homogeneous category of soil taxonomy. A "soil individual."

Poorly graded. Refers to soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor outlets. Surface or subsurface drainage outlets difficult or expensive to install.

Productivity (soil). The capability of a soil for producing a specified plant or sequence of plants under a specified system of management. Productivity is measured in terms of output, or harvest, in relation to input.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Range (or rangeland). Land that, for the most part, produces native plants suitable for grazing by livestock; includes land supporting some forest trees.

Range condition. The health or productivity of forage plants on a given range, in terms of the potential productivity under normal climate and the best practical management. Condition classes generally recognized are--excellent, good, fair, and poor. The classification is based on the percentage of original, or assumed climax vegetation on a site, as compared to what has been observed to grow on it when well managed.

Range site. An area of range where climate, soil, and relief are sufficiently uniform to produce a distinct kind and amount of native vegetation.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as--

Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock. Soil scientists regard as soil only the part of the regolith that is modified by organisms and other soil-building forces. Most engineers describe the whole regolith, even to a great depth, as "soil."

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulates over disintegrating rock.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth. Shallow root zone. The soil is shallow over a layer that greatly restricts roots. See Root zone.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged in stream channels from a drainage area. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Seepage. The rapid movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon.

Series, soil. A group of soils, formed from a particular type of parent material, having horizons that, except for the texture of the A or surface horizon, are similar in all profile characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineralogical and chemical composition.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-alumina ratio. The molecular ratio of silica to alumina in soil, clay, or any alumino-silicate mineral.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slick spot. Locally, a small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil is generally silty or clayey, is slippery when wet, and is low in productivity.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Sloughed till. Water-saturated till that has flowed slowly downhill from its original place of deposit by glacial ice. It may rest on other till, on glacial outwash, or on a glaciolacustrine deposit.

Slow intake. The slow movement of water into the soil.

Slow refill. The slow filling of ponds, resulting from restricted permeability in the soil.

Soil. A natural, three-dimensional body at the earth's surface that is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows: very coarse sand (2.0 millimeters to 1.0 millimeter); coarse sand (1.0 to 0.5 millimeter); medium sand (0.5 to 0.25 millimeter); fine sand (0.25 to 0.10 millimeter); very fine sand (0.10 to 0.05 millimeter); silt (0.005 to 0.002 millimeter); and clay (less than 0.002 millimeter).

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in mature soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum.

Stratified. Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining aggregates. The principal forms of soil structure are--platy (laminated), prismatic (vertical axis of aggregates longer than horizontal), columnar (prisms with rounded tops), blocky (angular or subangular), and granular. Structureless soils are either single grained (each grain by itself, as in dune sand) or massive (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil, or partly worked into the soil, to provide protection from soil blowing and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it can soak into the soil or flow slowly to a prepared outlet without harm. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. A stream terrace is frequently called a second bottom, in contrast with a flood plain, and is seldom subject to overflow. A marine terrace, generally wide, was deposited by the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are sand, loamy sand, sandy loam, loam, silt, silt loam, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer. Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The condition of the soil, especially the soil structure, as related to the growth of plants. Good tilth refers to the friable state and is associated with high non-capillary porosity and stable structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Topsoil (engineering). Presumably a fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Trace elements. The chemical elements in soils, in only extremely small amounts, essential to plant growth. Examples are zinc, cobalt, manganese, copper, and iron.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Unstable fill. Risk of caving or sloughing in banks of fill material.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but the limited geographic soil area does not justify creation of a new series.

Water table. The upper limit of the soil or underlying rock material that is wholly saturated with water.

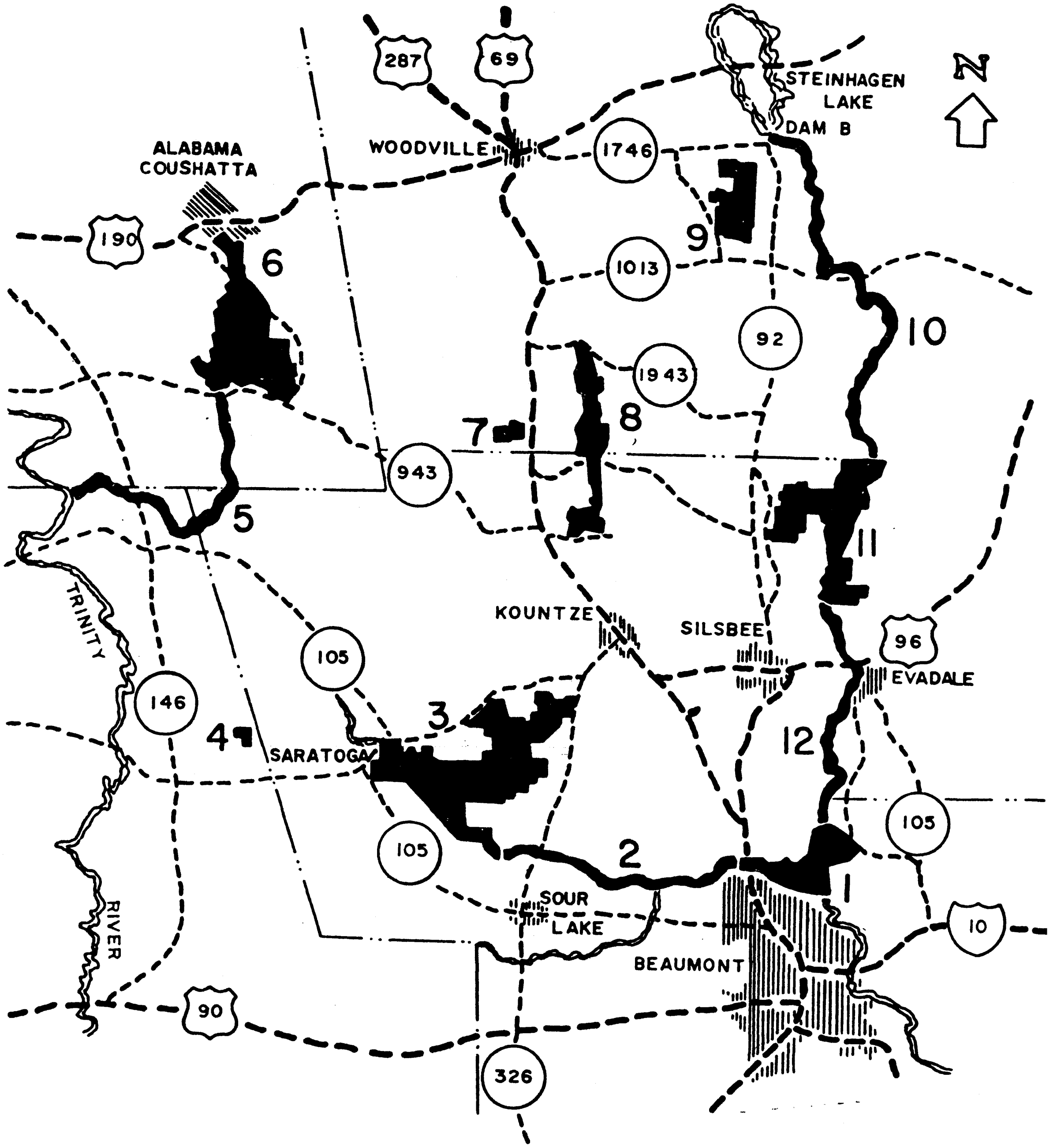
Water table, apparent. A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table, perched. A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to a soil or soil material consisting of particles well distributed over a wide range in size or diameter. Such a soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

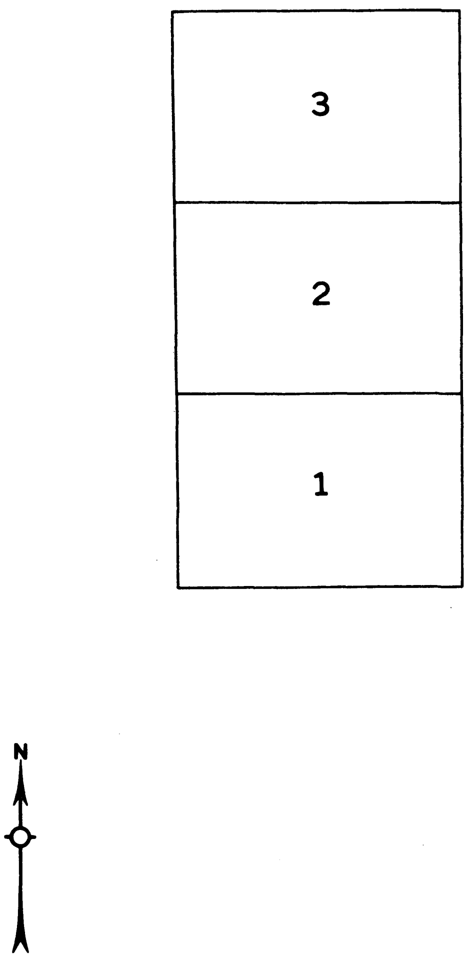


VICINITY MAP

1- BEAUMONT UNIT
2- PINE ISLAND BAYOU UNIT
3- LANCE ROSIER UNIT
4- LOBLOLLY UNIT
5- MENARD CREEK CORRIDOR UNIT
6- BIG SANDY CREEK UNIT
7- HICKORY CREEK SAVANNAH UNIT
8- TURKEY CREEK UNIT
9- BEECH CREEK UNIT
10- UPPER NECHES RIVER CORRIDOR UNIT
11- NECHES BOTTOM AND JACK GORE BAYGALL UI
12- LOWER NECHES RIVER CORRIDOR UNIT

BIG THICKET NATIONAL PRESERVE

BEECH CREEK UNIT



BIG THICKET NATIONAL PRESERVE
BEECH CREEK UNIT
SHEET 1 SCALE 1:12,000

BIG THICKET NATIONAL PRESERV

BEECH CREEK UNIT

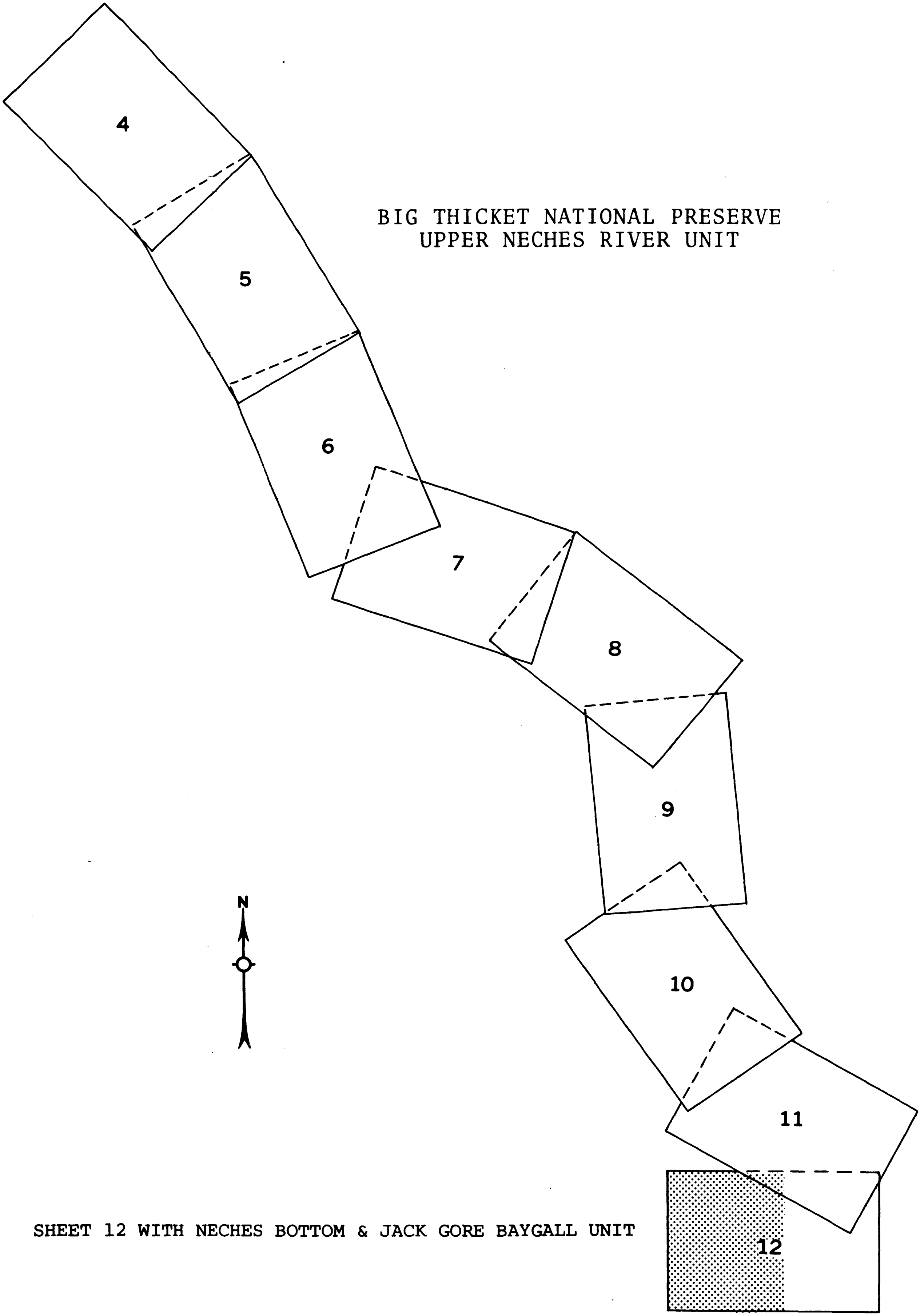
SHEET 2 SCALE 1:12,000

BIG THICKET NATIONAL PRESERVE

BEECH CREEK UNIT

SHEET 3 SCALE 1:12,000

BIG THICKET NATIONAL PRESERVE
UPPER NECHES RIVER UNIT



SHEET 12 WITH NECHES BOTTOM & JACK GORE BAYGALL UNIT

BIG THICKET NATIONAL PRESERVE
UPPER NECHES RIVER
CORRIDOR UNIT
SHEET 4 SCALE 1:12,000

BIG THICKET NATIONAL PRESERVE
UPPER NECHES RIVER
CORRIDOR UNIT
SHEET 5 SCALE 1:12,000

BIG THICKET NATIONAL PRESERVE
UPPER NECHES RIVER
CORRIDOR UNIT
SHEET 6 SCALE 1:12,000

BIG THICKET NATIONAL PRESERVE
UPPER NECHES RIVER
CORRIDOR UNIT
SHEET 7 SCALE 1:12,000

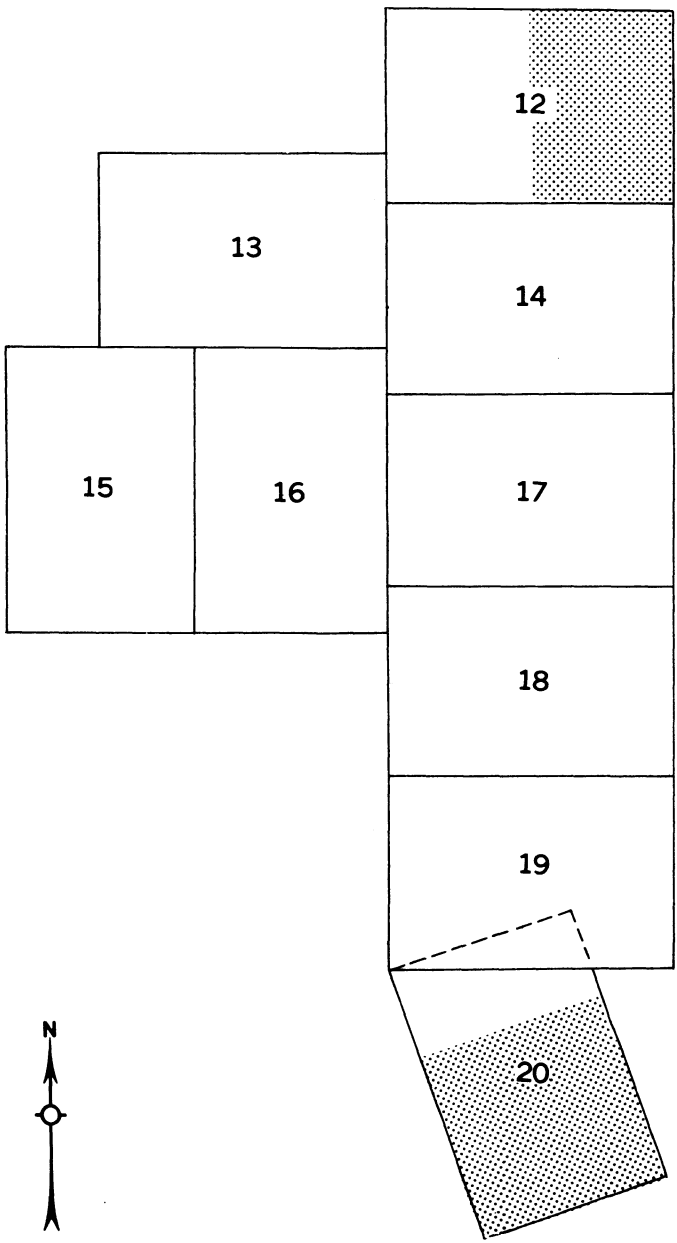
BIG THICKET NATIONAL PRESERVE
UPPER NECHES RIVER
CORRIDOR UNIT
SHEET 8 SCALE 1:12,000

BIG THICKET NATIONAL PRESERVE
UPPER NECHES RIVER
CORRIDOR UNIT
SHEET 9 SCALE 1:12,000

BIG THICKET NATIONAL PRESERVE
UPPER NECHES RIVER
CORRIDOR UNIT
SHEET 10 SCALE 1:12,000

BIG THICKET NATIONAL PRESERVE
UPPER NECHES RIVER
CORRIDOR UNIT
SHEET 11 SCALE 1:12,000

BIG THICKET NATIONAL PRESERVE
NECHES BOTTOM & JACK GORE BAYGALL UNIT



SHEET 20 WITH LOWER NECHES UNIT

BIG THICKET NATIONAL PRESERVE
NECHES BOTTOM &
JACK GORE BAYGALL UNIT &
LOWER NECHES RIVER CORRIDOR UNIT
SHEET 12 SCALE 1:12,000

BIG THICKET NATIONAL PRESERVE
NECHES BOTTOM &
JACK GORE BAYGALL UNIT
SHEET 13 SCALE 1:12,000

BIG THICKET NATIONAL PRESERVE
NECHES BOTTOM &
JACK GORE BAYGALL UNIT
SHEET 14 SCALE 1:12,000

(Joins sheet 16)

BIG THICKET NATIONAL PRESERVE
NECHES BOTTOM &
JACK GORE BAYGALL UNIT
SHEET 16 SCALE 1:12,000

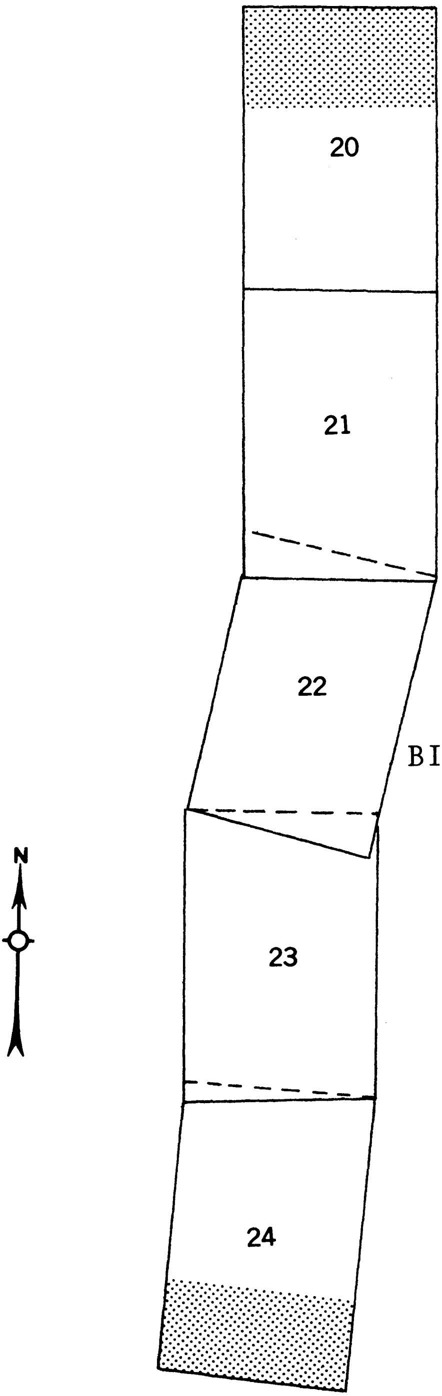
BIG THICKET NATIONAL PRESERVE
NECHES BOTTOM &
JACK GORE BAYGALL UNIT
SHEET 17 SCALE 1:12,000

(Joins sheet 17)

BIG THICKET NATIONAL PRESERVE
NECHES BOTTOM &
JACK GORE BAYGALL UNIT
SHEET 18 SCALE 1:12,000

(Joins sheet 19)

BIG THICKET NATIONAL PRESERVE
NECHES BOTTOM &
JACK GORE BAYGALL UNIT
SHEET 19 SCALE 1:12,000



BIG THICKET NATIONAL PRESERVE
LOWER NECHES RIVER UNIT

BIG THICKET NATIONAL PRESERVE
LOWER NECHES RIVER CORRIDOR UNIT &
NECHES BOTTOM &
JACK GORE BAYGALL UNIT
SHEET 20 SCALE 1:12,000

BIG THICKET NATIONAL PRESERVE
LOWER NECHES RIVER CORRIDOR UNIT
SHEET 21 SCALE 1:12,000

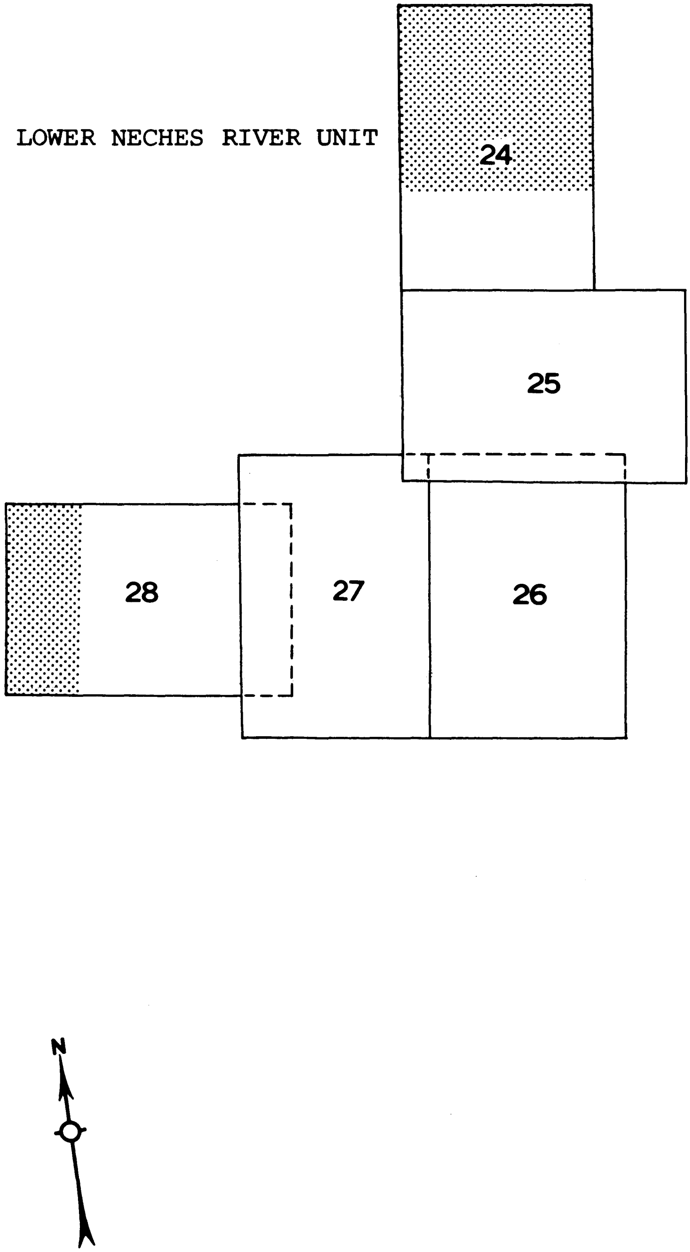
BIG THICKET NATIONAL PRESERVE
LOWER NECHES RIVER CORRIDOR UNIT
SHEET 22 SCALE 1:12,000

BIG THICKET NATIONAL PRESERVE
LOWER NECHES RIVER CORRIDOR UNIT
SHEET 23 SCALE 1:12,000

BIG THICKET NATIONAL PRESERVE
LOWER NECHES RIVER CORRIDOR UNIT
& BEAUMONT UNIT
SHEET 24 SCALE 1:12,000

BIG THICKET NATIONAL PRESERVE
BEAUMONT UNIT

SHEET 24 WITH LOWER NECHES RIVER UNIT



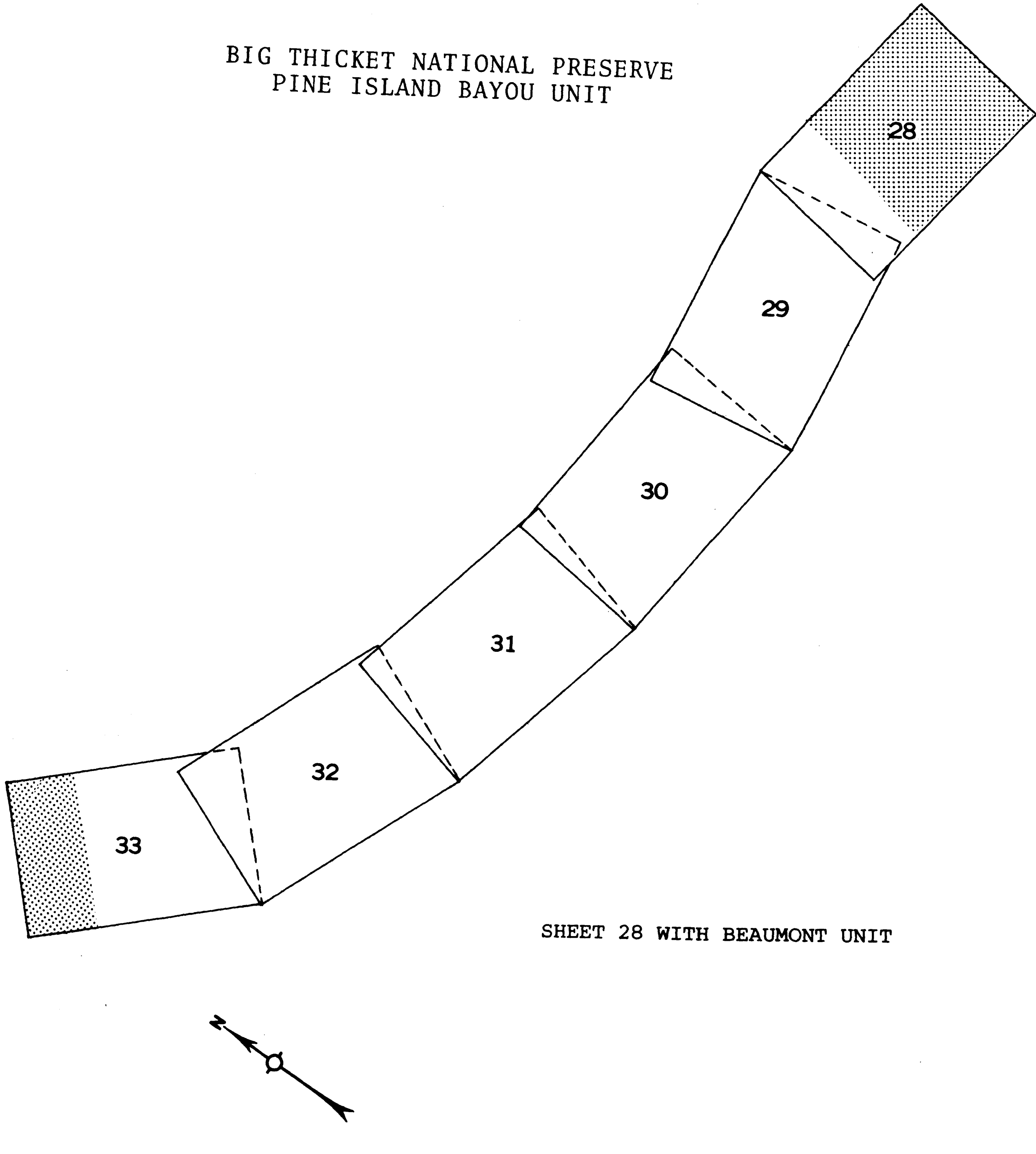
BIG THICKET NATIONAL PRESERVE
BEAUMONT UNIT
SHEET 25 SCALE 1:12,000

BIG THICKET NATIONAL PRESERVE
BEAUMONT UNIT
SHEET 26 SCALE 1:12,000

BIG THICKET NATIONAL PRESERVE
BEAUMONT UNIT
SHEET 27 SCALE 1:12,000

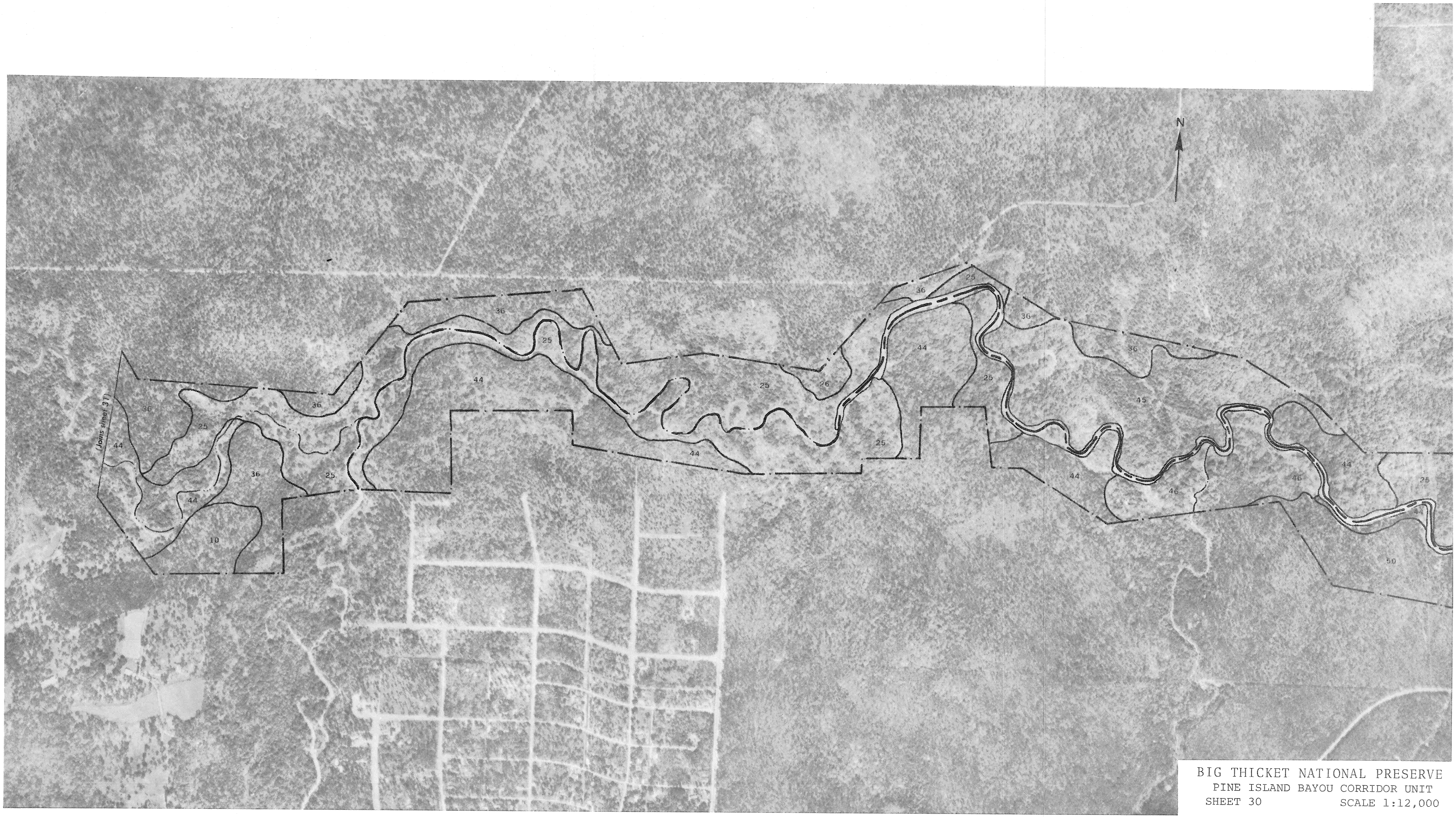
BIG THICKET NATIONAL PRESERVE
BEAUMONT UNIT &
PINE ISLAND BAYOU CORRIDOR UNIT
SHEET 28 SCALE 1:12,000

BIG THICKET NATIONAL PRESERVE
PINE ISLAND BAYOU UNIT



SHEET 28 WITH BEAUMONT UNIT

BIG THICKET NATIONAL PRESERVE
PINE ISLAND BAYOU CORRIDOR UNIT
SHEET 29 SCALE 1:12,000



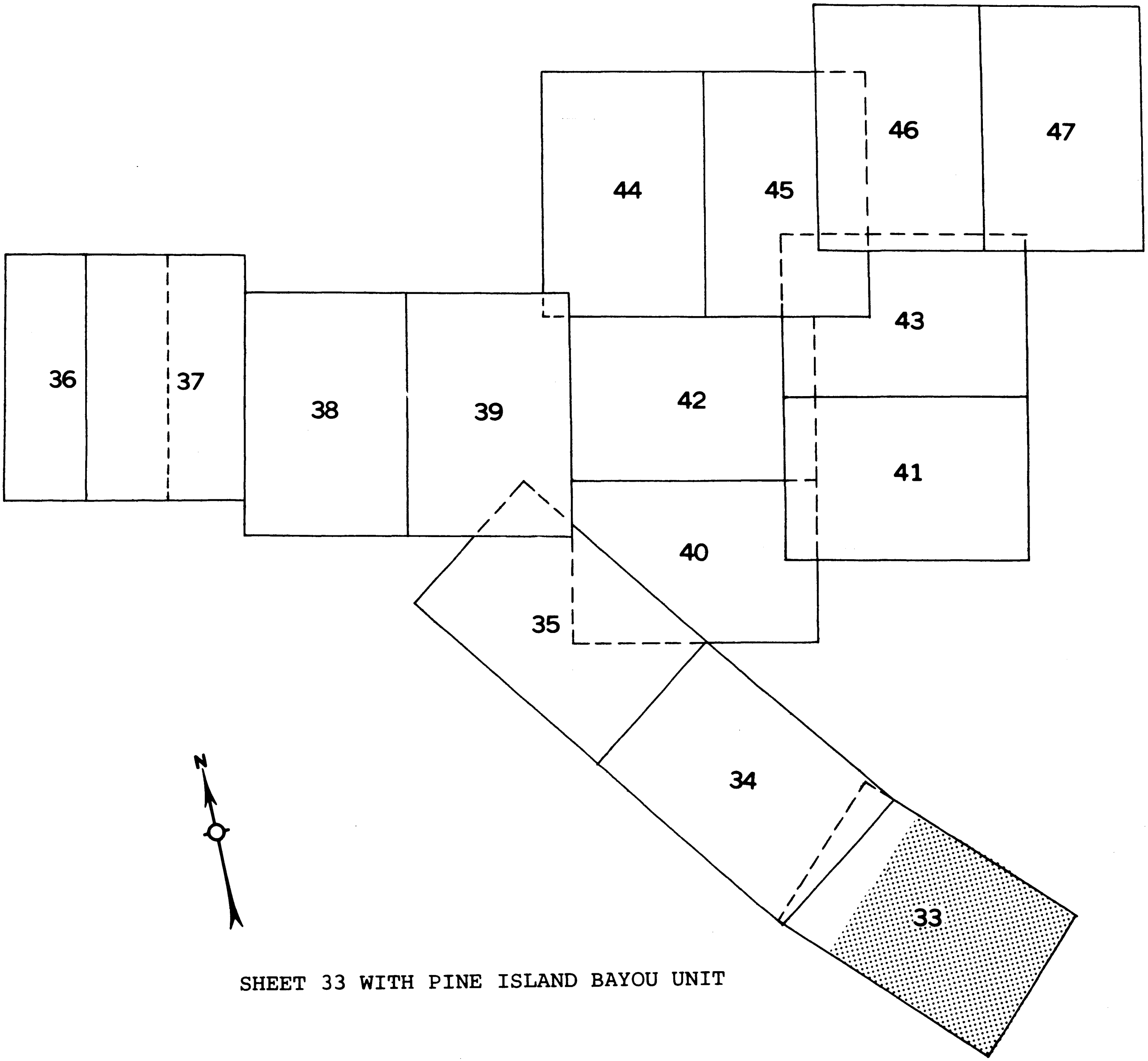
BIG THICKET NATIONAL PRESERVE
PINE ISLAND BAYOU CORRIDOR UNIT
SHEET 30 SCALE 1:12,000

BIG THICKET NATIONAL PRESERVE
PINE ISLAND BAYOU CORRIDOR UNIT
SHEET 31 SCALE 1:12,000

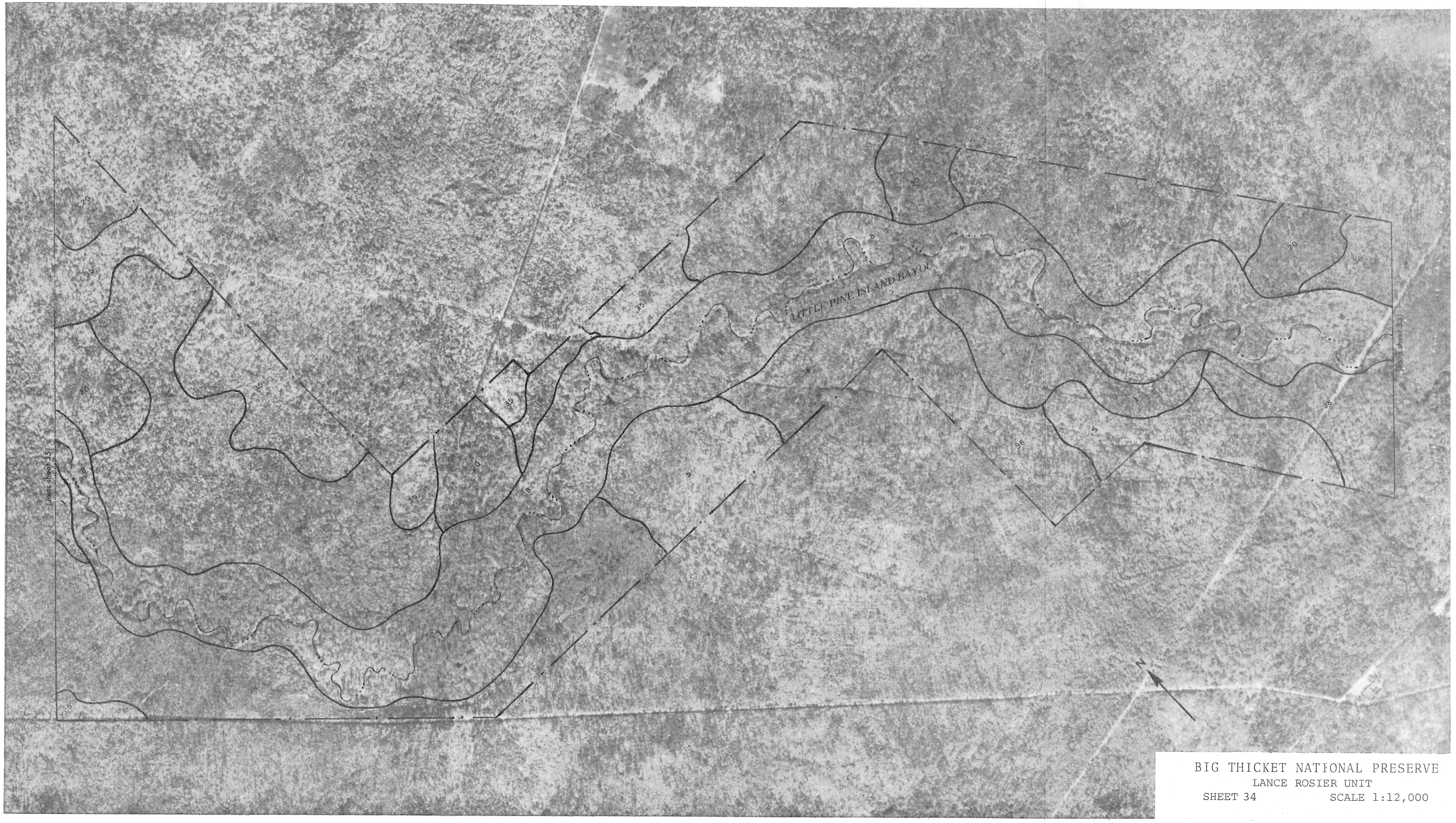
BIG THICKET NATIONAL PRESERVE
PINE ISLAND BAYOU CORRIDOR UNIT
SHEET 32 SCALE 1:12,000

BIG THICKET NATIONAL PRESERVE
PINE ISLAND BAYOU CORRIDOR UNIT
& LANCE ROSIER UNIT
SHEET 33 SCALE 1:12,000

BIG THICKET NATIONAL PRESERVE
LANCE ROSIER UNIT

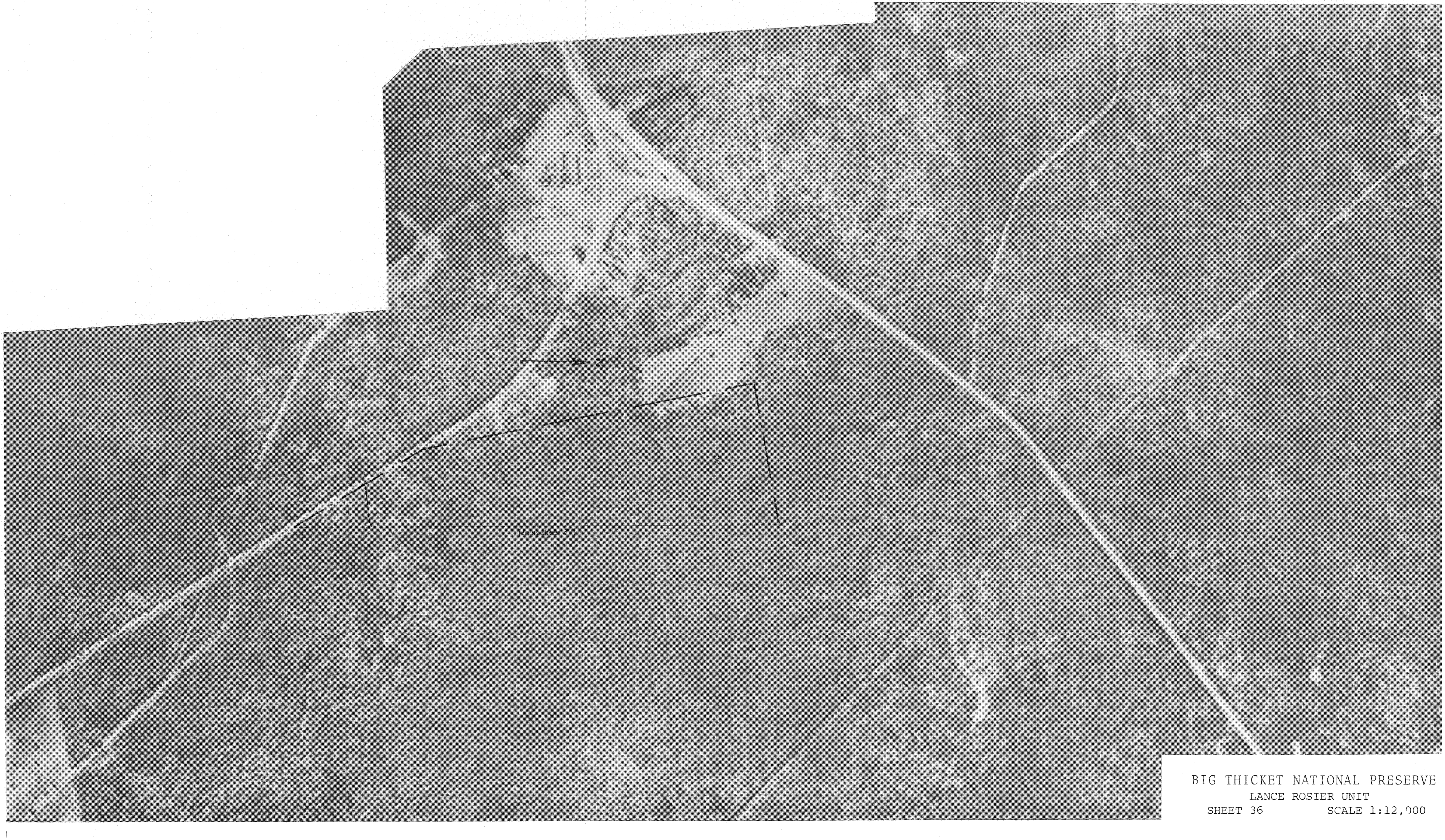


SHEET 33 WITH PINE ISLAND BAYOU UNIT



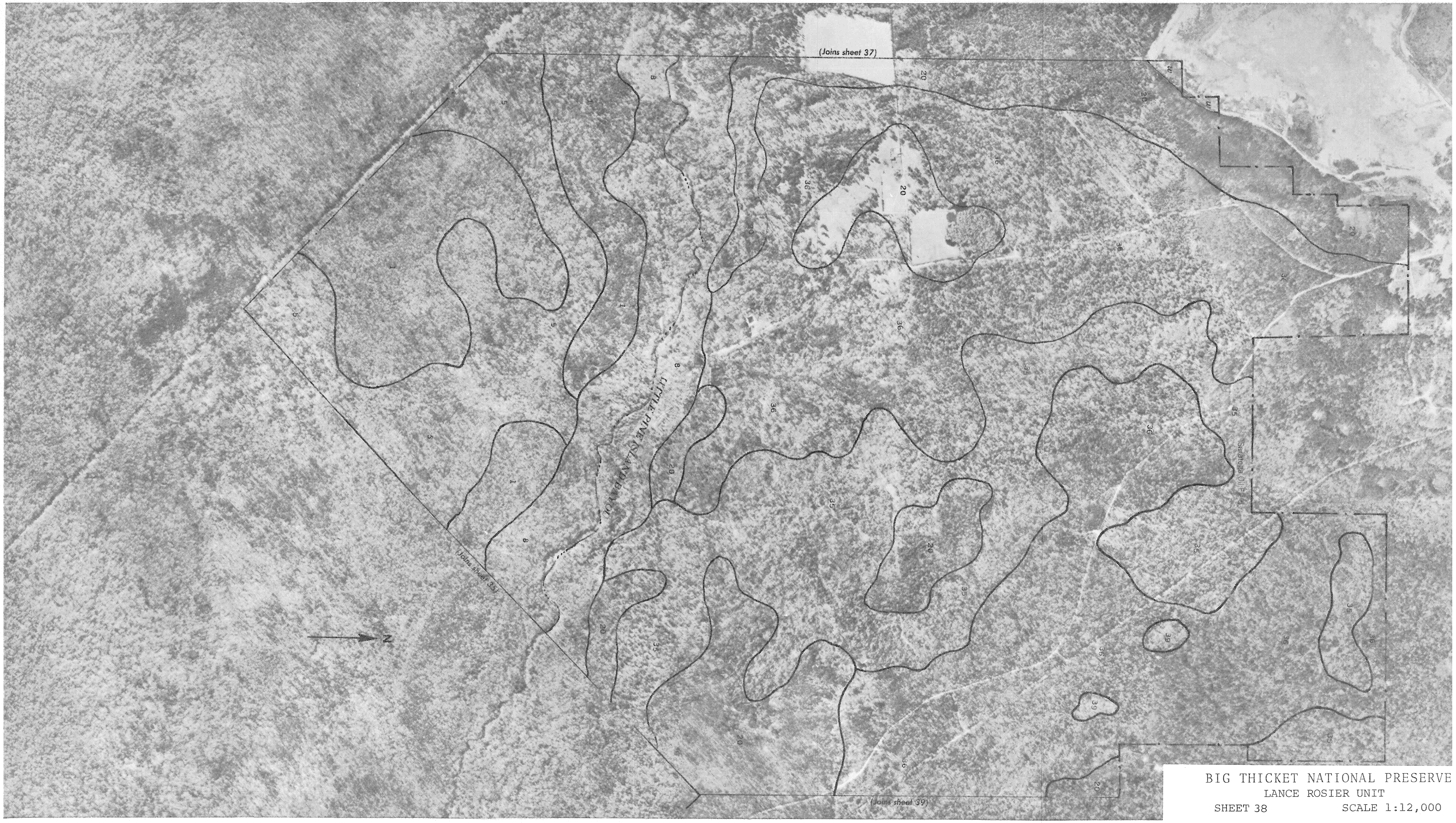
BIG THICKET NATIONAL PRESERVE
LANCE ROSIER UNIT
SHEET 34 SCALE 1:12,000

BIG THICKET NATIONAL PRESERVE
LANCE ROSIER UNIT
SHEET 35 SCALE 1:12,000



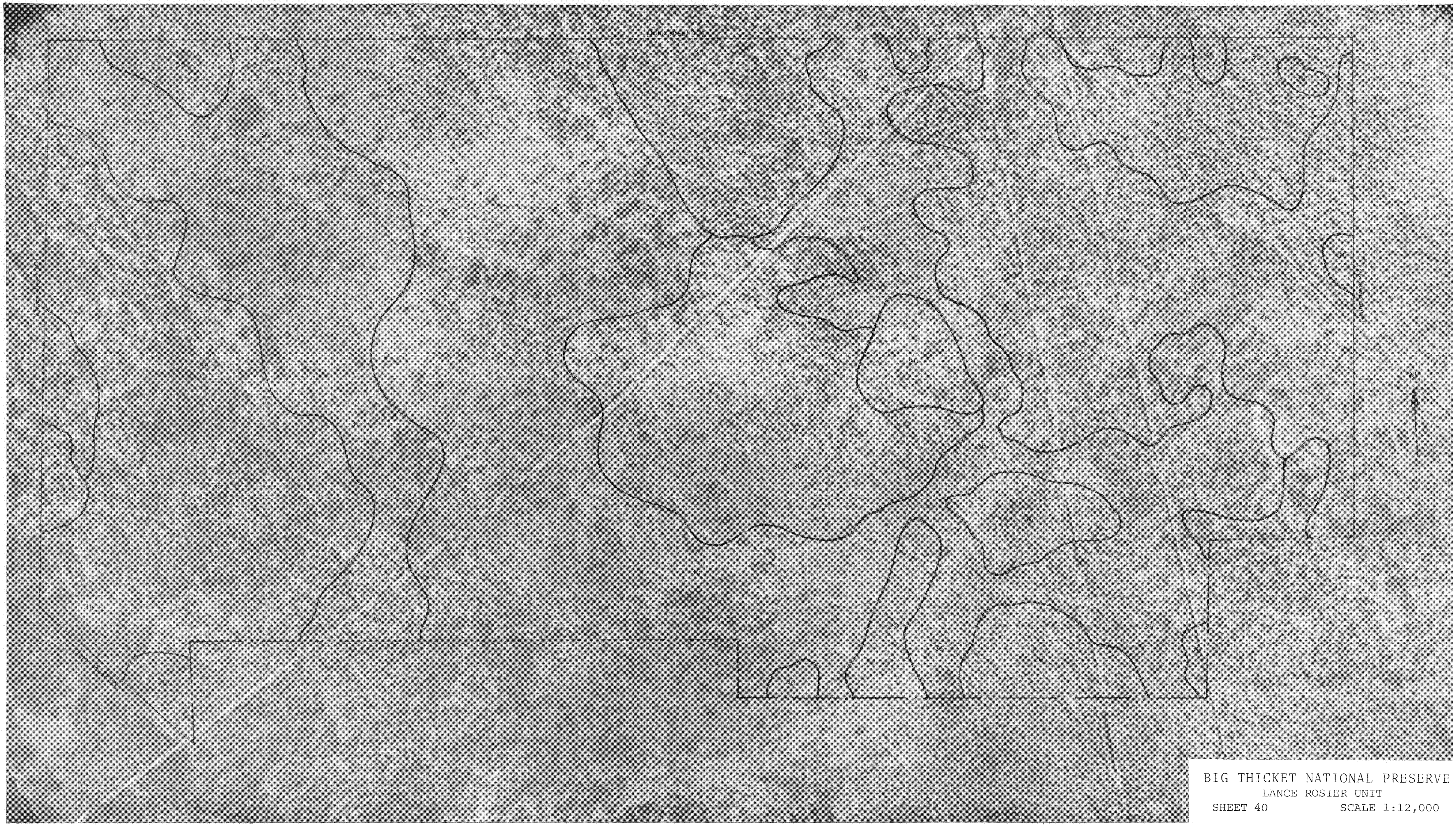
BIG THICKET NATIONAL PRESERVE
LANCE ROSIER UNIT
SHEET 36 SCALE 1:12,000

BIG THICKET NATIONAL PRESERVE
LANCE ROSIER UNIT
SHEET 37 SCALE 1:12,000



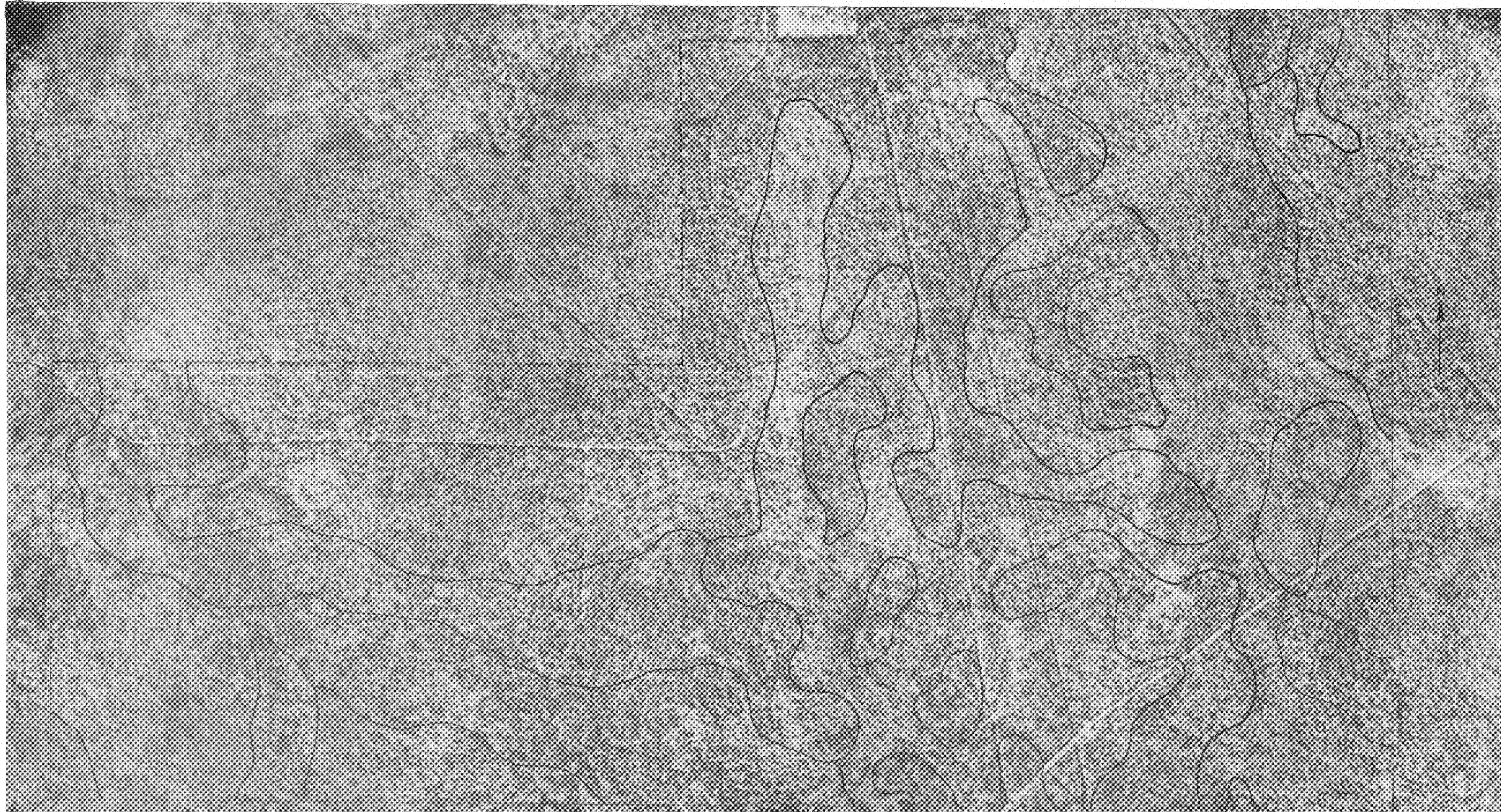
BIG THICKET NATIONAL PRESERVE
LANCE ROSIER UNIT
SHEET 38 SCALE 1:12,000

BIG THICKET NATIONAL PRESERVE
LANCE ROSIER UNIT
SHEET 39 SCALE 1:12,000



BIG THICKET NATIONAL PRESERVE
LANCE ROSIER UNIT
SHEET 40 SCALE 1:12,000

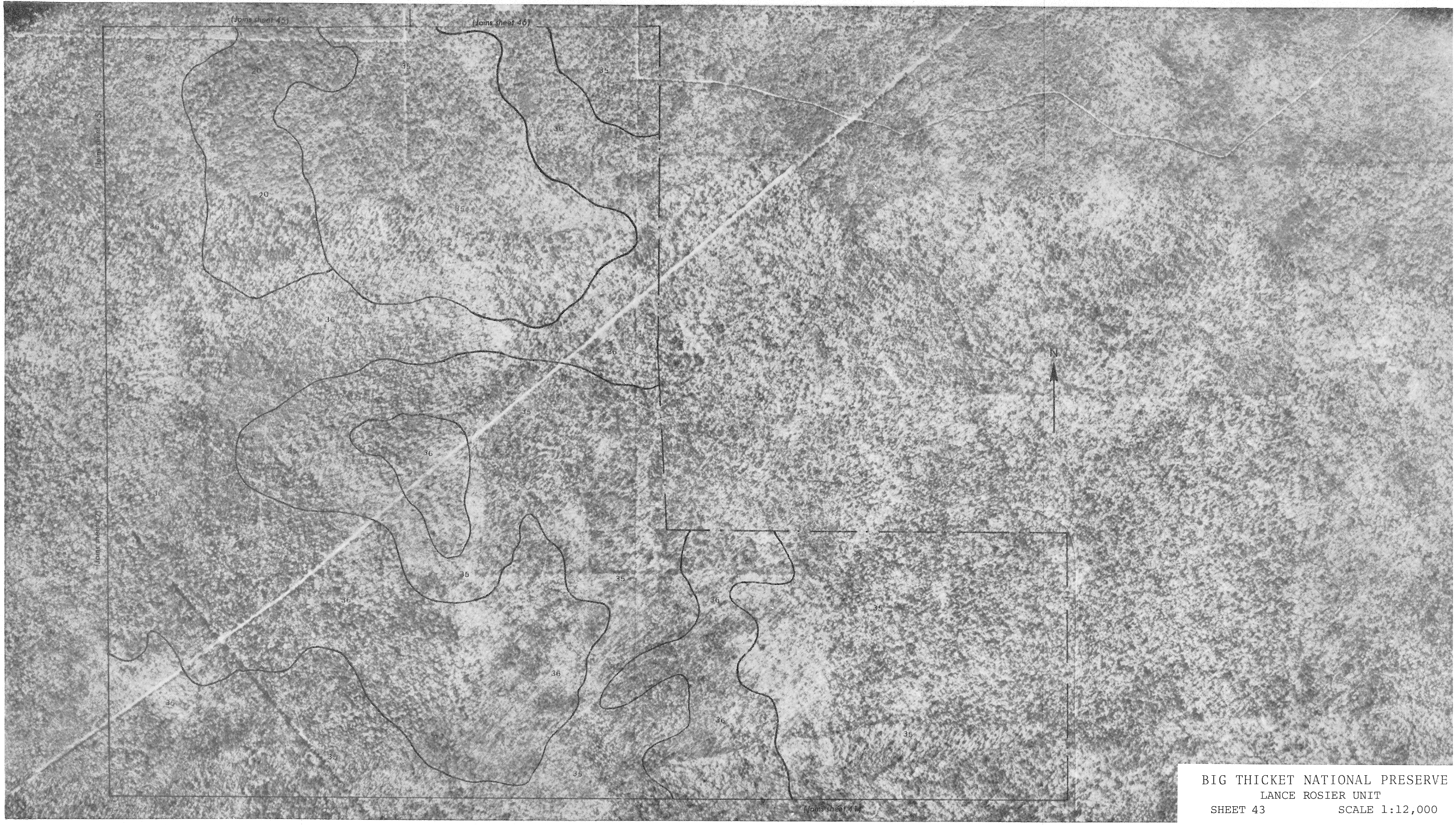
BIG THICKET NATIONAL PRESERVE
LANCE ROSIER UNIT
SHEET 41 SCALE 1:12,000



BIG THICKET NATIONAL PRESERVE

LANCE ROSIER UNIT

SHEET 42 SCALE 1:12,000

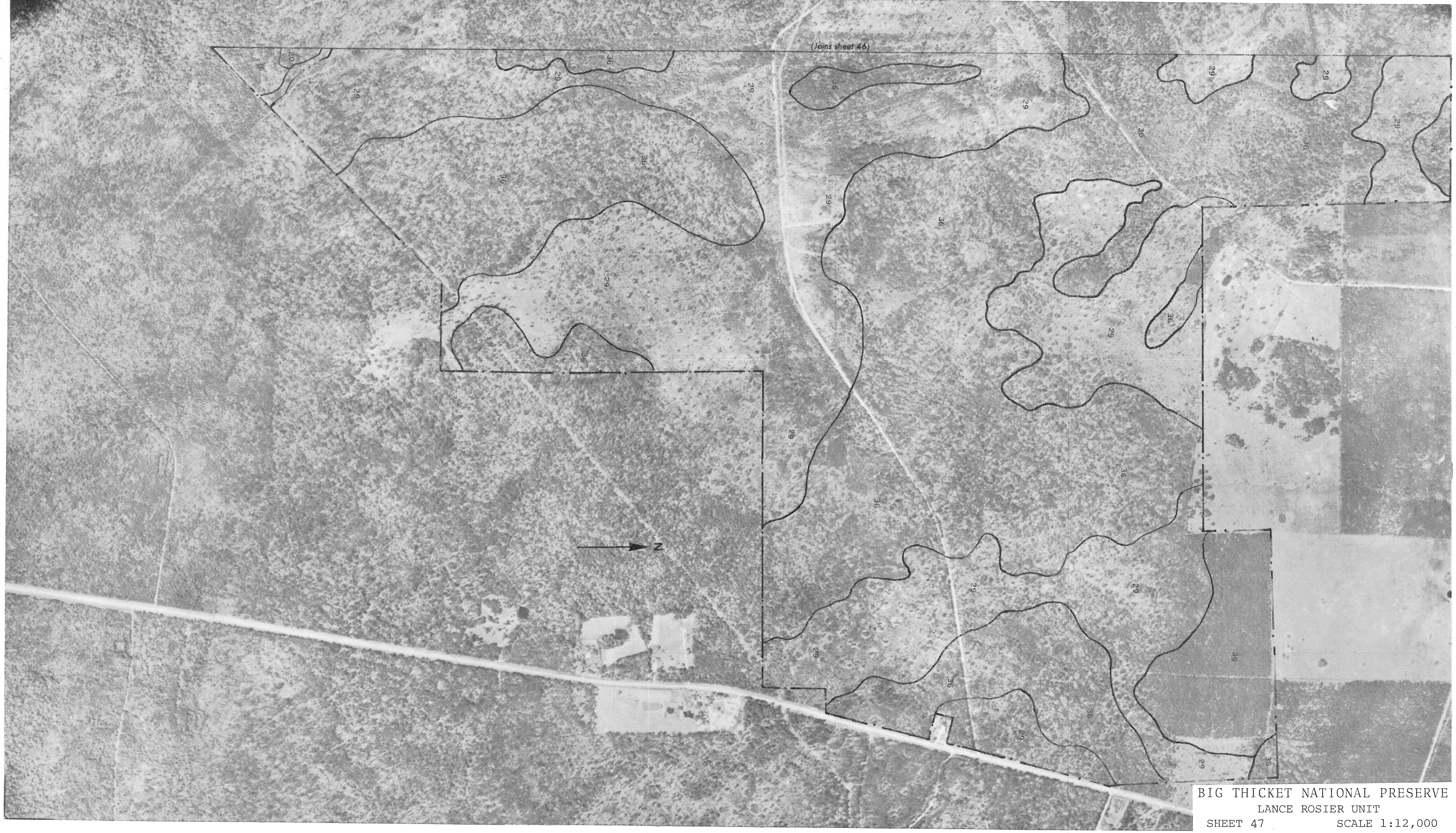


BIG THICKET NATIONAL PRESERVE
LANCE ROSIER UNIT
SHEET 43 SCALE 1:12,000

BIG THICKET NATIONAL PRESERVE
LANCE ROSIER UNIT
SHEET 44 SCALE 1:12,000


(Joins sheet 44)
(Joins sheet 42)
(Joins sheet 43)
(Joins sheet 43)
(Joins sheet 46)
N
BIG THICKET NATIONAL PRESERVE
LANCE ROSIER UNIT
SHEET 45
SCALE 1:12,000

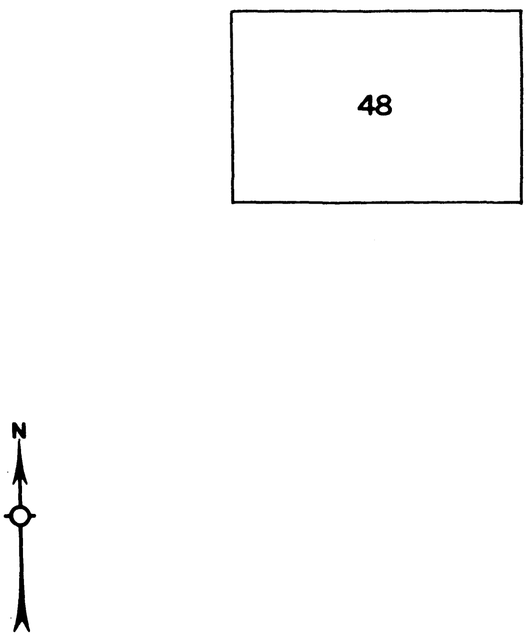
BIG THICKET NATIONAL PRESERVE
LANCE ROSIER UNIT
SHEET 46 SCALE 1:12,000



BIG THICKET NATIONAL PRESERVE
LANCE ROSIER UNIT
SHEET 47 SCALE 1:12,000

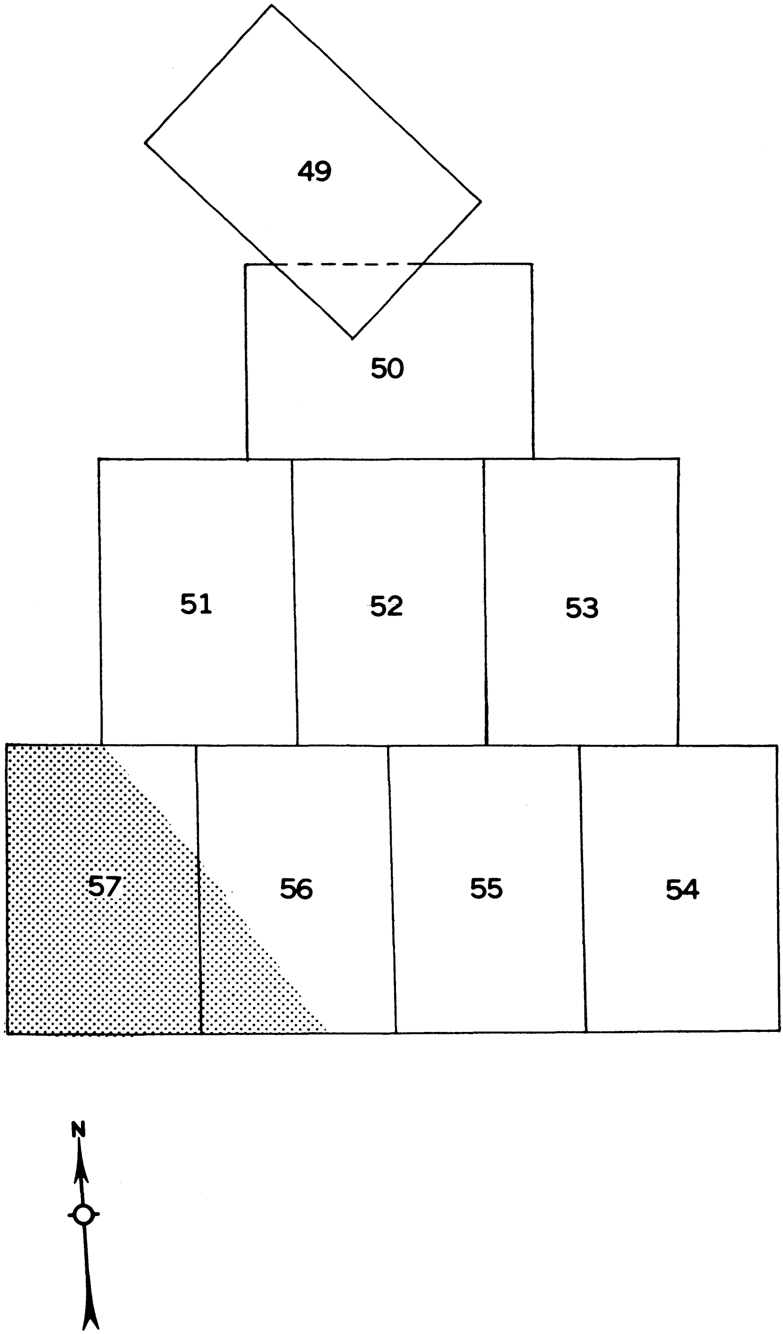
BIG THICKET NATIONAL PRESERVE

LOBLOLLY UNIT

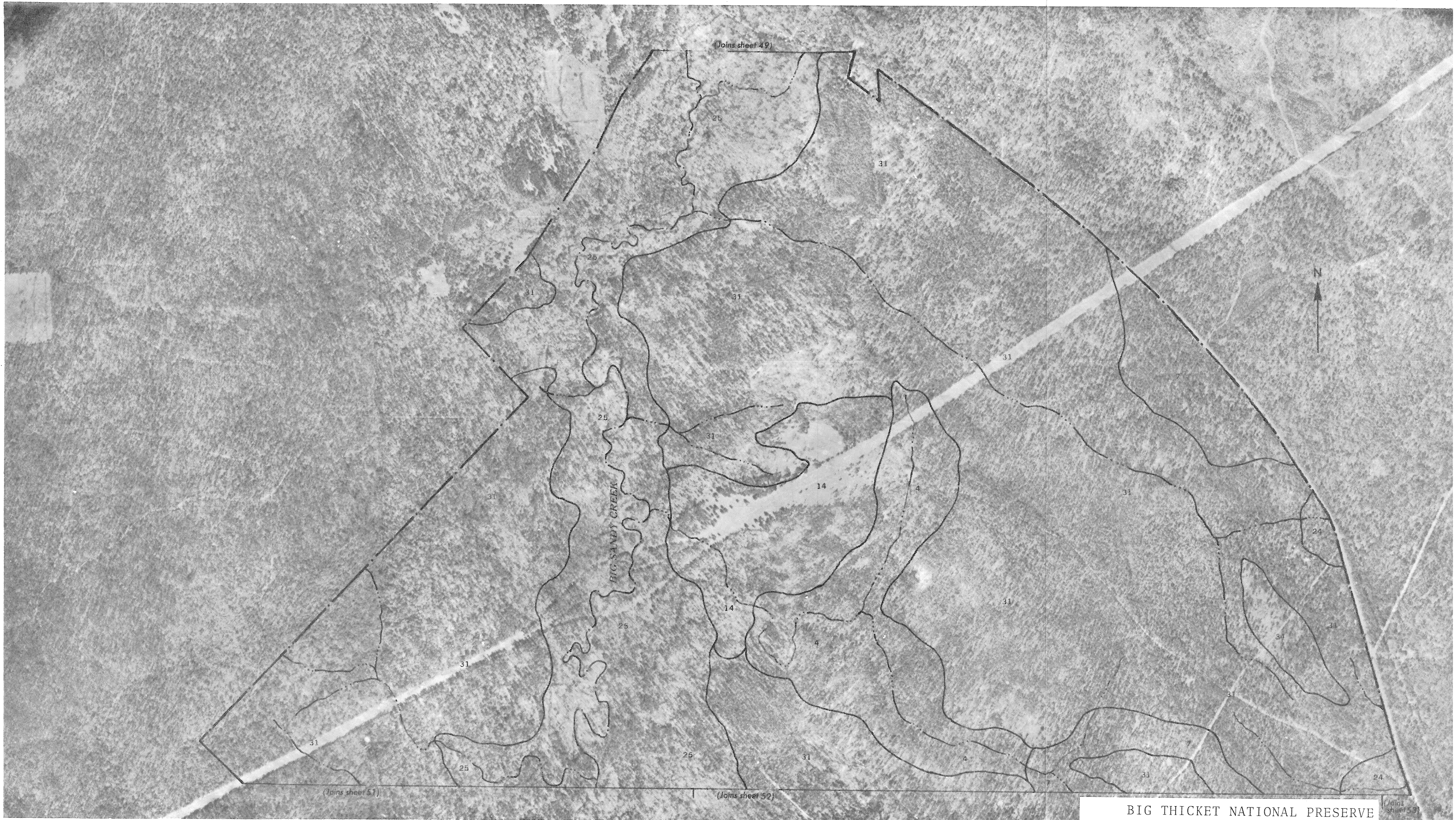


BIG THICKET NATIONAL PRESERVE
LOBLOLLY UNIT
SHEET 48 SCALE 1:12,000

BIG THICKET NATIONAL PRESERVE
BIG SANDY CREEK UNIT



BIG THICKET NATIONAL PRESERVE
BIG SANDY UNIT
SHEET 49 SCALE 1:12,000

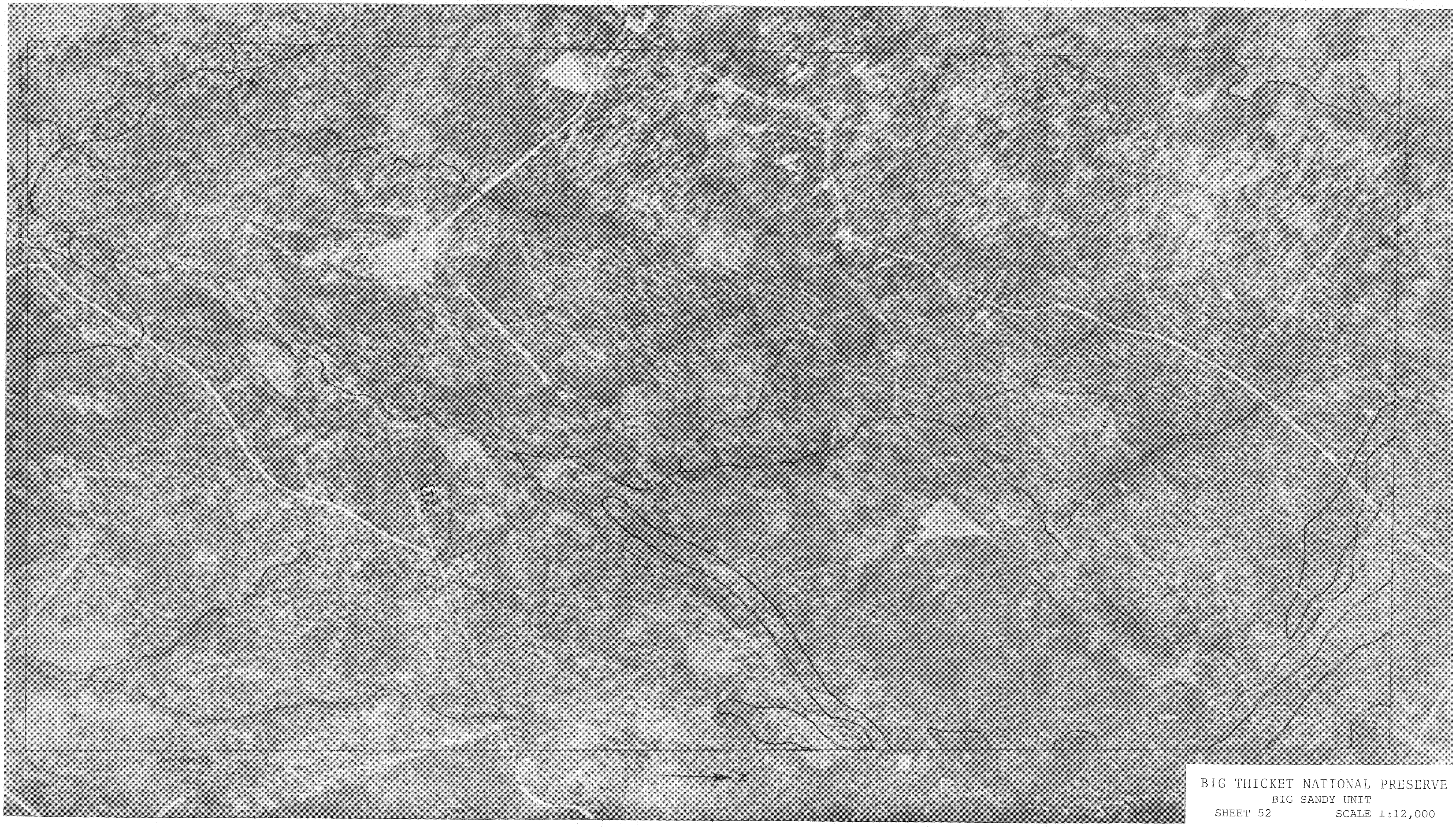


BIG THICKET NATIONAL PRESERVE

BIG SANDY UNIT

SHEET 50 SCALE 1:12,000

BIG THICKET NATIONAL PRESERVE
BIG SANDY UNIT
SHEET 51 SCALE 1:12,000

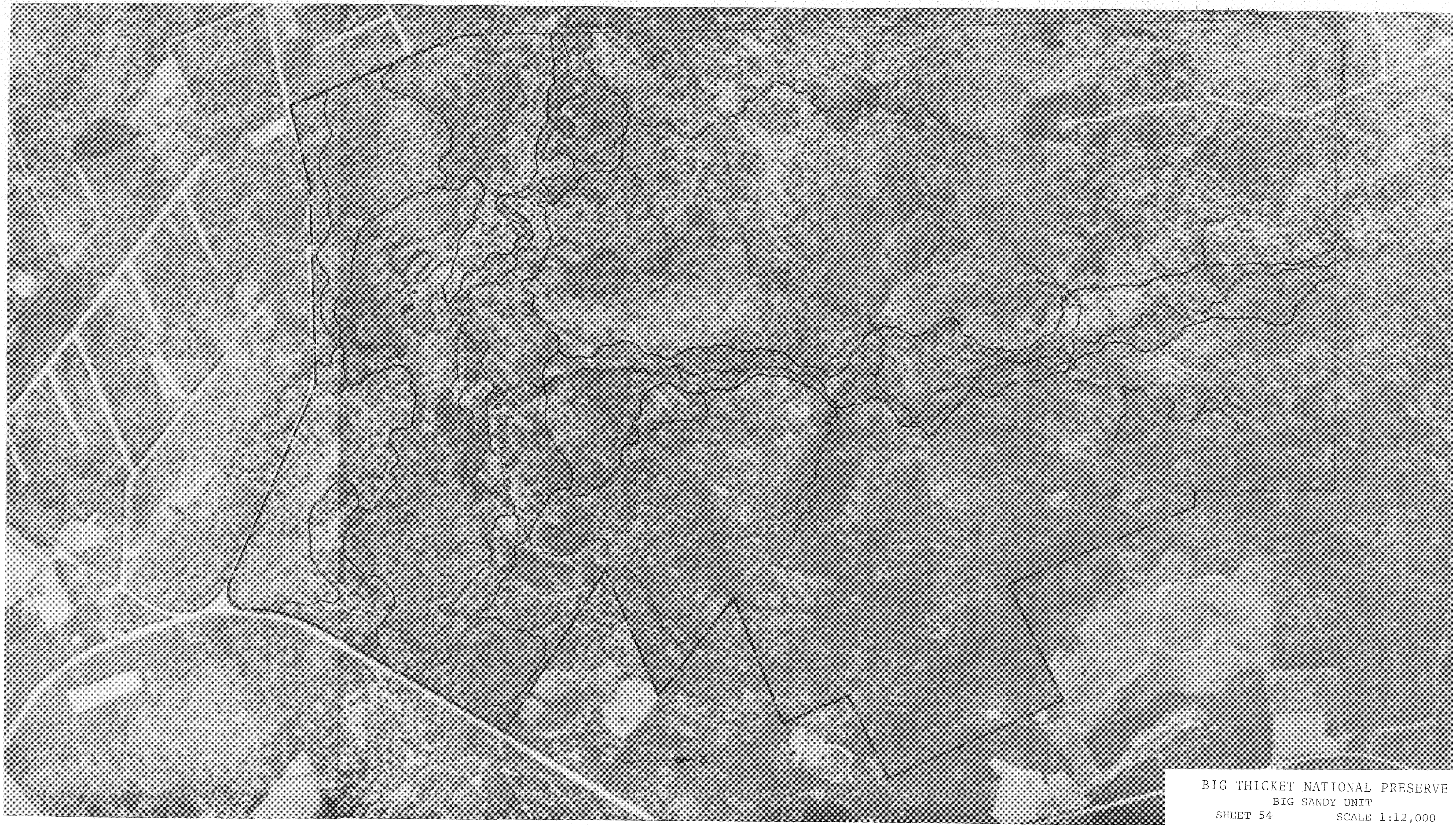


BIG THICKET NATIONAL PRESERVE
BIG SANDY UNIT
SHEET 52 SCALE 1:12,000

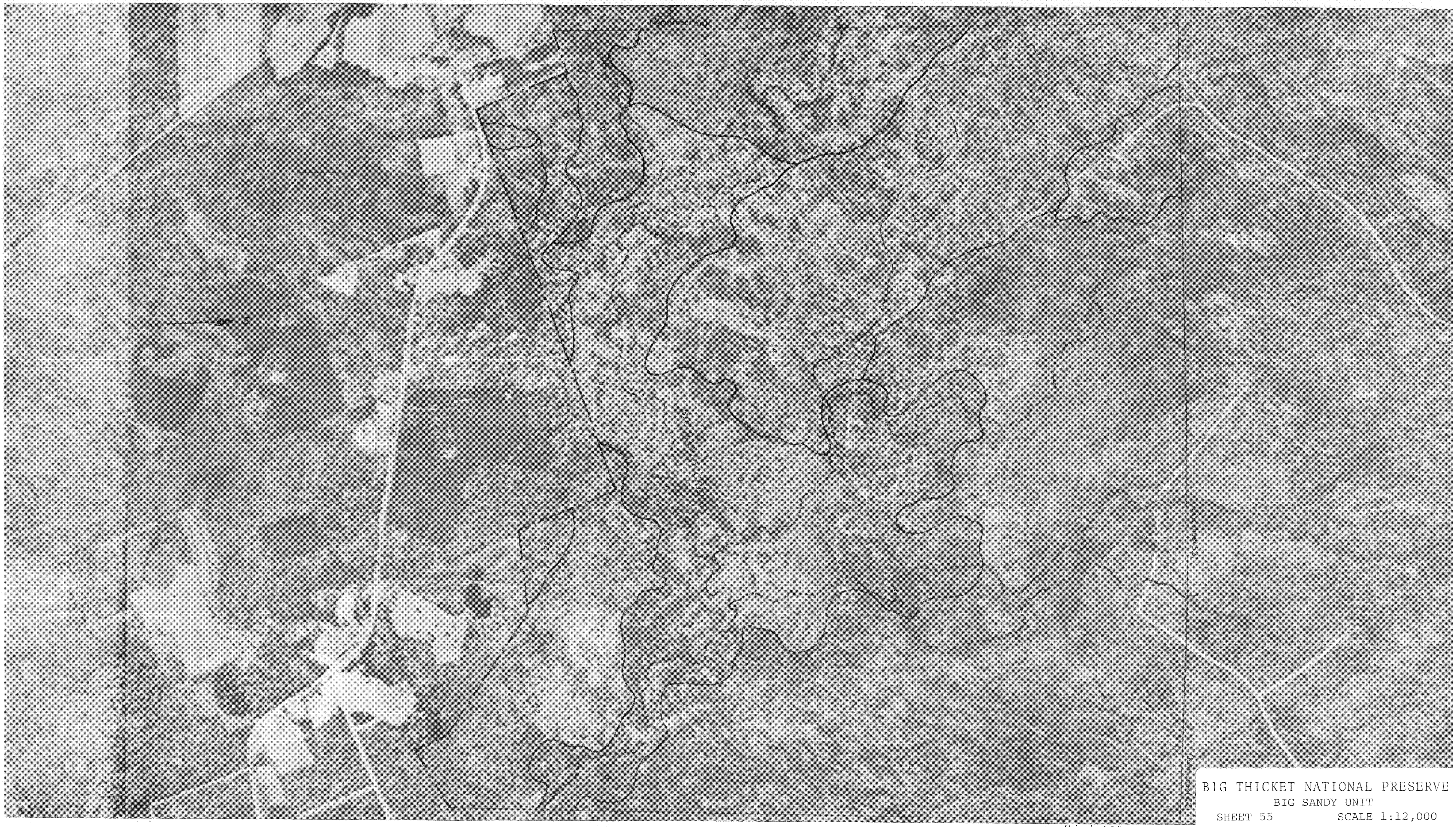
BIG THICKET NATIONAL PRESERVE

BIG SANDY UNIT

SHEET 53 SCALE 1:12,000

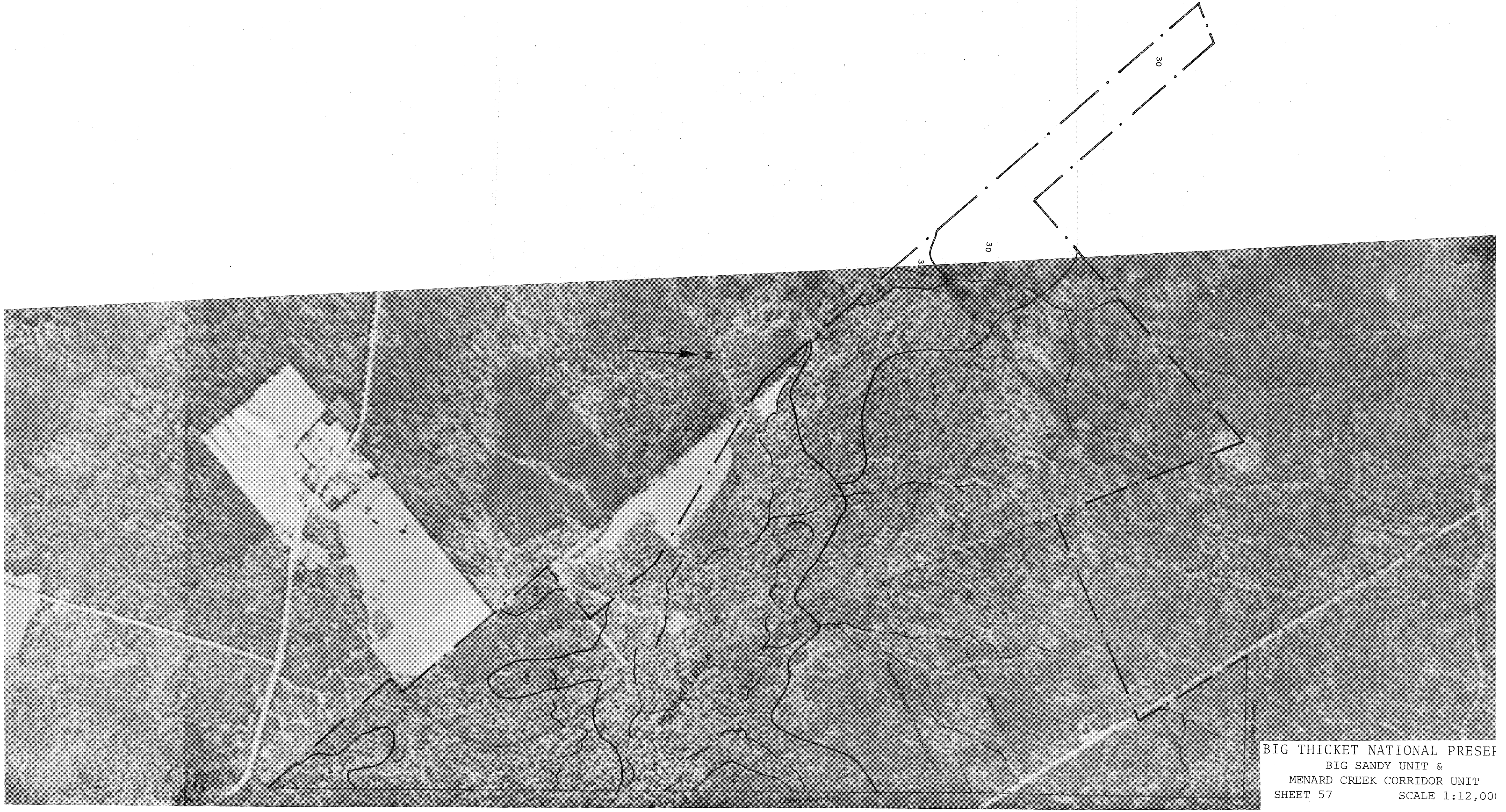


BIG THICKET NATIONAL PRESERVE
BIG SANDY UNIT
SHEET 54 SCALE 1:12,000



BIG THICKET NATIONAL PRESERVE
BIG SANDY UNIT
SHEET 55 SCALE 1:12,000

BIG THICKET NATIONAL PRESERVE
BIG SANDY UNIT &
MENARD CREEK CORRIDOR UNIT
SHEET 56 SCALE 1:12,000



BIG THICKET NATIONAL PRESE

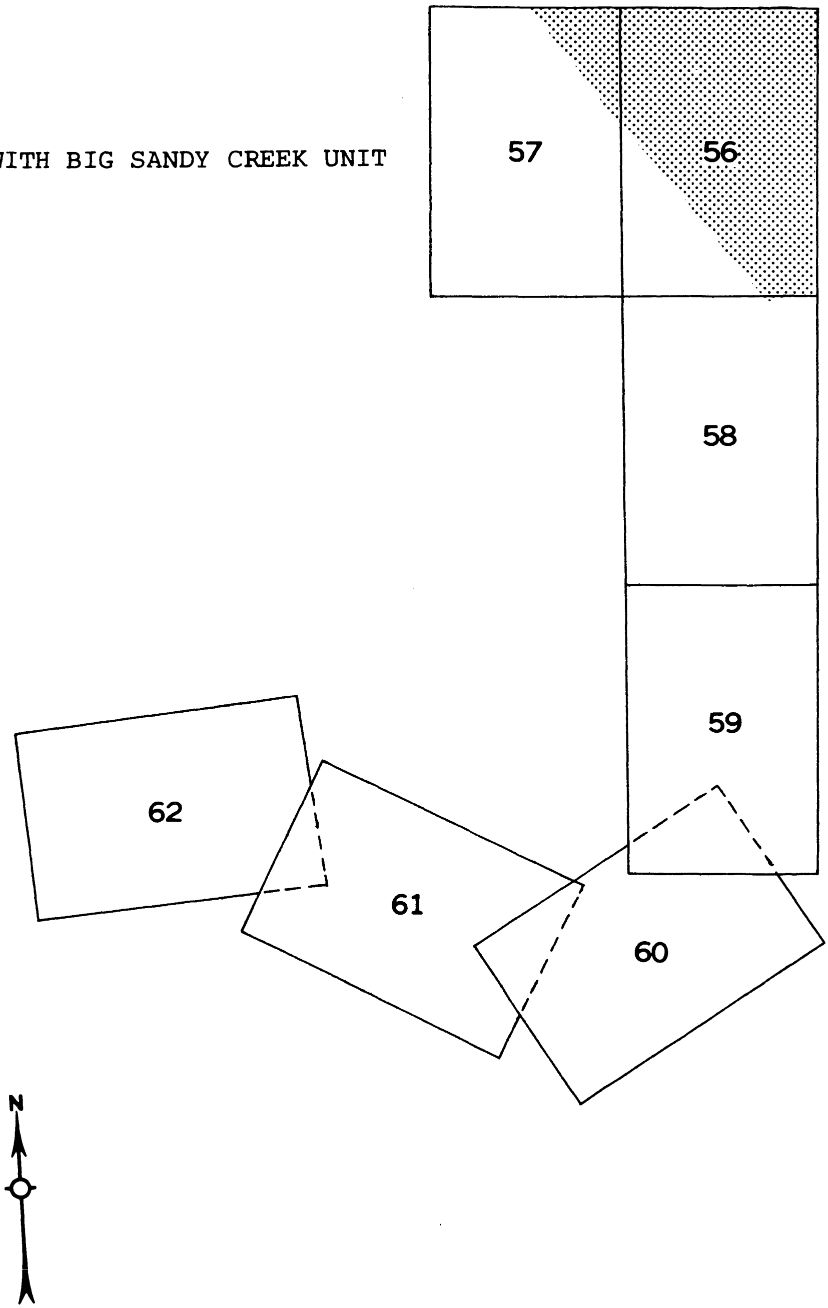
BIG SANDY UNIT &

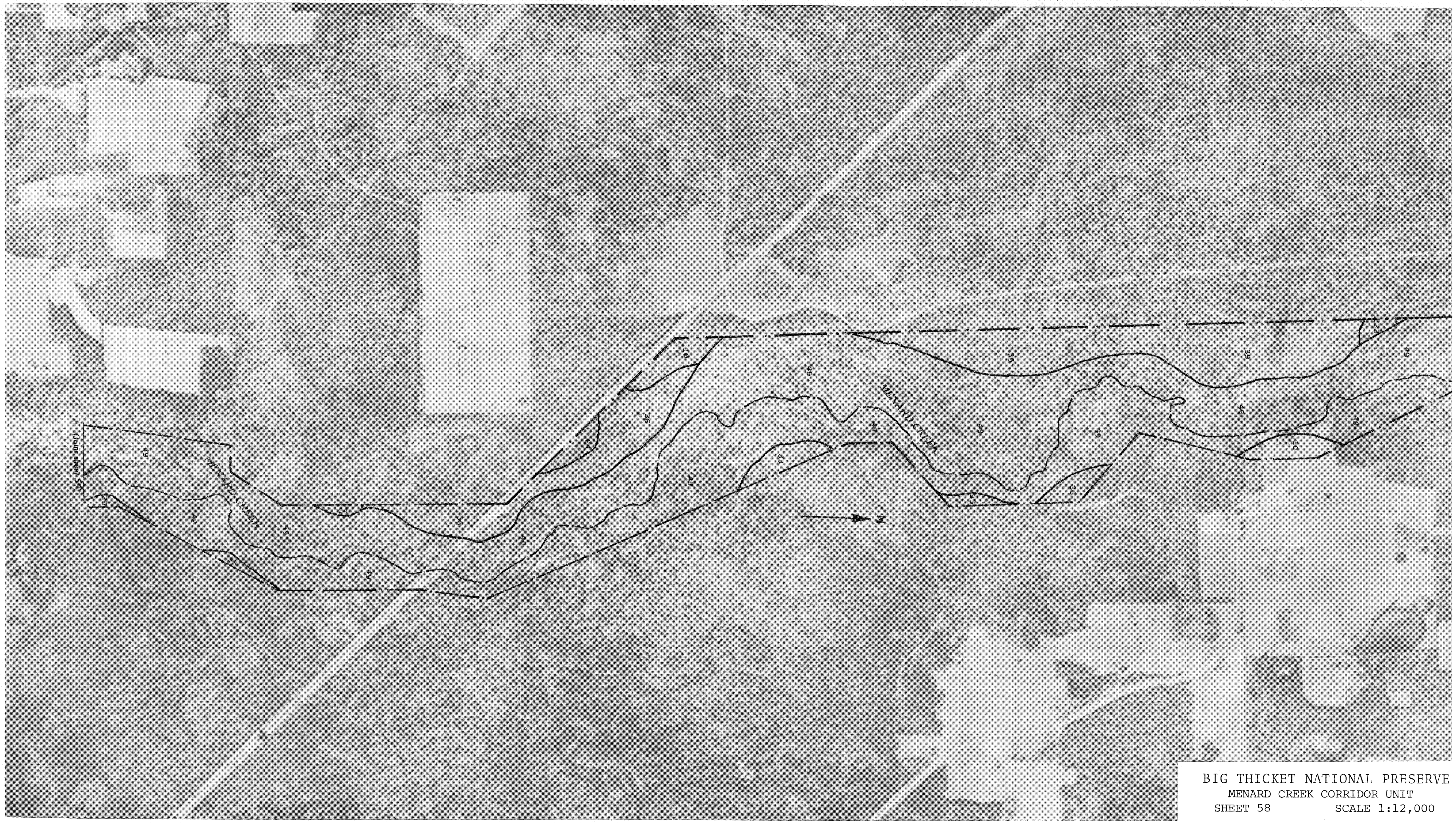
MENARD CREEK CORRIDOR UNIT

SHEET 57 SCALE 1:12,00

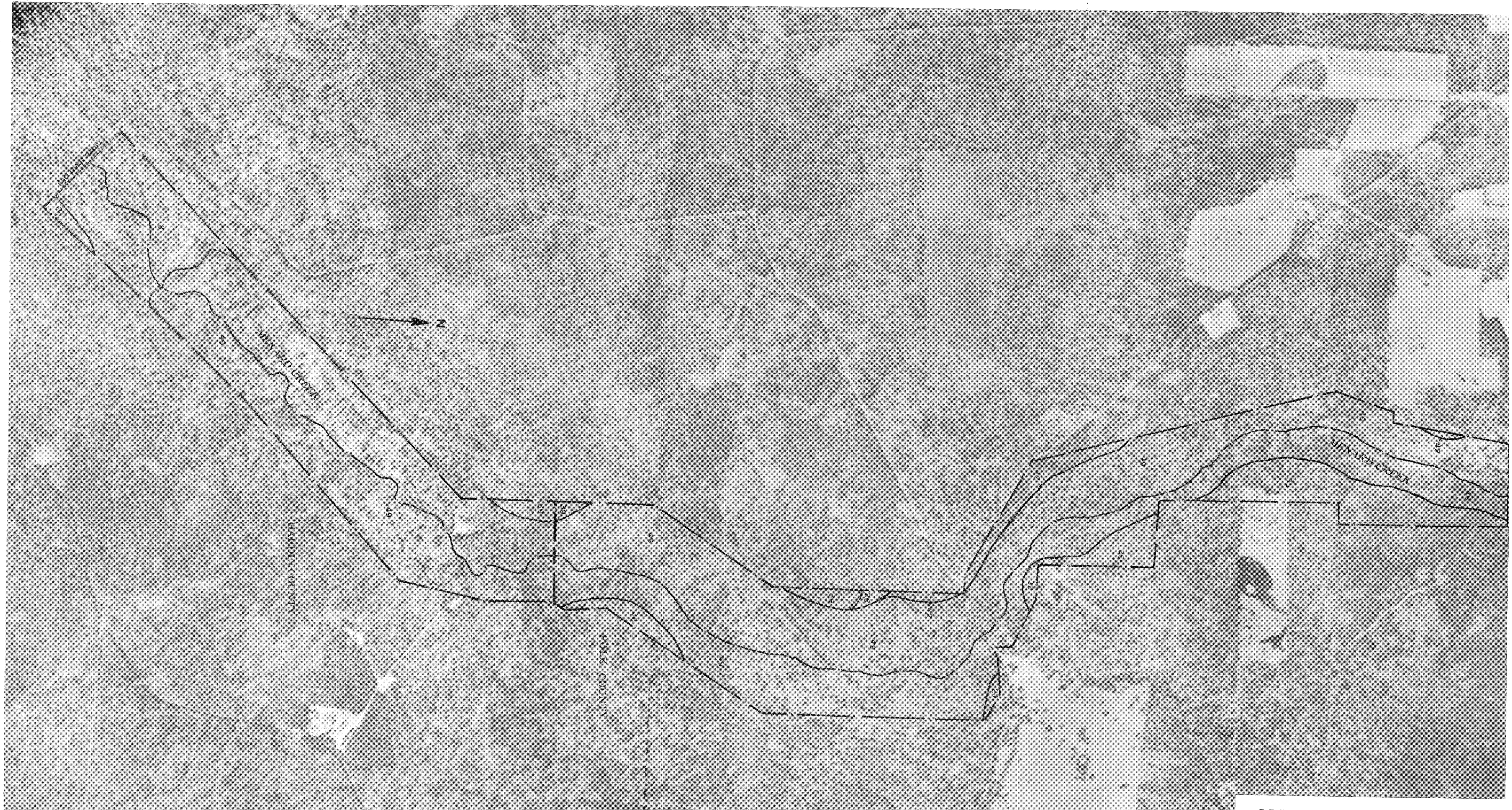
BIG THICKET NATIONAL PRESERVE
MENARD CREEK UNIT

SHEET 56 & 57 WITH BIG SANDY CREEK UNIT





BIG THICKET NATIONAL PRESERVE
MENARD CREEK CORRIDOR UNIT
SHEET 58 SCALE 1:12,000



BIG THICKET NATIONAL PRESERVE
MENARD CREEK CORRIDOR UNIT
SHEET 59 SCALE 1:12,000

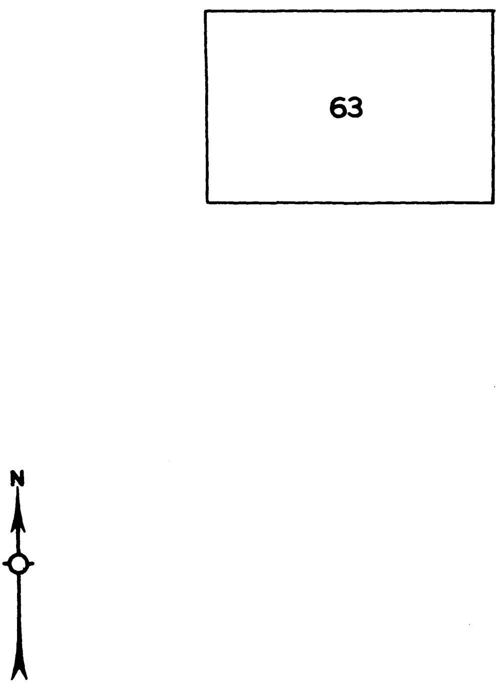
BIG THICKET NATIONAL PRESERVE
MENARD CREEK CORRIDOR UNIT
SHEET 60 SCALE 1:12,000

BIG THICKET NATIONAL PRESERVE
MENARD CREEK CORRIDOR UNIT
SHEET 61 SCALE 1:12,000

BIG THICKET NATIONAL PRESERVE
MENARD CREEK CORRIDOR UNIT
SHEET 62 SCALE 1:12,000

BIG THICKET NATIONAL PRESERVE

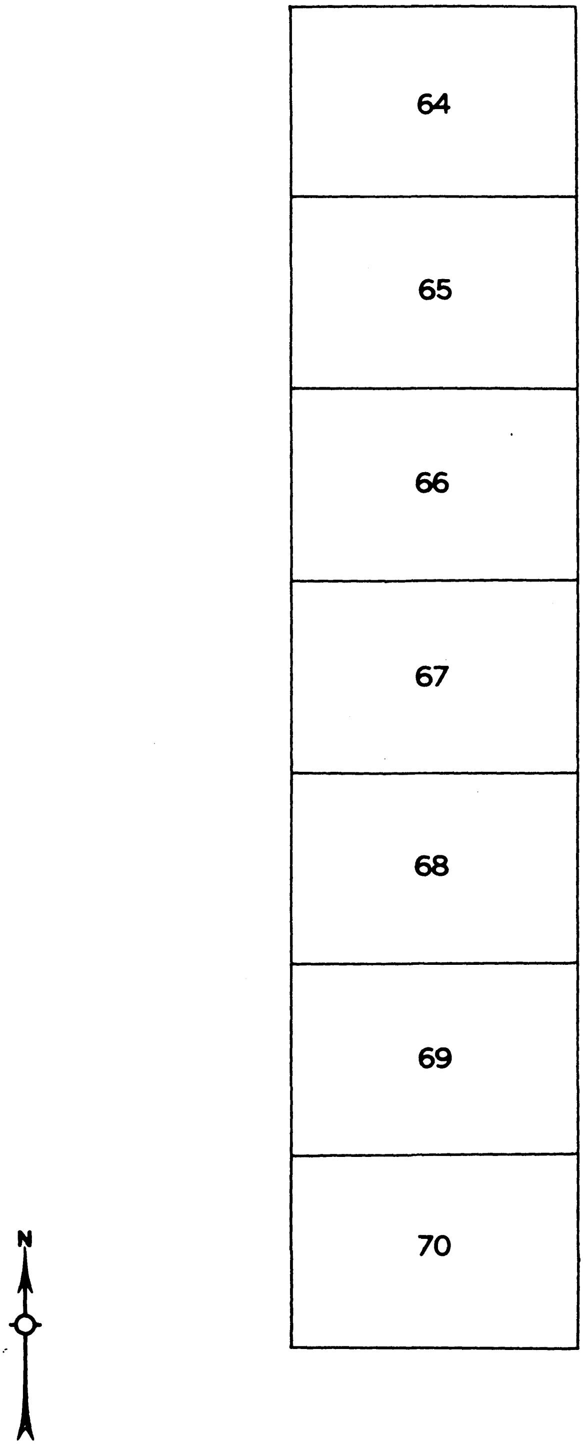
HICKORY CREEK SAVANNAH UNIT

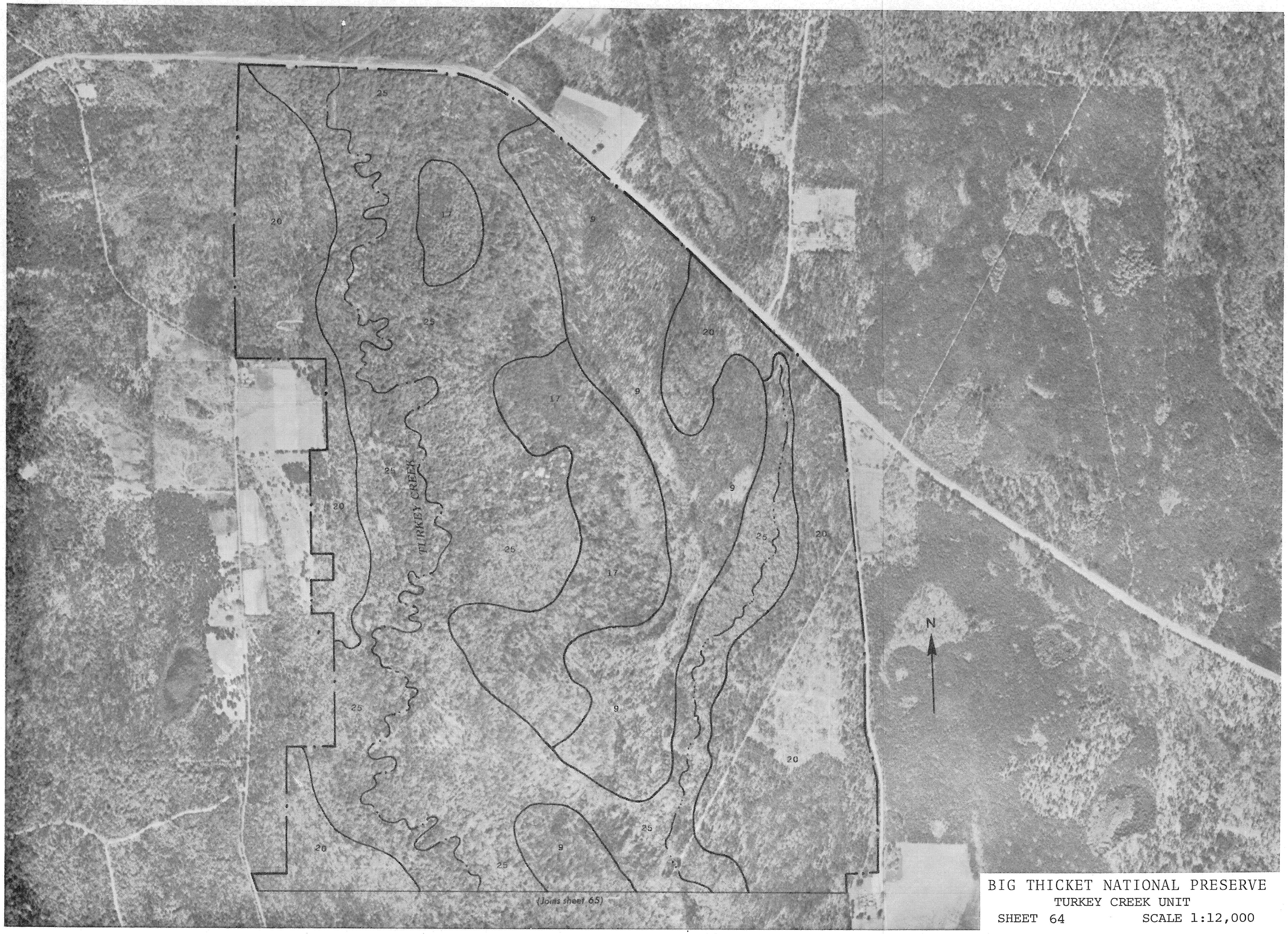


BIG THICKET NATIONAL PRESERVE
HICKORY CREEK
SAVANNAH UNIT
SHEET 63 SCALE 1:12,000

BIG THICKET NATIONAL PRESERVE

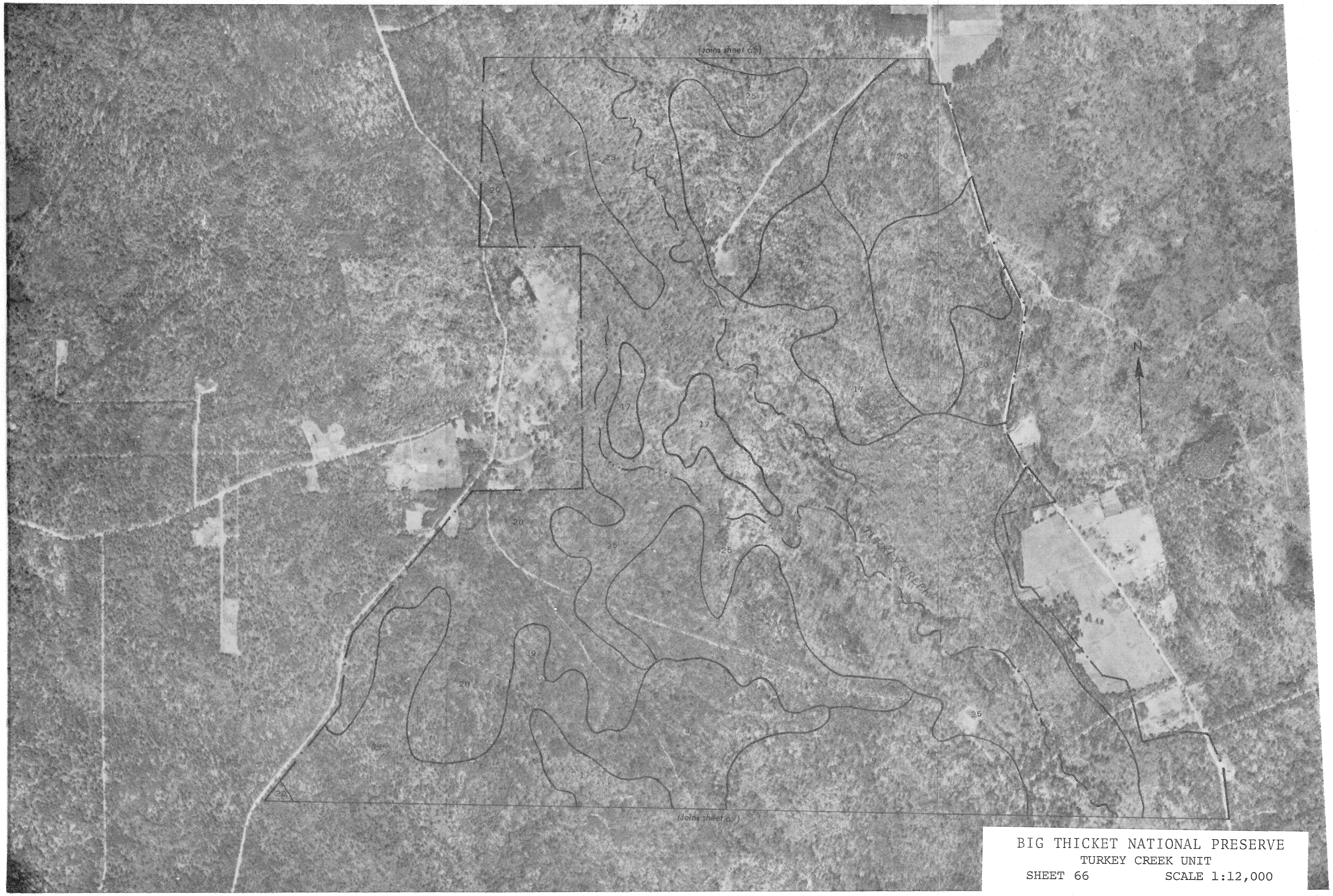
TURKEY CREEK UNIT





BIG THICKET NATIONAL PRESERVE
TURKEY CREEK UNIT
SHEET 64 SCALE 1:12,000

BIG THICKET NATIONAL PRESERVE
TURKEY CREEK UNIT
SHEET 65 SCALE 1:12,000

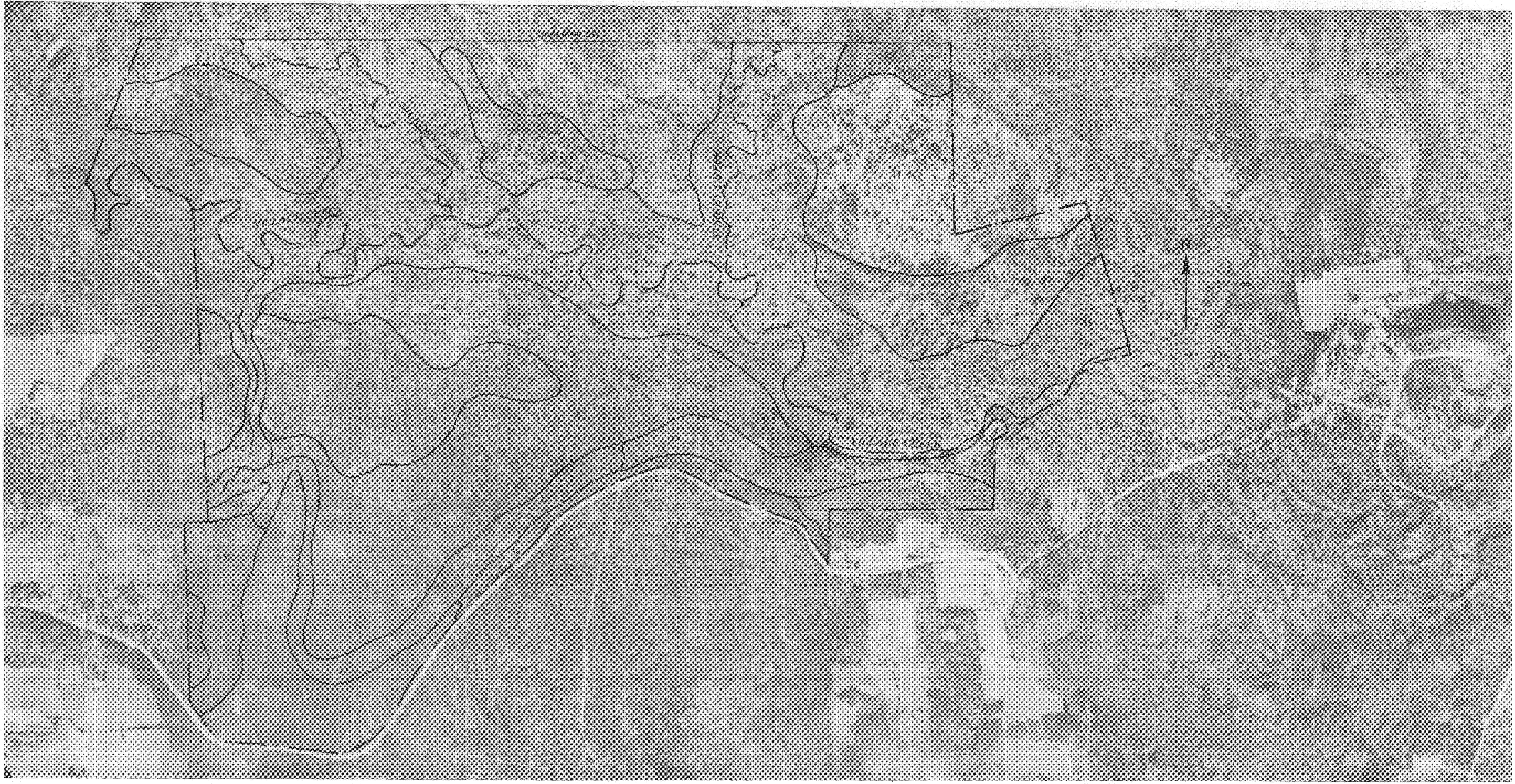


BIG THICKET NATIONAL PRESERVE
TURKEY CREEK UNIT
SHEET 66 SCALE 1:12,000

BIG THICKET NATIONAL PRESERVE
TURKEY CREEK UNIT
SHEET 67 SCALE 1:12,000

BIG THICKET NATIONAL PRESERVE
TURKEY CREEK UNIT
SHEET 68 SCALE 1:12,000

BIG THICKET NATIONAL PRESERVE
TURKEY CREEK UNIT
SHEET 69 SCALE 1:12,000



BIG THICKET NATIONAL PRESERVE
TURKEY CREEK UNIT
SHEET 70 SCALE 1:12,000