United States Department of Agriculture

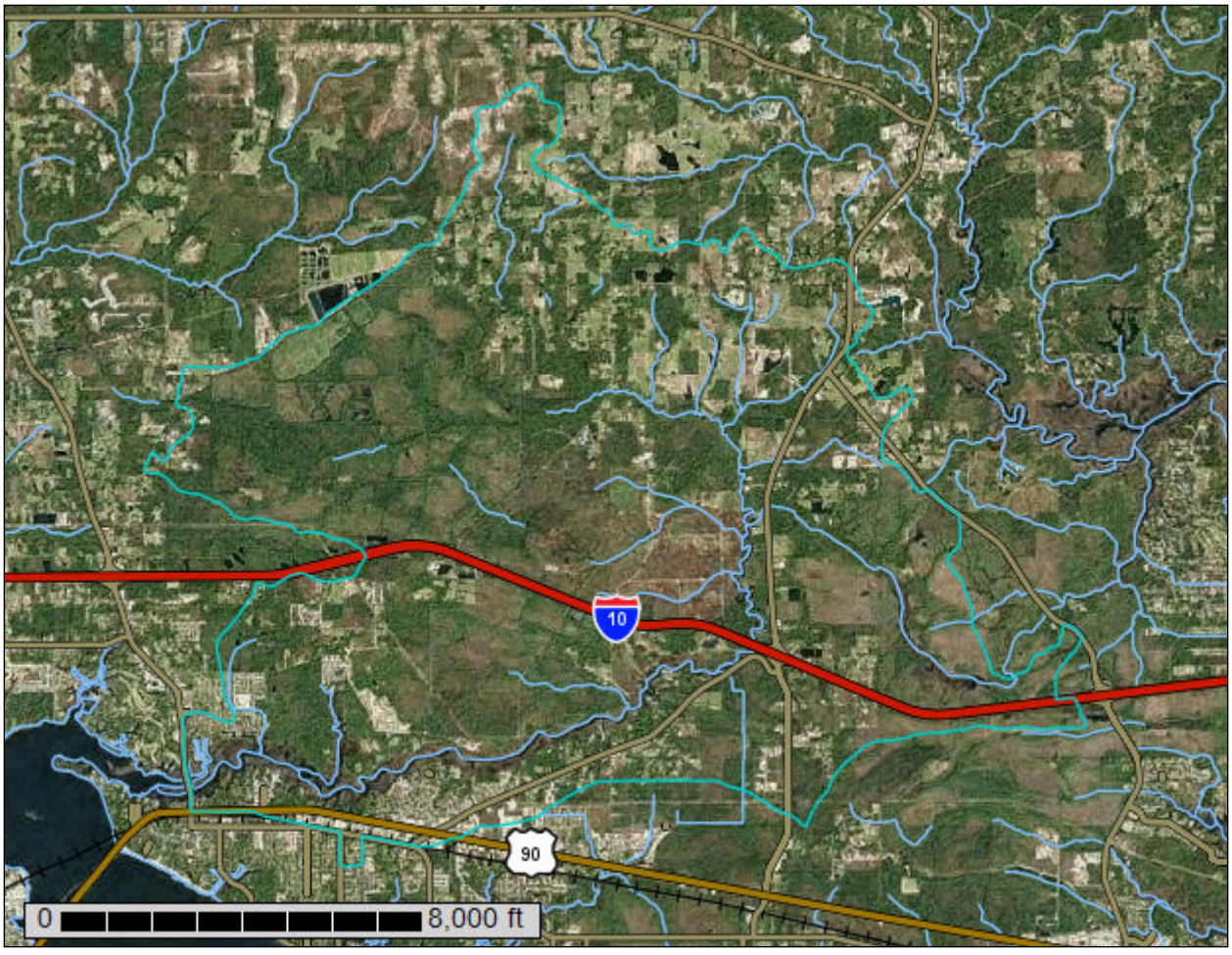
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Jackson County, Mississippi

Old Fort Bayou Watershed (HUC 031700090604)



May 24, 2018

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

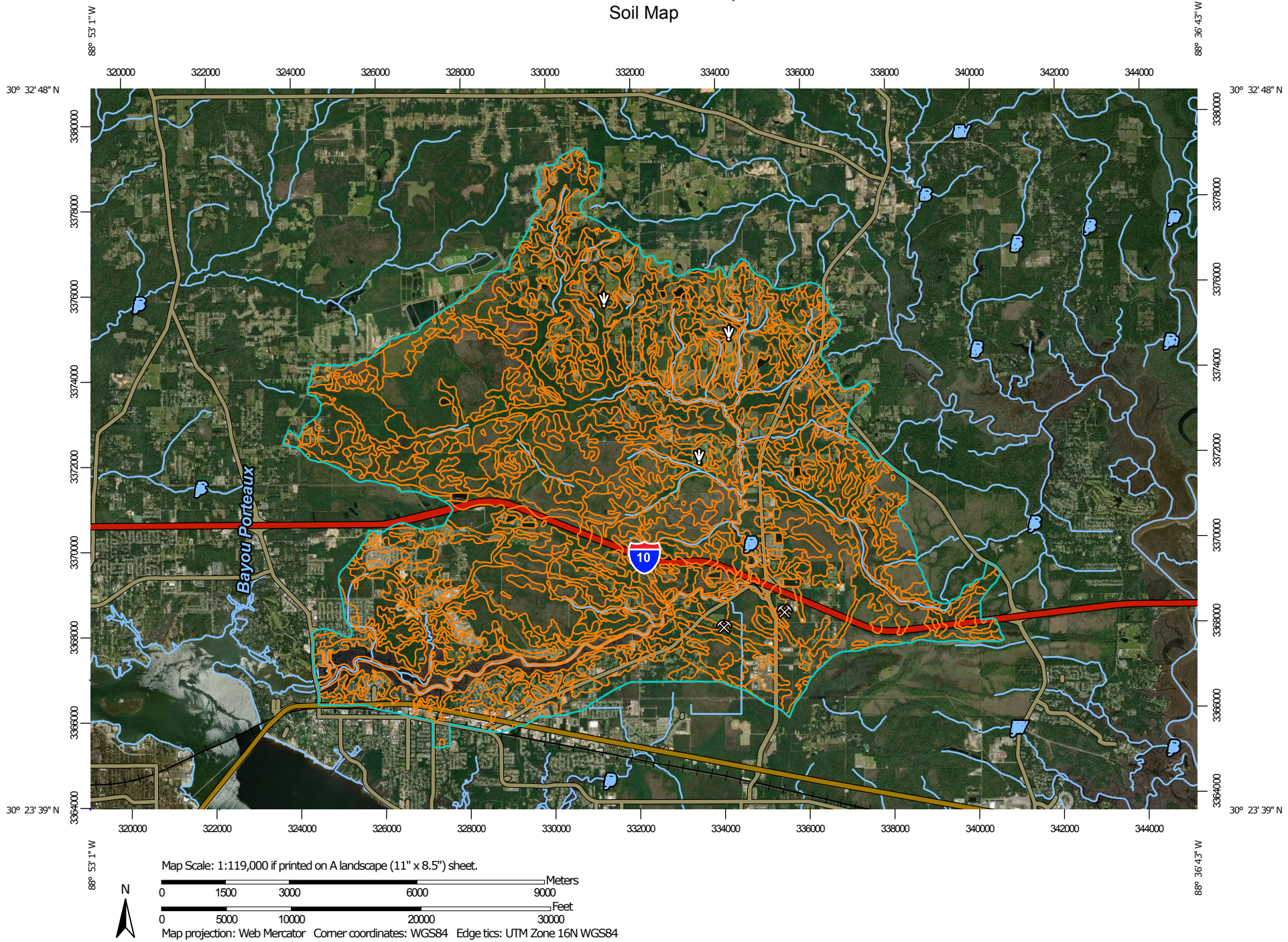
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Jackson County, Mississippi
Survey Area Data: Version 14, Oct 8, 2017

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 31, 2009—Nov 18, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
3	Atmore loam, 1 to 3 percent slopes	2,524.6	7.9%
5	Benndale fine sandy loam, 0 to 2 percent slopes	421.3	1.3%
6	Benndale fine sandy loam, 2 to 5 percent slopes	1,012.3	3.2%
13	Daleville silt loam, 0 to 1 percent slopes	343.6	1.1%
14	Daleville loam, ponded	45.6	0.1%
16	Eustis loamy sand, 0 to 5 percent slopes	32.9	0.1%
17	Eustis loamy sand, 5 to 12 percent slopes	170.6	0.5%
24	Hyde silt loam	1,696.3	5.3%
26	Smithton loam, 0 to 1 percent slopes, occasionally flooded	2,046.6	6.4%
28	Vancleave loamy sand, 0 to 2 percent slopes	2,632.4	8.2%
29	Vancleave loamy sand, 2 to 5 percent slopes	1,694.9	5.3%
30	Vancleave loamy sand, 5 to 8 percent slopes	465.9	1.5%
32	Escambia very fine sandy loam, 0 to 2 percent slopes	2,122.2	6.6%
33	Escambia very fine sandy loam, 2 to 5 percent slopes	1,107.9	3.5%
44	Malbis fine sandy loam, 0 to 2 percent slopes	803.1	2.5%
45	Malbis fine sandy loam, 2 to 5 percent slopes	1,404.3	4.4%
50	Ruston fine sandy loam, 0 to 2 percent slopes	24.6	0.1%
56	Benndale fine sandy loam, 3 to 8 percent slopes	288.9	0.9%
58	Benndale fine sandy loam, 8 to 12 percent slopes	24.3	0.1%
62	Prentiss silt loam, 0 to 2 percent slopes	157.3	0.5%
63	Stough loam, 0 to 2 percent slopes	316.6	1.0%
66	Freest sandy loam, 2 to 5 percent slopes	135.0	0.4%
68	Saucier fine sandy loam, 0 to 2 percent slopes	405.9	1.3%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
76	Nugent and Jena soils, 0 to 8 percent slopes, frequently flooded	246.7	0.8%
84	Wadley loamy sand, 0 to 5 percent slopes	139.9	0.4%
88	Croatan and Johnston soils, 0 to 2 percent slopes, frequently flooded	2,132.9	6.6%
89	Udorthents	63.6	0.2%
90	Pits	89.7	0.3%
91	Water (<40 acres)	146.9	0.5%
92	Water (>40 acres)	487.9	1.5%
95	Axis mucky sandy clay loam, frequently flooded	10.8	0.0%
96	Handsboro mucky silt loam, frequently flooded	893.5	2.8%
226	Bayou sandy loam, 0 to 1 percent slopes	7,230.5	22.5%
328	Harleston fine sandy loam, 0 to 2 percent slopes	153.5	0.5%
329	Harleston fine sandy loam, 2 to 5 percent slopes	274.3	0.9%
330	Harleston fine sandy loam, 5 to 8 percent slopes	335.0	1.0%
Totals for Area of Interest		**32,082.3**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties

and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Jackson County, Mississippi

3—Atmore loam, 1 to 3 percent slopes

Map Unit Setting

National map unit symbol: c521
Mean annual precipitation: 55 to 77 inches
Mean annual air temperature: 64 to 70 degrees F
Frost-free period: 250 to 315 days
Farmland classification: Not prime farmland

Map Unit Composition

Atmore and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Atmore

Setting

Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy marine deposits

Typical profile

H1 - 0 to 4 inches: loam
H2 - 4 to 35 inches: loam
H3 - 35 to 81 inches: clay loam

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 12.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: D
Hydric soil rating: Yes

5—Benndale fine sandy loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2sywg

Elevation: 30 to 380 feet
Mean annual precipitation: 57 to 69 inches
Mean annual air temperature: 61 to 70 degrees F
Frost-free period: 215 to 270 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Benndale and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Benndale

Setting

Landform: Fluviomarine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Coarse-loamy fluviomarine deposits derived from sedimentary rock

Typical profile

Ap - 0 to 5 inches: fine sandy loam
Bt1 - 5 to 33 inches: loam
Bt2 - 33 to 68 inches: fine sandy loam
BC - 68 to 73 inches: sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 1.0
Available water storage in profile: Moderate (about 9.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Mclaurin

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Linear

Across-slope shape: Convex
Hydric soil rating: No

Malbis

Percent of map unit: 4 percent
Landform: Fluviomarine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Atmore

Percent of map unit: 3 percent
Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Fruitdale

Percent of map unit: 3 percent
Landform: Fluviomarine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

6—Benndale fine sandy loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2sywh
Elevation: 30 to 380 feet
Mean annual precipitation: 57 to 69 inches
Mean annual air temperature: 61 to 70 degrees F
Frost-free period: 215 to 270 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Benndale and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Benndale

Setting

Landform: Fluviomarine terraces
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve, crest

Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Coarse-loamy fluviomarine deposits derived from sedimentary rock

Typical profile

Ap - 0 to 5 inches: fine sandy loam
Bt1 - 5 to 33 inches: loam
Bt2 - 33 to 68 inches: fine sandy loam
BC - 68 to 73 inches: sandy loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 1.0
Available water storage in profile: Moderate (about 9.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Fruitdale

Percent of map unit: 5 percent
Landform: Fluviomarine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Malbis

Percent of map unit: 4 percent
Landform: Fluviomarine terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Escambia

Percent of map unit: 3 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope

Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Atmore

Percent of map unit: 3 percent
Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

13—Daleville silt loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: c51l
Mean annual precipitation: 55 to 77 inches
Mean annual air temperature: 64 to 70 degrees F
Frost-free period: 250 to 315 days
Farmland classification: Not prime farmland

Map Unit Composition

Daleville and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Daleville

Setting

Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 62 inches: clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.60 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 10.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

14—Daleville loam, ponded

Map Unit Setting

National map unit symbol: c51m
Mean annual precipitation: 55 to 77 inches
Mean annual air temperature: 64 to 70 degrees F
Frost-free period: 250 to 315 days
Farmland classification: Not prime farmland

Map Unit Composition

Daleville and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Daleville

Setting

Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium

Typical profile

H1 - 0 to 8 inches: loam
H2 - 8 to 80 inches: clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.60 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Available water storage in profile: High (about 10.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

16—Eustis loamy sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2vy0q
Elevation: 20 to 340 feet
Mean annual precipitation: 57 to 69 inches
Mean annual air temperature: 61 to 70 degrees F
Frost-free period: 215 to 270 days
Farmland classification: Not prime farmland

Map Unit Composition

Eustis and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Eustis

Setting

Landform: Fluviomarine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Sandy fluviomarine deposits

Typical profile

Ap - 0 to 8 inches: loamy sand
E - 8 to 22 inches: loamy sand
Bt - 22 to 79 inches: loamy fine sand
C - 79 to 89 inches: sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Toinette

Percent of map unit: 7 percent
Landform: Fluviomarine terraces
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Mclaurin

Percent of map unit: 5 percent
Landform: Fluviomarine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Poarch

Percent of map unit: 3 percent
Landform: Fluviomarine terraces
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

17—Eustis loamy sand, 5 to 12 percent slopes

Map Unit Setting

National map unit symbol: 2vy0t
Elevation: 20 to 330 feet
Mean annual precipitation: 57 to 69 inches
Mean annual air temperature: 61 to 70 degrees F
Frost-free period: 215 to 270 days
Farmland classification: Not prime farmland

Map Unit Composition

Eustis and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Eustis

Setting

Landform: Fluviomarine terraces
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Side slope

Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Sandy fluviomarine deposits

Typical profile

Ap - 0 to 8 inches: loamy sand
E - 8 to 22 inches: loamy sand
Bt - 22 to 79 inches: loamy fine sand
C - 79 to 89 inches: sand

Properties and qualities

Slope: 5 to 12 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Toinette

Percent of map unit: 5 percent
Landform: Fluviomarine terraces
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Nose slope, side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Rutan

Percent of map unit: 5 percent
Landform: Fluviomarine terraces
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Mclaurin

Percent of map unit: 3 percent
Landform: Fluviomarine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex

Hydric soil rating: No

Atmore

Percent of map unit: 2 percent
Landform: Fluviomarine terraces
Landform position (two-dimensional): Footslope, backslope, toeslope
Landform position (three-dimensional): Head slope, side slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

24—Hyde silt loam

Map Unit Setting

National map unit symbol: c51v
Mean annual precipitation: 55 to 77 inches
Mean annual air temperature: 64 to 70 degrees F
Frost-free period: 250 to 315 days
Farmland classification: Not prime farmland

Map Unit Composition

Hyde and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hyde

Setting

Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy marine deposits

Typical profile

H1 - 0 to 14 inches: silt loam
H2 - 14 to 56 inches: silty clay loam
H3 - 56 to 80 inches: silty clay loam, variable

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 0 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 10.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: D
Hydric soil rating: Yes

26—Smithton loam, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

National map unit symbol: c51x
Mean annual precipitation: 55 to 77 inches
Mean annual air temperature: 64 to 70 degrees F
Frost-free period: 250 to 315 days
Farmland classification: Not prime farmland

Map Unit Composition

Smithton and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Smithton

Setting

Landform: Terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium

Typical profile

H1 - 0 to 3 inches: loam
H2 - 3 to 38 inches: sandy loam
H3 - 38 to 82 inches: sandy loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water storage in profile: High (about 9.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

28—Vancleave loamy sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: c51z
Mean annual precipitation: 55 to 77 inches
Mean annual air temperature: 64 to 70 degrees F
Frost-free period: 250 to 315 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Vancleave and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Vancleave

Setting

Landform: Terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy fluviomarine deposits

Typical profile

H1 - 0 to 11 inches: loamy sand
H2 - 11 to 22 inches: sandy loam
H3 - 22 to 51 inches: sandy loam
H4 - 51 to 90 inches: sandy clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 24 to 50 inches to fragipan
Natural drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Hydric soil rating: No

29—Vancleave loamy sand, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: c520
Mean annual precipitation: 55 to 77 inches
Mean annual air temperature: 64 to 70 degrees F
Frost-free period: 250 to 315 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Vancleave and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Vancleave

Setting

Landform: Terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy fluviomarine deposits

Typical profile

H1 - 0 to 11 inches: loamy sand
H2 - 11 to 22 inches: sandy loam
H3 - 22 to 51 inches: sandy loam
H4 - 51 to 90 inches: sandy clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: 24 to 50 inches to fragipan
Natural drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Hydric soil rating: No

30—Vancleave loamy sand, 5 to 8 percent slopes

Map Unit Setting

National map unit symbol: c522
Mean annual precipitation: 55 to 77 inches
Mean annual air temperature: 64 to 70 degrees F
Frost-free period: 250 to 315 days
Farmland classification: Not prime farmland

Map Unit Composition

Vancleave and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Vancleave

Setting

Landform: Terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy fluviomarine deposits

Typical profile

H1 - 0 to 11 inches: loamy sand
H2 - 11 to 22 inches: sandy loam
H3 - 22 to 51 inches: sandy loam
H4 - 51 to 90 inches: sandy clay loam

Properties and qualities

Slope: 5 to 8 percent
Depth to restrictive feature: 24 to 50 inches to fragipan
Natural drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Hydric soil rating: No

32—Escambia very fine sandy loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: c523
Mean annual precipitation: 55 to 77 inches
Mean annual air temperature: 64 to 70 degrees F
Frost-free period: 250 to 315 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Escambia and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Escambia

Setting

Landform: Coastal plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy and loamy marine deposits

Typical profile

H1 - 0 to 4 inches: very fine sandy loam
H2 - 4 to 44 inches: loam
H3 - 44 to 85 inches: sandy clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.60 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 9.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Hydric soil rating: No

33—Escambia very fine sandy loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: c526
Mean annual precipitation: 55 to 77 inches
Mean annual air temperature: 64 to 70 degrees F
Frost-free period: 250 to 315 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Escambia and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Escambia

Setting

Landform: Coastal plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy and loamy marine deposits

Typical profile

H1 - 0 to 4 inches: very fine sandy loam
H2 - 4 to 44 inches: loam
H3 - 44 to 85 inches: sandy clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.60 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 9.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Hydric soil rating: No

44—Malbis fine sandy loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2w8xv
Elevation: 20 to 380 feet
Mean annual precipitation: 57 to 69 inches
Mean annual air temperature: 61 to 70 degrees F
Frost-free period: 215 to 270 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Malbis and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Malbis

Setting

Landform: Fluviomarine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Fine-loamy marine deposits derived from sedimentary rock

Typical profile

Ap - 0 to 7 inches: fine sandy loam
Bt - 7 to 26 inches: loam
Btv - 26 to 71 inches: sandy clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 39 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 1.0
Available water storage in profile: High (about 9.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Saucier

Percent of map unit: 5 percent
Landform: Fluviomarine terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Benndale

Percent of map unit: 3 percent
Landform: Fluviomarine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Poarch

Percent of map unit: 2 percent
Landform: Ridges
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

45—Malbis fine sandy loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2w8xx
Elevation: 20 to 380 feet
Mean annual precipitation: 57 to 69 inches
Mean annual air temperature: 61 to 70 degrees F
Frost-free period: 215 to 270 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Malbis and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Malbis

Setting

Landform: Fluviomarine terraces
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Crest

Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Fine-loamy marine deposits derived from sedimentary rock

Typical profile

Ap - 0 to 7 inches: fine sandy loam
Bt - 7 to 26 inches: loam
Btv - 26 to 71 inches: sandy clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 39 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 1.0
Available water storage in profile: Moderate (about 7.8 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Saucier

Percent of map unit: 5 percent
Landform: Fluviomarine terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Poarch

Percent of map unit: 4 percent
Landform: Ridges
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Benndale

Percent of map unit: 4 percent
Landform: Fluviomarine terraces
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve, crest
Down-slope shape: Convex
Across-slope shape: Convex

Hydric soil rating: No

Escambia

Percent of map unit: 2 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

50—Ruston fine sandy loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2w8yl
Elevation: 100 to 410 feet
Mean annual precipitation: 53 to 69 inches
Mean annual air temperature: 61 to 70 degrees F
Frost-free period: 215 to 270 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Ruston and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ruston

Setting

Landform: Fluviomarine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy fluviomarine deposits derived from sedimentary rock

Typical profile

A - 0 to 5 inches: fine sandy loam
E - 5 to 9 inches: fine sandy loam
Bt - 9 to 37 inches: sandy clay loam
B/E - 37 to 46 inches: sandy loam
B't - 46 to 83 inches: sandy clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches

Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 9.9 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Mclaurin

Percent of map unit: 5 percent
Landform: Fluviomarine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Smithdale

Percent of map unit: 5 percent
Landform: Fluviomarine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Ora

Percent of map unit: 3 percent
Landform: Fluviomarine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Myatt

Percent of map unit: 2 percent
Landform: Drainageways, depressions
Landform position (two-dimensional): Summit, toeslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear, concave
Across-slope shape: Concave
Hydric soil rating: Yes

56—Benndale fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: c52r
Mean annual precipitation: 55 to 77 inches
Mean annual air temperature: 64 to 70 degrees F
Frost-free period: 250 to 315 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Benndale and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Benndale

Setting

Landform: Coastal plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy loam alluvium deposits

Typical profile

H1 - 0 to 6 inches: fine sandy loam
H2 - 6 to 44 inches: loam
H3 - 44 to 74 inches: sandy clay loam
H4 - 74 to 81 inches: sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 8.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Hydric soil rating: No

58—Benndale fine sandy loam, 8 to 12 percent slopes

Map Unit Setting

National map unit symbol: 2sywk
Elevation: 30 to 380 feet
Mean annual precipitation: 57 to 69 inches
Mean annual air temperature: 61 to 70 degrees F
Frost-free period: 215 to 270 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Benndale and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Benndale

Setting

Landform: Fluviomarine terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Coarse-loamy fluviomarine deposits derived from sedimentary rock

Typical profile

Ap - 0 to 5 inches: fine sandy loam
Bt1 - 5 to 33 inches: loam
Bt2 - 33 to 68 inches: fine sandy loam
BC - 68 to 73 inches: sandy loam

Properties and qualities

Slope: 8 to 12 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 1.0
Available water storage in profile: Moderate (about 9.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B

Hydric soil rating: No

Minor Components

Malbis

Percent of map unit: 5 percent
Landform: Fluviomarine terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Escambia

Percent of map unit: 3 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Bibb

Percent of map unit: 2 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: Yes

62—Prentiss silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: c52w
Mean annual precipitation: 55 to 77 inches
Mean annual air temperature: 64 to 70 degrees F
Frost-free period: 250 to 315 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Prentiss and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Prentiss

Setting

Landform: Terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest, tread
Down-slope shape: Linear

Across-slope shape: Linear
Parent material: Loamy alluvium deposits

Typical profile
H1 - 0 to 5 inches: silt loam
H2 - 5 to 23 inches: loam
H3 - 23 to 80 inches: sandy loam

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: 20 to 32 inches to fragipan
Natural drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 24 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.4 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Hydric soil rating: No

63—Stough loam, 0 to 2 percent slopes

Map Unit Setting
National map unit symbol: c52x
Elevation: 100 to 300 feet
Mean annual precipitation: 48 to 77 inches
Mean annual air temperature: 63 to 70 degrees F
Frost-free period: 200 to 315 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Stough and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Stough

Setting
Landform: Terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest, tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium

Typical profile
H1 - 0 to 5 inches: loam

H2 - 5 to 12 inches: sandy loam
H3 - 12 to 69 inches: loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 12 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Smithton

Percent of map unit: 10 percent
Landform: Terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

66—Freest sandy loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: c52y
Mean annual precipitation: 55 to 77 inches
Mean annual air temperature: 64 to 70 degrees F
Frost-free period: 250 to 315 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Freest and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Freest

Setting

Landform: Coastal plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Linear

Across-slope shape: Linear
Parent material: Loamy over clayey alluvium

Typical profile

H1 - 0 to 6 inches: sandy loam
H2 - 6 to 23 inches: loam
H3 - 23 to 88 inches: clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 9.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Hydric soil rating: No

68—Saucier fine sandy loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2w8xw
Elevation: 20 to 340 feet
Mean annual precipitation: 57 to 69 inches
Mean annual air temperature: 61 to 70 degrees F
Frost-free period: 215 to 270 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Saucier and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Saucier

Setting

Landform: Fluviomarine terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy over clayey fluviomarine deposits derived from sedimentary rock

Typical profile

A - 0 to 5 inches: fine sandy loam
BA - 5 to 12 inches: fine sandy loam
Bt - 12 to 26 inches: loam
Btv - 26 to 38 inches: loam
2Btv - 38 to 48 inches: silty clay loam
2Bt - 48 to 72 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.04 to 0.20 in/hr)
Depth to water table: About 18 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 1.0
Available water storage in profile: High (about 9.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Poarch

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Malbis

Percent of map unit: 5 percent
Landform: Fluviomarine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Escambia

Percent of map unit: 3 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Concave

Hydric soil rating: No

Atmore

Percent of map unit: 2 percent
Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

76—Nugent and Jena soils, 0 to 8 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: c530
Mean annual precipitation: 55 to 77 inches
Mean annual air temperature: 64 to 70 degrees F
Frost-free period: 250 to 315 days
Farmland classification: Not prime farmland

Map Unit Composition

Nugent and similar soils: 50 percent
Jena and similar soils: 40 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nugent

Setting

Landform: Natural levees
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy alluvium deposits

Typical profile

H1 - 0 to 6 inches: loamy sand
H2 - 6 to 60 inches: stratified sand to fine sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: About 42 to 72 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water storage in profile: Low (about 5.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: A
Hydric soil rating: Yes

Description of Jena

Setting

Landform: Natural levees
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium

Typical profile

H1 - 0 to 6 inches: fine sandy loam
H2 - 6 to 46 inches: fine sandy loam
H3 - 46 to 65 inches: loamy fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water storage in profile: Moderate (about 8.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B
Hydric soil rating: Yes

84—Wadley loamy sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: c535
Mean annual precipitation: 55 to 77 inches
Mean annual air temperature: 64 to 70 degrees F
Frost-free period: 250 to 315 days
Farmland classification: Not prime farmland

Map Unit Composition

Wadley and similar soils: 90 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wadley

Setting

Landform: Coastal plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy and loamy marine deposits

Typical profile

H1 - 0 to 72 inches: loamy sand
H2 - 72 to 100 inches: sandy clay loam

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Hydric soil rating: No

88—Croatan and Johnston soils, 0 to 2 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: c537
Mean annual precipitation: 55 to 77 inches
Mean annual air temperature: 64 to 70 degrees F
Frost-free period: 250 to 315 days
Farmland classification: Not prime farmland

Map Unit Composition

Croatan and similar soils: 50 percent
Johnston and similar soils: 40 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Croatan

Setting

Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Decomposed organic material over loamy alluvium deposits

Typical profile

Oa - 0 to 16 inches: muck
H2 - 16 to 50 inches: fine sandy loam
H3 - 50 to 66 inches: clay loam
H4 - 66 to 85 inches: clay loam, variable

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 2.00 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Very high (about 12.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Hydric soil rating: Yes

Description of Johnston

Setting

Landform: Flood plains
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Loamy alluvium

Typical profile

H1 - 0 to 26 inches: mucky loam
H2 - 26 to 48 inches: stratified sandy loam to fine sandy loam
H3 - 48 to 68 inches: stratified sand to loamy sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)

Depth to water table: About 0 to 18 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water storage in profile: Moderate (about 8.6 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Hydric soil rating: Yes

89—Udorthents

Map Unit Setting
National map unit symbol: c538
Mean annual precipitation: 55 to 77 inches
Mean annual air temperature: 64 to 70 degrees F
Frost-free period: 250 to 315 days
Farmland classification: Not prime farmland

Map Unit Composition
Udorthents and similar soils: 95 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents

Setting
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium

Typical profile
H1 - 0 to 6 inches: loamy sand
H2 - 6 to 80 inches: sandy loam

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 8.6 inches)

Interpretive groups
Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Hydric soil rating: No

90—Pits

Map Unit Setting

National map unit symbol: c539
Mean annual precipitation: 55 to 77 inches
Mean annual air temperature: 64 to 70 degrees F
Frost-free period: 250 to 315 days
Farmland classification: Not prime farmland

Map Unit Composition

Pits: 95 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pits

Setting

Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Linear
Across-slope shape: Linear

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: No

91—Water (<40 acres)

Map Unit Setting

National map unit symbol: c53b
Mean annual precipitation: 55 to 77 inches
Frost-free period: 250 to 315 days
Farmland classification: Not prime farmland

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

92—Water (>40 acres)

Map Unit Setting

National map unit symbol: c53g
Mean annual precipitation: 55 to 77 inches
Frost-free period: 250 to 315 days
Farmland classification: Not prime farmland

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

95—Axis mucky sandy clay loam, frequently flooded

Map Unit Setting

National map unit symbol: c53c
Mean annual precipitation: 55 to 77 inches
Mean annual air temperature: 64 to 70 degrees F
Frost-free period: 250 to 315 days
Farmland classification: Not prime farmland

Map Unit Composition

Axis and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Axis

Setting

Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy marine deposits

Typical profile

H1 - 0 to 6 inches: mucky sandy clay loam
H2 - 6 to 40 inches: sandy loam
H3 - 40 to 80 inches: sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Frequent
Frequency of ponding: None

Salinity, maximum in profile: Slightly saline to moderately saline (4.0 to 8.0 mmhos/cm)
Available water storage in profile: Moderate (about 7.2 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

96—Handsboro mucky silt loam, frequently flooded

Map Unit Setting
National map unit symbol: c53d
Mean annual precipitation: 55 to 77 inches
Mean annual air temperature: 64 to 70 degrees F
Frost-free period: 250 to 315 days
Farmland classification: Not prime farmland

Map Unit Composition
Handsboro and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Handsboro

Setting
Landform: Tidal flats
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Decomposed herbaceous plant remains and alluvium deposits

Typical profile
H1 - 0 to 4 inches: mucky silt loam
Oa - 4 to 26 inches: muck
H3 - 26 to 62 inches: stratified muck to loam

Properties and qualities
Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: Frequent
Frequency of ponding: Frequent
Salinity, maximum in profile: Strongly saline (16.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Very high (about 14.5 inches)

Interpretive groups
Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

226—Bayou sandy loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: c51j
Mean annual precipitation: 55 to 77 inches
Mean annual air temperature: 64 to 70 degrees F
Frost-free period: 250 to 315 days
Farmland classification: Not prime farmland

Map Unit Composition

Bayou and similar soils: 85 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bayou

Setting

Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy marine deposits

Typical profile

H1 - 0 to 7 inches: sandy loam
H2 - 7 to 40 inches: sandy loam
H3 - 40 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 8.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

Minor Components

Escambia

Percent of map unit: 10 percent
Landform: Coastal plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

328—Harleston fine sandy loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: c524
Mean annual precipitation: 55 to 77 inches
Mean annual air temperature: 64 to 70 degrees F
Frost-free period: 250 to 315 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Harleston and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Harleston

Setting

Landform: Stream terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium

Typical profile

H1 - 0 to 6 inches: fine sandy loam
H2 - 6 to 42 inches: sandy loam
H3 - 42 to 62 inches: sandy clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 24 to 36 inches
Frequency of flooding: None
Frequency of ponding: None

Available water storage in profile: Moderate (about 8.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Atmore

Percent of map unit: 10 percent
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

329—Harleston fine sandy loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: c525
Mean annual precipitation: 55 to 77 inches
Mean annual air temperature: 64 to 70 degrees F
Frost-free period: 250 to 315 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Harleston and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Harleston

Setting

Landform: Stream terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium

Typical profile

H1 - 0 to 6 inches: fine sandy loam
H2 - 6 to 42 inches: sandy loam
H3 - 42 to 62 inches: sandy clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 24 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 8.8 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Hydric soil rating: No

330—Harleston fine sandy loam, 5 to 8 percent slopes

Map Unit Setting
National map unit symbol: c527
Mean annual precipitation: 55 to 77 inches
Mean annual air temperature: 64 to 70 degrees F
Frost-free period: 250 to 315 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Harleston and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Harleston

Setting
Landform: Stream terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium

Typical profile
H1 - 0 to 6 inches: fine sandy loam
H2 - 6 to 42 inches: sandy loam
H3 - 42 to 62 inches: sandy clay loam

Properties and qualities
Slope: 5 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 24 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 8.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Hydric soil rating: No

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Glossary

Many of the terms relating to landforms, geology, and geomorphology are defined in more detail in the following National Soil Survey Handbook link: “National Soil Survey Handbook.”

ABC soil

A soil having an A, a B, and a C horizon.

Ablation till

Loose, relatively permeable earthy material deposited during the downwasting of nearly static glacial ice, either contained within or accumulated on the surface of the glacier.

AC soil

A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep, rocky slopes.

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.

Alkali (sodic) soil

A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvial cone

A semiconical type of alluvial fan having very steep slopes. It is higher, narrower, and steeper than a fan and is composed of coarser and thicker layers of material deposited by a combination of alluvial episodes and (to a much lesser degree) landslides (debris flow). The coarsest materials tend to be concentrated at the apex of the cone.

Alluvial fan

A low, outspread mass of loose materials and/or rock material, commonly with gentle slopes. It is shaped like an open fan or a segment of a cone. The material was deposited by a stream at the place where it issues from a narrow mountain valley or upland valley or where a tributary stream is near or at its junction with the main stream. The fan is steepest near its apex, which points upstream, and slopes gently and convexly outward (downstream) with a gradual decrease in gradient.

Alluvium

Unconsolidated material, such as gravel, sand, silt, clay, and various mixtures of these, deposited on land by running water.

Alpha,alpha-dipyridyl

A compound that when dissolved in ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction implies reducing conditions and the likely presence of redoximorphic features.

Animal unit month (AUM)

The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions

Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Argillic horizon

A subsoil horizon characterized by an accumulation of illuvial clay.

Arroyo

The flat-floored channel of an ephemeral stream, commonly with very steep to vertical banks cut in unconsolidated material. It is usually dry but can be transformed into a temporary watercourse or short-lived torrent after heavy rain within the watershed.

Aspect

The direction toward which a slope faces. Also called slope aspect.

Association, soil

A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

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:

Very low: 0 to 3
Low: 3 to 6
Moderate: 6 to 9
High: 9 to 12
Very high: More than 12

Backslope

The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

Backswamp

A flood-plain landform. Extensive, marshy or swampy, depressed areas of flood plains between natural levees and valley sides or terraces.

Badland

A landscape that is intricately dissected and characterized by a very fine drainage network with high drainage densities and short, steep slopes and narrow interfluves. Badlands develop on surfaces that have little or no vegetative cover overlying unconsolidated or poorly cemented materials (clays, silts, or sandstones) with, in some cases, soluble minerals, such as gypsum or halite.

Bajada

A broad, gently inclined alluvial piedmont slope extending from the base of a mountain range out into a basin and formed by the lateral coalescence of a series of alluvial fans. Typically, it has a broadly undulating transverse profile, parallel to the mountain front, resulting from the convexities of component fans. The term is generally restricted to constructional slopes of intermontane basins.

Basal area

The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Base saturation

The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Base slope (geomorphology)

A geomorphic component of hills consisting of the concave to linear (perpendicular to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

Bedding plane

A planar or nearly planar bedding surface that visibly separates each successive layer of stratified sediment or rock (of the same or different lithology)

from the preceding or following layer; a plane of deposition. It commonly marks a change in the circumstances of deposition and may show a parting, a color difference, a change in particle size, or various combinations of these. The term is commonly applied to any bedding surface, even one that is conspicuously bent or deformed by folding.

Bedding system

A drainage system made by plowing, grading, or otherwise shaping the surface of a flat field. It consists of a series of low ridges separated by shallow, parallel dead furrows.

Bedrock

The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-controlled topography

A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Bench terrace

A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Bisequum

Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Blowout (map symbol)

A saucer-, cup-, or trough-shaped depression formed by wind erosion on a preexisting dune or other sand deposit, especially in an area of shifting sand or loose soil or where protective vegetation is disturbed or destroyed. The adjoining accumulation of sand derived from the depression, where recognizable, is commonly included. Blowouts are commonly small.

Borrow pit (map symbol)

An open excavation from which soil and underlying material have been removed, usually for construction purposes.

Bottom land

An informal term loosely applied to various portions of a flood plain.

Boulders

Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breaks

A landscape or tract of steep, rough or broken land dissected by ravines and gullies and marking a sudden change in topography.

Breast height

An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Brush management

Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Butte

An isolated, generally flat-topped hill or mountain with relatively steep slopes and talus or precipitous cliffs and characterized by summit width that is less than the height of bounding escarpments; commonly topped by a caprock of resistant material and representing an erosion remnant carved from flat-lying rocks.

Cable yarding

A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

Calcareous soil

A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Caliche

A general term for a prominent zone of secondary carbonate accumulation in surficial materials in warm, subhumid to arid areas. Caliche is formed by both geologic and pedologic processes. Finely crystalline calcium carbonate forms a nearly continuous surface-coating and void-filling medium in geologic (parent) materials. Cementation ranges from weak in nonindurated forms to very strong in indurated forms. Other minerals (e.g., carbonates, silicate, and sulfate) may occur as accessory cements. Most petrocalcic horizons and some calcic horizons are caliche.

California bearing ratio (CBR)

The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Canopy

The leafy crown of trees or shrubs. (See Crown.)

Canyon

A long, deep, narrow valley with high, precipitous walls in an area of high local relief.

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.

Catena

A sequence, or “chain,” of soils on a landscape that formed in similar kinds of parent material and under similar climatic conditions but that have different characteristics as a result of differences in relief and drainage.

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.

Catsteps

See Terracettes.

Cement rock

Shaly limestone used in the manufacture of cement.

Channery soil material

Soil material that has, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

Chemical treatment

Control of unwanted vegetation through the use of chemicals.

Chiseling

Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Cirque

A steep-walled, semicircular or crescent-shaped, half-bowl-like recess or hollow, commonly situated at the head of a glaciated mountain valley or high on the side of a mountain. It was produced by the erosive activity of a mountain glacier. It commonly contains a small round lake (tarn).

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 depletions

See Redoximorphic features.

Clay film

A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Clay spot (map symbol)

A spot where the surface texture is silty clay or clay in areas where the surface layer of the soils in the surrounding map unit is sandy loam, loam, silt loam, or coarser.

Claypan

A dense, compact subsoil layer that contains much more clay than the overlying materials, from which it is separated by a sharply defined boundary. The layer restricts the downward movement of water through the soil. A claypan is commonly hard when dry and plastic and sticky when wet.

Climax plant community

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 textured soil

Sand or loamy sand.

Cobble (or cobblestone)

A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material

Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

COLE (coefficient of linear extensibility)

See Linear extensibility.

Colluvium

Unconsolidated, unsorted earth material being transported or deposited on side slopes and/or at the base of slopes by mass movement (e.g., direct gravitational action) and by local, unconcentrated runoff.

Complex slope

Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil

A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions

See Redoximorphic features.

Conglomerate

A coarse grained, clastic sedimentary rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system

Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage

A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil

Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the “Soil Survey Manual.”

Contour stripcropping

Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

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 that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coprogenous earth (sedimentary peat)

A type of limnic layer composed predominantly of fecal material derived from aquatic animals.

Corrosion (geomorphology)

A process of erosion whereby rocks and soil are removed or worn away by natural chemical processes, especially by the solvent action of running water, but also by other reactions, such as hydrolysis, hydration, carbonation, and oxidation.

Corrosion (soil survey interpretations)

Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop

A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Crop residue management

Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cropping system

Growing crops according to a planned system of rotation and management practices.

Cross-slope farming

Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown

The upper part of a tree or shrub, including the living branches and their foliage.

Cryoturbate

A mass of soil or other unconsolidated earthy material moved or disturbed by frost action. It is typically coarser than the underlying material.

Cuesta

An asymmetric ridge capped by resistant rock layers of slight or moderate dip (commonly less than 15 percent slopes); a type of homocline produced by differential erosion of interbedded resistant and weak rocks. A cuesta has a long, gentle slope on one side (dip slope) that roughly parallels the inclined beds; on the other side, it has a relatively short and steep or clifflike slope (scarp) that cuts through the tilted rocks.

Culmination of the mean annual increment (CMAI)

The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

Cutbanks cave

The walls of excavations tend to cave in or slough.

Decreasers

The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing

Postponing grazing or resting grazing land for a prescribed period.

Delta

A body of alluvium having a surface that is fan shaped and nearly flat; deposited at or near the mouth of a river or stream where it enters a body of relatively quiet water, generally a sea or lake.

Dense layer

A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depression, closed (map symbol)

A shallow, saucer-shaped area that is slightly lower on the landscape than the surrounding area and that does not have a natural outlet for surface drainage.

Depth, soil

Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Desert pavement

A natural, residual concentration or layer of wind-polished, closely packed gravel, boulders, and other rock fragments mantling a desert surface. It forms where wind action and sheetwash have removed all smaller particles or where rock fragments have migrated upward through sediments to the surface. It typically protects the finer grained underlying material from further erosion.

Diatomaceous earth

A geologic deposit of fine, grayish siliceous material composed chiefly or entirely of the remains of diatoms.

Dip slope

A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

Diversion (or diversion terrace)

A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Divided-slope farming

A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to reduce the hazard of water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit a full stripcropping pattern to be used.

Drainage class (natural)

Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained*. These classes are defined in the “Soil Survey Manual.”

Drainage, surface

Runoff, or surface flow of water, from an area.

Drainageway

A general term for a course or channel along which water moves in draining an area. A term restricted to relatively small, linear depressions that at some time move concentrated water and either do not have a defined channel or have only a small defined channel.

Draw

A small stream valley that generally is shallower and more open than a ravine or gulch and that has a broader bottom. The present stream channel may appear inadequate to have cut the drainageway that it occupies.

Drift

A general term applied to all mineral material (clay, silt, sand, gravel, and boulders) transported by a glacier and deposited directly by or from the ice or transported by running water emanating from a glacier. Drift includes unstratified material (till) that forms moraines and stratified deposits that form outwash plains, eskers, kames, varves, and glaciofluvial sediments. The term is generally applied to Pleistocene glacial deposits in areas that no longer contain glaciers.

Drumlin

A low, smooth, elongated oval hill, mound, or ridge of compact till that has a core of bedrock or drift. It commonly has a blunt nose facing the direction from which the ice approached and a gentler slope tapering in the other direction. The longer axis is parallel to the general direction of glacier flow. Drumlins are products of streamline (laminar) flow of glaciers, which molded the subglacial floor through a combination of erosion and deposition.

Duff

A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

Dune

A low mound, ridge, bank, or hill of loose, windblown granular material (generally sand), either barren and capable of movement from place to place or covered and stabilized with vegetation but retaining its characteristic shape.

Earthy fill

See Mine spoil.

Ecological site

An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other ecological sites in kind and/or proportion of species or in total production.

Eluviation

The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation

A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Eolian deposit

Sand-, silt-, or clay-sized clastic material transported and deposited primarily by wind, commonly in the form of a dune or a sheet of sand or loess.

Ephemeral stream

A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Episaturation

A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion

The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (accelerated)

Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Erosion (geologic)

Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion pavement

A surficial lag concentration or layer of gravel and other rock fragments that remains on the soil surface after sheet or rill erosion or wind has removed the finer soil particles and that tends to protect the underlying soil from further erosion.

Erosion surface

A land surface shaped by the action of erosion, especially by running water.

Escarpment

A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Most commonly applied to cliffs produced by differential erosion. Synonym: scarp.

Escarpment, bedrock (map symbol)

A relatively continuous and steep slope or cliff, produced by erosion or faulting, that breaks the general continuity of more gently sloping land surfaces. Exposed material is hard or soft bedrock.

Escarpment, nonbedrock (map symbol)

A relatively continuous and steep slope or cliff, generally produced by erosion but in some places produced by faulting, that breaks the continuity of more gently sloping land surfaces. Exposed earthy material is nonsoil or very shallow soil.

Esker

A long, narrow, sinuous, steep-sided ridge of stratified sand and gravel deposited as the bed of a stream flowing in an ice tunnel within or below the ice (subglacial) or between ice walls on top of the ice of a wasting glacier and left

behind as high ground when the ice melted. Eskers range in length from less than a kilometer to more than 160 kilometers and in height from 3 to 30 meters.

Extrusive rock

Igneous rock derived from deep-seated molten matter (magma) deposited and cooled on the earth's surface.

Fallow

Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fan remnant

A general term for landforms that are the remaining parts of older fan landforms, such as alluvial fans, that have been either dissected or partially buried.

Fertility, soil

The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat)

The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity

The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity*.

Fill slope

A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.

Fine textured soil

Sandy clay, silty clay, or clay.

Firebreak

An area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

First bottom

An obsolete, informal term loosely applied to the lowest flood-plain steps that are subject to regular flooding.

Flaggy soil material

Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone

A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain

The nearly level plain that borders a stream and is subject to flooding unless protected artificially.

Flood-plain landforms

A variety of constructional and erosional features produced by stream channel migration and flooding. Examples include backswamps, flood-plain splays, meanders, meander belts, meander scrolls, oxbow lakes, and natural levees.

Flood-plain splay

A fan-shaped deposit or other outspread deposit formed where an overloaded stream breaks through a levee (natural or artificial) and deposits its material (commonly coarse grained) on the flood plain.

Flood-plain step

An essentially flat, terrace-like alluvial surface within a valley that is frequently covered by floodwater from the present stream; any approximately horizontal surface still actively modified by fluvial scour and/or deposition. May occur individually or as a series of steps.

Fluvial

Of or pertaining to rivers or streams; produced by stream or river action.

Foothills

A region of steeply sloping hills that fringes a mountain range or high-plateau escarpment. The hills have relief of as much as 1,000 feet (300 meters).

Footslope

The concave surface at the base of a hillslope. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).

Forb

Any herbaceous plant not a grass or a sedge.

Forest cover

All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type

A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Fragipan

A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Genesis, soil

The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gilgai

Commonly, a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of clayey soils that shrink and swell considerably with changes in moisture content.

Glaciofluvial deposits

Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur in the form of outwash plains, valley trains, deltas, kames, eskers, and kame terraces.

Glaciolacustrine deposits

Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are bedded or laminated.

Gleyed soil

Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Graded stripcropping

Growing crops in strips that grade toward a protected waterway.

Grassed waterway

A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel

Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravel pit (map symbol)

An open excavation from which soil and underlying material have been removed and used, without crushing, as a source of sand or gravel.

Gravelly soil material

Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Gravelly spot (map symbol)

A spot where the surface layer has more than 35 percent, by volume, rock fragments that are mostly less than 3 inches in diameter in an area that has less than 15 percent rock fragments.

Green manure crop (agronomy)

A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water

Water filling all the unblocked pores of the material below the water table.

Gully (map symbol)

A small, steep-sided channel caused by erosion and cut in unconsolidated materials by concentrated but intermittent flow of water. 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 whereas a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock

Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hard to reclaim

Reclamation is difficult after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

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.

Head slope (geomorphology)

A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway. The overland waterflow is converging.

Hemic soil material (mucky peat)

Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

High-residue crops

Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill

A generic term for an elevated area of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline. Slopes are generally more than 15 percent. The distinction between a hill and a mountain is arbitrary and may depend on local usage.

Hillslope

A generic term for the steeper part of a hill between its summit and the drainage line, valley flat, or depression floor at the base of a hill.

Horizon, soil

A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the “Soil Survey Manual.” The major horizons of mineral soil are as follows:

O horizon: An organic layer of fresh and decaying plant residue.

L horizon: A layer of organic and mineral limnic materials, including coprogenous earth (sedimentary peat), diatomaceous earth, and marl.

A horizon: The mineral horizon 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.

E horizon: The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon: The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

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 overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon: Soft, consolidated bedrock beneath the soil.

R layer: Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

M layer: A root-limiting subsoil layer consisting of nearly continuous, horizontally oriented, human-manufactured materials.

W layer: A layer of water within or beneath the soil.

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 potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties include depth to a seasonal high water table, the infiltration rate, and depth to a layer that significantly restricts the downward movement of water. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Igneous rock

Rock that was formed by cooling and solidification of magma and that has not been changed appreciably by weathering since its formation. Major varieties include plutonic and volcanic rock (e.g., andesite, basalt, and granite).

Illuviation

The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

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.

Intake rate

The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Very low: Less than 0.2
Low: 0.2 to 0.4
Moderately low: 0.4 to 0.75
Moderate: 0.75 to 1.25
Moderately high: 1.25 to 1.75
High: 1.75 to 2.5
Very high: More than 2.5

Interfluve

A landform composed of the relatively undissected upland or ridge between two adjacent valleys containing streams flowing in the same general direction. An elevated area between two drainageways that sheds water to those drainageways.

Interfluve (geomorphology)

A geomorphic component of hills consisting of the uppermost, comparatively level or gently sloping area of a hill; shoulders of backwearing hillslopes can narrow the upland or can merge, resulting in a strongly convex shape.

Intermittent stream

A stream, or reach of a stream, that does not flow year-round but that is commonly dry for 3 or more months out of 12 and whose channel is generally below the local water table. It flows only during wet periods or when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders

On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Iron depletions

See Redoximorphic features.

Irrigation

Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin: Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border: Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding: Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation: Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle): Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow: Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler: Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation: Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding: Water, released at high points, is allowed to flow onto an area without controlled distribution.

Kame

A low mound, knob, hummock, or short irregular ridge composed of stratified sand and gravel deposited by a subglacial stream as a fan or delta at the margin of a melting glacier; by a supraglacial stream in a low place or hole on the surface of the glacier; or as a ponded deposit on the surface or at the margin of stagnant ice.

Karst (topography)

A kind of topography that formed in limestone, gypsum, or other soluble rocks by dissolution and that is characterized by closed depressions, sinkholes, caves, and underground drainage.

Knoll

A small, low, rounded hill rising above adjacent landforms.

Ksat

See Saturated hydraulic conductivity.

Lacustrine deposit

Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Lake plain

A nearly level surface marking the floor of an extinct lake filled by well sorted, generally fine textured, stratified deposits, commonly containing varves.

Lake terrace

A narrow shelf, partly cut and partly built, produced along a lakeshore in front of a scarp line of low cliffs and later exposed when the water level falls.

Landfill (map symbol)

An area of accumulated waste products of human habitation, either above or below natural ground level.

Landslide

A general, encompassing term for most types of mass movement landforms and processes involving the downslope transport and outward deposition of soil and rock materials caused by gravitational forces; the movement may or may not involve saturated materials. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones

Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Lava flow (map symbol)

A solidified, commonly lobate body of rock formed through lateral, surface outpouring of molten lava from a vent or fissure.

Leaching

The removal of soluble material from soil or other material by percolating water.

Levee (map symbol)

An embankment that confines or controls water, especially one built along the banks of a river to prevent overflow onto lowlands.

Linear extensibility

Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at $^{1}/_{3}$- or $^{1}/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

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.

Loess

Material transported and deposited by wind and consisting dominantly of silt-sized particles.

Low strength

The soil is not strong enough to support loads.

Low-residue crops

Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Marl

An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal proportions; formed primarily under freshwater lacustrine conditions but also formed in more saline environments.

Marsh or swamp (map symbol)

A water-saturated, very poorly drained area that is intermittently or permanently covered by water. Sedges, cattails, and rushes are the dominant vegetation in marshes, and trees or shrubs are the dominant vegetation in swamps. Not used in map units where the named soils are poorly drained or very poorly drained.

Mass movement

A generic term for the dislodgment and downslope transport of soil and rock material as a unit under direct gravitational stress.

Masses

See Redoximorphic features.

Meander belt

The zone within which migration of a meandering channel occurs; the flood-plain area included between two imaginary lines drawn tangential to the outer bends of active channel loops.

Meander scar

A crescent-shaped, concave or linear mark on the face of a bluff or valley wall, produced by the lateral erosion of a meandering stream that impinged upon and undercut the bluff.

Meander scroll

One of a series of long, parallel, close-fitting, crescent-shaped ridges and troughs formed along the inner bank of a stream meander as the channel migrated laterally down-valley and toward the outer bank.

Mechanical treatment

Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil

Very fine sandy loam, loam, silt loam, or silt.

Mesa

A broad, nearly flat topped and commonly isolated landmass bounded by steep slopes or precipitous cliffs and capped by layers of resistant, nearly horizontal rocky material. The summit width is characteristically greater than the height of the bounding escarpments.

Metamorphic rock

Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement at depth in the earth’s crust. Nearly all such rocks are crystalline.

Mine or quarry (map symbol)

An open excavation from which soil and underlying material have been removed and in which bedrock is exposed. Also denotes surface openings to underground mines.

Mine spoil

An accumulation of displaced earthy material, rock, or other waste material removed during mining or excavation. Also called earthy fill.

Mineral soil

Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage

Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area

A kind of map unit that has little or no natural soil and supports little or no vegetation.

Miscellaneous water (map symbol)

Small, constructed bodies of water that are used for industrial, sanitary, or mining applications and that contain water most of the year.

Moderately coarse textured soil

Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil

Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon

A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Moraine

In terms of glacial geology, a mound, ridge, or other topographically distinct accumulation of unsorted, unstratified drift, predominantly till, deposited primarily by the direct action of glacial ice in a variety of landforms. Also, a general term for a landform composed mainly of till (except for kame moraines, which are composed mainly of stratified outwash) that has been deposited by a glacier. Some types of moraines are disintegration, end, ground, kame, lateral, recessional, and terminal.

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. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent*. 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).

Mountain

A generic term for an elevated area of the land surface, rising more than 1,000 feet (300 meters) above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can

occur as a single, isolated mass or in a group forming a chain or range. Mountains are formed primarily by tectonic activity and/or volcanic action but can also be formed by differential erosion.

Muck

Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Mucky peat

See Hemic soil material.

Mudstone

A blocky or massive, fine grained sedimentary rock in which the proportions of clay and silt are approximately equal. Also, a general term for such material as clay, silt, claystone, siltstone, shale, and argillite and that should be used only when the amounts of clay and silt are not known or cannot be precisely identified.

Munsell notation

A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Natric horizon

A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.

Neutral soil

A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules

See Redoximorphic features.

Nose slope (geomorphology)

A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent. Nose slopes consist dominantly of colluvium and slope-wash sediments (for example, slope alluvium).

Nutrient, plant

Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter

Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low: Less than 0.5 percent
Low: 0.5 to 1.0 percent
Moderately low: 1.0 to 2.0 percent
Moderate: 2.0 to 4.0 percent
High: 4.0 to 8.0 percent
Very high: More than 8.0 percent

Outwash

Stratified and sorted sediments (chiefly sand and gravel) removed or “washed out” from a glacier by meltwater streams and deposited in front of or beyond the end moraine or the margin of a glacier. The coarser material is deposited nearer to the ice.

Outwash plain

An extensive lowland area of coarse textured glaciofluvial material. An outwash plain is commonly smooth; where pitted, it generally is low in relief.

Paleoterrace

An erosional remnant of a terrace that retains the surface form and alluvial deposits of its origin but was not emplaced by, and commonly does not grade to, a present-day stream or drainage network.

Pan

A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material

The unconsolidated organic and mineral material in which soil forms.

Peat

Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped

An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedisediment

A layer of sediment, eroded from the shoulder and backslope of an erosional slope, that lies on and is being (or was) transported across a gently sloping erosional surface at the foot of a receding hill or mountain slope.

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 movement of water through the soil.

Perennial water (map symbol)

Small, natural or constructed lakes, ponds, or pits that contain water most of the year.

Permafrost

Ground, soil, or rock that remains at or below 0 degrees C for at least 2 years. It is defined on the basis of temperature and is not necessarily frozen.

pH value

A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Phase, soil

A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

Piping

Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Pitting

Pits caused by melting around ice. They form on the soil after plant cover is removed.

Plastic limit

The moisture content at which a soil changes from semisolid to plastic.

Plasticity index

The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plateau (geomorphology)

A comparatively flat area of great extent and elevation; specifically, an extensive land region that is considerably elevated (more than 100 meters) above the adjacent lower lying terrain, is commonly limited on at least one side by an abrupt descent, and has a flat or nearly level surface. A comparatively large part of a plateau surface is near summit level.

Playa

The generally dry and nearly level lake plain that occupies the lowest parts of closed depressions, such as those on intermontane basin floors. Temporary flooding occurs primarily in response to precipitation and runoff. Playa deposits are fine grained and may or may not have a high water table and saline conditions.

Plinthite

The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on 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. It is a form of laterite.

Plowpan

A compacted layer formed in the soil directly below the plowed layer.

Ponding

Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded

Refers to a coarse grained soil or 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.

Pore linings

See Redoximorphic features.

Potential native plant community

See Climax plant community.

Potential rooting depth (effective rooting depth)

Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning

Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

Productivity, soil

The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil

A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use

Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and

promotes the accumulation of litter and mulch necessary to conserve soil and water.

Rangeland

Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Reaction, soil

A measure of acidity or alkalinity of a soil, expressed as 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 degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid: Less than 3.5
Extremely acid: 3.5 to 4.4
Very strongly acid: 4.5 to 5.0
Strongly acid: 5.1 to 5.5
Moderately acid: 5.6 to 6.0
Slightly acid: 6.1 to 6.5
Neutral: 6.6 to 7.3
Slightly alkaline: 7.4 to 7.8
Moderately alkaline: 7.9 to 8.4
Strongly alkaline: 8.5 to 9.0
Very strongly alkaline: 9.1 and higher

Red beds

Sedimentary strata that are mainly red and are made up largely of sandstone and shale.

Redoximorphic concentrations

See Redoximorphic features.

Redoximorphic depletions

See Redoximorphic features.

Redoximorphic features

Redoximorphic features are associated with wetness and result from alternating periods of reduction and oxidation of iron and manganese compounds in the soil. Reduction occurs during saturation with water, and oxidation occurs when the soil is not saturated. Characteristic color patterns are created by these processes. The reduced iron and manganese ions may be removed from a soil if vertical or lateral fluxes of water occur, in which case there is no iron or manganese precipitation in that soil. Wherever the iron and manganese are oxidized and precipitated, they form either soft masses or hard concretions or nodules. Movement of iron and manganese as a result of redoximorphic processes in a soil may result in redoximorphic features that are defined as follows:

1. Redoximorphic concentrations.—These are zones of apparent accumulation of iron-manganese oxides, including:
   A. Nodules and concretions, which are cemented bodies that can be removed from the soil intact. Concretions are distinguished from nodules on the basis of internal organization. A concretion typically has concentric layers that are visible to the naked eye. Nodules do not have visible organized internal structure; *and*
   B. Masses, which are noncemented concentrations of substances within the soil matrix; *and*
   C. Pore linings, i.e., zones of accumulation along pores that may be either coatings on pore surfaces or impregnations from the matrix adjacent to the pores.
2. Redoximorphic depletions.—These are zones of low chroma (chromas less than those in the matrix) where either iron-manganese oxides alone or both iron-manganese oxides and clay have been stripped out, including:
   A. Iron depletions, i.e., zones that contain low amounts of iron and manganese oxides but have a clay content similar to that of the adjacent matrix; *and*
   B. Clay depletions, i.e., zones that contain low amounts of iron, manganese, and clay (often referred to as silt coatings or skeletans).
3. Reduced matrix.—This is a soil matrix that has low chroma *in situ* but undergoes a change in hue or chroma within 30 minutes after the soil material has been exposed to air.

Reduced matrix

See Redoximorphic features.

Regolith

All unconsolidated earth materials above the solid bedrock. It includes material weathered in place from all kinds of bedrock and alluvial, glacial, eolian, lacustrine, and pyroclastic deposits.

Relief

The relative difference in elevation between the upland summits and the lowlands or valleys of a given region.

Residuum (residual soil material)

Unconsolidated, weathered or partly weathered mineral material that accumulated as bedrock disintegrated in place.

Rill

A very small, steep-sided channel resulting from erosion and cut in unconsolidated materials by concentrated but intermittent flow of water. A rill generally is not an obstacle to wheeled vehicles and is shallow enough to be smoothed over by ordinary tillage.

Riser

The vertical or steep side slope (e.g., escarpment) of terraces, flood-plain steps, or other stepped landforms; commonly a recurring part of a series of natural, steplike landforms, such as successive stream terraces.

Road cut

A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments

Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rock outcrop (map symbol)

An exposure of bedrock at the surface of the earth. Not used where the named soils of the surrounding map unit are shallow over bedrock or where “Rock outcrop” is a named component of the map unit.

Root zone

The part of the soil that can be penetrated by plant roots.

Runoff

The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil

A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Saline spot (map symbol)

An area where the surface layer has an electrical conductivity of 8 mmhos/cm more than the surface layer of the named soils in the surrounding map unit. The surface layer of the surrounding soils has an electrical conductivity of 2 mmhos/cm or less.

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-sized particles.

Sandy spot (map symbol)

A spot where the surface layer is loamy fine sand or coarser in areas where the surface layer of the named soils in the surrounding map unit is very fine sandy loam or finer.

Sapric soil material (muck)

The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saturated hydraulic conductivity (Ksat)

The ease with which pores of a saturated soil transmit water. Formally, the proportionality coefficient that expresses the relationship of the rate of water movement to hydraulic gradient in Darcy's Law, a law that describes the rate of water movement through porous media. Commonly abbreviated as "Ksat." Terms describing saturated hydraulic conductivity are:

Very high: 100 or more micrometers per second (14.17 or more inches per hour)

High: 10 to 100 micrometers per second (1.417 to 14.17 inches per hour)

Moderately high: 1 to 10 micrometers per second (0.1417 inch to 1.417 inches per hour)

Moderately low: 0.1 to 1 micrometer per second (0.01417 to 0.1417 inch per hour)

Low: 0.01 to 0.1 micrometer per second (0.001417 to 0.01417 inch per hour)

Very low: Less than 0.01 micrometer per second (less than 0.001417 inch per hour).

To convert inches per hour to micrometers per second, multiply inches per hour by 7.0572. To convert micrometers per second to inches per hour, multiply micrometers per second by 0.1417.

Saturation

Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Scarification

The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

Sedimentary rock

A consolidated deposit of clastic particles, chemical precipitates, or organic remains accumulated at or near the surface of the earth under normal low temperature and pressure conditions. Sedimentary rocks include consolidated equivalents of alluvium, colluvium, drift, and eolian, lacustrine, and marine deposits. Examples are sandstone, siltstone, mudstone, claystone, shale, conglomerate, limestone, dolomite, and coal.

Sequum

A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil

A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Severely eroded spot (map symbol)

An area where, on the average, 75 percent or more of the original surface layer has been lost because of accelerated erosion. Not used in map units in which “severely eroded,” “very severely eroded,” or “gullied” is part of the map unit name.

Shale

Sedimentary rock that formed by the hardening of a deposit of clay, silty clay, or silty clay loam and that has a tendency to split into thin layers.

Sheet erosion

The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Short, steep slope (map symbol)

A narrow area of soil having slopes that are at least two slope classes steeper than the slope class of the surrounding map unit.

Shoulder

The convex, erosional surface near the top of a hillslope. A shoulder is a transition from summit to backslope.

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.

Shrub-coppice dune

A small, streamlined dune that forms around brush and clump vegetation.

Side slope (geomorphology)

A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel. Side slopes are dominantly colluvium and slope-wash sediments.

Silica

A combination of silicon and oxygen. The mineral form is called quartz.

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

An indurated silt having the texture and composition of shale but lacking its fine lamination or fissility; a massive mudstone in which silt predominates over clay.

Similar soils

Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole (map symbol)

A closed, circular or elliptical depression, commonly funnel shaped, characterized by subsurface drainage and formed either by dissolution of the surface of underlying bedrock (e.g., limestone, gypsum, or salt) or by collapse of underlying caves within bedrock. Complexes of sinkholes in carbonate-rock terrain are the main components of karst topography.

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.

Slickensides (pedogenic)

Grooved, striated, and/or glossy (shiny) slip faces on structural peds, such as wedges; produced by shrink-swell processes, most commonly in soils that have a high content of expansive clays.

Slide or slip (map symbol)

A prominent landform scar or ridge caused by fairly recent mass movement or descent of earthy material resulting from failure of earth or rock under shear stress along one or several surfaces.

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.

Slope alluvium

Sediment gradually transported down the slopes of mountains or hills primarily by nonchannel alluvial processes (i.e., slope-wash processes) and characterized by particle sorting. Lateral particle sorting is evident on long slopes. In a profile sequence, sediments may be distinguished by differences in size and/or specific gravity of rock fragments and may be separated by stone lines. Burnished peds and sorting of rounded or subrounded pebbles or cobbles distinguish these materials from unsorted colluvial deposits.

Slow refill

The slow filling of ponds, resulting from restricted water transmission in the soil.

Slow water movement

Restricted downward movement of water through the soil. See Saturated hydraulic conductivity.

Sodic (alkali) soil

A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Sodic spot (map symbol)

An area where the surface layer has a sodium adsorption ratio that is at least 10 more than that of the surface layer of the named soils in the surrounding map unit. The surface layer of the surrounding soils has a sodium adsorption ratio of 5 or less.

Sodicity

The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^{+} to $Ca^{++} + Mg^{++}$. The degrees of sodicity and their respective ratios are:

Slight: Less than 13:1
Moderate: 13-30:1
Strong: More than 30:1

Sodium adsorption ratio (SAR)

A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

Soft bedrock

Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil

A natural, three-dimensional body at the earth's surface. It 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 and by the passage of time.

Soil separates

Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand: 2.0 to 1.0
Coarse sand: 1.0 to 0.5
Medium sand: 0.5 to 0.25
Fine sand: 0.25 to 0.10
Very fine sand: 0.10 to 0.05
Silt: 0.05 to 0.002
Clay: Less than 0.002

Solum

The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Spoil area (map symbol)

A pile of earthy materials, either smoothed or uneven, resulting from human activity.

Stone line

In a vertical cross section, a line formed by scattered fragments or a discrete layer of angular and subangular rock fragments (commonly a gravel- or cobble-sized lag concentration) that formerly was draped across a topographic surface and was later buried by additional sediments. A stone line generally caps material that was subject to weathering, soil formation, and erosion before burial. Many stone lines seem to be buried erosion pavements, originally formed by sheet and rill erosion across the land surface.

Stones

Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony

Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stony spot (map symbol)

A spot where 0.01 to 0.1 percent of the soil surface is covered by rock fragments that are more than 10 inches in diameter in areas where the surrounding soil has no surface stones.

Strath terrace

A type of stream terrace; formed as an erosional surface cut on bedrock and thinly mantled with stream deposits (alluvium).

Stream terrace

One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel, originally formed near the level of the stream; represents the remnants of an abandoned flood plain, stream bed, or valley floor produced during a former state of fluvial erosion or deposition.

Stripcropping

Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil

The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are:

Platy: Flat and laminated

Prismatic: Vertically elongated and having flat tops

Columnar: Vertically elongated and having rounded tops

Angular blocky: Having faces that intersect at sharp angles (planes)

Subangular blocky: Having subrounded and planar faces (no sharp angles)

Granular: Small structural units with curved or very irregular faces

Structureless soil horizons are defined as follows:

Single grained: Entirely noncoherent (each grain by itself), as in loose sand

Massive: Occurring as a coherent mass

Stubble mulch

Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion 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

Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow

The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Summit

The topographically highest position of a hillslope. It has a nearly level (planar or only slightly convex) surface.

Surface layer

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.”

Surface soil

The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Talus

Rock fragments of any size or shape (commonly coarse and angular) derived from and lying at the base of a cliff or very steep rock slope. The accumulated mass of such loose broken rock formed chiefly by falling, rolling, or sliding.

Taxadjuncts

Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

Terminal moraine

An end moraine that marks the farthest advance of a glacier. It typically has the form of a massive arcuate or concentric ridge, or complex of ridges, and is underlain by till and other types of drift.

Terrace (conservation)

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 water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field

generally is 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 (geomorphology)

A steplike surface, bordering a valley floor or shoreline, that represents the former position of a flood plain, lake, or seashore. The term is usually applied both to the relatively flat summit surface (tread) that was cut or built by stream or wave action and to the steeper descending slope (scarp or riser) that has graded to a lower base level of erosion.

Terracettes

Small, irregular steplike forms on steep hillslopes, especially in pasture, formed by creep or erosion of surficial materials that may be induced or enhanced by trampling of livestock, such as sheep or cattle.

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 loam, silt, 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 that is too thin for the specified use.

Till

Dominantly unsorted and nonstratified drift, generally unconsolidated and deposited directly by a glacier without subsequent reworking by meltwater, and consisting of a heterogeneous mixture of clay, silt, sand, gravel, stones, and boulders; rock fragments of various lithologies are embedded within a finer matrix that can range from clay to sandy loam.

Till plain

An extensive area of level to gently undulating soils underlain predominantly by till and bounded at the distal end by subordinate recessional or end moraines.

Tilth, soil

The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope

The gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

Topsoil

The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements

Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Tread

The flat to gently sloping, topmost, laterally extensive slope of terraces, flood-plain steps, or other stepped landforms; commonly a recurring part of a series of natural steplike landforms, such as successive stream terraces.

Tuff

A generic term for any consolidated or cemented deposit that is 50 percent or more volcanic ash.

Upland

An informal, general term for the higher ground of a region, in contrast with a low-lying adjacent area, such as a valley or plain, or for land at a higher elevation than the flood plain or low stream terrace; land above the footslope zone of the hillslope continuum.

Valley fill

The unconsolidated sediment deposited by any agent (water, wind, ice, or mass wasting) so as to fill or partly fill a valley.

Variegation

Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve

A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

Very stony spot (map symbol)

A spot where 0.1 to 3.0 percent of the soil surface is covered by rock fragments that are more than 10 inches in diameter in areas where the surface of the surrounding soil is covered by less than 0.01 percent stones.

Water bars

Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Weathering

All physical disintegration, chemical decomposition, and biologically induced changes in rocks or other deposits at or near the earth's surface by atmospheric or biologic agents or by circulating surface waters but involving essentially no transport of the altered material.

Well graded

Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wet spot (map symbol)

A somewhat poorly drained to very poorly drained area that is at least two drainage classes wetter than the named soils in the surrounding map unit.

Wilting point (or permanent wilting point)

The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow

The uprooting and tipping over of trees by the wind.

Appendix B: Mississippi National Heritage Inventory

Source: Mississippi National Heritage Inventory. < http://www.mdwfp.com/museum/seek-study/heritage-program/nhp-online-data/>. Accessed 25 May 2018.

This list is not meant as a comprehensive listing of all animal species. Rather the animals listed below are recognized as species of "special concern".

RED indicates endangered federal status.

GREEN indicates threatened federal status.

Plants – Jackson County, MS

County	Scientific Name	Common Name	Global Rank	State Rank	State Status	Type
Jackson	Agalinis aphylla	Coastal Plain False-foxglove	G3G4	S3		Plant
Jackson	Agalinis filicaulis	Thin Stemmed False-foxglove	G3G4	S2		Plant
Jackson	Agalinis linifolia	Flaxleaf False Foxglove	G4?	S2		Plant
Jackson	Agalinis maritima	Saltmarsh False Foxglove	G5	S3S4		plant
Jackson	Agalinis oligophylla	Ridge-stem False-foxglove	G4	S2		Plant
Jackson	Andropogon dealbatus	Wetland White Bluestem	GNR	S1S2		Plant
Jackson	Andropogon perangustatus	Narrow-leaved Bluestem	GNR	S1S2		Plant

Jackson	Aristida simpliciflora	Southern Three-awned Grass	G3G4	S1		Plant
Jackson	Aristida spiciformis	Pine Barren Three-awned Grass	G4	S1		Plant
Jackson	Asclepias humistrata	Pinewoods Milkweek	G4G5	S3S4		Plant
Jackson	Asclepias rubra	Red Milkweed	G4G5	S3S4		Plant
Jackson	Avicennia germinans	Black Mangrove	G5	S1		Plant
Jackson	Balduina angustifolia	Coastal Plain Honeycomb-head	G5	S2		Plant
Jackson	Bartonia verna	White Screwstem	G5?	S3S4		Plant
Jackson	Burmannia biflora	Northern Burmannia	G4G5	S1		Plant
Jackson	Calopogon barbatus	Bearded Grass-pink	G4?	S2		Plant
Jackson	Calopogon multiflorus	Many-flower Grass-pink	G2G3	S1		Plant
Jackson	Canna flaccida	Golden Canna	G4?	S1		Plant
Jackson	Carex exilis	Coast Sedge	G5	S2		Plant
Jackson	Carex striata var. striata	Southern Peatland Sedge	G4G5T4T5	S1		Plant

Jackson	Carex verrucosa	Wartysedge	G4	S1S2		Plant
Jackson	Ceratiola ericoides	Rosemary	G4	S3?		Plant
Jackson	Chamaecyparis thyoides	Atlantic White Cedar	G4	S2		Plant
Jackson	Chasmanthium ornithorhynchum	Bird-Bill Spikegrass	G4	S1S2		Plant
Jackson	Cirsium lecontei	Leconte's Thistle	G2G3	S2		Plant
Jackson	Cladium mariscoides	Twig Rush	G5	S1		Plant
Jackson	Cleistesiopsis oricamporum	Small Coastal Plain Spreading Pogonia	GNR	S3		Plant
Jackson	Collinsonia anisata	Anise-scented Horse-balm	GNR	S1		Plant
Jackson	Conradina canescens	Seaside Balm	G5	S1		Plant
Jackson	Coreopsis gladiata	Southeastern Tickseed	G4G5	S3S4		Plant
Jackson	Coreopsis nudata	Georgia Tickseed	G3?	S1S2		Plant
Jackson	Cyperus drummondii	Drummond's Flatsedge	G5TNR	S1S2		Plant
Jackson	Cyperus elegans	Sticky Flatsedge	G5	S1		Plant

Jackson	Cyperus esculentus var. macrostachyus		GNR	S2S3		Plant
Jackson	Cyperus lanceolatus	Epiphytic Flatsedge	G5?	S2S3		Plant
Jackson	Cyperus lecontei	Le Conte's Flatsedge	G4?	S1		Plant
Jackson	Cyperus ochraceus	Pond Flatsedge	G5	S1		Plant
Jackson	Cyperus ovatus	Flatsedge	G4	S2S3		Plant
Jackson	Cyperus oxylepis	Sharp-scale Flatsedge	G5?	S2		Plant
Jackson	Cyperus plukenetii	Plukenet's Cyperus	G5	S3		Plant
Jackson	Cyperus polystachyos var. polystachyos	Many-spike Flatsedge	G5T5?	S2S3		Plant
Jackson	Dalea carnea var. gracilis	Pine Barrens Prairie Clover	G5T3T4	S2S3		Plant
Jackson	Desmodium tenuifolium	Slim-leaf Tick-trefoil	G4	S2		Plant
Jackson	Dichanthelium erectifolium	Erect-leaf Witchgrass	G4	S2		Plant
Jackson	Dichanthelium fusiforme	A Panicum	G5?	S3S4		Plant
Jackson	Dichanthelium nudicaule	Naked-stemmed Panic Grass	G3Q	S2		Plant

Jackson	Dichanthelium wrightianum	Wright's Witchgrass	G4	S1S2		Plant
Jackson	Eleocharis albida	White Spikerush	G4G5	S3S4		Plant
Jackson	Eleocharis cellulosa	Carolina Spikerush	G4G5	S1		Plant
Jackson	Eleocharis elongata	Slim Spike-rush	G5?	S1		Plant
Jackson	Eleocharis equisetoides	Horse-tail Spikerush	G4	S3S4		Plant
Jackson	Eleocharis flavescens var. flavescens	Pale Spikerush	G5T5	S3S4		Plant
Jackson	Eleocharis geniculata	Capitate Spikerush	G5	S3S4		Plant
Jackson	Eleocharis olivacea	Capitate Spikerush	G5	S2?		Plant
Jackson	Eleocharis parvula	Small Spikerush	G5	S3S4		Plant
Jackson	Epidendrum magnoliae	Green-fly Orchid	G4	S2S3		Plant
Jackson	Eriocaulon texense	Texas Pipewort	G4	S2S3		Plant
Jackson	Eryngium aquaticum	Marsh Eryngo	G4	S1		Plant
Jackson	Eupatorium ivifolium	Ivy-leaf Throughwort	G5	S3S4		Plant
Jackson	Euphorbia inundata	Florida Pine Spurge	G4G5	S1S2		Plant

Jackson	Eustoma exaltatum	Tall Prairie-gentain	G4G5	S1		Plant
Jackson	Fimbristylis caroliniana	Carolina Fimbry	G4	S3		Plant
Jackson	Fimbristylis castanea	Marsh Fimbry	G5	S3		Plant
Jackson	Fimbristylis puberula var. puberula	Hairy Fimbristylis	G5T5	S3		Plant
Jackson	Fuirena scirpoidea	Southern Umbrella-sedge	G5	S2S3		Plant
Jackson	Gaylussacia nana	Dangleberry	G4	S2S3		Plant
Jackson	Gordonia lasianthus	Loblolly Bay	G5	S3		Plant
Jackson	Gratiola ramosa	Branched Hedge-hyssop	G4G5	S1		Plant
Jackson	Halodule wrightii	Shoal-grass	G5	S1		Plant
Jackson	Halophila engelmannii	Engelmann's Sea-grass	G3G5	S1		Plant
Jackson	Helenium brevifolium	Shortleaf Sneezeweed	G4	S2S3		Plant
Jackson	Helenium vernale	Spring Sneezeweed	G4?	S3S4		Plant
Jackson	Helianthemum arenicola	Gulf Rockrose	G3	S1S2		Plant
Jackson	Helianthemum georgianum	Georgia Frostweed	G4	S3S4		Plant

Jackson	Helianthus heterophyllus	Wetland Sunflower	G4	S3		Plant
Jackson	Hibiscus coccineus	Brillant Hibiscus	G4?	S1S2		Plant
Jackson	Hymenocallis choctawensis	Florida Panhandle Spider-lily	G3G4	S1		Plant
Jackson	Hymenocallis liriosome	Texas Spider-lily	G4?	S2		Plant
Jackson	Hypericum myrtifolium	Myrtle-leaved St. Johnswort	G4G5	S2		Plant
Jackson	Ilex amelanchier	Juneberry Holly	G4	S3		Plant
Jackson	Ilex cassine	Dahoon Holly	G5	S2		Plant
Jackson	Ilex myrtifolia	Myrtle Holly	G5?	S3S4		Plant
Jackson	Ipomoea macrorhiza	Large-stem Morning-glory	G3G5	S1		Plant
Jackson	Ipomoea pes-caprae	Railroad Vine	G5	S1		Plant
Jackson	Isoetes louisianensis	Louisiana Quillwort	G2G3	S2		Plant
Jackson	Juniperus virginiana var. silicicola	Southern Red Cedar	G5T4T5	S2		Plant
Jackson	Lachnocaulon digynum	Pineland Bogbutton	G3	S2S3		Plant
Jackson	Lilaeopsis carolinensis	Carolina Lilaeopsis	G3G5	S2		Plant

Jackson	Lindera subcoriacea	Bog Spice Bush	G2G3	S2		Plant
Jackson	Linum floridanum var. chrysocarpum	Yellow-fruited Flax	G5?T3?	S2S3		Plant
Jackson	Linum macrocarpum	Large Fruited Flax	G2	S2		Plant
Jackson	Lobelia boykinii	Boykin's Lobelia	G2G3	S1		Plant
Jackson	Ludwigia alata	Winged Seedbox	G3G5	S2		Plant
Jackson	Lycium carolinianum	Carolina Wolf-berry	G4	S1		Plant
Jackson	Macranthera flammea	Flame Flower	G3	S3		Plant
Jackson	Magnolia tripetala	Umbrella Magnolia	G5	S1		Plant
Jackson	Marshallia graminifolia var. cynanthera	Narrow-leaf Barbara's Button	G4T4Q	S2		Plant
Jackson	Mikania cordifolia	Florida Keys Hempvine	G5	S3S4		Plant
Jackson	Mitreola angustifolium	Narrowleaf Miterwort	G4G5	S1		Plant
Jackson	Myriophyllum laxum	Loose Watermilfoil	G3	S1		Plant
Jackson	Nymphoides aquatica	Big Floating Heart	G5	S2		Plant
Jackson	Nymphoides cordata	Floating-heart	G5	S1S2		Plant

Jackson	Palhinhaea cernua	Nodding Clubmoss	G5	S2		Plant
Jackson	Parnassia grandifolia	Large-leaved Grass-of-parnassus	G3	S2		Plant
Jackson	Paronychia erecta	Beach Sand-squares	G3G4	S1S2		Plant
Jackson	Peltandra sagittifolia	White Arum	G3G4	S3		Plant
Jackson	Phaseolus polystachios var. sinuatus	Sandhill Bean	G5T3?	SH		Plant
Jackson	Physalis angustifolia	Coast Ground-cherry	G3G4	S3		Plant
Jackson	Physalis arenicola	Cypress-head Ground-cherry	G3?	SH		Plant
Jackson	Pieris phillyreifolia	Climbing Fetter-bush	G3	S1		Plant
Jackson	Pinguicula planifolia	Chapman's Butterwort	G3?	S2S3		Plant
Jackson	Pinguicula primuliflora	Southern Butterwort	G3G4	S3		Plant
Jackson	Pinguicula pumila	Dwarf Butterwort	G4	S2S3		Plant
Jackson	Pinus clausa	Sand Pine	G4	S1		Plant
Jackson	Platanthera conspicua	Large White Fringed Orchid	G4G5T3T4	S2		Plant

Jackson	Platanthera cristata	Crested Fringed Orchid	G5	S3S4		Plant
Jackson	Platanthera integra	Yellow Fringeless Orchid	G3G4	S3		Plant
Jackson	Platanthera nivea	Snowy Orchis	G5	S3		Plant
Jackson	Polanisia tenuifolia	Slender-leaf Clammy-weed	G5	S1		Plant
Jackson	Polygala crenata	Crenate Milkwort	G4?	S2		Plant
Jackson	Polygala hookeri	Hooker's Milkwort	G3	S2		Plant
Jackson	Polygala leptocaulis	Swamp Milkwort	G4G5	S2		Plant
Jackson	Polygala leptocaulis	Swamp Milkwort	G4G5	S2		Plant
Jackson	Quercus minima	Dwarf Live Oak	G5	S1		Plant
Jackson	Quercus myrtifolia	Myrtle-leaf Oak	G5	S2		Plant
Jackson	Rhapidophyllum hystrix	Needle Palm	G4	S3		Plant
Jackson	Rhododendron austrinum	Florida Flame Azalea	G3	S2		Plant
Jackson	Rhynchospora baldwinii	Baldwin's Beakrush	G4	S2		Plant
Jackson	Rhynchospora careyana	Broad-fruit Horned Beakrush	G4?Q	S1		Plant

Jackson	Rhynchospora cephalantha	Capitate Beakrush	G5	S3		Plant
Jackson	Rhynchospora chalarocephala	Loose-head Beakrush	G5	S3		Plant
Jackson	Rhynchospora ciliaris	Ciliate Beakrush	G4	S3S4		Plant
Jackson	Rhynchospora colorata	Narrowleaf Whitetop	G5	S2S3		Plant
Jackson	Rhynchospora compressa	Flat-fruit Beakrush	G4	S3S4		Plant
Jackson	Rhynchospora crinipes	Hairy-peduncled Beak-rush	G2	S1		Plant
Jackson	Rhynchospora curtissii	Curtiss's Beakrush	G4	S1		Plant
Jackson	Rhynchospora debilis	Savannah Beakrush	G4?	S3		Plant
Jackson	Rhynchospora distans	Fascicled Beakrush	G5T4?	S3S4		Plant
Jackson	Rhynchospora filifolia	Threadleaf Beakrush	G5	S3		Plant
Jackson	Rhynchospora harperi	Harper Beakrush	G4?	S1		Plant
Jackson	Rhynchospora harveyi	Harvey's Beakrush	G4	S2		Plant
Jackson	Rhynchospora inundata	Drowned Hornedrush	G4?	S2S3		Plant
Jackson	Rhynchospora latifolia	Giant Whitetop Sedge	G5	S2S3		Plant

Jackson	Rhynchospora macra	Large Beakrush	G3	S2S3		Plant
Jackson	Rhynchospora megalocarpa	Sandy-field Beakrush	G5	S3		Plant
Jackson	Rhynchospora microcarpa	Southern Beakrush	G5	S3S4		Plant
Jackson	Rhynchospora oligantha	Few-flowered Beakrush	G4	S3S4		Plant
Jackson	Rhynchospora perplexa var. perplexa	Pineland Beakrush	G5TNR	S1		Plant
Jackson	Rhynchospora plumosa	Plume Beakrush	G5	S3S4		Plant
Jackson	Rhynchospora rariflora	Few-flowered Beakrush	G5	S3S4		Plant
Jackson	Rhynchospora scirpoides	Long-beaked Baldrush	G4	S3S4		Plant
Jackson	Rhynchospora stenophylla	Chapman Beakrush	G4	S1S2		Plant
Jackson	Rhynchospora tracyi	Tracy's Beakrush	G4	S1		Plant
Jackson	Ruellia noctiflora	Night-flowering Ruellia	G2	S2		Plant
Jackson	Ruellia pinetorum	Pine Barren Ruellia	G5T3T4	S3		Plant

Jackson	Sabatia bartramii	Bartram's Rose-gentian	G4G5	S1		Plant
Jackson	Sageretia minutiflora	Tiny-leaved Buckthorn	G4	S2		Plant
Jackson	Sagittaria kurziana	Spring-tape Arrowhead	G4	S1		Plant
Jackson	Sapindus marginatus	Florida Soapberry	G5	S1		Plant
Jackson	Sarracenia leucophylla	Crimson Pitcher-plant	G3	S2		Plant
Jackson	Sarracenia rosea	Rose Pitcherplant	G5T3	S1		Plant
Jackson	Schisandra glabra	Scarlet Woodbine	G3	S3		Plant
Jackson	Schizachyrium maritimum	Gulf Bluestem	G3G4Q	S2		Plant
Jackson	Schoenoplectus americanus	Three-square Bulrush	G5	S3S4		Plant
Jackson	Schoenoplectus etuberculatus	Canby Bullrush	G3G4	S3S4		Plant
Jackson	Schoenoplectus tabernaemontani	Softstem Bulrush	G5	S2S3		Plant
Jackson	Schwalbea americana	Chaffseed	G2G3	SH		Plant
Jackson	Scleria baldwinii	Baldwin's Nutrush	G4	S2S3		Plant

Jackson	Scleria georgiana	Georgia Nutrush	G4	S2		Plant
Jackson	Scleria reticularis	Reticulated Nutrush	G4	S1		Plant
Jackson	Scleria verticillata	Low Nutrush	G5	S1		Plant
Jackson	Setaria corrugata	Coastal Fox-tail	G5?	S1		Plant
Jackson	Sorghastrum apalachicolense	Open Indian Grass	G3G4Q	S3		Plant
Jackson	Spiranthes floridana	Florida Ladies'-tresses	G1	S1		Plant
Jackson	Spiranthes longilabris	Giant Spiral Ladies'-tresses	G3	S2		Plant
Jackson	Spiranthes ovalis	Lesser Ladies'-tresses	G5?	S2S3		Plant
Jackson	Stewartia malacodendron	Silky Camellia	G4	S3S4		Plant
Jackson	Stylisma aquatica	Water Southern Morning-glory	G4	S1		Plant
Jackson	Syngonanthus flavidulus	Yellow Pipewort	G5	S2		Plant
Jackson	Syringodium filiforme	Manatee-grass	G4	S1		Plant
Jackson	Thalassia testudinum	Turtle-grass	G4G5	S1		Plant
Jackson	Utricularia olivacea	Piedmont Bladderwort	G4	S1		Plant

Jackson	Utricularia purpurea	Purple Bladderwort	G5	S2		Plant
Jackson	Veratrum virginicum	Virginia Bunchflower	G5	S3		Plant
Jackson	Xyris chapmanii	Chapman's Yellow-eyed Grass	GNR	S2		Plant
Jackson	Xyris drummondii	Drummond's Yellow-eyed Grass	G3	S3		Plant
Jackson	Xyris flabelliformis	Fan-shaped Yellow-eyed Grass	G4	S1		Plant
Jackson	Xyris scabrifolia	Harper's Yellow-eyed Grass	G3	S3		Plant
Jackson	Xyris serotina	Acid-swamp Yellow-eyed-grass	G3G4	S1		Plant

Animals – Jackson County, MS

County	Scientific Name	Common Name	Global Rank	State Rank	State Status	Type
Jackson	Accipiter striatus	Sharp-shinned Hawk	G5	S1?B		Animal
Jackson	Acipenser oxyrinchus desotoi	Gulf Sturgeon	G3T2	S1	LE	Animal
Jackson	Aimophila aestivalis	Bachman's Sparrow	G3	S3B,S3S4N		Animal

Jackson	Alosa alabamae	Alabama Shad	G3	S1		Animal
Jackson	Ammodramus henslowii	Henslow's Sparrow	G4	S3N		Animal
Jackson	Ammodramus leconteii	Le Conte's Sparrow	G4	S3N		Animal
Jackson	Ammodramus maritimus	Seaside Sparrow	G5	S3		Animal
Jackson	Ammodramus nelsoni	Nelson's Sharp-tailed Sparrow	G5	S3N		Animal
Jackson	Ammodramus savannarum	Grasshopper Sparrow	G5	S3B,S3N		Animal
Jackson	Amphiuma pholeter	One-toed Amphiuma	G3	S1	LE	Animal
Jackson	Anas fulvigula	Mottled Duck	G4	S2B,S4N		Animal
Jackson	Anas rubripes	American Black Duck	G5	S2N		Animal
Jackson	Anhinga anhinga	Anhinga	G5	S3B,S1N		Animal
Jackson	Anodonta hartfieldorum	Cypress Floater	G4	S3S4		Animal
Jackson	Aquila chrysaetos	Golden Eagle	G5	S1N		Animal
Jackson	Asio flammeus	Short-eared Owl	G5	S3N		Animal

Jackson	Atractosteus spatula	Alligator Gar	G3G4	S2		Animal
Jackson	Botaurus lentiginosus	American Bittern	G4	S3N		Animal
Jackson	Calidris canutus	Red Knot	G4	S2N		Animal
Jackson	Cambarellus diminutus	Least Crayfish	G3	S2		Animal
Jackson	Caretta caretta	Loggerhead Sea Turtle	G3	S1B, SNA	LE	Animal
Jackson	Celithemis verna	Double-ringed Pennant	G5	S3		Animal
Jackson	Charadrius melodus	Piping Plover	G3	S2N	LE	Animal
Jackson	Charadrius nivosus	Southeastern Snowy Plover	G4T3Q	S2	LE	Animal
Jackson	Charadrius wilsonia	Wilson's Plover	G5	S1		Animal
Jackson	Chelonia mydas	Green Turtle	G3	SNA	LE	Animal
Jackson	Colinus virginianus	Northern Bobwhite	G5	S3S4		Animal
Jackson	Columbina passerina	Common Ground-Dove	G5	S1S2		Animal
Jackson	Coturnicops noveboracensis	Yellow Rail	G4	S2N		Animal

Jackson	Dermochelys coriacea	Leatherback Sea Turtle	G2	SNA	LE	Animal
Jackson	Egretta caerulea	Little Blue Heron	G5	S2B, S2N		Animal
Jackson	Egretta rufescens	Reddish Egret	G4	S2N		Animal
Jackson	Egretta thula	Snowy Egret	G5	S4B,S1N		Animal
Jackson	Egretta tricolor	Tricolored Heron	G5	S2B,S1N		Animal
Jackson	Elanoides forficatus	Swallow-tailed Kite	G5	S2B		Animal
Jackson	Elliptio arca	Alabama Spike	G3Q	S1S2		Animal
Jackson	Enallagma pallidum	Pale Bluet	G4	S2		Animal
Jackson	Enneacanthus gloriosus	Bluespotted Sunfish	G5	S3		Animal
Jackson	Eretmochelys imbricata	Hawksbill	GE	SNA	LE	Animal
Jackson	Eudocimus albus	White Ibis	G5	S2B,S3N		Animal
Jackson	Euphagus carolinus	Rusty Blackbird	G4	S2N		Animal
Jackson	Falco columbarius	Merlin	G5	SNA		Animal
Jackson	Falco peregrinus	Peregrine Falcon	G4	S1N	LE	Animal

Jackson	Falco sparverius paulus	Southeastern American Kestrel	G5T4	S3B		Animal
Jackson	Fallicambarus burrisi	Burris' Burrowing Crawfish	G3	S2		Animal
Jackson	Fallicambarus byersi	Lavender Burrowing Crayfish	G4	S3		Animal
Jackson	Fallicambarus danielae	Speckled Burrowing Crayfish	G2	S2		Animal
Jackson	Farancia erytrogramma	Rainbow Snake	G5	S2	LE	Animal
Jackson	Fundulus jenkinsi	Saltmarsh Topminnow	G2	S3		Animal
Jackson	Gelochelidon nilotica	Gull-billed Tern	G5	S1B,S3S4N		Animal
Jackson	Gopherus polyphemus	Gopher Tortoise	G3	S2	LE	Animal
Jackson	Graptemys flavimaculata	Yellow-blotched Map Turtle	G2	S2	LE	Animal
Jackson	Graptemys gibbonsi	Pascagoula Map Turtle	G2G3	S2		Animal
Jackson	Grus canadensis pulla	Mississippi Sandhill Crane	G5T1	S1	LE	Animal

Jackson	Haematopus palliatus	American Oystercatcher	G5	S1		Animal
Jackson	Haliaeetus leucocephalus	Bald Eagle	G5	S2B,S2N		Animal
Jackson	Himantopus mexicanus	Black-necked Stilt	G5	S3B		Animal
Jackson	Laterallus jamaicensis	Black Rail	G4	S2N		Animal
Jackson	Lepidochelys kempii	Kemp's Ridley Sea Turtle	G1	S1N	LE	Animal
Jackson	Leptolucania ommata	Pygmy Killifish	G5	SH		Animal
Jackson	Limnothlypis swainsonii	Swainson's Warbler	G4	S3S4B		Animal
Jackson	Limosa fedoa	Marbled Godwit	G5	S2N		Animal
Jackson	Macrochelys temminckii	Alligator Snapping Turtle	G3G4	S3		Animal
Jackson	Macrodiplax balteata	Marl Pennant	G5	S3		Animal
Jackson	Malaclemys terrapin pileata	Mississippi Diamondback Terrapin	G4T3	S2		Animal
Jackson	Micrurus fulvius	Eastern Coral Snake	G5	S3S4		Animal

Jackson	Mustela frenata	Long-tailed Weasel	G5	S2?		Animal
Jackson	Myotis lucifugus	Little Brown Myotis	G5	SH		Animal
Jackson	Nerodia clarkii clarkii	Gulf Salt Marsh Snake	G4T3	S2		Animal
Jackson	Notropis chalybaeus	Ironcolor Shiner	G4	S1	LE	Animal
Jackson	Nyctanassa violacea	Yellow-crowned Night-Heron	G5	S3B,S1N		Animal
Jackson	Nycticorax nycticorax	Black-crowned Night-heron	G5	S3B,S4N		Animal
Jackson	Obovaria unicolor	Alabama Hickorynut	G3	S1S2		Animal
Jackson	Pandion haliaetus	Osprey	G5	S3B,S1S2N		Animal
Jackson	Passerina ciris	Painted Bunting	G5	S3S4B		Animal
Jackson	Pelecanus erythrorhynchos	American White Pelican	G4	S3N		Animal
Jackson	Pelecanus occidentalis	Brown Pelican	G4	S1N	LE	Animal
Jackson	Percina aurora	Pearl Darter	G1	S1	LE	Animal
Jackson	Picoides borealis	Red-cockaded Woodpecker	G3	S1	LE	Animal

Jackson	Pituophis melanoleucus lodingi	Black Pine Snake	G4T2T3	S2	LE	Animal
Jackson	Plestiodon anthracinus pluvialis	Southern Coal Skink	G5T5	S3S4		Animal
Jackson	Pleurobema beadleianum	Mississippi Pigtoe	G3	S3?		Animal
Jackson	Porphyrio martinica	Purple Gallinule	G5	S3B		Animal
Jackson	Procambarus fitzpatricki	Spiny-tailed Crayfish	G2	S2		Animal
Jackson	Procambarus lecontei	Mobile Crayfish	G3G4	S2		Animal
Jackson	Procambarus shermani	Gulf Crayfish	G4	SNR		Animal
Jackson	Pseudemys alabamensis	Alabama Redbelly Turtle	G1	S1	LE	Animal
Jackson	Puma concolor coryi	Florida Panther	G5T1	SX	LE	Animal
Jackson	Quadrula refulgens	Purple Pimpleback	G3G4	S3S4		Animal
Jackson	Rallus elegans	King Rail	G4G5	S3		Animal
Jackson	Rana sevosa	Dusky Gopher Frog	G1	S1	LE	Animal
Jackson	Regina rigida sinicola	Gulf Crayfish Snake	G5T5	S3?		Animal

Jackson	Rhadinaea flavilata	Pine Woods Snake	G4	S2S3		Animal
Jackson	Rynchops niger	Black Skimmer	G5	S2B,S3N		Animal
Jackson	Sciurus niger	Eastern Fox Squirrel	G5	S3S4		Animal
Jackson	Scolopax minor	American Woodcock	G5	S3B?, S4N		Animal
Jackson	Somatochlora georgiana	Coppery Emerald	G3G4	S2		Animal
Jackson	Sternula antillarum	Least Tern	G4	S3B, S3N		Animal
Jackson	Stylurus potulentus	Yellow-sided Clubtail	G2	S1		Animal
Jackson	Stylurus townesi	Townes' Clubtail	G3	S1		Animal
Jackson	Succinea luteola	Spanish Ambersnail	G4	SNR		Animal
Jackson	Thalasseus maximus	Royal Tern	G5	S1B,S4N		Animal
Jackson	Thalasseus sandvicensis	Sandwich Tern	G5	S1B,S4N		Animal
Jackson	Thryomanes bewickii	Bewick's Wren	G5	S2B,S3N	LE	Animal
Jackson	Trichechus manatus	Manatee	G2	S1N	LE	Animal
Jackson	Tyto alba	Barn owl	G5	S3		Animal

Jackson	Ursus americanus	Black Bear	G5	S1	LE	Animal
Jackson	Ursus americanus luteolus	Louisiana Black Bear	G5T2	S1	LE	Animal

Federally Endangered, Threatened, and Candidate Species in Mississippi

U.S. Fish and Wildlife Service Mississippi Field Office January 2018

MAMMALS

Gray Bat

The endangered gray bat *(Myotis grisescens)* is a historical resident of Tishomingo County. They are the only listed bat species in Mississippi that roosts year round in caves. Activities that impact caves or suitable mines could adversely affect this species. Protection measures for the gray bat include preventing human entry into caves with hibernating or maternity gray bat colonies by installing bat friendly gates and establishing a buffer of undisturbed vegetation around bat caves.

County: Tishomingo

Indiana Bat

The endangered Indiana bat (*Myotis sodalis*) is a migratory bat that hibernates in caves and abandoned mines in the winter, then migrates to wooded areas (roost sites) in the spring to bear and raise their young over the summer. Reproductive females occupy roost sites under the exfoliating bark of large, often dead, trees. Roost trees are typically within canopy gaps in the forest where the primary roost tree receives direct sunlight for more than half the day. Habitats include riparian zones, bottomland and floodplain habitats, wooded wetlands, and upland communities. A significant threat to the survival and recovery of Indiana bats in Mississippi is the destruction of maternity and foraging habitats; therefore, we recommend that all tree removal activities in areas supporting Indiana bat habitat take place in the non-maternity season (September 1st – May 14th).

Counties: *Alcorn, Benton, Marshall, Prentiss, Tippah, and Tishomingo*

Northern Long-eared Bat

The northern long-eared bat (*Myotis septentrionalis*) (NLEB) was listed as threatened on May 4th, 2015. The NLEB is a migratory bat that hibernates in caves, mines, and occasionally culverts and migrates to wooded areas to raise young over the summer. During the summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities, or in crevices of both live trees and snags (dead trees). NLEB seem to be flexible in selecting roosts, choosing roost trees based on suitability to retain bark or provide cavities or crevices.

A final 4(d) rule was published in 2016 exempting incidental take of otherwise legal actions related to tree clearing, except when tree removal occurs within a hibernacula site or when tree removal activities: 1) occur within a quarter-mile of a known hibernacula; or 2) cut or destroy known occupied maternity roost trees, or any other trees within 150 feet of that maternity roost tree during the pup-rearing season (June 1–July 31). Currently, there are no

known maternity roost trees in the state of Mississippi and one known hibernaculum located in Tishomingo County near Pickwick Lake.

If tree clearing is not proposed then the Service has determined the proposed project will have "no effect" on NLEB. If tree clearing is proposed, then this project "may affect" the NLEB. If this project is federally funded or requires a federal permit, then we encourage the lead federal agency or its designated non-federal representative to rely upon the findings of the 2016 programmatic biological opinion for the final 4(d) rule to fulfill their project-specific section 7 responsibilities. A federal agency or its designated non-federal representative may use the NLEB 4(d) Rule Streamlined Consultation Form (https://www.fws.gov/midwest/endangered/mammals/nleb/pdf/StreamlinedConsultationForm29Feb2016.docx) to notify the Service that it proposes an action that may rely on the 4(d) rule biological opinion. If this is a non-federal activity, then incidental take from tree removal is not prohibited and no permits or further coordination is required with the Service.

Counties: Alcorn, Attala, Benton, Bolivar, Calhoun, Carroll, Chickasaw, Choctaw, Clay, Coahoma, Desoto, Grenada, Hinds, Holmes, Humphreys, Issaquena, Itawamba, Kemper, Lafayette, Lauderdale, Leake, Lee, Leflore, Lowndes, Madison, Marshall, Monroe, Montgomery, Neshoba, Newton, Noxubee, Oktibbeha, Panola, Pontotoc, Prentiss, Quitman, Rankin, Scott, Sharkey, Sunflower, Tallahatchie, Tate, Tippah, Tishomingo, Tunica, Union, Warren, Washington, Webster, Winston, Yalobusha, and Yazoo.

West Indian Manatee

The threatened West Indian manatee *(Trichechus manatus)* is an aquatic mammal that occurs in rivers, estuaries, and coastal areas of the Gulf of Mexico. The manatee was downlisted from endangered to threatened on May 5, 2017 due to notable increases in manatee populations and improvements in its habitat. Manatees have large, seal-shaped bodies with paired flippers and a round, paddle-shaped tail. Most manatee sightings in Mississippi occur in tidal rivers such as the Pascagoula and Jordan Rivers. Manatees have also been spotted in Biloxi Bay, Bay St. Louis, and near shore in the Gulf of Mexico. Most of the sightings in Mississippi occur during the months of June through November; however, winter sightings do occur.

Counties: Hancock, Harrison, and Jackson

BIRDS

Bald Eagle

Although the bald eagle (*Haliaeetus leucocephalus*) was officially removed from the List of Endangered and Threatened Species as of August 8, 2007, it continues to be protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act (BGEPA). Bald eagles nest in Mississippi from December through mid-May in mature trees (e.g., bald cypress, sycamore, willow, etc.) near fresh to intermediate marshes or open water. Nest sites

typically include at least one perch with a clear view of the water or area where the eagles usually forage. Bald eagles are vulnerable to disturbance during courtship, nest building, egg laying, incubation, and brooding. The Service developed the National Bald Eagle Management (NBEM) Guidelines to provide landowners, land managers, and others with information and recommendations regarding how to minimize potential project impacts to bald eagles, particularly where such impacts may constitute "disturbance," which is prohibited by the BGEPA. A copy of the NBEM Guidelines is available at https://catalog.data.gov/dataset/national-bald-eagle-management-guidelines.

Counties: All

Interior Least Tern

The endangered interior least tern (*Sterna antillarum*) is a migratory shorebird that breeds, nests, and rears its young on sparsely or non-vegetated portions of sand or gravel bars located mid-stream or along the shoreline in the Mississippi, Missouri, Arkansas, Ohio, Red and Rio Grande river systems and the rivers of central Texas. On the lower Mississippi River, the interior least tern is a common summer resident between Cairo, Illinois, and Baton Rouge, Louisiana. The breeding season for terns is approximately May through July. Avoidance of non-vegetated islands or point bars during the breeding season would prevent adverse impacts to this species.

Counties: Adams, Bolivar, Claiborne, Coahoma, DeSoto, Issaquena, Jefferson, Tunica, Warren, Washington, and Wilkinson

Mississippi Sandhill Crane

The endangered Mississippi sandhill crane *(Grus canadensis pulla*) is found only in Jackson County. Critical habitat has been designated for the species on and adjacent to the Mississippi Sandhill Crane National Wildlife Refuge. Primary habitat for the cranes is wet pine savanna grasslands with scattered longleaf pine, slash pine, and pond cypress. Crane nests are typically laid in an open area of grasses and sedges with perennial shallow water, but they may also nest in swamp or marsh edges. During fall, winter, and early spring, the cranes will feed in small corn and chufa fields and in pastures. Increasing commercial, industrial and residential development in the area surrounding the refuge is limiting the availability of off-refuge habitat for the crane and limiting the ability of the refuge to manage crane habitat through the use of prescribed burning. Because the cranes fly between nesting, foraging, and roosting areas that may be off-refuge or between refuge units, the increase in off-refuge motorized vehicular traffic increases the likelihood that a crane will be hit and killed.

County: Jackson

Piping Plover

The threatened piping plover *(Charadrius melodus)* is a small shorebird approximately seven inches long with sand-colored plumage on their backs and crown and white underparts. The piping plover breeds from central Canada south to Nebraska and Iowa, east along the Great Lakes and Newfoundland, and south along the Atlantic Coast to Virginia. Plovers depart for the wintering grounds from mid-July through late October. Breeding and wintering plovers feed on exposed wet sand in wash zones; intertidal ocean beach; wrack lines; washover passes; mud-, sand-, and algal flats; and shorelines of streams, ephemeral ponds, lagoons, and salt marshes by probing for invertebrates at or just below the surface. They use beaches adjacent to foraging areas for roosting and preening. Small sand dunes, debris, and sparse vegetation within adjacent beaches provide shelter from wind and extreme temperatures. The piping plover does not nest in Mississippi but winters along the coastal beaches and barrier islands. Critical habitat has been designated along many sand beach areas along the Mississippi Gulf Coast. Major threats to this species along the Gulf of Mexico include the loss and degradation of beach habitat due to erosion and shoreline stabilization development, disturbance by humans and pets, and predation.

Counties: Hancock, Harrison, and Jackson

Red-cockaded Woodpecker

The endangered red-cockaded woodpecker (*Picoides borealis*) excavates nesting cavities in mature pine trees (60+ years old). A mated pair of birds and all helper birds forms a group. A collection of cavity trees where the group nests and roosts is called a cluster. All cavity trees, active and inactive, are important to the group and should therefore be avoided. Also, older (30+ years) pine stands within a half-mile of a colony should be considered suitable or potentially suitable foraging habitats and should not be adversely impacted without additional foraging habitat analysis.

Counties: Adams, Amite, Choctaw, Copiah, Forrest, Franklin, George, Greene, Harrison, Jackson, Jasper, Jefferson, Jones, Lincoln, Newton, Noxubee, Oktibbeha, Pearl River, Perry, Scott, Smith, Stone, Wayne, Wilkinson, and Winston

Red Knot

The red knot (*Calidris canutus rufa*), a threatened species, is a medium-sized shorebird about 9 to 11 inches in length with a proportionately small head, small eyes, short neck, and short legs. The red knot can be found in Mississippi during the winter months (generally October through March). In the southeastern United States, red knots forage along sandy beaches, tidal mudflats, salt marshes, and peat banks. Observations along the Texas coast indicate that red knots forage on beaches, oyster reefs, and exposed bay bottoms and roost on high sand flats, reefs, and other sites protected from high tides. In wintering and migration habitats, red knots commonly forage on bivalves, gastropods, and crustaceans. Coquina clams (*Donax variabilis*), a frequent and often important food resource for red knots, are common along many gulf beaches. Major threats to this species along the Gulf of Mexico include the loss and degradation of habitat due to erosion and shoreline stabilization development,

disturbance by humans and pets, and predation.

Counties: Hancock, Harrison, and Jackson

Wood Stork

Wood storks (*Mycteria americana*) are large, long-legged wading birds, about 50 inches tall, with a wingspan of 60-65 inches. The plumage is white except for black primaries and secondaries and a short black tail. The head and neck are largely unfeathered and dark gray in color. Two distinct populations of wood storks occur in the United States. One population breeds in Florida, Georgia, and South Carolina, and is federally protected (threatened). The other population breeds from Mexico to northern Argentina and is not federally protected. Wood storks from each of these populations occur seasonally in Mississippi during the non-breeding season (May-October) and are not distinguishable from one another. The major threat to this species is a reduction in food base (primarily small fish) due to habitat loss, modification, and fragmentation. Typical foraging sites include freshwater marshes, swales, ponds, hardwood and cypress swamps, narrow tidal creeks or shallow tidal pools, and artificial wetlands (such as stock ponds; shallow, seasonally flooded roadside or agricultural ditches; and impoundments).

Counties: All

FISH

Bayou Darter

The threatened bayou darter (*Etheostoma rubrum*) is found only in the Bayou Pierre River and its tributaries: White Oak Creek, Foster Creek, and Turkey Creek. The darter prefers stable gravel riffles or sandstone exposures with large sized gravel or rock. Habitat loss or degradation has been a major contributor to the reduction in bayou darter numbers. Historical in-stream-bed gravel mining has caused various head-cuts throughout the last 50 years. Along with severe erosion rates from adjacent farm fields and bankside collapse, the river is becoming more shallow and wider. Tributaries are less impacted but also have various threats such as gravel mining, stream fords, ATV traffic and non-point and point source pollution.

Counties: Claiborne, Copiah, Hinds, and Lincoln

Gulf Sturgeon

The threatened Atlantic sturgeon, Gulf subspecies (*Acipenser oxyrinchus (=oxyrhynchus) desotoi*) is found in the coastal rivers of the northeastern Gulf of Mexico generally from Lake Pontchartrain in Louisiana to the Suwanee River in Florida. Critical habitat has been designated for the species in Mississippi to include portions of the Bogue Chitto, Bouie, Chickasawhay, Leaf, Pascagoula and Pearl Rivers and the Gulf of Mexico. Gulf sturgeons are primitive, anadromous fish that annually migrate from the Gulf of Mexico into freshwater streams to spawn. Subadults and adults spend eight to nine months each year in rivers. Adult and subadult holding areas have been identified in the Pascagoula River. The decline of the

Gulf sturgeon is primarily due to limited access to riverine migration routes and historic spawning areas, habitat modification, and water quality degradation.

Counties: Clarke, Copiah, Forrest, George, Greene, Hancock, Harrison, Hinds, Jackson, Jones, Lawrence, Marion, Pearl River, Perry, Pike, Rankin, Simpson, Walthall, and Wayne

Pallid Sturgeon

The endangered pallid sturgeon (*Scaphirhynchus albus*) is found throughout the lower Mississippi River. These fish require large, turbid, free-flowing riverine habitats, and feed on aquatic invertebrates and small fish. They are usually found near the bottom of rivers on sand flats or gravel bars. Little information is known on spawning or migration habits of these fish, although spawning likely occurs in the spring and summer months. Pallid sturgeon may be entrained into water intake structures or by dredging.

Counties: Adams, Bolivar, Claiborne, Coahoma, DeSoto, Issaquena, Jefferson, Tunica, Warren, Washington, and Wilkinson

Pearl Darter

The threatened pearl darter *(Percina aurora)* was historically found in the Pearl and Pascagoula River systems. However, it is currently found only in the Pascagoula River system. The darter prefers stable gravel riffles or sandstone exposures with large sized gravel or rock. The pearl darter is vulnerable to non-point source pollution, urbanization, and changes in river geomorphology due to its localized distribution within one river drainage and its apparent low population sizes.

Counties: Clarke, Covington, Forrest, George, Greene, Jackson, Jones, Lauderdale, Perry, Stone, and Wayne

Snail Darter

The threatened snail darter (*Percina tanasi*) was recently (2015) discovered within Bear Creek in Tishomingo County. The previous distribution included the upper Tennessee River drainage of eastern Tennessee, northern Georgia, and Alabama. Snail darters inhabit gravel or sandy shoals in large creeks and rivers with low degrees of turbidity or siltation. Threats to this species include non-sustainable agricultural practices, environmental contamination and pollution, pesticides, channel modification, habitat inundation (reservoirs), and siltation.

County: Tishomingo

REPTILES

Alabama Red-bellied Turtle

The endangered Alabama red-bellied turtle *(Pseudemys alabamensis)* is found in the lower Pascagoula River and its tributaries and bayous: Bayou Chemise, Bluff Lake, Dead River,

Escatawpa River, Farragut Lake, John's Bayou, King's Bayou, Little Bear Bayou, Mary Walker Bayou, Page Bayou, and Sioux Bayou. It is also found in the Back Bay of Biloxi, Bayou Cassotte, Bayou Cumbest, Biloxi River, Old Fort Bayou, and the Tchoutacabouffa River. Destruction of nesting areas along riverbanks; degradation of submerged aquatic vegetation feeding areas; and reduced water quality have impacted this species.

Counties: Harrison and Jackson

Black Pinesnake

The threatened black pinesnake (*Pituophis melanoleucus lodingi*) prefers uplands with well-drained, sandy soils in pine-dominated forests, particularly longleaf pine. Using prescribed fire and other beneficial practices to maintain an open-canopied forest with abundant herbaceous groundcover is essential to maintain prey base and basking opportunities; additionally, leaving stumps intact during forestry activities is important so they may naturally burn or rot out and provide the root system refugia that pinesnakes utilize. Critical habitat is proposed for Forrest, George, Greene, Harrison, Jones, Marion, Perry, Stone, and Wayne Counties.

Counties: Covington, Forrest, George, Greene, Hancock, Harrison, Jackson, Jefferson Davis, Jones, Lamar, Lawrence, Marion, Pearl River, Perry, Stone, and Wayne

Green, Hawksbill, Kemp's Ridley, Leatherback, and Loggerhead Sea Turtles

There are five species of federally protected sea turtles that inhabit the Gulf of Mexico waters along the Mississippi coast: the leatherback *(Dermochelys coriacea),* loggerhead *(Caretta caretta),* green *(Chelonia mydas),* hawksbill (*Chelonia mydas*) and Kemp's ridley *(Lepidochelys kempii).* Although these are predominantly marine animals, they can come ashore to nest on barrier island and mainland beaches. Currently, only the loggerhead is known to nest in Mississippi. Mortality due to fishing nets and trawls, ingestion of inedible objects, and nest predation has reduced these species numbers. Critical habitat for the loggerhead includes Horn and Petit Bois Islands in Jackson County.

Counties: Hancock, Harrison, and Jackson

Gopher Tortoise

The threatened gopher tortoise (*Gopherus polyphemus*) occupies a wide range of upland habitat types; most frequently the longleaf pine ecosystem. The general physical and biotic features thought to characterize suitable tortoise habitat are: presence of well-drained, sandy soils, which allow easy burrowing; an abundance of diverse herbaceous ground cover; and an open canopy and sparse shrub cover, which allows sunlight to reach the ground floor. The gopher tortoise digs burrows for shelter, and groups of tortoises dig burrows in the same location, forming a colony. Some of the major threats to the species are habitat degradation (often attributed to fire suppression) and habitat fragmentation (often attributed to

urbanization and agricultural/silvicultural conversion), which can result in forage reduction, direct human impacts, and reproductive isolation.

Counties: Clarke, Covington, Forrest, George, Greene, Hancock, Harrison, Jackson, Jasper, Jefferson Davis, Jones, Lamar, Marion, Pearl River, Perry, Smith, Stone, Walthall, and Wayne

Ringed Map Turtle

The threatened ringed map turtle (*Graptemys oculifera*) is found in the Pearl River. It prefers river stretches with moderate currents, abundant basking sites, and sand bars for nesting. Stream modification in the Pearl River for flood control and urban development has significantly contributed to the decline of the species. Threats to this species include removing forested habitat along the river banks (source of the deadwood used for basking) and/or removing instream deadwood used for basking and foraging (commonly referred to as desnagging). Water quality degradation has also posed a serious problem for the turtle.

Counties: Copiah, Hancock, Hinds, Lawrence, Leake, Madison, Marion, Neshoba, Pearl River, Pike, Rankin, Scott, Simpson, and Walthall

Yellow-blotched Map Turtle

The threatened yellow-blotched map turtle (*Graptemys flavimaculata*) is found in the Chickasawhay, Leaf, and Pascagoula Rivers and their larger tributaries. The yellow-blotched map turtle prefers river stretches with moderate currents, abundant basking sites, and sand bars. Threats to this species include removing forested habitat along the river banks (source of the deadwood used for basking) and/or removing instream deadwood used for basking and foraging (commonly referred to as desnagging). Water quality degradation has also posed a serious problem for the turtle.

Counties: Clarke, Covington, Forrest, George, Greene, Jackson, Jefferson Davis, Jones, Lauderdale, Perry, Smith, and Wayne

AMPHIBIANS

Dusky Gopher Frog

The endangered dusky gopher frog *(Rana sevosa)*, formerly called the Mississippi gopher frog, historically was widely distributed in the southern counties of Mississippi. Dusky gopher frog habitat includes both upland sandy sites historically forested with longleaf pine and isolated temporary wetland breeding sites embedded within the forested landscape. Adult and subadult dusky gopher frogs spend the majority of their lives underground, primarily in stump holes and small mammal burrows, but they will also use gopher tortoise burrows. Breeding sites are small, relatively shallow, isolated, depressional ponds (not connected to any other water body) that dry completely on a cyclic basis. Emergent herbaceous vegetation is important for egg attachment. The dominant source of water to the ponds is rainfall within

their small, localized watersheds. Approximately 4,933 acres are designated as critical habitat in Forrest, Harrison, Jackson, and Perry Counties, Mississippi.

Counties: Forrest, George, Greene, Hancock, Harrison, Jackson, Jones, Lamar, Pearl River, Perry, Stone, and Wayne

MUSSELS

Alabama Moccasinshell, Black Clubshell, Heavy Pigtoe, Orange-nacre Mucket, Ovate Clubshell, Southern Clubshell, and Southern Combshell

Seven federally listed mussel species are found within top bank of the Tombigbee, Luxapallila, and Buttahatchie Rivers; and Bull Mountain Creek. Two of these species (southern clubshell and southern combshell) may be found in the Noxubee River. The endangered heavy pigtoe mussel (*Pleurobema taitianum*), the endangered southern combshell mussel (*Epioblasma penita*), the endangered southern clubshell mussel (*Pleurobema decisum*), the endangered ovate clubshell mussel (*Pleurobema perovatum*), the endangered black clubshell mussel (*Pleurobema curtum*), the threatened Alabama moccasinshell *(Medionidus acutissimus),* and the threatened orange-nacre mucket (*Lampsilis perovalis*) all require clean, swiftly moving stable streams with pools and riffles. Work activities that affect channel geometry (depth, width) or that increase sedimentation and water turbidity could have adverse impacts on these species. Also, be advised that in-stream activities can affect channel geometry both up- and downstream. Critical habitat has been designated for the Alabama moccasinshell, orange-nacre mucket, ovate clubshell, and southern clubshell in Itawamba, Lowndes and Monroe Counties.

Counties: Clay, Itawamba, Kemper, Lauderdale, Lowndes, Monroe, and Noxubee
[Note: Not every county listed has all seven species; see County List for greater detail]

Cumberlandian Combshell, Oyster Mussel, Slabside Pearlymussel and Snuffbox

The endangered Cumberlandian combshell mussel *(Epioblasma brevidens),* oyster mussel (*Epioblasma capsaeformis*), slabside pearly mussel *(Lexingonia dolabelloides),* and snuffbox mussel *(Epioblasma triquetra)* are found in the Bear Creek watershed. Work activities that alter flow, channel geometry or increase sedimentation and water turbidity could have adverse impacts on these species. All of Bear Creek in Tishomingo County is designated as critical habitat for the cumberlandian combshell, oyster mussel, and slabside pearlymussel.

County: Tishomingo

Fat Pocketbook

The endangered fat pocketbook mussel *(Potamilus capax)* is found in the Mississippi River and associated tributaries. It is a broad, rounded, and slightly angular mussel with a smooth, yellowish exterior color that is frequently clouded with brown. Fat pocketbooks occur primarily in sand and mud substrates, although the species has been found in fine gravel and

hard clay occasionally. Water depth ranges from a few inches to several feet. The fish host for this species is freshwater drum. Fat pocketbook mussels may be affected by dredging or channel clearing activities, excessive sedimentation, channel erosion, and pollutants.

Counties: Adams, Bolivar, Claiborne, Coahoma, DeSoto, Issaquena, Jefferson, Tunica, Warren, Washington, and Wilkinson

Inflated Heelsplitter

The threatened inflated heelsplitter mussel *(Potamilus inflatus)* is found in the lower Pearl River and Tombigbee watersheds. It inhabits areas with moderate to swift currents, and prefers riffle or shoal areas with stable bottoms composed of sandy gravel or firm mud gravel and cobble. Work activities that increase sedimentation and water turbidity, or alter channel geometry or flow could have adverse impacts on this species.

Counties: Clay, Hancock, Itawamba, Lowndes, Monroe, Noxubee, and Pearl River

Rabbitsfoot

The rabbitsfoot mussel (*Quadrula cylindrica cylindrica*), a threatened species, is a historical resident of the Bear Creek, Big Sunflower River and Big Black River watersheds. Population declines can be attributed to channel erosion, water-quality degradation, loss of stable substrates, sedimentation, channelization, gravel mining, dredging, impoundments, and competition of exotic mussel species. Critical habitat has been designated for the Big Black River in Hinds and Warren Counties (from Porter Creek to Highway 27), the Big Sunflower River in Sunflower County (from Highway 442 to the Quiver River), and Bear Creek in Tishomingo County (from state line to state line).

Counties: Bolivar, Claiborne, Hinds, Humphreys, Madison, Sharkey, Sunflower, Tishomingo, Warren, Washington, and Yazoo

Sheepnose

The endangered sheepnose mussel (*Plethobasus cyphyus*) is a larger stream species occurring primarily in shallow shoal habitats with moderate to swift currents over course sand and gravel. A population of sheepnose survives in the Big Sunflower River, which may be limited to a 12 to 15-mile reach upstream of Indianola in Sunflower County. Although no juvenile mussels have been found in recent sampling efforts, variably sized individuals indicate some, possibly very low, level of recruitment in the population (Jones 2008, pers. comm.). The species is believed to be extirpated from the Hatchie and Big Black Rivers.

Counties: Bolivar, Humphreys, Sharkey, Sunflower, and Washington

INSECTS

Mitchell's Satyr Butterfly

The endangered Mitchell's satyr butterfly (*Neonympha mitchellii mitchellii*) is a medium sized butterfly with an overall rich brown color. A distinctive series of orange-ringed black circular eyespots with silvery centers are located on the lower surfaces of both pairs of wings. It occurs in wetlands where low nutrient systems receive carbonate-rich ground water from seeps and springs. In Mississippi, Mitchell's satyr has been found in small upland wetlands created by beaver dams and in wetlands formed by road culverts. The greatest threat to the Mitchell's satyr is habitat destruction caused by beaver control, draining and filling of wetlands, invasion from exotic weeds, and contamination of wetlands by pesticides, fertilizer, and nutrient runoff from adjacent agriculture.

Counties: Alcorn, Itawamba, Monroe, Prentiss, and Tishomingo

PLANTS

Louisiana Quillwort

The endangered Louisiana quillwort (*Isoetes louisianensis*) is a small, nonflowering grass-like semi-aquatic to aquatic plant. Mature plants are six to ten inches long, mostly evergreen, with spore-bearing structures below ground. Surveys need to be conducted during the appropriate field season when the plants are visible, typically November into May. Timing varies depending upon rainfall, as plants completely die back and are not visible when the intermittent streams, which are habitat for this species, have dried-up. As such, it is recommended that known sites are visited prior to initiating surveys to determine if plants will likely be visible. Threats include activities that increase stream sedimentation, reduce stream flow, and reduce the overstory canopy cover.

Counties: Forrest, George, Greene, Hancock, Harrison, Jackson, Jones, Lamar, Pearl River, Perry, Stone, and Wayne

Pondberry

The endangered pondberry (*Lindera melissifolia*) is a member of the laurel family (Lauraceae) and is a deciduous aromatic shrub that averages two to six feet tall. It occurs in seasonally flooded wetlands, sandy sinks, pond margins, and swampy depressions. It is best to conduct surveys for this species during the flowering season, when the species is highly visible (February to March); however surveys are still possible later in the season following leaf-out and into the fruiting season (late summer-fall). Fruits turn bright red as they mature in the late fall before being dropped in the early winter (December). Since pondberry is a deciduous shrub, it is recommended that a nearby known site be visited prior to initiating any surveys, to confirm adequate visibility of the species for a determination of its presence or absence at a project site. Threats included habitat destruction, population fragmentation, altered hydrologic regimes, competition from encroaching vegetation, and disturbance by wild hogs and domestic cattle.

Counties: Bolivar, Carroll, Coahoma, DeSoto, Grenada, Holmes, Humphreys, Issaquena, Leflore, Panola, Quitman, Sharkey, Sunflower, Tallahatchie, Tunica, Warren, Washington, and Yazoo

Price's Potato Bean

The threatened Price's potato bean (*Apios priceana*) is a perennial, herbaceous, twining vine that belongs to the pea family (Fabaceae [=Leguminosae]). It is found on slopes or bluffs with open woods that often grade into creek and river bottoms. The species may also be found along forested margins of power-line and road rights-of-ways. These areas are typically underlain by alkaline soils. Surveys should be conducted when species is in flower or fruit, typically mid-June into October. Price's potato bean is readily confused with its more common relative groundnut (*Apios americana*) and surveys should be conducted by individuals familiar with both species. Threats include excessive shading from forest canopy closure, incompatible right-of-way maintenance, and competition from non-native, invasive plants.

Counties: Alcorn, Calhoun, Chickasaw, Clay, Kemper, Lee, Lowndes, Monroe, Noxubee, Oktibbeha, Pontotoc, Prentiss, Tippah, Union, Webster, and Winston

White Fringeless Orchid

The threatened white fringeless orchid (*Platanthera integrilabia*) is a perennial herbaceous plant with a light green stem (growing to over 2 feet tall) arising from a tuber. Leaves decrease in size from the base to the top of the stem, have alternate arrangement, are narrowly elliptic to lanceolate in shape, and have entire margins. Flowers are white and borne in a loose cluster at the end of the stem. The flower's lower petal (the lip) does not have a conspicuous fringe along the margin, but may be slightly toothed. A prominent green to white spur (growing to nearly 2.5 inches) protrudes from the underside of each flower. Flowering occurs from July to September and fruiting capsules mature in October. The species can be found in forested wetlands, wet, boggy areas at the heads of streams and on seepage slopes that are partially shaded. Plants are often associated with *Sphagnum* (peat) moss and other orchids. Threats include habitat destruction and modification from development; incompatible forestry practices; alteration of hydrologic regimes; right-of-way maintenance; competition invasive species; and disturbance by feral hogs. Other threats include herbivory by deer and feral hogs as well as over-collection.

Counties: Alcorn, Itawamba, Lowndes, Monroe, Prentiss, and Tishomingo

Whorled Sunflower

The endangered whorled sunflower (*Helianthus verticillatus*), a member of the aster family (Asteraceae [=Compositae]), is a tall (growing to over 15 feet tall), rhizomatous, perennial herbaceous plant. The firm, linear to lanceolate leaves have a prominent mid-vein, lack prominent lateral veins, are short-petioled to nearly sessile, and can grow to over 7 inches

long. Leaf arrangement is opposite on the lower stem, whorled (verticillate) in groups of 3 or 4 (to 6) along the mid-stem, and alternate or opposite near the top. The stem is smooth, waxy (glaucus), and has a bluish tint during the growing season. Flowering occurs from mid- to late August into October. Flowers are arranged in branched inflorescences (cymes) of 3 to 7 heads. Heads consist of deep yellow ray flowers and lighter yellow disk flowers. The species can be confused with its more common close relatives, *H. angustifolius* (narrowleaf sunflower), *H. giganteus* (giant sunflower), and *H. grosseserratus* (sawtooth sunflower). Plants are found on moist soils in open, grassy areas (such as wet prairies, road and utility rights-of-way, and along margins of agricultural fields) with little to no overstory canopy and are often associated with floodplains of small streams. Threats include herbicide application and incompatible mowing regimes, habitat destruction, and encroachment of woody vegetation.

County: Marshall

Old Fort Bayou
Fecal Coliform Bacteria Total Maximum Daily Load Reduction Plan

Prepared for:

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955 W Howard Ave,
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1.0 Introduction

The Land Trust for the Mississippi Coastal Plain (LTMCP) is working in partnership with Mississippi Department of Environmental Quality (MDEQ) and the Gulf Coast Community Design Studio (GCCDS) to develop an update to the 2007 Old Fort Bayou Watershed Action Plan. The updated plan is being prepared in accordance with all nine elements of watershed planning required by the US Environmental Protection Agency (USEPA) for Section 319 funding and now recommended for all watershed plans intended to address water quality impairments.

In 2002, MDEQ evaluated Old Fort Bayou for impairment for secondary contact due to previously measured elevated levels of bacterial pathogens (MDEQ 2002). While no reductions in pathogen loading were prescribed for Old Fort Bayou, the report noted that the Back Bay of Biloxi is subjected to large volumes of pollutants from both point and nonpoint sources, including Old Fort Bayou, which could impact recreation and shellfish harvesting usages and impose environmental stresses on this heavily utilized Back Bay estuarine system.

This report focuses on nonpoint source stormwater management issues related to elevated pathogen levels in the Old Fort Bayou Watershed and particularly challenges watershed stakeholders face in developing effective strategies for pathogen related problems in Old Fort Bayou. Potential sources of pathogens are investigated, and recommendations are provided for consideration.

2.0 Problem Statement

Water quality impairment related to “pathogens” is one of the most frequent causes of water quality problems in the U.S., with over 14,168 waterbodies listed as impaired on state 303(d) lists (USEPA 2018). Pathogen impairments usually are identified based on elevated counts of fecal indicator bacteria (FIB) such as *Escherichia coli* (*E. coli*), Enterococci or Fecal Coliform. Pathogens are disease-causing organisms found in fecal waste, whereas FIB indicate the potential presence of such pathogens.

FIB indicate the presence of fecal wastes from warm-blooded animals. Livestock, failing septic systems, domestic pets, and wildlife are all potential contributors (Meal, et.al 2014). Where bacteria levels exceed state standards, an unacceptable health risk exists for fishermen, bathers, and children that engage in recreational activities that involve contact with those polluted waters. Determinations regarding impairment are based on comparison of FIB concentrations to applicable waterbody standards and classifications.

In the majority of cases, this contamination cannot be traced to a single point discharge such as a wastewater treatment plant (Clark et al. 2010). There are many natural and human-induced sources of FIB in receiving waters and stormwater systems and identifying these sources and controlling them pose significant challenges. Unlike chemical pollutants, FIB and pathogens are living organisms that die-off, grow, or persist, depending on environmental conditions, which are mostly uncontrollable for all practical purposes. Additionally, even when human and non-human anthropogenic sources of FIB and pathogens (e.g., leaking sanitary sewers, pet wastes, etc.) are controlled, urban wildlife and other ubiquitous non-fecal sources may persist as on-going causes of elevated FIB.

After monitoring and modeling bacterial levels in Old Fort Bayou, the MDEQ found that "under existing conditions Old Fort Bayou showed no impairment based on the Secondary Contact standard" (MDEQ 2002). Allocation modeling by the department determined that the Total Maximum Daily Load (TMDL) for fecal coliform in Old Fort Bayou as 1.98E+12 Most Probable Number (MPN)/15 days. Based on the allocation modeling, the MDEQ established a goal for reducing existing loads due to urban runoff from the smaller watersheds, including Old Fort Bayou, by 35% (MDEQ 2002).

3.0 Basin Description

The Old Fort Bayou watershed basin encompasses an area of approximately 50 square miles. It is located within the East Gulf Coastal Plain Ecoregion (Ecoregion 75a, USEPA 2005) which includes portions of Georgia, Florida, Alabama, Mississippi, and Louisiana. The habitats within the watershed include pine dominated forests and mixed pine-hardwood forests in the northern portion and pine flatwood forest, hardwood swamps, floodplain terraces, and coastal marshes in the lower portion of the watershed (NRCS 2006). Old Fort Bayou begins near the Latimer community and flows in a southwesterly direction where is empties into the Back Bay of Biloxi.

Photograph 1: Lower end of Old Fort Bayou-looking south.

3.1 Land Use

The land use characteristics vary greatly within the Old For Bayou Watershed (See Figure 1). Land uses in the upper reaches include farming/agricultural uses, forestry/timber uses, and some residential uses. The lower reaches of the Old Fort Bayou Watershed include urban/ developed land uses that are primarily associated with typical urban/residential/commercial developed land uses in the cities of Ocean Springs and Gautier, Mississippi. While these land uses are typical of coastal stream watersheds, it is important to note that a significant area of land in the central portion of the Old Fort Bayou Watershed is designated "Resource Conservation" lands which are held and managed by the US Fish and Wildlife Service (USFWS), The Nature Conservancy (TNC), and the LTMCP.

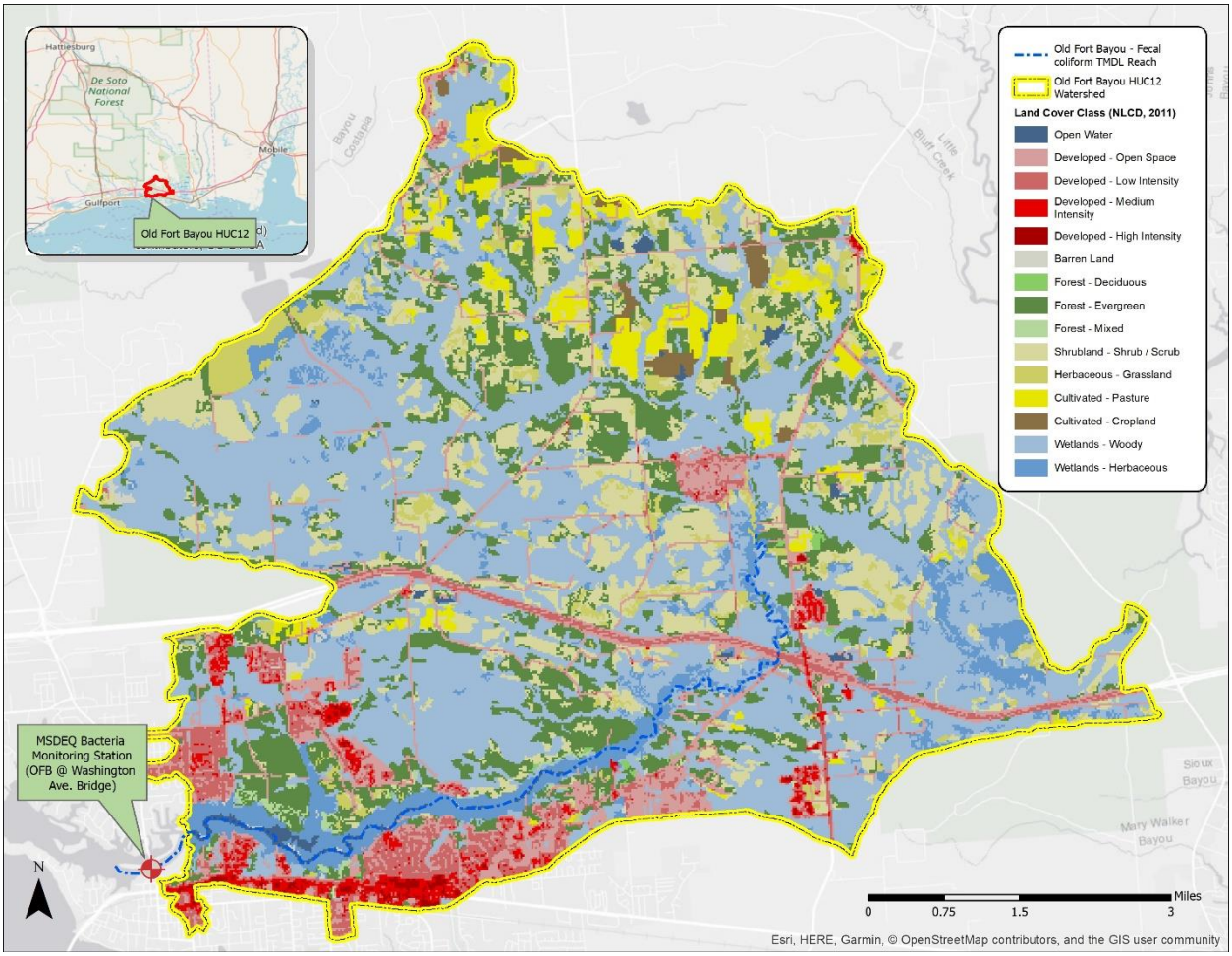

Figure 1: 2011 Land cover map for Old fort Bayou Watershed (HUC1031700090604).

3.2 Water Body Classifications for Old Fort Bayou

Old Fort Bayou from Biloxi Bay to Bayou Talla is classified as suitable for Recreation and the remaining upper reach of Old Fort Bayou from Bayou Talla to the headwaters of Old Fort Bayou is classified as Fish and Wildlife (MDEQ 2016).

Waters in the Recreation classification are suitable for recreational purposes, including such water contact activities as swimming and water skiing. The associated USEPA designated use is Primary Contact Recreation. Waters in the Fish and Wildlife classification are intended for fishing and for propagation of fish, aquatic life, and wildlife. The associated USEPA designated use is Aquatic Life Use, Fish Consumption, and Secondary Contact Recreation. Secondary contact recreation is defined as incidental contact with the water during activities such as wading, fishing, and boating, that are not likely to result in full body immersion. The State of Mississippi water body classifications and USEPA associated uses are shown in Table 1.

Table 1: Mississippi Water Body Classifications and Designated Uses for Old Fort Bayou.

MS Water Body Classification	USEPA Associated Designated Use
Recreation	Primary Contact Recreation
Fish and Wildlife	Aquatic Life Use Fish Consumption Secondary Contact Recreation

3.3 Water Quality Data for Old Fort Bayou

Seasonal water quality monitoring, including sampling for fecal coliform and E. coli, has been regularly performed at a state ambient monitoring station (#02481299) near the mouth of the system, but pathogen levels upstream of this segment have been poorly documented (See Table 2 and Figure 2). While MDEQ has not listed Old Fort Bayou on the 2016 303(d) list of impaired waterbodies the lower reaches are currently listed under a Category 2 “attaining” status in the 2016 305(b) report (MDEQ 2016). This category is designated for water bodies that are attaining some surface water uses but have insufficient data available for the assessment of other uses.

The current water quality standard for bacteria for Recreation Water Body Classification requires that culturable E. coli bacteria shall not exceed a geometric mean of 126 per 100 ml, nor shall the samples examined during a 30-day period exceed 410 per 100 ml more than 10% of the time. The standard also defined the geometric mean as a minimum of 5 samples taken over a 30-day period with no less than 12 hours between individual samples.

Based upon the available data from Old Fort Bayou, bacterial water quality between 2009 and 2017 was generally in compliance with MDEQ designated use standard for Recreation. During the 2009 to 2017 monitoring period, periodic high fecal coliform and E. coli concentrations were observed. For the three highest bacterial concentration periods (Feb-Mar 2012, July-Aug 2013, and Apr 2016), precipitation totaled 6.02, 12.75, and 2.74 inches, respectively, indicating that elevated bacterial concentrations are likely correlated with rainfall and associated stormwater runoff.

Table 2. Fecal coliform and E. coli geometric means and maximum concentrations observed during the semi-annual 2009-2017 monitoring period for Old Fort Bayou. Enterococci geometric mean and maximum concentrations for the 12-Front Beach monitoring station are included for reference.

Year/Season/Data Date Range			Fecal Coliform[1]		E. coli[1]		14-Front Beach Enterococci[2]	
Year	Season	Data Date Range	Geometric Mean	Maximum Observed	Geometric Mean	Maximum Observed	Geometric Mean	Maximum Observed
			CFU / 100ml					
2009	Winter	2/24 > 3/11	8	23	8	33	4	21
	Summer	7/16 > 83	28	87	33	70	19	123
2010	Winter	2/3 > 2/24	118	390	120	410	42	390
	Summer	9/16 > 9/30	46	280	No data	No data	2	2
2011	Winter	2/1 > 2/23	49	500	56	460	9	42
	Summer	7/20 > 8/17	58	250	50	170	5	12
2012	Winter	2/3 > 3/8	120	2,000	113	1,800	38	590
	Summer	7/24 > 8/24	45	120	21	46	5	246
2013	Winter	1/24 > 3/14	51	103	51	117	31	733
	Summer	7/29 > 8/22	280	2,000	152	1,633	38	2,000
2014	Winter	1/23 > 2/20	18	40	21	65	11	143
	Summer	9/22 > 10/8	24	90	22	67	3	5
2015	Winter	3/18 > 4/7	29	67	30	80	10	47
	Summer	10/7 > 10/21	42	85	17	40	10	56
2016	Winter	4/11 > 4/26	112	2,780	92	4,500	50	880
	Summer	9/16 > 10/6	82	322	31	121	73	170
2017	Winter	3/23 > 4/19	No data	No data	29	96	11	92
	Summer	8/24 > 10/4	No data	No data	20	54	19	106

[1] Samples collected from Old Fort Bayou @ Washington Avenue Bridge (MDEQ Ambient Water Quality Monitoring Station 02481299)

[2] Samples collected from Front Beach near Martin Ave. (USEPA:MS335067)

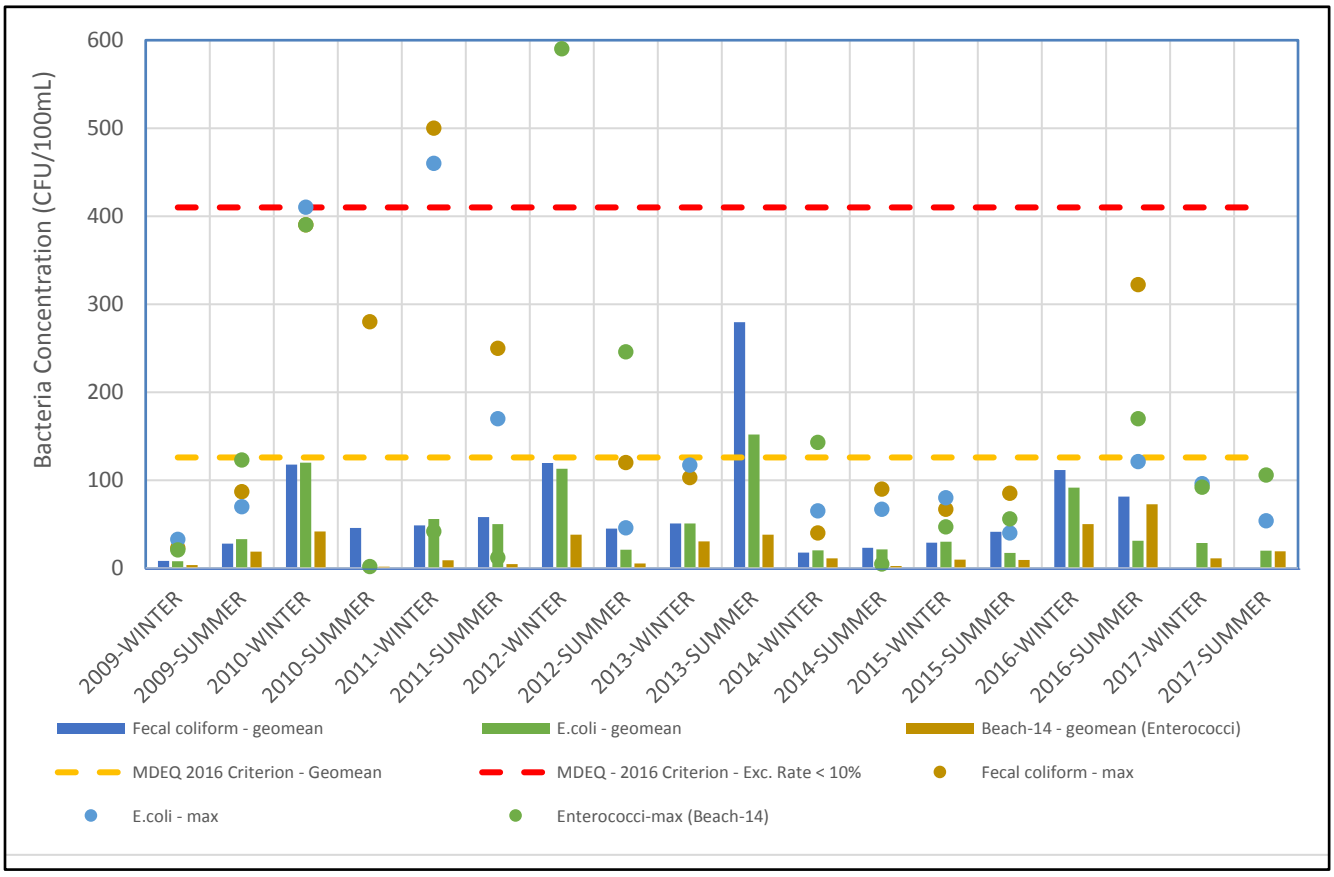

Figure 2: Plot of MDEQ Seasonal Monitoring Data for Bacteria Concentrations at Washington Ave Bridge. Entero Beach-14 data is taken from a nearby monitoring site on the Back Bay or Biloxi for reference.

To investigate the strength of the correlation between surface water bacterial concentration and precipitation, the 3-day total precipitation preceding each unique bacterial sampling event was calculated and regressed against the measured fecal coliform (n=98) and E. coli (n=103) concentration. As depicted in Figure 3, a strong positive correlation was observed when comparing precipitation and surface water bacterial concentration. This correlation suggests that fecal coliform and E. coli concentrations increase as the amount of precipitation increases. Similar trends in Enterrococci surface water concentrations were observed at the Mississippi Beach Monitoring Program 14-Front Beach monitoring station suggesting that bacterial loading from inland waters, including Old Fort Bayou, influence near-coast estuarine environments.

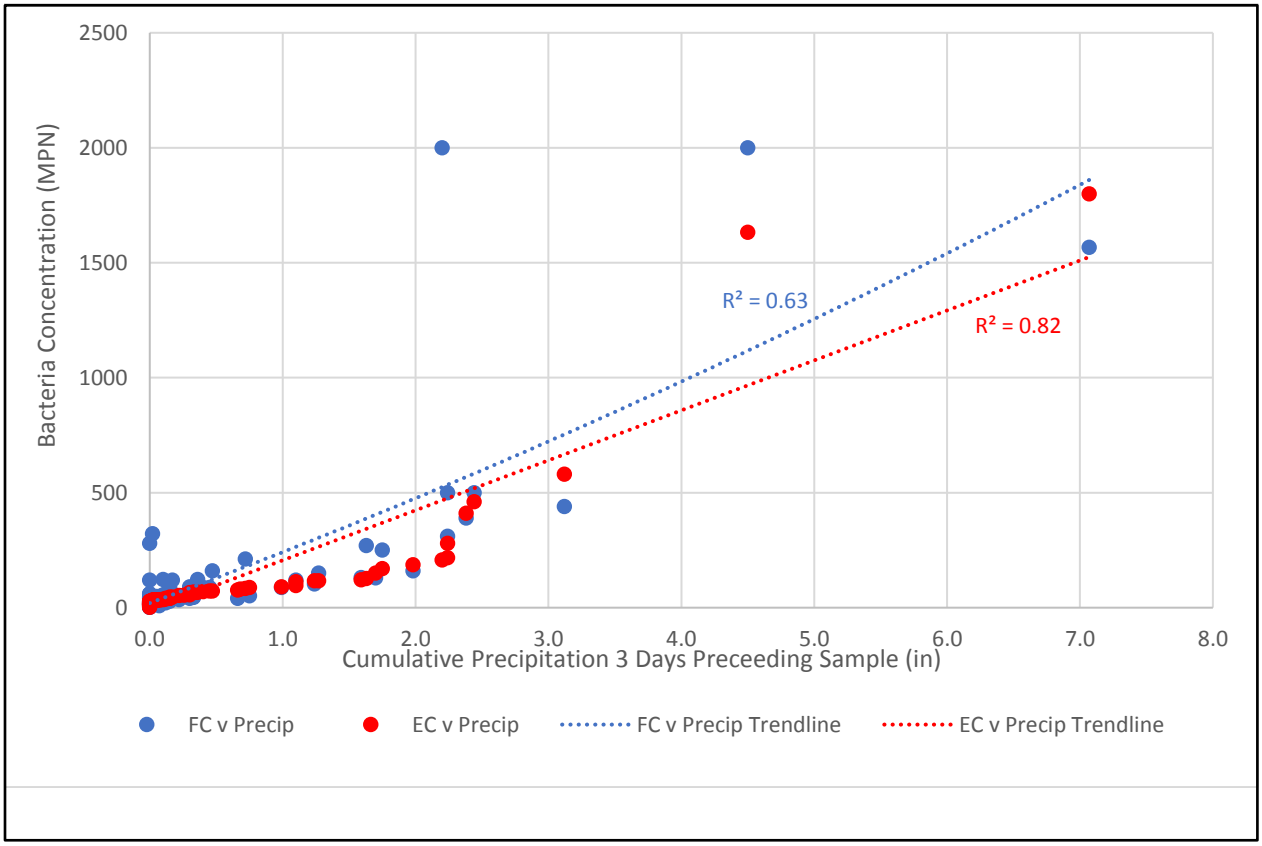

Figure 3: Comparison of bacteria (FC=Fecal coliform; EC=E.coli) concentration and recent precipitation for Old Fort Bayou at the Washington Ave. Bridge between 2009 and 2017. (precipitation data source: NOAA Climate Station GHCND: USC00226484, Ocean Springs, MS)

4.0 Watershed Analysis

As discussed above, water quality data for Old Fort Bayou is limited. While the data available for Old Fort Bayou suggest that bacterial loading is primarily associated with stormwater run-off from upland areas, the lack of spatial water quality data within the watershed does not allow for data-based related pollutant source loading to be identified. Given the lack of geographically distributed water quality data, windshield reconnaissance surveys, boat reconnaissance surveys, and stakeholder feedback were used to identify potential pollutant sources and/or opportunities for BMP implementation.

Windshield surveys and interviews with the interested stakeholders were conducted at random times throughout the period of study by members of the technical committee and consultants, and a boat-based reconnaissance of Old Fort Bayou which extended from near the mouth of the bayou to near the extent of upstream motorized boat navigability conducted on August 24, 2018.

During the boat reconnaissance, 32 potential land use impairment features which indicate potential FIB/Pathogen sources were geospatially located (Figure 4). The impairment features identified in the reconnaissance include potential impairments related to land uses (e.g. marinas, boat launches, RV campgrounds, residential uses), structural modifications to the shoreline (e.g. Bulkheads, rip-rap stabilization, artificial beaches) and stormwater/drainage features (e.g. stormwater discharge pipes, improper drainage conveyance, modification of overland flow).

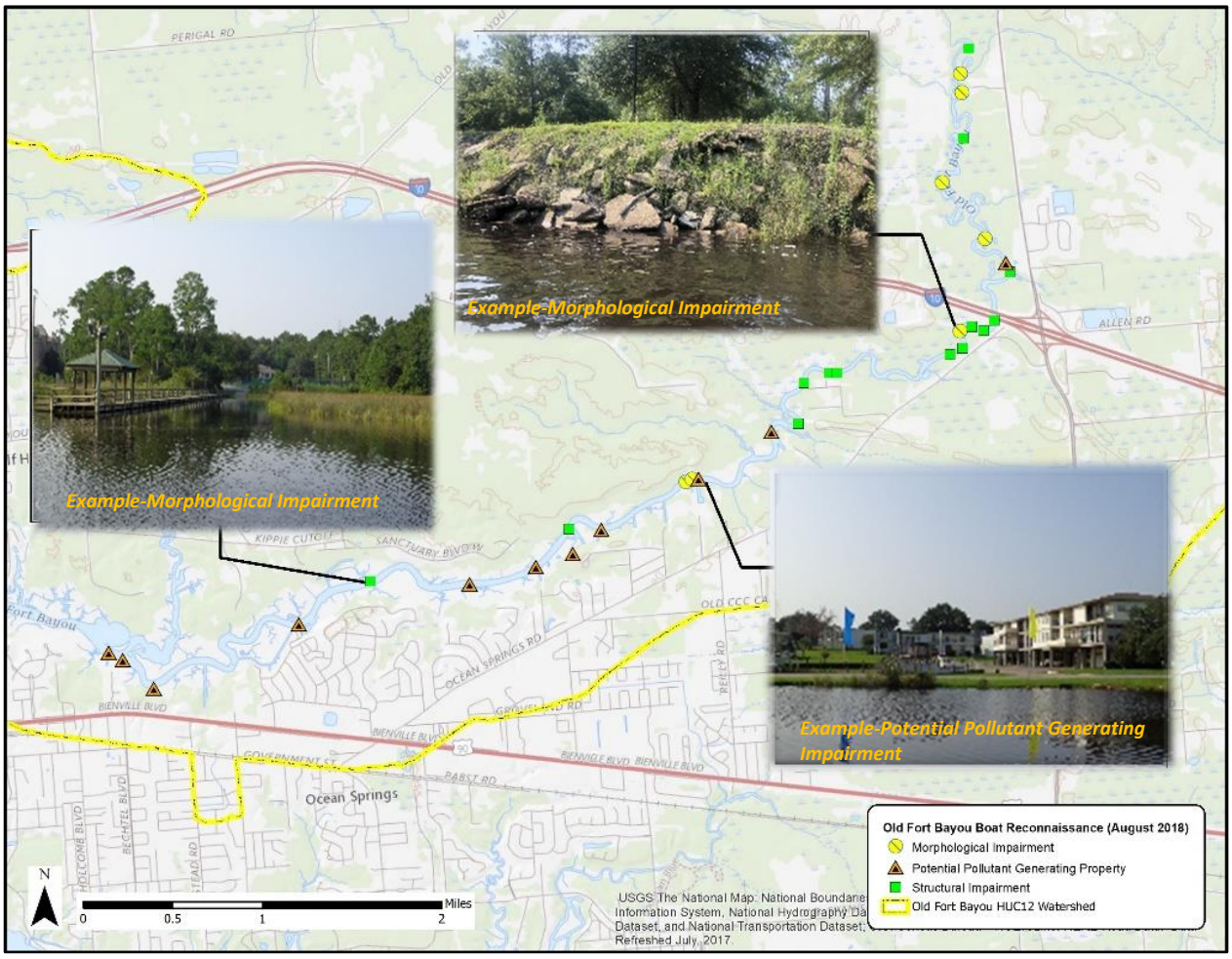

Figure 4: Photo-points showing potential land use impairment features observed during boat reconnaissance of August 24, 2018.

Based upon the results of water quality evaluations, watershed reconnaissance, and geospatial data (land cover, land use, soils, etc.), the Old Fort Bayou watershed was divided into three geographically and morphologically separate subunits that vary in terms of land use, level of development, conservation status, and potential for systemic impacts due to pathogenic loading (Figure 5). The purpose of the subdivision was to develop sub-watershed specific pollutant source assessments and BMP prescriptions tailored to FIB/Pathogen impairments within each subunit. In general, the northern unit is comprised of agricultural and low intensity developed lands, the middle unit is largely comprised of conservation lands, while the southern unit is comprised of high intensity developed or developing areas. A detailed land use map for each of the three subunits is provided in Figures 6, 7, and 8 respectively. A summary description of each subunit which includes subunit size in acres, land cover types and land use is provided in the margin of the respective subunit figures.

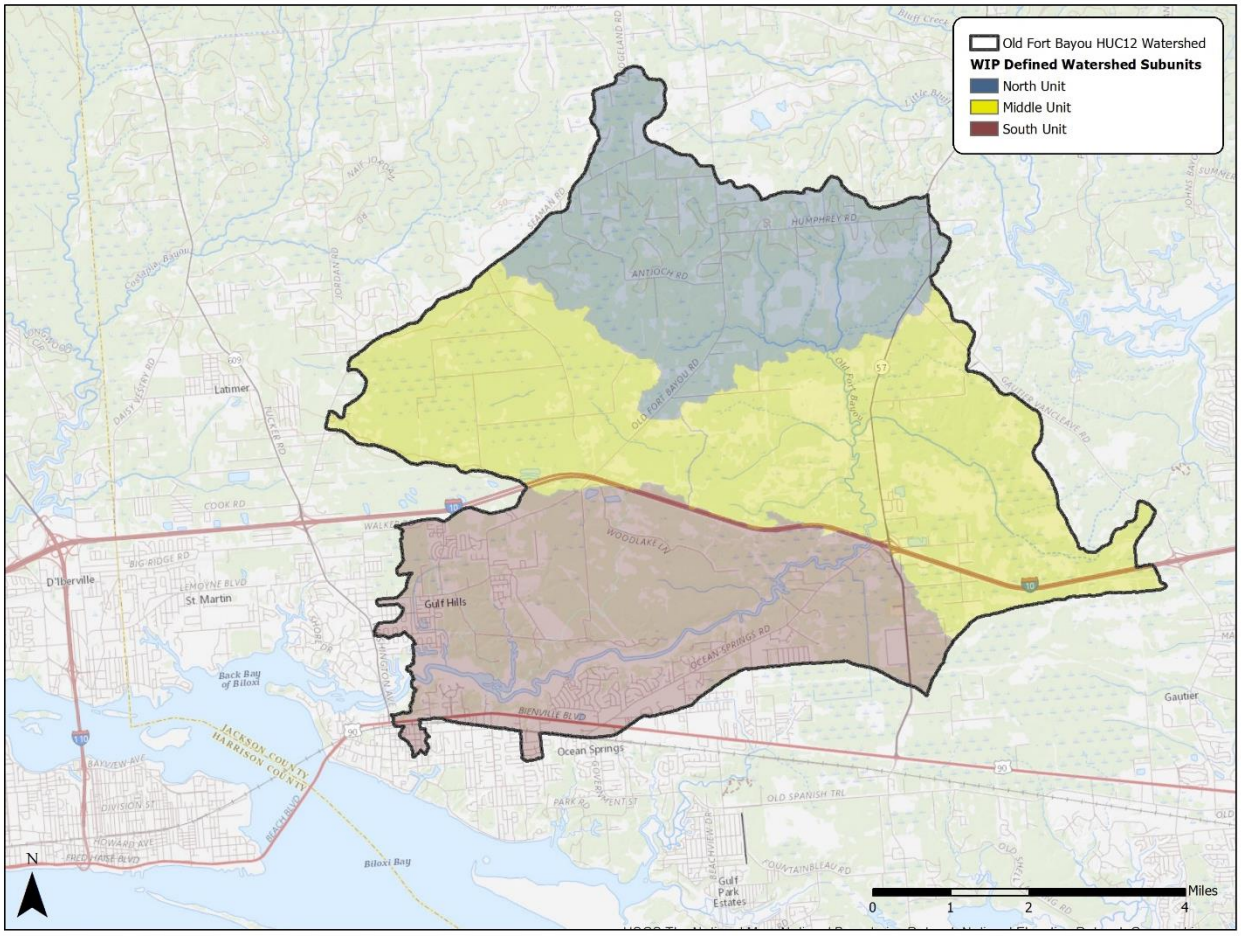

Figure 5: Old Fort Bayou watershed subunits

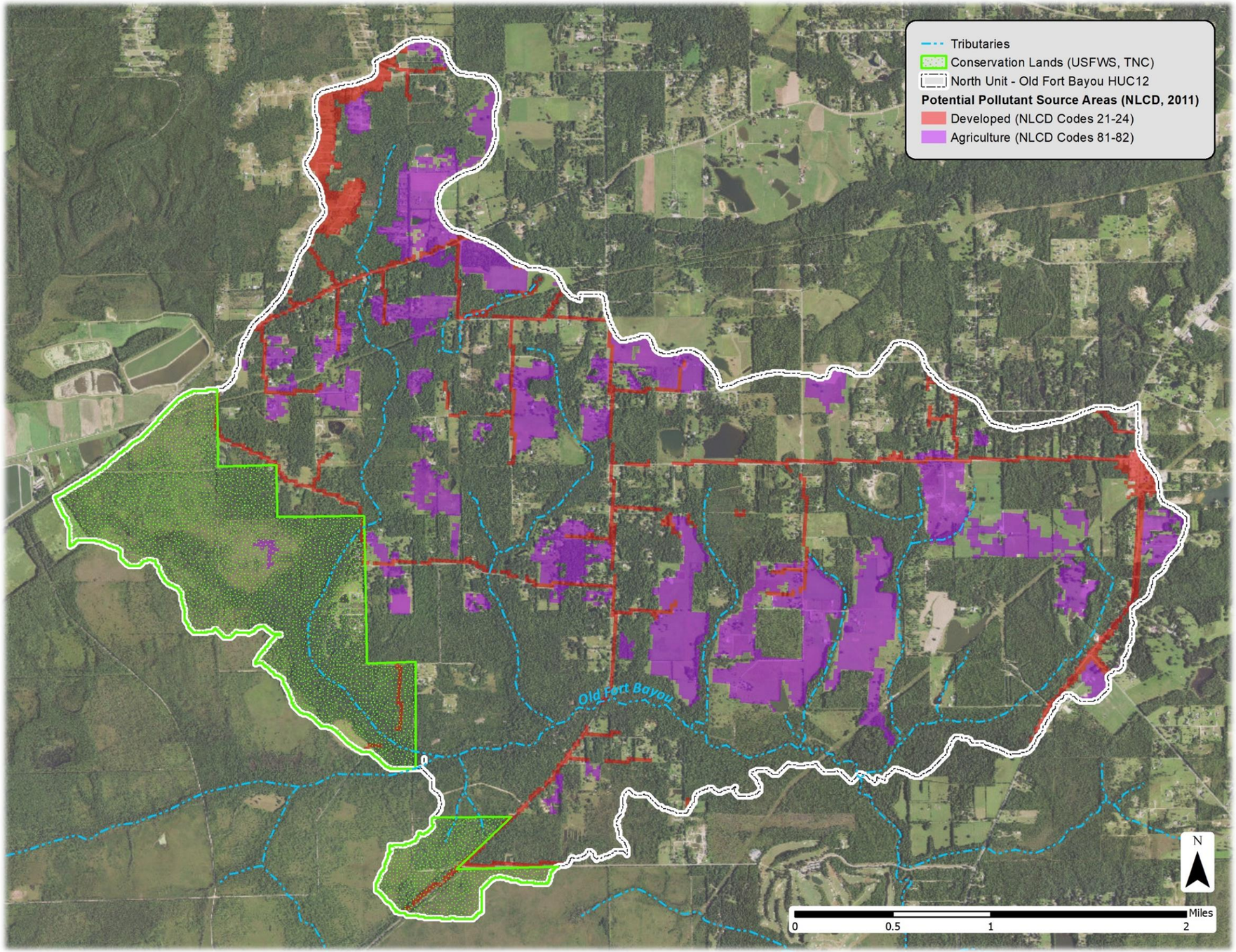

Figure 6: Upper Old Fort Bayou Watershed Subunit.

OFB Upper Subunit

Area: 7,688 acres

Land Cover Type: Mixed-pine forests and rolling hills, wet pine flatwoods, and shrub shrub-emergent wetlands.

Land Use: Predominant land uses are Cultivated Gropland (222 ac.), Cultivated Pasture (840ac.), Forest (1,709 ac.), Shrubland (1,489 ac.), and Wetlands (2,443 ac.).

Land Use Class (NLCD, 2011)	Acres	% Coverage
Barren Land	34	0.4
Cultivated - Cropland	222	2.9
Cultivated - Pasture	840	10.9
Developed - High Intensity	2	0.0
Developed - Low Intensity	59	0.8
Developed - Medium Intensity	8	0.1
Developed - Open Space	340	4.4
Forest - Deciduous	6	0.1
Forest - Evergreen	1689	22.0
Forest - Mixed	14	0.2
Herbaceous - Grassland	485	6.3
Open Water	57	0.7
Shrubland - Shrub / Scrub	1489	19.4
Wetlands - Herbaceous	97	1.3
Wetlands - Woody	2346	30.5

Photograph 2: Typical shoreline OFB Upper Subunit -looking north.

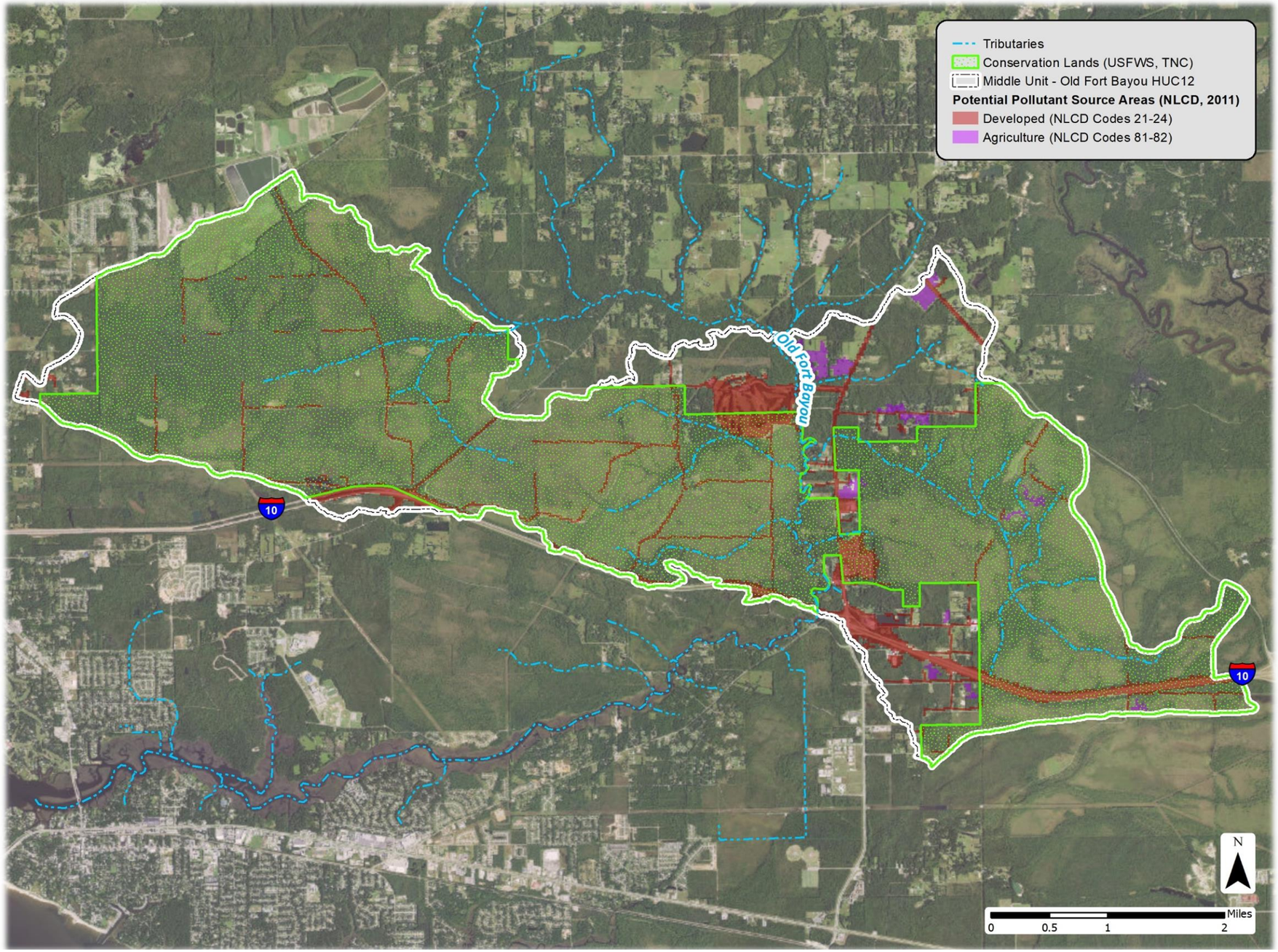

Figure 7: Middle Old Fort Bayou Watershed Subunit.

OFB Middle Subunit

Area: 13,787 acres

Land Cover Type: Mixed-pine forests, wet pine flatwoods, and shrub shrub-emergent wetlands.

Land Use: Predominant land uses are Developed (1,253 ac.), Forests (1,252 ac.), Shrubland (2,554 ac.) and Wetlands (7,840 ac.). A significant portion of this subunit is classified as Conservation Lands.

Land Use Class (NLCD, 2011)	Acres	% Coverage
Barren Land	45	0.3
Cultivated - Cropland	13	0.1
Cultivated - Pasture	130	0.9
Developed - High Intensity	4	0.0
Developed - Low Intensity	320	2.3
Developed - Medium Intensity	42	0.3
Developed - Open Space	887	6.4
Forest - Deciduous	23	0.2
Forest - Evergreen	1216	8.8
Forest - Mixed	13	0.1
Herbaceous - Grassland	673	4.9
Open Water	27	0.2
Shrubland - Shrub / Scrub	2554	18.5
Wetlands - Herbaceous	942	6.8
Wetlands - Woody	6898	50.0

Photograph 3: Developed shoreline on the south bank of a segment in the OFB Middle Subunit-looking south

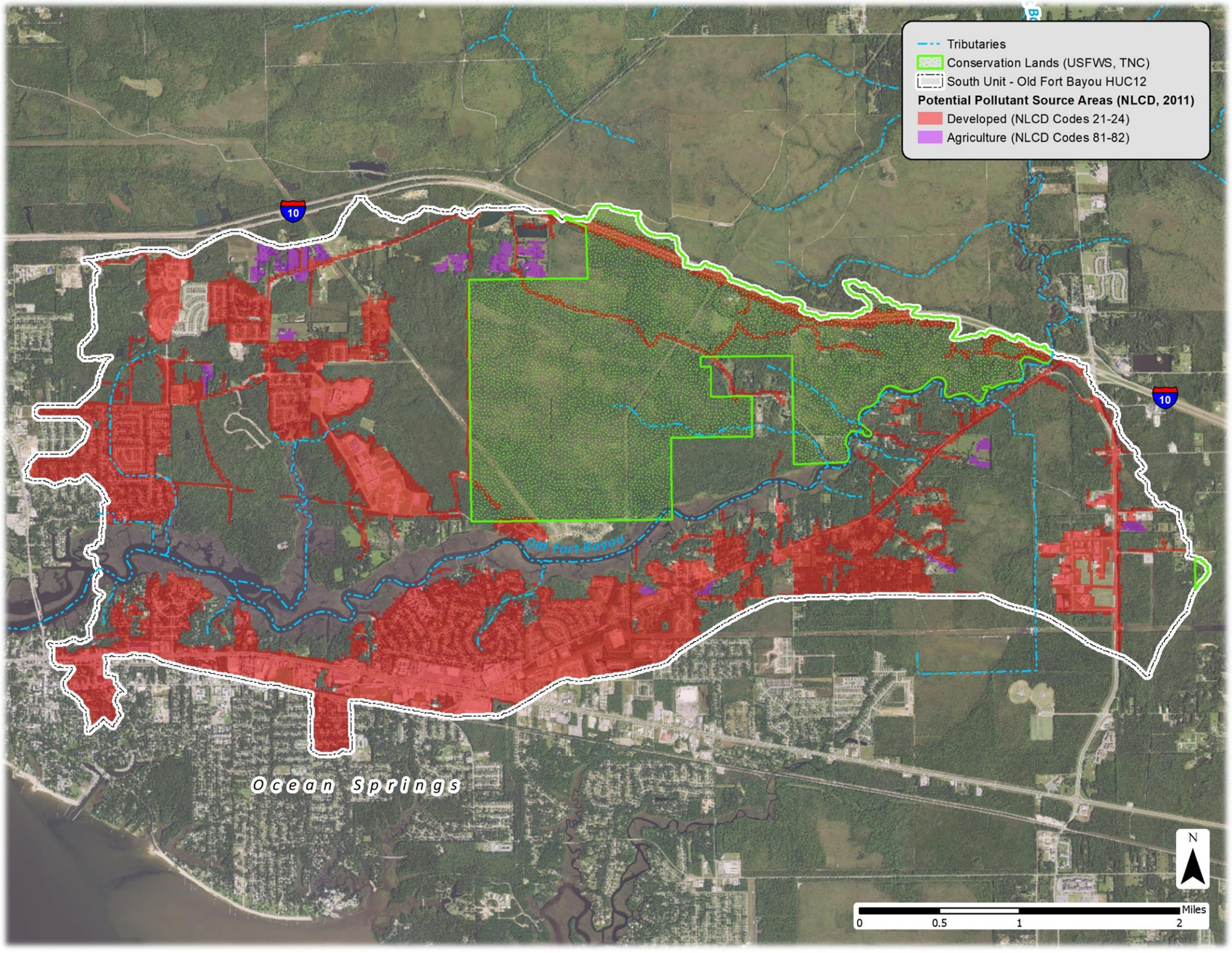

Figure 8: Lower Old Fort Bayou Watershed Subunit.

OFB Lower Subunit

Area: 10,449 acres

Land Cover Type: Mixed-pine forests, wet pine flatwoods, and shrub shrub-emergent wetlands.

Land Use: Predominant land uses are Developed (3,150 ac.) Forests (1,793 ac.), Shrubland (2,554 ac.) and Wetlands (4,466 ac.).

Land Use Class (NLCD, 2011)	Acres	% Coverage
Barren Land	73	0.7
Cultivated - Pasture	103	1.0
Developed - High Intensity	104	1.0
Developed - Low Intensity	1188	11.4
Developed - Medium Intensity	449	4.3
Developed - Open Space	1409	13.5
Forest - Deciduous	18	0.2
Forest - Evergreen	1698	16.2
Forest - Mixed	77	0.7
Herbaceous - Grassland	130	1.2
Open Water	125	1.2
Shrubland - Shrub / Scrub	608	5.8
Wetlands - Herbaceous	967	9.3
Wetlands - Woody	3499	33.5

Photograph 4: Developed shoreline on the south bank of a segment in the OFB Lower Subunit-looking south

5.0 Pollution Sources and Best Management Practices

Nonpoint source (NPS) pollution is driven mainly by land use and land management activities, including best management practices (BMPs) that are implemented to reduce, prevent, or treat such pollution (Meals, et.al 2014). All human activities have some effect on the natural environment. When managed properly, the impacts can be reduced, and surface waters can remain available for the wide range of allowable uses.

5.1 Pollution Sources Overview

The MDEQ has identified a number of potential NPS sources of pathogens in coastal watersheds, including the Old Fort Bayou Watershed**.** The potential sources, the characteristics of the source, and the potential source area within the Old Fort Bayou Watershed identified as part of this study are shown in Table 3.

Table 3: Potential FIB/Pathogen sources within the Old Fort Bayou Watershed.

Sources	Explanation	Source Area
Stormwater	- Livestock and pet waste - Illegal connections of sewer to storm drainage system - Failing onsite septic tanks	- Farms and pastures - Rural residential areas - Urban and developed areas
Urban/Residential Development	- Surfacing septic tank wastewater - Subsurface septic tank wastewater - Direct discharge of septic tank waste to a stream or stormwater system	- Rural residential areas - Urban residential areas without sewage collection - Surcharging sewer system
Agricultural Livestock Operations	- Bacteria, nutrients, and surface runoff from grazing practices or manure management practices - Livestock	- Farms - Cattle and other livestock operations
Wildlife	Usually considered part of natural background levels. An exception can occur when a pollution source is created by manmade alterations of the environment	- Rural areas of the county

5.2 BMP Overview

A stormwater BMP is a technique, measure, or structural control that is used to manage the quantity and improve the quality of stormwater runoff in the most cost-effective manner (USEPA 1999b). The USEPA defines BMPs as "schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States."

There are two general types of BMPs used to reduce the threat of stormwater runoff pollution from construction, development, and various land uses: (i) Nonstructural or source control BMPs and (ii) Structural or treatment BMPs (USEPA, 1993b).

Structural BMPs are engineered systems and methods designed to provide temporary storage and treatment of stormwater runoff for the removal of pollutants (Clar *et al.*, 2003). These practices are aimed at controlling the volume and discharge rate of stormwater runoff, as well as reducing the magnitude of pollutants in the discharge water with containment or flow restrictions, filtration, percolation, and/or biological uptake (Florida DER, 1988).

Nonstructural BMPs refer to those stormwater runoff management techniques that use natural measures to reduce pollution levels, do not require extensive construction efforts, and either limit the generation of stormwater runoff, or reduce the amounts of pollutants contained in the runoff (Taylor and Wong, 2002).

A list of potential structural and nonstructural BMPS that could be implemented in the Old Fort Bayou Watershed are provided in Table 4.

Table 4: A list of potential structural and non-structural BMPS with applicability in the Old Fort Bayou Watershed (List modified from UWRRC, 2014 and MNDA, 2017).

Land Use	Structural Practices	Nonstructural Practices
Agriculture (Avoiding)	- Contour buffer strips - Grade stabilization - Cover Crops	- Rotational grazing - Management plans - Educational materials
Agriculture (Controlling)	- Grassed waterways - Livestock exclusion fencing - Streambank/shoreline protection	- Conservation tillage - Educational materials - Workshops/training
Agricultural BMPs (Trapping)	- Sediment basins - Waste treatment lagoons - Constructed wetlands	- Residue management - Educational materials - Workshops/training
Urban/Residential Development	- Connect septic system to utility line - Septic system retrofits - Provide vegetated buffers - Redirect surface water drainage - Low Impact Development	- Reduce impervious surfaces (e.g., eliminating or reducing curb and gutter) - Septic system incentive program - Erosion and sediment control plan - Pet waste programs
Wildlife	- Wildlife Corridors - Expand forest buffers - Add physical buffers (fences, etc.)	- Hunting/culling management - Reduce food sources - Educational materials

5.3 Potential BMPs Summary by Watershed Subunits

Potential BMPs for the three Old Fort Bayou Watershed subunits are provided below in Tables 5, 6, and 7 which appear under respective subunit headings. The BMPs are based on existing conditions and opportunities for water quality improvement through implementation of the BMPs which have proven to be successful in previous BMP implementation activities in the Old Fort Bayou watershed. Information regarding effectiveness of the BMPs is presented as a range of effectiveness for percent pathogen reduction, and cost is presented as qualitative range (high, medium, low) of cost for construction and maintenance. Nonstructural BMPs are not listed in Tables 5, 6, and 7, however it is recommended that the nonstructural BMPs listed in Table 4 be incorporated as needed to insure a comprehensive BMP approach.

OFB UPPER SUBUNIT – Predominant land uses in the OFB Upper Subunit includes Cultivated Gropland (222 ac.), Cultivated Pasture (840ac.), Forest (1,709 ac.), Shrubland (1,489 ac.), and Wetlands (2,443 ac.) Less than 5 percent of this subunit is classified as developed land use, however, future land use projections by the Gulf Regional Planning Commission (GRPC 2016) indicate possible increases in residential development. Natural Resources Conservation Service (NRCS) and Mississippi Soil and Water Conservation Commission (MSSWCC) have worked with land owners in the watershed to implement a number of structural and non-structural BMPs that have been shown to reduce FIB loading. A list of suggested BMPs for this subunit are provided in Table 5.

Photograph 5: Typical cattle farming operation in OFB Upper Subunit.

Table 5. Suggested BMPs for OFB Upper Subunit.

BMP	Effectiveness [1,2,3]	Cost
Contour buffer strips	50-90%	Medium
Grade stabilization/Grassed waterways	60%	Medium
Livestock exclusion fencing	30-60%	Medium
Streambank/Shoreline protection	50-90%	Medium
Sediment basins/Constructed wetlands	70%	High

[1] ARC. 2016. Georgia Stormwater Management Manual, Volumes 1 & 2, 2016 Edition
[2] MNDA. 2017. The Agriculture BMP Handbook for Minnesota, Second Edition
[3] MPCA. 2016 Chippewa River Fecal Coliform and Turbidity TMDL Implementation Plan

OFB MIDDLE SUBUNIT – The OFB Middle Subunit is dominated by Forests (1,252 ac.), Shrubland (2,554 ac.) and Wetlands (7,840 ac.) land uses which represent approximately 90 percent of the total area. Only a small percentage of this subunit is considered Developed land use (9 Percent) and the remaining 1 percent (188 ac.) is Cultivated Crop/Pasture land and Barren Land. The largest landholders are the USFWS and TNC. There is limited development along US Highway 57, and Old Fort Bayou corridor which could increase in the future, potentially leading to changes in shoreline structure (bulkheads, rip-rap, erosion) and impacts from septic and sewage systems. A list of suggested BMPs for this subunit are provided in Table 6.

Photograph 6: Pine flatwoods habitat in OFB Middle Subunit

Table 6. Suggested BMPs for OFB Middle Subunit.

BMP	Effectiveness	Cost
Connect septic system to utility line	100%	High
Septic retrofits	70-90%	High
Provide vegetated buffers	50-90%	Medium
Redirect surface water drainage	50%	High
Low Impact Development	Unknown	High
Wildlife Corridors	Unknown	Medium
Expand forest buffers	Unknown	High
Add physical buffers (fences, etc.)	30-60%	Medium

LOWER OFB SUBUNIT – Because this unit comprises the highest impervious surface coverage, population densities, and levels of development in the watershed, efforts to reduce bacterial loading should be focused and prioritized for this section. Nonpoint source loading from stormwater runoff, sewage system spills, and direct deposits are likely the greatest source of anthropogenic pathogen loading for Old Fort Bayou. Increased stakeholder engagement to assist city and county officials in implementing potential BMPs and policies in order to ensure that loading from current infrastructure is minimized and new development is adequately covered by stormwater, erosion, and wastewater regulatory guidelines. A list of suggested BMPs for this subunit are provided in Table 7.

Photograph 7: Aerial photo showing urban development in Ocean Springs, MS.

Table 7. Suggested BMPs for OFB Lower Subunit.

BMP	Effectiveness	Cost
Connect septic system to utility line	100%	High
Septic retrofits	70-90%	High
Implement MS4 BMPS for public education, outreach, and involvement	Unknown	Unknown
Redirect surface water drainage	50-90%	High
Low Impact Development	Unknown	Unknown

6.0 Discussion

This report focuses on nonpoint source stormwater management issues related to elevated FIB levels in the Old Fort Bayou Watershed. While MDEQ has not listed Old Fort Bayou on the 2016 303(d) list of impaired waterbodies, the lower reaches of the bayou are currently listed under a Category 2 “attaining” status in the 2016 305(b) report. This category is designated for water bodies that are attaining some surface water uses but have insufficient information available for the assessment of other uses.

Behavior of microorganisms in the environment is a complex phenomenon that requires a comprehensive assessment of the watershed in order to understand both the source of and the environmental factors affecting persistence, growth and die-off of those bacteria in the environment. Management strategies for FIB are complicated by natural sources of FIB and other environmental factors, requiring a realistic assessment of which sources and environmental factors can be controlled.

Potential pathogen impairments within the Old Fort Bayou Watershed result from the cumulative effects of a number of potential sources, both natural and anthropogenic. Current land uses, topography, and geomorphic conditions in the Old Fort Bayou Watershed, are examples of those factors which influence potential FIB/Pathogen sources. Potential FIB/Pathogen sources in the upper reaches of the watershed are related to agricultural and livestock land uses. Potential sources in the middle reaches of the watershed appear to be related primarily to wildlife and anthropogenic (failing septic systems) sources. The lower reaches of the Old Fort Bayou Watershed are urbanized, and potential sources of FIB/Pathogen loading are related to sanitary system surcharge releases, pet wastes, and failing septic systems.

NRCS and MSSWCC personnel are currently working with individual landowners to advise, supplement, and implement agricultural BMPs within the watershed. This effort has been very successful and efforts to continue these relationships and programs could be beneficial.

Likewise, representatives of the cities of Ocean Springs and Gautier, and the Jackson County Planning Department are actively engaged in implementing their respective Municipal Separate Storm Sewer System (MS4) programs. According to information provided by these officials, much progress has been made in developing stormwater management BMPs that address public involvement, illicit discharge abatement, and regulations relating to construction site sediment controls, and site development regulations (e.g. LID, bioswales, rain gardens).

At the present time, there is limited data to accurately identify potential FIB/Pathogen sources in the Old Fort Bayou Watershed and there is a need for a comprehensive long-term FIB/Pathogen monitoring program in the watershed. Monitoring strategies to develop an understanding of the sources of FIB range from simple and relatively inexpensive sample collection and analysis of FIB to very comprehensive monitoring strategies which involve sampling during both wet and dry periods at various location within the watershed.

7.0 Recommendations

One of the most meaningful steps in developing a watershed management plan is preparing a framework for developing a list of projects and actions necessary to address the goal of a 35% reduction in FIB/Pathogen loading in the Old Fort Bayou Watershed. Recognizing that the watershed management planning process can be overwhelming, and the development of a comprehensive plan based on current data for watershed analysis, BMP identification, and implementation, a multi-year action plan is recommended. In order to meet the 35% reduction goal, the following Short-Term and Long-Term activities are recommended.

Short-Term (1-2 Years)

- Develop and implement a comprehensive FIB/Pathogen monitoring plan in the watershed. The sampling points should be located in the subunit areas and focused on specific points within the watershed that would provide data for determining sources contributing FIB and pathogens within the identified reaches.

- Review water quality data to determine current water quality conditions and identify any development or land use factors that may be contributing to water quality degradation.

- Coordinate with city and county representatives to identify and implement appropriate structural and nonstructural BMPs to reduce and control nonpoint source pathogen discharges from anthropogenic related sources.

- Continue to work with NRCS and MSSWCC and assist in efforts to engage agricultural interest in identifying and implementing appropriate BMPs to reduce FIB sources in the watershed.

- Continue watershed planning efforts and build on accomplishments of previous watershed planning activities. This effort should include steps to document success of previous BMP projects and the identification of new and/or modified BMPs.

- Identify and seek additional funding for watershed planning and implementation.

Long-Term (2-5) Years

- Build on the conservation land acquisition and management activities in the Old Fort Bayou Watershed. Seek cooperative agreements with federal, state and non-governmental organizations to maximize benefits of the respective organization's programs and projects.

- Continue to analyze land use changes within the watershed and identify any new and/or modified structural and non-structural BMPs to address land use impacts to water quality.

- Continue watershed planning efforts, assess progress, and continue to build on accomplishments of previous watershed management actions.

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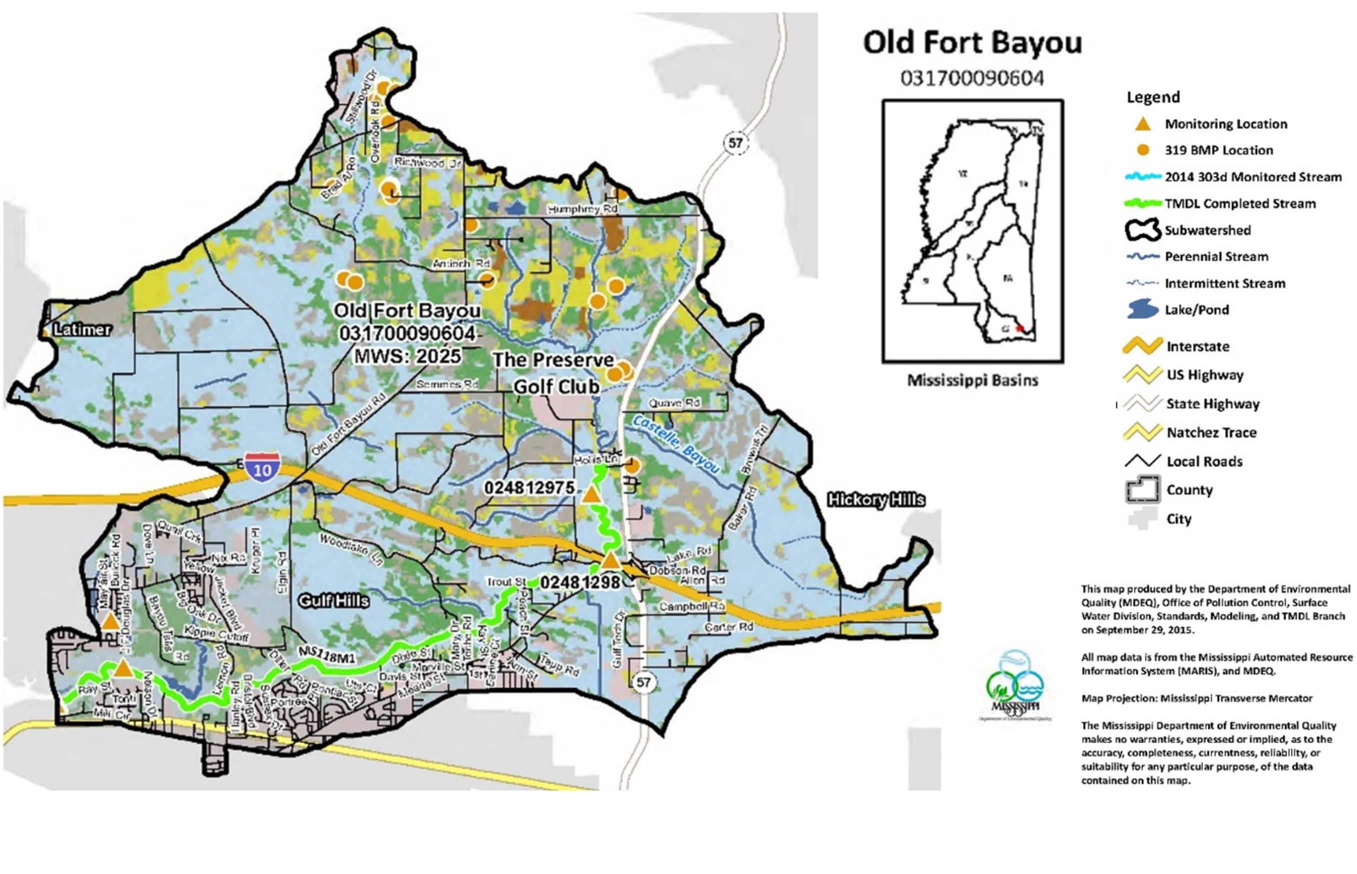
Appendix E: B-WET Old Fort Bayou Watershed Education & Civic Engagement

Project Overview

Mississippi State University's Gulf Coast Community Design Studio (GCCDS), in partnership with the Land Trust for the Mississippi Coastal Plain, is currently being funded by the Mississippi Department of Environmental Quality to develop a Watershed Implementation Plan for Old Fort Bayou Watershed (HUC 031700090604) and serve to update the 2007 Watershed Action Plan for Old Fort Bayou. The watershed is just over 32,000 acres and includes parts of Ocean Springs, Gautier and Jackson County. The Watershed Implementation Plan will address the fecal coliform TMDL (Total Maximum Daily Load) for Old Fort Bayou as documented in the 2002 TMDL report for the Back Bay of Biloxi and Biloxi Bay, as well as other environmental stressors impacting water quality and their sources. The updated plan will included specific recommendations and strategies, some of which will be funded with EPA Section 319 grants.

Concurrently, GCCDS has received funding from NOAA's Gulf of Mexico B-WET program to implement a watershed education program with students in Old Fort Bayou Watershed to compliment the watershed planning work. GCCDS and other project partners will be working with students enrolled in Marine Science and AP Environmental Science classes and the environmental club at St. Martin High School during the 2018-2019 academic year. Programming will include in-class workshops and field experiences and introduce students to watershed dynamics including how land development and human behavior impact water quality. Through each phase of the program students will have the opportunity to interact with professionals in a range of fields related to environmental science, ecological restoration, planning and design.

Student work will be documented in the Old Fort Bayou Watershed Implementation Plan. Toward the end of the project students will be challenged to compile and present their findings to Jackson County leadership and the larger community. In addition, several students will be selected to participate in paid internships with the Jackson County Planning Department, under the guidance of GCCDS staff, to increase the County's capacity around low impact development best management practices and reducing impacts of stormwater runoff.



Fall Semester Schedule

OCTOBER 2018						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16 In-Class Workshop	17 In-Class Workshop	18	19 On-Site Field Experience	20
21	22	23	24	25	26	27
28	29	30	31			

NOVEMBER 2018						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
				1	2	3
4	5 Off-Site Field Trip	6	7	8	9	10
11	12	13 In-Class Workshop	14	15 In-Class Workshop	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

This project is being funded by the FY18 Gulf of Mexico Bay-Watershed Education and Training Program (B-WET)

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GULF COAST
COMMUNITY DESIGN STUDIO
MISSISSIPPI STATE UNIVERSITY
COLLEGE OF ARCHITECTURE, ART AND DESIGN

Other Ways to Get Involved

Mississippi Coastal Cleanup

The annual Cleanup is scheduled for **Saturday, October 20th** from 8am to 11am. This is a coastwide effort to remove trash and debris from Mississippi's coastline, waterways, and barrier islands. Data is collected as part of this effort to categorize the major sources of marine debris entering the coastal environment.

Visit http://coastalcleanup.extension.msstate.edu/ for more information and to **register for the Old Fort Bayou site**!

Surfrider Foundation Found Objects Photo Contest

From **September 10th - October 31st**, the Surfrider Foundation presents the 2nd annual Found Objects photo contest. Found Objects is a an opportunity for people to share items that they've found [and cleaned-up!] off of their local beach or waterway. Participants are encouraged to take a photo of the objects found on the beach, arranged in a creative and artistic way AND share a story about the photograph.

Visit https://www.surfrider.org/found-objects for more information.

Water/Ways Exhibit at the Ocean Springs Municipal Library

The Water/Ways exhibit is a traveling Smithsonian exhibition that explores the relationship between people and water. The exhibit will be open from **October 20th through November 30th**. Other organizations are partnering by planning and coordinating related events - many of which are free and open to the public.

More information about the exhibit and corresponding events can be found here: http://n2rh2o.com/events/

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FOR IMMEDIATE RELEASE

MSU AND ST MARTIN HIGH SCHOOL PARTNER TO IMPROVE WATER QUALITY IN OLD FORT BAYOU

ST MARTIN, MS (November 16, 2018) – Over the last month around 80 upperclassman students in the Marine Science classes and Biophilia Club at St. Martin High School have been learning about Old Fort Bayou Watershed and gathering data on water quality in the bayou and factors that may be impacting water quality. The student teams are now compiling their findings in the form of storyboards that include their vision for the future of the watershed and recommendations. The work will be included in the Watershed Implementation Plan for Old Fort Bayou that is being developed concurrently with funding through a U.S. Environmental Protection Agency (EPA) FY2015 Nonpoint Sources Grant awarded by the Department of Environmental Quality (DEQ) to the Land Trust for the Mississippi Coastal Plain that will lead to recommended policy and restoration actions for the watershed.

As the lead on the project, Mississippi State University's Gulf Coast Community Design Studio was awarded funding to work with the students through the National Oceanic and Atmospheric Administration's (NOAA) Gulf of Mexico Bay Watershed Education and Training (B-WET) Program. The program, which began in October, challenges students to learn about watershed dynamics in Old Fort Bayou Watershed and the impacts of stormwater runoff on water quality and quantity, alongside NOAA staff and other science professionals. The Old Fort Bayou Watershed consists of just over 32,000 acres in Ocean Springs, Gautier and Jackson County, Mississippi. The bayou is a tributary of the Back Bay of Biloxi and has been identified as a priority watershed by the Mississippi Department of Environmental Quality that may be a source of pollutants impacting water quality in the Back Bay and Mississippi Sound. The main sources of pollutants are likely coming from a range of nonpoint sources including expanding development close to the waterway and livestock operations on rural estates in the upper watershed.

St. Martin High School is adjacent to Old Fort Bayou and was an ideal setting to start engaging students and the larger community around stormwater and water quality issues and opportunities for improvement in the watershed. In addition to doing assessments of their school property, the students did water quality testing and learned about best management practices at two additional sites along the bayou: The Twelve Oaks Property and Nature Trail in Ocean Springs that is owned and managed by the Mississippi Department of Marine Resources and Secretary of State Coastal Preserves Program and the Land Trust for the Mississippi Coastal Plain and The Preserve Golf Club in Vancleave. The Preserve Golf Club is a certified Audubon

Signature Sanctuary dedicated to protecting the natural environment in addition to providing a high quality golf experience. "We're proud of what we do here at The Preserve and it was great to be able to share some of the Low Impact Development strategies we use on the golf course to protect the environment and water quality in Old Fort Bayou," said Stephen Miles, Director of Golf Operations at Old Fort Bayou. "Golf courses can have a significant impact on water quality and it is important to show that the steps we have taken here at The Preserve to protect water quality have not only been good for the environment, but good for business."

During the field experience students worked alongside professionals and volunteers from local nonprofits, various state and federal agencies including the Land Trust for the Mississippi Coastal Plain (LTMCP), NOAA National Centers for Environmental Information's Center for Coast, Oceans and Geophysics (NCEI), EPA Gulf of Mexico Program, National Park Service, Mississippi Department of Wildlife, Fisheries and Parks, and The Nature Conservancy.

"We are excited to partner on this project and happy when we can help students learn about and experience nature in unique ways," commented Judy Steckler, Executive Director of the Land Trust for the Mississippi Coastal Plan. "We are also looking forward to including the students' work in the Watershed Plan for Old Fort Bayou that we are developing in partnership with the Gulf Coast Community Design Studio and Mississippi Department of Environmental Quality." The Watershed Implementation Plan will be completed in December and student work will be on display for the Advisory Committee at their final meeting on December 17th. The meeting will be held during school hours so students who participated in the project can interact with members of the Advisory Committee. Additionally, students will have the opportunity to apply for a paid summer internship working with the Gulf Coast Community Design Studio, LTMCP and the Jackson County Planning Department to start implementing the plan.

"This has been a great way for our students to get involved in an important project in their community and see how what they learn in the classroom really does have relevance," said Mike Heise, science teacher at St. Martin High School. "The students have also enjoyed interacting with professionals and learning about professions related to environment science and planning."

To learn more about Mississippi State University's Gulf Coast Community Design Studio, visit: http://gccds.org

To learn more about NOAA and the B-WET program, visit: http://www.noaa.gov/office-education/bwet

To learn more about the Land Trust for the Mississippi Coastal Plain, visit: http://ltmcp.org/

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Old Fort Bayou Watershed BWET, St. Martin High School, Fall 2018

No.	Management Action	Watershed Management Category	Goals and Objectives	Pathogen Reduction Effectiveness*	Cost Estimate**	Implementer and Potential Partners	Potential Funders	Milestones	Proposed Implementation Schedule (S < 5 Years, L > 5 Years)
1	Coordination of Old Fort Bayou Watershed Partnership through Jackson County Stormwater Task Force	Watershed Partnership	4a, but critical to accomplishing all goals and objectives	n/a	n/a	Jackson County, Ocean Springs and Gautier with support from Allen Engineering	n/a, currently funded through MS4 Stormwater Management Plan implementation	Subcommittee formed to oversee implementation of Old Fort Bayou Watershed Implementation Plan	Ongoing
2	Study: Primary Source(s) of Pathogens	Data Gaps	1a, 1b	n/a	TBD at time services requested	Subcontractor with assistance from MDEQ	MDEQ with potential grant funding	Old Fort Bayou Watershed Partnership to determine if this is feasible and a priority	S
3	Study: Nutrients	Data Gaps	1a, 1b	n/a	Internal to MDEQ	MDEQ	MDEQ	Old Fort Bayou Watershed Partnership to determine if this is feasible and a priority	S
4	Study: Erosion and Sediment Delivery Rates	Data Gaps	2a	n/a	TBD at time services requested	Subcontractor with assistance from MDEQ	MDEQ with potential grant funding	Old Fort Bayou Watershed Partnership to determine if this is feasible and a priority	S
5	Conservation and Restoration at Bayou Talla	Priority Projects	2c, 3c	50-90%	Dependent on possibility of land donation or acquisition	LTMCP	Land donation or funding for land acquisition may be necessary to proceed. Certain grants (i.e. Tidelands Trust Fund Program and/or Natural Resource Damage Assessment and Restoration Program) will pay for land acquisition and restoration activities.	Land acquisition and restoration	S

							Grants may pay for recreational trails including Five Star grants through National Fish and Wildlife Foundation/Southern Company, Outdoor Recreation Grant through the Mississippi Department of Wildlife, Fisheries and Parks or the National Park Service.	Access points and trail development	L
6	Golf Course BMPs	Priority Projects	1, 4	Unknown	BMP-dependent	The Preserve Golf Club	The Preserve Golf Club with possible grant funding from EPA Section 319 or Natural Resource Damage Assessment and Restoration Program.	Complete implementation of BMPs per the GCSAA Best Management Practices Planning Guide	S
						Gulf Hills Golf Course	Gulf Hills Golf Course with possible grant funding from EPA Section 319 or Natural Resource Damage Assessment and Restoration Program.	Develop short and long-term BMP goals and start implementation	S
								Complete implementation of BMPs per the GCSAA Best Management Practices Planning Guide	L

7	Urban Ordinances and Low Impact Development	Priority Projects, Urban: Nonstructural and Education and Outreach	2	n/a	n/a	Jackson County, Ocean Springs and Gautier with support from GCCDS	Current funding through NOAA Gulf of Mexico B-Wet Program to work with Jackson County. Recommended changes likely to apply to Ocean Springs and Gautier.	Determine recommended changes and/or additions and work toward adoption.	S
								Promote Low Impact Development Strategies	Ongoing
8	Critical Area Planting	Priority Projects, Agricultural and Rural: Structural	1,2,4c	50-90%	$250-$400/acre	Property owners with assistance from Jackson County Soil and Water Conservation District	Property owner with possible assistance from EPA Section 319 or cost-share program through USDA.	32 acres	S
9	Fencing	Priority Projects, Agricultural and Rural: Structural	1,2,4c	30-60%	$1.50-$5.00/foot	Property owners with assistance from Jackson County Soil and Water Conservation District	Property owner with possible assistance from EPA Section 319 or cost-share program through USDA.	12,500 ft	S
10	Grade Stabalization Structures	Priority Projects, Agricultural and Rural: Structural	1,2,4c	60%	$5,000/unit	Property owners with assistance from Jackson County Soil and Water Conservation District	Property owner with possible assistance from EPA Section 319 or cost-share program through USDA.	5 units	S
11	Heavy Use Area Protection	Priority Projects, Agricultural and Rural: Structural	1,2,4c	Unknown	$1-$2/acre	Property owners with assistance from Jackson County Soil and Water Conservation District	Property owner with possible assistance from EPA Section 319 or cost-share program through USDA.	8,000 acres	S

12	Pipeline	Priority Projects, Agricultural and Rural: Structural	1,2,4c	Unknown	$1-$2/foot	Property owners with assistance from Jackson County Soil and Water Conservation District	Property owner with possible assistance from EPA Section 319 or cost-share program through USDA.	3,600 ft Implemented on private property	S
13	Stream Bank Protection	Priority Projects, Agricultural and Rural: Structural	1,2,4c	50-90%	$1-$5/acre	Property owners with assistance from Jackson County Soil and Water Conservation District	Property owner with possible assistance from EPA Section 319 or cost-share program through USDA.	1,600 acres	S
14	Grassed Waterways	Priority Projects, Agricultural and Rural: Structural	1,2,4c	60%	$1,000-$2,000/unit	Property owners with assistance from Jackson County Soil and Water Conservation District	Property owner with possible assistance from EPA Section 319 or cost-share program through USDA.	10-15 units	S
15	Pond (Alternative Water Source)	Priority Projects, Agricultural and Rural: Structural	1,2,4c	Unknown	$3-$5/acre	Property owners with assistance from Jackson County Soil and Water Conservation District	Property owner with possible assistance from EPA Section 319 or cost-share program through USDA.	2,000-2,200 acres	S
16	Tank/Trough	Priority Projects, Agricultural and Rural: Structural	1,2,4c	Unknown	$4,600/unit	Property owners with assistance from Jackson County Soil and Water Conservation District	Property owner with possible assistance from EPA Section 319 or cost-share program through USDA.	10 units	S

17	Conservation and Riparian Buffers	Conservation and Restoration	2c, 3c	50-90%	Dependent on the property, donation or sales agreement, and extent of restoration needed.	LTMCP, TNC or other land conservation entity.	Land donation or funding for land acquisition may be necessary to proceed. Certain grants (i.e. Tidelands Trust Fund Program and/or Natural Resource Damage Assessment and Restoration Program) will pay for land acquisition and restoration activities.	15+ acres starting with Management Action 5	S
					Forest Buffer: $200-700/acre to plant and maintain. Grass Buffer: $100-400/acres to plant and maintain.	Property owners	Property owner, cost-share program through USDA or Mississippi Reforestation Tax Credit.	TBD based on assessment of acreage acquired	S-L
18	Living Shorelines and Marsh Restoration	Conservation and Restoration	2c, 3c	50-90%	n/a or TBD at time services requested	Management Action 2	If funds are needed, most likely will need to be covered by a private sponsor.	Determine priority areas through visual survey	S
					$3/plant/LF to $200/LF depending on wave energy and amount of hard stabalization needed	Private land owners	Property owner with possible grant funding or cost-share.	One high priority project implemented	L
19	Blueway Update and Expansion	Recreation and Ecotourism	4	n/a	Blueway update is currently funded. Signage for blueway expansion is roughly $100/sign including post and installation. Signs are typically installed at every stream mile and points of interest.	LTMCP, DMR, and Jackson County	DMR and/or Jackson County. Five Star grant may apply.	Install updated signage and distribute materials. Extend blueway up Bayou Talla.	S

20	No Wake Zones	Recreation and Ecotourism	2	n/a	Locations for No Wake Zones can be determined for a minimal cost by Jackson County and Ocean Springs with assistance from DMR. Signage is roughly $100/sign including post and installation	Jackson County and Ocean Springs with assistance from DMR	Potential funding from DMR or EPA Section 319	Determine locations for No Wake Zones	S
								Install signage	S
21	Watershed Signage	Recreation and Ecotourism	4	n/a	Locations for signage can be determined for a minimal cost by the Old Fort Bayou Watershed Partnership with assistance from Jackson County, Gautier, Ocean Springs and MDEQ. Signage is roughly $100/sign including post and installation	Jackson County, Gautier, Ocean Springs and MDEQ	Potential funding through EPA Section 319	Determine locations for signage	S
								Install signage	S
22	Promotion of Conservation Areas Open to the Public	Recreation and Ecotourism	4	n/a	TBD at time services requested	Subcontractor with assistance from Mississippi Sandhill Crane National Refuge	U.S. Fish and Wildlife Service	Develop a Visitors Services Plan for Mississippi Sandhill Crane National Refuge	S
23	Septic System Inventory and Maintenance Education	Waste and Wastewater and Education and Outreach	1b, 4c	70-90% for septic retrofits and 100% for connection of septic to utility lines	Administrative expenses along with costs associated with printing and mailing/distribution	Jackson County with assistance from MDEQ and Mississippi Department of Health	Jackson County with potential grant funding from EPA Section 319	Adopt and implement program similar to Coast-A-Syst	S-L
24	Coastal Cleanup Extension and other Cleanup events/incentives	Litter	1c, 4c	n/a	Minimal expenses to be absorbed by MS Coastal Cleanup Program	MSU Coastal Research and Extension Center	Current funders of MS Coastal Cleanup	Add 1-2 cleanup sites along Old Fort Bayou	Ongoing

					Minimal additional expenses to existing event(s)	Dependent upon event	n/a	Add cleanup component to Battle of the Bayou and other events held on or adjacent to Old Fort Bayou	Ongoing
					Minimal additional expense to retaurant/business	TBD	n/a	Restaurants along Bayou and other business to offer incentives for litter cleanup	Ongoing
25	Trash Catches	Litter	1c	n/a	n/a	Jurisdictions - primarily City of Ocean Springs	Jurisdictions - primarily City of Ocean Springs. Potential funding through Keep America Beautiful	Inventory and prioritize sites to install catches	S
					$50-$150 /stormdrain			Install 3 trash catches in high priority locations	S
26	Street Sweeping	Litter	1c	n/a	n/a	Jackson County, Ocean Springs and Gautier	n/a	Identify high priority roadways in watershed	S
					$105/curb mile if already own machine	Jurisdictions and MDOT	Jurisdictions, MDOT	Petition jurisdiction to increase frequency and miles swept	Ongoing
27	Adopt -a-Roadway	Litter	1c	n/a	n/a	Jurisdictions	n/a	Identify high priority roadways in watershed	S
					One-time costs: $200/sign and est. $35/person for resusable supplies including a trash grabber, gloves and safety vest. Annual costs include $20/adopted roadway segment for trash bags. Jurisdictions will also need to pick up grarbage bags on the roadways after clean-up and may incure some minimal additional expenses.	Jurusdictions	Jurisdictions and/or grant through Keep America Beautiful	Implement program with a goal of having 5 roadway segments adopted	S

28	Coast Technical Manual	Urban: Nonstructural	2b	n/a	Funding needed dependent on creation of new manual or adoption of existing manual.	MDEQ, MASGC, DMR	MDEQ, MASGC, DMR	Review current technical documents compared to newly revised Georgia Coastal Supplement	S
								Take action to revise existing or adopt Georgia Coastal Supplement	L
29	Fertilizer Ordinance	Urban: Nonstructural	1	n/a	Minimal administrative and/or legal expenses	Jackson County, Ocean Springs and Gautier	Jackson County, Ocean Springs and Gautier	Ordinance adoption	L
30	Enforcement of Stormwater Pollution Prevention Plans	Urban: Structural	1	n/a	Administrative Expenses. Potential need for additional staff or staff hours.	Jurisdictions, MDEQ	Jurisdictions, MDEQ	Increase monitoring and enforcement of SWPPPs	Ongoing
31	Drainage Swale Maintenance	Urban: Structural	1,2b	n/a	$1/foot annually	Jurisdictions with guidance from MDEQ/EPA	Jurisdictions	Jurisdictions to stop scouring ditches as part of regular maintenance	Ongoing
32	Rain Barrels	Urban: Structural	1, 2b, 4c	n/a	$50-$150	Property owners	Property owners	Implemented on private property	Ongoing
33	Rain Gardens	Urban: Structural	1, 2b, 4c	Unknown	$3-$5/square foot	Property owners	Property owners	Implemented on private property	Ongoing
34	Logging and Forestry Ordinance	Rural: Nonstructural	2	n/a	Minimal administrative and/or legal expenses	Jackson County	Jackson County	Adopt ordinance	L
35	Education in Schools	Education and Outreach	4, indirectly accomplishes other water quality goals 1 and 2	n/a	$30-60K per school depending on programming	GCCDS and LTMCP with assistance from MDEQ and Jackson County and Ocean Springs School Districts	Potential funding through EPA Section 319	Expand education programming to St. Martin Middle School, St. Martin Elementary School, Ocean Springs Upper Elementary School and Pecan Park Elementary School	S

					MDEQ Mobile Classroom shows, paid for by Section 319 funds and provided at no cost to schools in priority watersheds. MDOT anti-litter education program provided at no cost.	Schools in partnership with Bayou Town Productions, MDOT or other watershed/anti-litter education groups	n/a	3 general watershed education and anti-litter education programs brought to St. Martin Elementary School, Ocean Springs Upper Elementary School and Pecan Park Elementary School	S
36	Education through Arts Organizations	Education and Outreach	4, indirectly accomplishes other water quality goals 1 and 2	n/a	Rain barrels cost between $50-$150 and rain gardens are $3-$5/square foot. Signage and artistic components potentially add additional expense	Walter Anderson Museum of Art, Mary C. O'Keefe Cultural Center, etc.	Arts organizations with potential funding assistance through the Mississippi Arts Commission, Bacot McCarty Foundation, etc.	1 art/environmental installation at Walter Anderson Museum of Art and the Mary C. O'Keefe Cultural Center	S
37	Facebook Page	Education and Outreach	4	n/a	n/a	Old Fort Bayou Watershed Partnership/Jackson County Stormwater Taskforce	n/a	Page maintained and number of likes increased	Ongoing
38	Plastic Free	Education and Outreach	1c, 4	n/a	Efforts currently funded through NOAA Marine Debris Prevention Program	GCCDS and MSU Coastal Research and Extension Center	Efforts currently funded through NOAA Marine Debris Prevention Program	Enlist atleast 2 retaurants along Old Fort Bayou to participate in Plastic Free Gulf Coast	S
39	Projects for Scout Troops	Education and Outreach	4	n/a	n/a	Boy Scout Troops	n/a	At least 2 local scouts achieving their Soil and Water Conservation Badge through projects that apply to Old Fort Bayou Watershed	S
					Minimal administrative expenses	Mississippi Sandhill Crane National Wildlife Refuge, TNC and Boy Scout Troops	n/a	Develop fire ecology merit badge	S

40	Pet Waste Education	Education and Outreach	1b, 4	Unknown	No cost or cost of printing if included in regular mailing or newsletter or distributed at local pet-related businesses such as veterinary clinics	Jurisdictions and local pet-related businesses	Possible grant funding available through Keep America Beautiful	1 educational ad, mailer or flier distributed in each jurisdiction	S
41	Pet Waste Signage and Receptacles	Education and Outreach	1b, 4	Unknown	n/a	Jurisdictions	Jurisdictions with possible grant funding available through Keep America Beautiful	Identify high priority locations within the watershed.	S
					$200-$600 per receptacle/sign combination			Install at least 5 receptacles with signage	S
42	Promote Use of Native Plants	Education and Outreach	4, indirectly accomplishes other water quality goals 1 and 2	n/a	n/a	Jurisdictions, MSU Coastal Research and Extention Center, LTMCP, GCCDS and other civic organizations or business with an interest in landscape	n/a	Promote use of native plants through social media, member meetings and community projects	Ongoing

*BMI Environmental Services, LLC and Nutter & Associates, Inc. Prepared for Land Trust for the Mississippi Coastal Plain. (2018). Old Fort Bayou Fecal Coliform Bacteria Total Maximum Daily Load Reduction Plan.

**All prices will vary depending upon the site preparation needed, contractor pricing, and the market for the products that will be needed to install the Best Management Practice.