

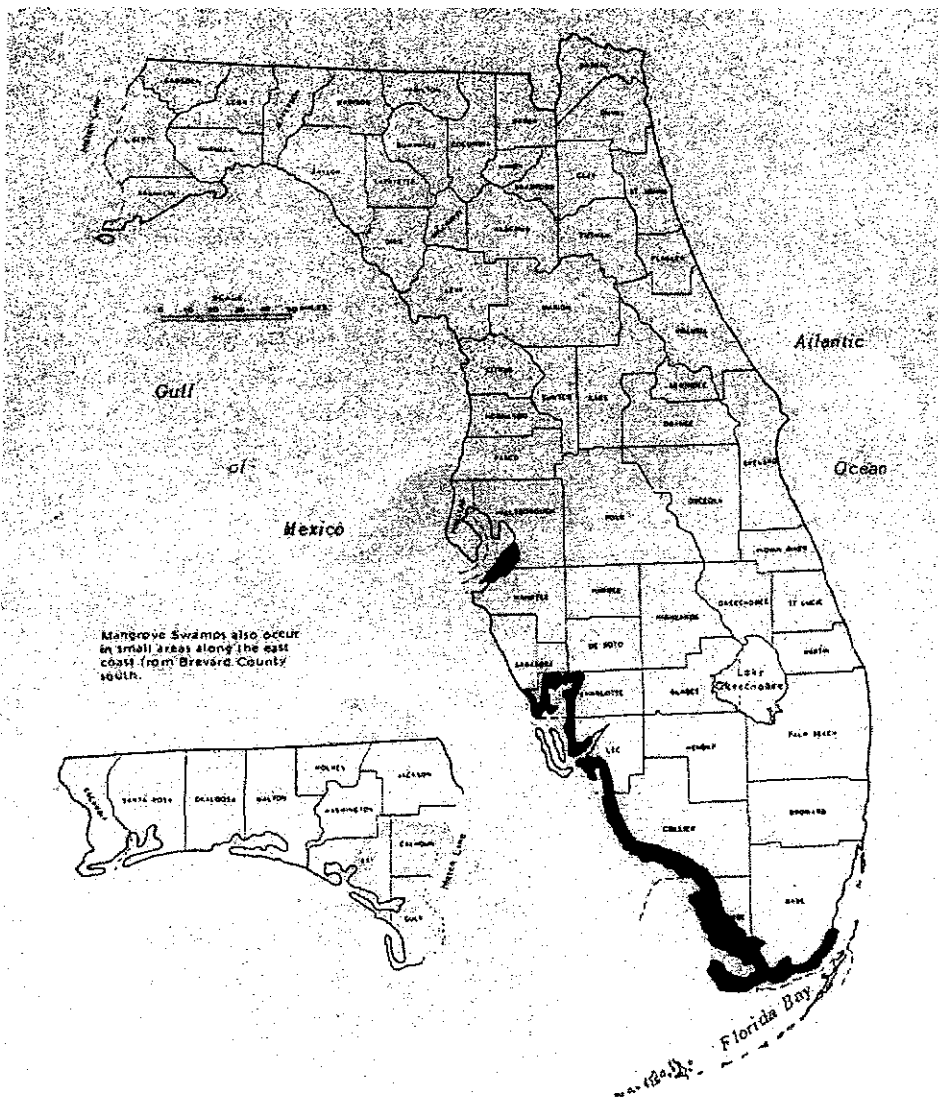
SOIL AND WATER

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RELATIONSHIPS OF FLORIDA'S

ECOLOGICAL COMMUNITIES

19 – MANGROVE SWAMP



Ecological Communities of Florida

Introduction

The ecological community concept is based on the awareness that a soil type commonly supports a specific vegetative community. Each specific community may have many different soil types, but each of these soils has similar characteristics and responds to management in a similar manner.

These vegetative communities form recognizable units in the landscape, most of which are apparent to the casual observer after only a little training. Even with no botanical training, an observer can soon distinguish between pine flatwoods and longleaf-turkey oak hills; between upland hardwood hammocks and cypress swamps; and between mangrove swamps and salt marsh. Once the community is recognized, much information is inferred concerning the general characteristics of the soil in which it occurs and the types of plants and animals that commonly occur there.

For example, more than 50 different soil series occur in the South Florida Flatwoods Ecological Community. Each of these soils is seasonally wet and acid in the surface layer. Some of these soils are hydric; however, most are not hydric. There are also more than 50 soil series that occur in the Longleaf Pine -Turkey Oak Hills Ecological Community. Each of these soils is droughty, sandy, and not hydric. Some communities such as Freshwater Marsh and Ponds have up to 300 soil series. Although each of these soils is very poorly drained and hydric, the soils range from shallow to very deep and from sandy to clayey.

Each ecological community has characteristic vegetation that is easily identified. Once the ecological community is identified, much knowledge about the soil that supports that community can be inferred due to the fact that each ecological community is supported by soils that have similar characteristics and response to management.

26 Ecological Communities of Florida

As early as 1970 plant and soil scientists of USDA's Soil Conservation Service (SCS) now known as the NRCS (Natural Resources Conservation Service) began to correlate all existing information for the vegetative communities most often encountered by SCS personnel. Field studies were conducted, in addition to reviewing research and reference materials. Although this is by no means a complete listing of communities occurring in Florida, twenty-six communities were identified. Aquatic communities (such as rivers, lakes, and bays) were not included, and the 26 identified could be subdivided or combined, depending on which characteristics are of the most interest.

These communities were selected because knowledge about them would be most useful to individuals (such as wetland delineators) involved in environmental evaluations.

The communities described are essentially the types that occur in nature where human influence has not greatly altered them. In other words, they have evolved through natural plant succession over long periods of time. Under this concept, even a cropped field would be expected to revert to a specific type of ecological community if human influence were removed.

For example, A Norfolk soil in northwest Florida that is now a corn field which would return to its original community (Mixed Hardwood and Pine Ecological Community) within 25 to 50 years if the field was to be abandoned. A Hontoon soil in south Florida that has been drained for vegetable production would revert to its original Freshwater Marsh Ecological Community within only a few years once the drainage ditches were filled. This anticipated reversion is the reason that this soil would still be considered hydric even though it was drained. Human influences are often temporal, variable, and the effects are often over estimated. Most drainage, even where maintained annually, effects the duration of seasonal high saturation but not the depth to that saturation.

Field Identification of Ecological Communities

The next few pages contain a brief description of each ecological community. Vegetation, landforms, and location within the state are discussed for each community. The frequency of the occurrence of hydric soils is also discussed. Additional information concerning ecological communities is contained in 26 Ecological Communities of Florida (Florida Soil Conservation Staff. 1984.)

Field Identification of Ecological Communities

Ecological Community No. 1 - North Florida Coastal Strand

The North Florida Coastal Strand ecological community occurs along the Atlantic Ocean north of Sebastian Inlet in Indian River County to St Marys River in Nassau County and along the Gulf of Mexico from Perdido Bay in Escambia County to Alligator Point in Franklin County. This community parallels coastal beaches, bays and sounds and encompasses the area affected by salt spray from the ocean, gulf, and salt water bays. Few areas (mostly interdunal swales) of this community have hydric soils.

Ecological Community No.2 - South Florida Coastal Strand

The South Florida Coastal Strand ecological community occurs along the Atlantic Ocean south of Sebastian Inlet in Indian River County to Key West in Monroe County and along the Gulf of Mexico from the Anclote River in Pinellas County to Naples in Collier County. These communities parallel coastal beaches, bays, and sounds and encompass the area affected by salt spray from the ocean, gulf, and salt water bays. Few areas (mostly interdunal swales) of this community have hydric soils.

Ecological Community No.3 - Sand Pine Scrub

The Sand Pine Scrub ecological community occurs throughout Florida. It is most commonly found inland from the coast and in the central portion of the state. The largest areas are in the Ocala National Forest in and around Marion County. It is easily identified by the very droughty soils, rolling topography, and the even height stands of sand pine or by the dense stands of scrub oak vegetation. This community does not have hydric soils.

Ecological Community No.4 - Longleaf Pine -Turkey Oak Hills

The Longleaf Pine - Turkey Oak Hills ecological community occurs throughout Florida. It is most commonly found north of Lake Placid to Georgia and in the Florida panhandle inland from the coast. It is easily identified by the droughty soils, rolling topography, and the longleaf pine and turkey oak vegetation; palmetto shrubs and small hollies are common. Hydric soils are absent in this ecological community.

Ecological Community No.5 - Mixed Hardwood and Pine

The Mixed Hardwood and Pine ecological community occurs in the Florida's panhandle and east to Madison County. It is most commonly found north Interstate 10 in the Florida panhandle inland from the coast. This community is readily identified by the mixed hardwood and pine vegetation occurring on well drained but non droughty soils. It contains most of the prime farmland of Florida. Few areas of this community have hydric soils.

Ecological Community No. 6 - South Florida Flatwoods

The South Florida Flatwoods ecological community occurs throughout south and central Florida. The northern limit of its occurrence is approximately a line from Levy County on the west to St. Johns County on the east. This community covers more land area than any other in Florida. It is easily identified by the seasonally wet soils, flat topography, and the pine and palmetto vegetation. Approximately 30 percent of this community has hydric soils. The hydric soil areas are usually adjacent to wetter communities such as Sloughs and Freshwater Marsh and Ponds.

Ecological Community No.7 - North Florida Flatwoods

The North Florida Flatwoods ecological community occurs throughout north and west Florida. The southern limit of its occurrence is approximately a line from Levy County on the west to St. Johns County on the east. It is easily identified by the seasonally wet soils, flat topography, and the pine and palmetto vegetation. Approximately 40 percent of this community has hydric soils in north Florida. The hydric soil areas are usually adjacent to wetter communities such as Sloughs and Freshwater Marsh and Ponds. Due to the increase in rainfall and corresponding wetter vegetation, a higher percentage of this community has hydric soils in west Florida.

Ecological Community No.8 - Cabbage Palm Flatwoods

The Cabbage Palm Flatwoods ecological community occurs throughout south Florida and, to a limited extent in, central Florida. The northern limit of its occurrence is approximately a line from Levy County on the west to St. Johns County on the east. It is easily identified by the seasonally wet soils, flat topography, and the cabbage palm and palmetto vegetation. Appropriately 40 percent of this community has hydric soils.

Ecological Community No.9 - Everglades Flatwoods

The Everglades Flatwoods ecological community occurs only in Monroe, Collier, Dade, and Henry counties of south Florida. The largest areas are west of Miami and east of Flamingo in Dade County and on Big Pine Key in Monroe County. It is easily identified by the seasonally wet, shallow to limestone soils, flat topography, and the South Florida slash pine and palmetto vegetation. Outcropping of limestone bedrock is common. Approximately 30 percent of this community has hydric soils.

Ecological Community No.10 - Cutthroat Seeps

The Cutthroat Seeps ecological community occurs in Polk and Highlands Counties and, to a lesser extent, adjacent counties. It is easily identified by the wet soils, nearly level to gently sloping topography, and the slash pine and cutthroat grass vegetation. Most areas of this community have hydric soils.

Ecological Community No. 11 - Upland Hardwood Hammocks

The Upland Hardwood Hammocks ecological community occurs from Madison and Hamilton Counties in the north to Polk and Pasco Counties in the south, most commonly near Gainesville, Brooksville, and Ocala. It is readily identified by the moist soils, rolling topography, and vegetation dominated by shade tolerant hardwood and with few pine. Few areas of this community have hydric soils.

Ecological Community No.12 - Wetland Hardwood Hammocks

The Wetland Hardwood Hammocks ecological community occurs from Wakulla County to Pasco County inland from the gulf. The largest area is near the Waccasassa River in Levy County. It is readily identified by the wet soils, level topography, and vegetation dominated by water tolerant evergreen conifer and evergreen hardwood trees. This community is dominated by hydric soils.

Ecological Community No.13 - Cabbage Palm Hammocks

The Cabbage Palm Hammocks ecological community occurs throughout central and south Florida. The largest areas are east and west of Lake Okeechobee in Glades and Martin Counties, west of the beaches in Volusia County, and west of the St. Johns River in Seminole and Orange Counties. It is readily identified by the seasonally wet soils, level to gently sloping topography, and vegetation dominated by cabbage palms and scattered oak. Approximately 40 percent of this community has hydric soils.

Ecological Community No.14 - Tropical Hammocks

The Tropical Hammocks ecological community occurs only in south Florida. The largest areas are on Key Largo and other keys in Monroe County. This community also occurs in south Dade County. It is readily identified by the somewhat poorly drained to well drained organic soils, nearly level topography, and the dense stands of small to medium-sized trees and shrubs which give areas a "jungle like" appearance. Although the soils are organic, this community does not have hydric soils. The organic material is leaf and other vegetative litter that has become soil material beneath the dense stand of trees and shrubs.

Ecological Community No.15 - Oak Hammocks

The Oak Hammocks ecological community occurs throughout central Florida south to Lake Okeechobee and west to Tallahassee. The largest areas are in Marion and Sumter Counties. It is readily identified by the moist soils, nearly level topography, and the dense stands of laurel oak and live oak trees. Approximately 30 percent of this community has hydric soils.

Ecological Community No.16 - Scrub Cypress

The Scrub Cypress ecological community occurs in Monroe, Collier, Broward, and Dade Counties in south Florida, dominantly in Big Cypress National Preserve. One additional large area is in Tates Hell Swamp in Franklin County. This community is easily identified by the wet, shallow to limestone soils and marl soils, level topography, and vegetation dominated by marsh grasses and dwarf cypress. The area in Tates Hell Swamp has deep sandy soils. This community is dominated by hydric soils.

Ecological Community No.17 - Cypress Swamp

The Cypress Swamp ecological community occurs throughout Florida along rivers, streams, and lakes; or as isolated "cypress domes" and "cypress heads". This community is easily identified by the very poorly drained soils, level to depressional topography, and the normally pure stand of cypress trees with few shrubs and no grasses. This community is dominated by hydric soils.

Ecological Community No.18 - Salt Marsh

The Salt Marsh ecological community occurs along the Atlantic and Gulf coasts and inland along tidal streams. One large continuous area extends from Tarpon Springs in Pinellas County to St. Marks National Wildlife Refuge in Wakulla County. This community is very easily identified by the very poorly drained organic soils, level topography, and the vegetation that is grasses, rushes, and sedges. This community is dominated by hydric soils.

Ecological Community No.19 - Mangrove Swamps

The Mangrove Swamp ecological community occurs along saltwater shorelines south of Pasco County on the Gulf coast and south of Volusia County on the Atlantic coast. The Ten Thousand Islands area of Monroe and Collier Counties is the largest area of this community in Florida and, perhaps, the world. This community is very easily identified by the very poorly drained organic and marl soils, level topography, and the mangrove monoculture. This community is dominated by hydric soils.

Ecological Community No.20 - Bottomland Hardwoods

The Bottomland Hardwoods ecological community occurs within flood plains of rivers and streams of west Florida. The forests along the Apalachicola River are typical of this community. It is readily identified by the seasonally flooded soils, level topography, and the myriad of hardwood trees. Bottomland Hardwoods have an open park-like appearance. Approximately 50 percent of this community is dominated by hydric soils.

Ecological Community No.21 - Swamp Hardwoods

The Swamp Hardwoods ecological community occurs throughout Florida along rivers, streams, and poorly defined drainageways. It is readily identified by the very poorly drained soils, level topography, the deciduous hardwood trees, and dense undergrowth. Ferns and other shade tolerant herbaceous plants are common. This community is dominated by hydric soils.

Ecological Community No.22 - Scrub Bog -Bay Swamp

The Scrub Bog -Bay Swamp ecological community occurs throughout Florida on hillsides, in depressions, ravines, and along poorly defined drainageways. This community is readily identified by the very poorly drained soils, level to sloping topography, and evergreen shrub vegetation. Vegetation is dominantly less than twenty feet high. This community is dominated by hydric soils.

Ecological Community No.23 - Pitcher Plant Bogs

The Pitcher Plant Bogs ecological community occurs in north Florida, primarily in the panhandle. This community appears as an open expanse of grasses, sedges, and picture plants with scattered, stunted pine and cypress. It is readily identified by the poorly drained soils, level to sloping topography, and insect-eating plants. This community is dominated by hydric soils.

Ecological Community No.24 - Saw grass Marsh

The Saw grass Marsh ecological community occurs in one large almost continuous area south of Lake Okeechobee County and extending into Dade, Monroe, and Collier Counties. It also occurs as small isolated areas in other parts of south Florida and, to a lesser extent, north Florida. This community is very easily identified by the very poorly drained organic and many soils, level topography, and the saw grass monoculture. This community is dominated by hydric soils.

Ecological Community No.25 - Freshwater Marsh and Ponds

The Freshwater Marsh and Ponds ecological community occurs throughout Florida. The largest area is on the flood plain of the Kissimmee River. This community appears as an open expanse of grasses, sedges, and rushes. It is readily identified by the very poorly drained, and almost continuously, wet soils, level topography, and absence of trees and shrubs. This community is dominated by hydric soils.

Ecological Community No.26 - Slough

The Slough ecological community occurs throughout peninsular Florida. The largest areas are in Charlotte, Lee, and Collier Counties. This community appears as a nearly open expanse of grasses, sedges, and rushes with scattered pine trees. The percentage of tree and other woody vegetation cover increases from south to north Florida. This community is readily identified by the poorly drained soils that are covered with a few inches of slowly moving water during wet seasons, the level topography, and the absence of shrubs. Some areas in North Florida are dominated by trees; these areas are also covered with a few inches of slowly moving water during wet seasons. This community is dominated by hydric soils.

Hydric Soils of Florida

From all of the attributes which can be applied to soils one of the most requested is the question of hydric vs. non hydric. For that reason on the next few pages hydric soils are discussed. This discussion includes the definition, criteria, and field identification of hydric soils.

Hydric Soils of Florida

Introduction

Wetlands possess three essential characteristics: (1) hydrophytic vegetation, (2) hydric soils, and (3) wetland hydrology (Cowardin, et al., 1979; Tiner, 1985; Environmental Laboratory, 1987.). Most agencies consider that technical criteria for each of the characteristics must be met for an area to be identified as a wetland. Therefore the synonymy between hydric soils and wetlands is implied. Undrained hydric soils with natural vegetation should support a dominant population of ecologically facultative wetland and obligate wetland plant species.

Definition of Hydric Soils

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (USDA, Soil Conservation Service, 1987, as revised). This definition identifies soils that are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

Hydric Soil Criteria

The above definition identifies in generalities those properties that are associated with wetness. However, in order to determine whether a specific soil is or is hydric, specific information such as inundation depth and duration is needed. For that reason, criteria which identify those soil properties unique to hydric soils have been established. These criteria are utilized to identify phases of soil series that normally are associated with wetlands. The criteria used in Florida are those criteria established by the NTCHS (USDA, Soil Conservation Service, 1991, as revised)

By comparing the hydric soil criteria with data in published soil surveys, county lists of hydric soils are developed. These individual lists are available at local field offices of the Natural Resources Conservation Service. A state list of hydric soils is available by combining the county lists. Hydric soil lists when used in conjunction with the published soil survey series are excellent land use planning tools. However, an on-site examination is always required when making a hydric soil determination for a specific site. A specific area is not necessarily considered to have hydric soils just because it is dominated by soils on any hydric soils list. Hydric soils must be field identified by verifying the presence of one or more of the hydric soil indicators.

Field Identification of Hydric Soils

Hydric Soil Indicator Concept

The Hydric Soil Indicator concept is based on the premise that hydric soils develop and exhibit characteristic morphologies that result from repeated periods of saturation and/or inundation for more than a few days. Saturation or inundation when combined with anaerobic microbiological activity in the soil causes a depletion of oxygen. This anaerobiosis promotes biogeochemical processes such as the accumulation of organic matter and the reduction, translocation, and/or accumulation of iron and other reducible elements. These processes result in characteristic morphologies which persist in the soil during both wet and dry periods, making them particularly useful for identifying hydric soils.

Hydric soil indicators are formed predominantly by the accumulation or loss of iron, manganese, sulfur, or carbon compounds. The presence of hydrogen sulfide gas (rotten egg odor) is a strong indicator of a hydric soil, but this indicator is found in only the wettest sites containing sulfur.

Hydric Soil Indicator Identification Procedure

To document a hydric soil, dig a hole and describe the soil profile to a depth of approximately 50 cm (20 inches). Using the completed soil description specify which of the Hydric Soil Indicators have been matched. Deeper examination of soil may be required where Hydric Soil Indicators are not easily seen within 50 cm (20 in.) of the surface. It is always recommended that soils be excavated and described as deep as necessary to make reliable interpretations. Examination to less than 50 cm (20 in.) may suffice in soils with surface horizons of organic material or mucky mineral material because these shallow organic accumulations only occur in hydric soils. Depths used in are measured from the muck or mineral soil surface unless otherwise indicated. All colors refer to moist Munsell colors.

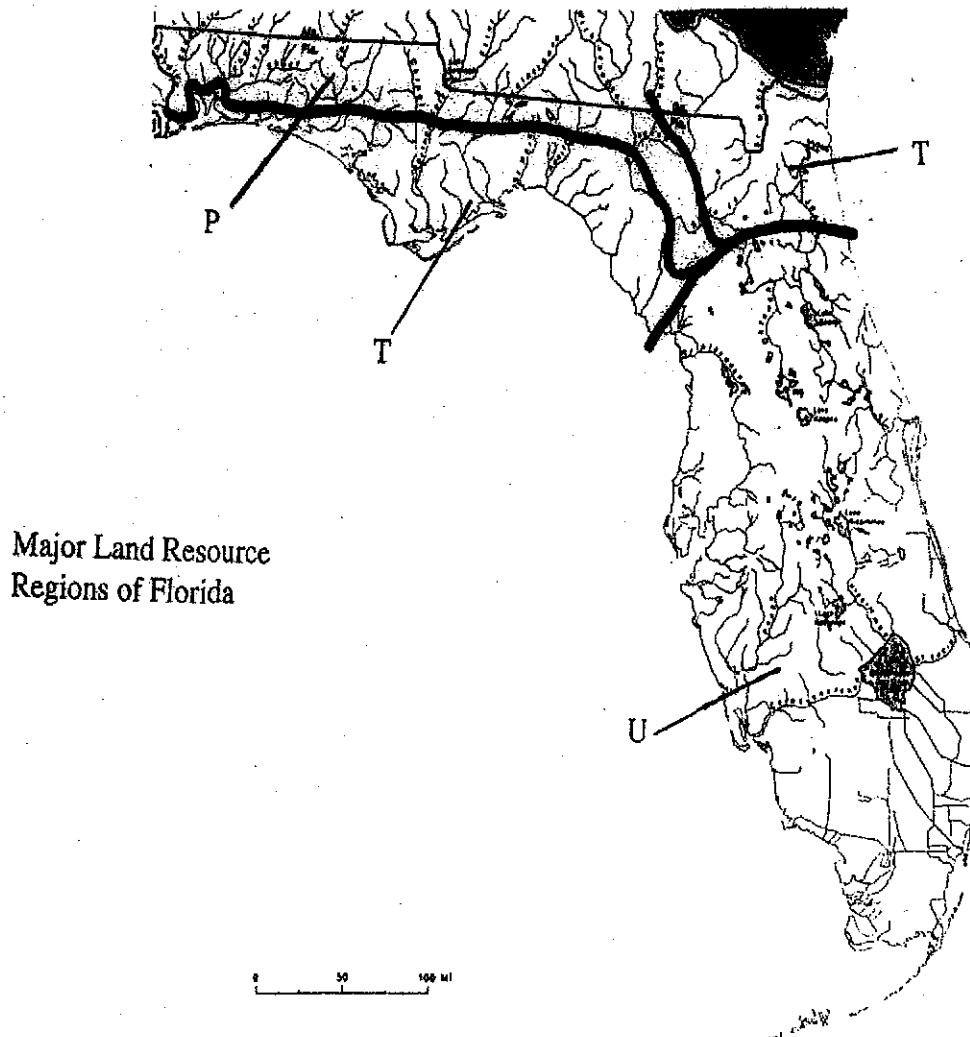
Hydric Soil Indicator Schema

Each of the Hydric Soil Indicators is structured as follows:

1. Alpha-numeric Listing
2. Short Name
3. Applicable Land Resource Regions (LRRs)
4. Description of the Field Indicator
5. User Notes

For example, A1 indicates the first indicator for all soils; Histosol is the short name; the indicator is for use in all LRRs; classifies as a Histosol, except Folists is the indicator description; helpful User Notes are added. Unless otherwise indicated, all mineral layers above any of the Indicators have dominant chroma 2 or less, or the layer(s) with dominant chroma of more than 2 is less than 15 cm (6 in.) thick. Also, unless otherwise indicated, nodules and concretions are not considered to be redox concentrations.

The indicators are designed to be regionally specific. Each indicator states the Land Resource Regions (LRRs) in which it can be used. The geographic extent of LRRs is defined in USDA Ag. Handbook 296 (USDA, SCS, 1981) and displayed for Florida below.



Land Resource Region P is typified by gently sloping to steep uplands. Dominate soils are sandy excessively well drained soils like those of Eglin Air Force Base and in Suwannee County and well drained red and yellow soils that extend from Pensacola to Tallahassee. Land Resource Regions T and U have similar soils. The regions are separated climatically by a line from Cedar Key through Alachua County to St. Augustine.

Indicators

Hydric soil indicators are divided into two groups. The first group has those indicators normally used to delineate hydric soils. These normally occur at the hydric soil boundary. The second group of indicators are often used to identify hydric soils but, because they are maximum expressions of anaerobiosis, they are rarely used for delineation purposes.

Hydric Soil Delineation Indicators for All Soils

These indicators are to be used for all soils regardless of texture.

A5. Stratified Layers. *For use in all LRRs.* Several stratified layers starting within the upper 15 cm (6 inches) of the soil surface. One or more of the layers has value 3 or less with chroma 1 or less and/or it is muck, mucky peat, peat, or mucky modified mineral texture. The remaining layers have chroma 2 or less.

Stratified Layers User Notes: Use of this indicator may require assistance from a trained soil scientist with local experience. The minimum organic carbon content of at least one layer of this indicator is slightly less than required for indicator A7 (Mucky Modified Mineral Texture); at least 70 percent of soil material is covered, coated, or similarly masked with organic matter. An undisturbed sample must be observed. Individual strata are dominantly less than 2.5 cm (1 inch) thick. A hand lens is an excellent tool to aid in the identification of this indicator. Many alluvial soils have stratified layers at greater depths; these are not hydric soils. Many alluvial soils have stratified layers at the required depths but lack chroma 2 or less; these do not fit this indicator. Stratified Layers occur in any type soil material.

A6. Organic Bodies. *For use in all LRRs.* Presence of 2% or more organic bodies of muck or a mucky modified mineral texture, approximately 1 to 3 cm (0.5 to 1 inches) in diameter, starting within 15 cm (6 inches) of the soil surface. In some soils the organic bodies are smaller than 1 cm.

Organic Bodies User Notes: The percent organic carbon in organic bodies is the same as in the Muck or Mucky Texture Indicators. This indicator includes the indicator previously named "accretions" (Florida Soil Survey Staff, 1992). Many organic bodies lack the required amount of organic carbon and are not indicative of hydric soils. The content of organic carbon should be known before this indicator is used. Organic bodies of hemic (mucky peat) and/or fibric (peat) soil materials do not qualify as this indicator. Material consisting of partially decomposed root tissue does not qualify as the indicator.

A7. 5 cm Mucky Mineral. *For use in all LRRs.* A layer of mucky modified mineral soil material 5 cm (2 inches) or more thick starting within 15 cm (6 inches) of the soil surface.

5 cm Mucky Mineral User Notes: "Mucky" is a USDA texture modifier for mineral soils. The organic carbon content is at least 5 and ranges to as high as 18 percent. The percentage requirement is dependent upon the clay content of the soil; the higher the clay content, the higher the organic carbon requirement. An example is mucky fine sand, which has at least 5 percent organic carbon but not more than about 12 percent organic carbon. Another example is mucky sandy loam, which has at least 7 percent organic carbon but not more than about 14 percent organic carbon.

A8. Muck Presence. *For use in LRR U.* A layer of muck with value 3 or less and chroma 1 or less within 15 cm (6 inches) of the soil surface.

Muck Presence User Notes: The presence of muck of any thickness within 15 cm (6 inches) is the only requirement. Normally this expression of anaerobiosis is at the soil surface; however, it may occur at any depth within 15 cm (6 inches). Muck is sapric soil material with at least 12 to 18 percent organic carbon. Organic soil material is called muck (sapric soil material) if virtually all of the material has undergone sufficient decomposition such that plant parts can not be identified. Hemic (mucky peat) and fibric (peat) soil materials do not qualify. Generally muck is black and has a "greasy" feel; sand grains should not be evident.

A9. 1 cm Muck. *For use in LRRs P, and T.* A layer of muck 1 cm (0.5 inches) or more thick with value 3 or less and chroma 1 or less starting within 15 cm (6 inches) of the soil surface.

1 cm Muck User Notes: Unlike Indicator A8 (Muck Presence) there is a minimum thickness requirement of 1 cm. Normally this expression of anaerobiosis is at the soil surface; however, it may occur at any depth within 15 cm (6 inches). Muck is sapric soil material with at least 12 to 18 percent organic carbon. Organic soil material is called muck (sapric soil material) if virtually all of the material has undergone sufficient decomposition to limit recognition of the plant parts. Hemic (mucky peat) and fibric (peat) soil materials do not qualify. Generally muck is black and has a "greasy" feel; sand grains should not be evident.

A11. Depleted Below Dark Surface. *For use in all LRRs.* A layer with a depleted or gleyed matrix that has 60% or more chroma 2 or less starting within 30 cm (12 inches) of the soil surface that has a minimum thickness of either:

a. 15 cm (6 inches), or

b. 5 cm (2 inches) if the 5 cm (2 inches) consists of fragmental soil material.

Loamy/clayey layer(s) above the depleted or gleyed matrix must have value 3 or less and chroma 2 or less. Any sandy material above the depleted or gleyed matrix must have value 3 or less, chroma 1 or less, and at least 70% of the visible soil particles must be covered, coated or similarly masked with organic material.

Depleted Below Dark Surface User Notes: This indicator often occurs in Mollisols but also applies to soils with umbric epipedons and dark colored ochric epipedons. For soils with dark colored epipedons greater than 30 cm (12 inches) thick, use Indicator A12. Redox concentrations

including iron/manganese soft masses and/or pore linings are required in soils with matrix colors of 4/1, 4/2, and 5/2. A, E and calcic horizons may have low chromas and high values and may therefore be mistaken for a depleted matrix; however, they are excluded from the concept of depleted matrix unless common or many, distinct or prominent redox concentrations as soft masses or pore linings are present.

A12. Thick Dark Surface. *For use in all LRRs.* A layer at least 15cm (6 inches) thick with a depleted or gleyed matrix that has 60% or more chroma 2 or less starting below 30cm (12 inches) of the surface. The layer (s) above the depleted or gleyed matrix must have value 2.5 or less and chroma 1 or less to a depth of at least 30cm (12 inches) and value 3 or less and chroma 1 or less in any remaining layers above the depleted or gleyed matrix. Any sandy material above the depleted or gleyed matrix must have at least 70% of the visible soil particles covered, coated, or similarly masked with organic material.

Thick Dark Surface User Notes: This indicator has a black layer 30 cm (12 inches) or more thick and has value 3 or less, chroma 1 or less in any remaining layers immediately above a depleted matrix or gleyed matrix. This indicator is most often associated with overthickened soils in concave landscape positions. Redox concentrations including iron/manganese soft masses and/or pore linings are required in soils with matrix colors of 4/1, 4/2, and 5/2. A, E and calcic horizons may have low chromas and high values and may therefore be mistaken for a depleted matrix; however, they are excluded from the concept of depleted matrix unless common or many, distinct or prominent redox concentrations as soft masses or pore linings are present.

Hydric Soil Delineation Indicators for Sandy Soils

These indicators are to be used for soil materials with a USDA texture of loamy fine sand and coarser.

S5. Sandy Redox. *For use in all LRRs.* A layer starting within 15 cm (6 inches) of the soil surface that is at least 10 cm (4 inches) thick, and has a matrix with 60% or more chroma 2 or less with 2% or more distinct or prominent redox concentrations as soft masses and/or pore linings.

Sandy Redox User Notes: Distinct and prominent are defined in the Glossary. Redox concentrations include iron and manganese masses (reddish mottles) and pore linings. Included within this concept of redox concentrations are iron/manganese bodies as soft masses with diffuse boundaries. The iron/manganese masses are 2 to 5 mm in size and have value 3 or less and chroma 3 or less; most commonly they are black. Iron/manganese masses should not be confused with concretions and nodules associated with plinthitic or relict concretions. Common to many redox concentrations are required.

S6. Stripped Matrix. *For use in all LRRs.* A layer starting within 15 cm (6 inches) of the soil surface in which iron/manganese oxides and/or organic matter have been stripped from the

matrix exposing the primary base color of soil materials. The stripped areas and translocated oxides and/or organic matter form a faint diffuse splotchy pattern of two or more colors. The stripped zones are 10% or more of the volume; they are rounded and approximately 1 to 3 cm (0.5 to 1 inches) in diameter.

Stripped Matrix User Notes: This indicator includes the indicator previously named "polychromatic matrix" as well as the term "streaking." Common to many areas of stripped (uncoated) soil materials are required. The stripped areas are approximately 1 to 3 cm (0.5 to 1 inches) in size; they may be smaller. Commonly the splotches of color have value 5 or more and chroma 1 and/or 2 (stripped) and chroma 3 and/or 4 (unstripped). The matrix may lack the 3 and/or 4 chroma material. The mobilization and translocation of the oxides and/or organic matter is the important process and should result in splotchy coated and uncoated soil areas.

S7. Dark Surface. For use in all LRRs. A layer 10 cm (4 inches) or more thick starting within the upper 15 cm (6 inches) of the soil surface with a matrix value 3 or less and chroma 1 or less. At least 70% of the visible soil particles must be covered, coated, or similarly masked with organic material. The matrix color of the layer immediately below the dark layer must have chroma 2 or less.

Dark Surface User Notes: The organic carbon content of this indicator is slightly less than required for "mucky." An undisturbed sample must be observed. A 10X or 15X hand lens is an excellent tool to help aid this decision. Many wet soils have a ratio of about 50 percent soil particles that are covered or coated with organic matter and about 50 percent uncoated or uncovered soil particles, giving the soil a salt and pepper appearance. Where the percent of coverage is less than 70 percent, a Dark Surface indicator is not present.

S8. Polyvalue Below Surface. For use in LRRs T and U. A layer with value 3 or less and chroma 1 or less starting within 15 cm (6 inches) of the soil surface underlain by a layer(s) where translocated organic matter unevenly covers the soil material forming a diffuse splotchy pattern. At least 70% of the visible soil particles in the upper layer must be covered, coated, or masked with organic material. Immediately below this layer, the organic coating occupies 5% or more of the soil volume and has value 3 or less and chroma 1 or less. The remainder of the soil volume has value 4 or more and chroma 1 or less to a depth of 30 cm (12 inches) or to the spodic horizon, whichever is less.

Polyvalue Below Surface User Notes: This indicator describes soils with a very dark gray or black surface or near surface layer less than 10 cm (4 inches) thick underlain by a layer where organic matter has been differentially distributed within the soil by water movement. The mobilization and translocation of organic matter results in splotchy coated and uncoated soil areas as described in the Sandy Redox and Stripped Matrix Indicators except that for S8 the whole soil is in shades of black and gray. The chroma 1 or less is critical because it limits application of this indicator to only those soils which are depleted of iron. This indicator includes the indicator previously termed "streaking."

S9. Thin Dark Surface. For use in all LRRs. A layer 5 cm (2 inches) or more thick within the upper 15 cm (6 inches) of the surface, with value 3 or less and chroma 1 or less. At least

70% of the visible soil particles in this layer must be covered, coated, or masked with organic material. This layer is underlain by a layer(s) with value 4 or less and chroma 1 or less to a depth of 30 cm (12 inches) or to the spodic horizon, whichever is less.

Thin Dark Surface User Notes: This indicator describes soils with a very dark gray or black near-surface layer at least 5 cm (2 inches) thick underlain by a layer where organic matter has been carried downward by flowing water. The mobilization and translocation of organic matter results in an even distribution of organic matter in the eluvial (E) horizon. The chroma 1 or less is critical because it limits application of this indicator to only those soils which are depleted of iron. This indicator commonly occurs in hydric Spodosols; however, a spodic horizon is not required.

Hydric Soil Delineation Indicators for Loamy and Clayey Soils

These indicators are to be used for soil materials with a USDA texture of loamy very fine sand and finer.

F2. Loamy Gleyed Matrix. *For use in all LRRs except W, X, and Y.* A gleyed matrix that occupies 60% or more of a layer starting within 30 cm (12 inches) of the soil surface.

Loamy Gleyed Matrix User Notes: Gley colors are not synonymous with gray colors. Gley colors are those colors that are found on the gley pages (Gretag/Macbeth, 2000). They have hue N, 10Y, 5GY, 10GY, 5G, 10G, 5BG, 10BG, 5B, 10B, or 5PB, with value 4 or more. The gleyed matrix only has to be present within 30 cm (12 inches) of the surface. Soils with gleyed matrices are saturated for a significant duration; this is why no thickness of the layer is required.

F3. Depleted Matrix. *For use in all LRRs.* A layer with a depleted matrix that has 60% or more chroma 2 or less that has a minimum thickness of either:

- a. 5 cm (2 inches) if 5 cm (2 inches) is entirely within the upper 15 cm (6 inches) of the soil, or
- b. 15 cm (6 inches) and starts within 25 cm (10 inches) of the soil surface.

Depleted Matrix User Notes: Redox concentrations including iron/manganese soft masses and/or pore linings are required in soils with matrix colors of 4/1, 4/2, and 5/2. A, E and calcic horizons may have low chromas and high values and may therefore be mistaken for a depleted matrix; however, they are excluded from the concept of depleted matrix unless common or many, distinct or prominent redox concentrations as soft masses or pore linings are present. The low chroma matrix must be due to wetness and not a relict or parent material feature.

F6. Redox Dark Surface. *For use in all LRRs.* A layer at least 10 cm (4 inches) thick entirely within the upper 30 cm (12 inches) of the mineral soil that has:

- a. matrix value 3 or less and chroma 1 or less and 2% or more distinct or prominent redox concentrations as soft masses or pore linings, or
- b. matrix value 3 or less and chroma 2 or less and 5% or more distinct or prominent redox concentrations as soft masses or pore linings.

Redox Dark Surface User Notes: Redox concentrations in high organic matter mineral soils with dark surfaces are often difficult to see. The organic matter "masks" some or all of the concentrations that may be present. Careful examination is required in order to see what are often brownish "mottles" in the darkened materials. In some instances, drying of the samples makes the concentrations (if present) easier to see. Dried colors, if used, need to have matrix chromas of 1 or 2 and the redox concentrations need to be distinct or prominent. In soils which are wet due to subsurface saturation, the layer immediately below the dark epipedon should have a depleted or gleyed matrix. Soils which are wet due to ponding or shallow perched layer of saturation may not always have a depleted/gleyed matrix below the dark surface. It is recommended that delineators evaluate the hydrologic source and examine and describe the layer below the dark colored epipedon when applying this indicator. Redox concentrations including iron/manganese soft masses and/or pore linings are required in soils with matrix colors of 4/1, 4/2, and 5/2. A, E and calcic horizons may have low chromas and high values and may therefore be mistaken for a depleted matrix; however, they are excluded from the concept of depleted matrix unless common or many, distinct or prominent redox concentrations as soft masses or pore linings are present.

F7. Depleted Dark Surface. *For use in all LRRs except W, X, and Y; for testing in LRRs W, X, and Y.* Redox depletions, with value 5 or more and chroma 2 or less, in a layer at least 10 cm (4 inches) thick entirely within the upper 30 cm (12 inches) of the mineral soil that has:

- a. matrix value 3 or less and chroma 1 or less and 10% or more redox depletions, or
- b. matrix value 3 or less and chroma 2 or less and 20% or more redox depletions.

Depleted Dark Surface User Notes: Care should be taken not to mistake mixing of an E or calcic horizon into the surface layer as depletions. The "pieces" of E and calcic horizons are not redox depletions. Knowledge of local conditions is required in areas where E and/or calcic horizons may be present. In soils which are wet due to subsurface saturation, the layer immediately below the dark surface should have a depleted or gleyed matrix. Redox depletions should have associated microsites redox concentrations that occur as Fe pore linings or masses within the depletion(s) or surrounding the depletion(s).

F8. Redox Depressions. *For use in all LRRs.* In closed depressions subject to ponding, 5% or more distinct or prominent redox concentrations as soft masses or pore linings in a layer 5 cm (2 inches) or more thick entirely within the upper 15 cm (6 inches) of the soil surface.

Redox Depressions User Notes: This indicator occurs on depressional landforms such as: vernal pools, playa lakes, rainwater basins, "Grady" ponds, and potholes: not micro-depressions on convex or plane landscapes.

F10. Marl. *For use in LRR U.* A layer of marl with a value 5 or more starting within 10 cm (4 inches) of the soil surface.

Marl User Notes: Marl is a limnic material deposited in water by precipitation of CaCO₃ by algae as defined in Soil Taxonomy (USDA, NRCS, Soil Survey Staff. 1999). It has a Munsell value 5

or more and reacts with dilute HCl to evolve CO₂. Marl is not the carbonatic substrate material associated with limestone bedrock. Some soils have materials with all the properties of marl except they lack the required Munsell value. These soils are hydric if the required value is present within 10 cm (4 in) of the soil surface. Normally this indicator occurs at the soil surface.

F12. Iron/Manganese Masses. *For use in LRRs P, and T.* On flood plains, a layer 10 cm (4 inches) or more thick with 40% or more chroma 2 or less, and 2 percent or more distinct or prominent redox concentrations as soft iron/manganese masses with diffuse boundaries. The layer occurs entirely within 30 cm (12 inches) of the soil surface. Iron/manganese masses have value 3 or less and chroma 3 or less; most commonly they are black. The thickness requirement is waived if the layer is the mineral surface layer.

Iron/Manganese Masses User Notes: These iron/manganese masses are usually small (2 to 5 mm in size) and have a value and chroma 3 or less. They can be dominated by manganese and therefore have a color approaching black. The low matrix chroma must be due to wetness and not be a relict or parent material feature. Iron/manganese masses should not be confused with the larger and redder iron nodules associated with plinthite or with concretions that have sharp boundaries. This indicator occurs on flood plains of rivers such as the Apalachicola, Congaree, Mobile, Savannah, and Tennessee Rivers.

F13. Umbric Surface. *For use in all LRRs.* In depressions and other concave landforms, a layer 25 cm (10 inches) or more thick starting within 15 cm (6 inches) of the soil surface in which the upper 15 cm (6 inches) must have value 3 or less and chroma 1 or less, and the lower 10 cm (4 inches) of the layer must have the same colors as above or any other color that has a chroma 2 or less.

Umbric Surface User Notes: Thickness requirements maybe slightly less than those required for an umbric epipedon. Microlows are not considered to be concave landforms. Umbric surfaces on higher landscape positions, such as side slopes dominated by Humic Dystrudepts, are excluded.

Estimating Seasonal High Saturation

Introduction

Seasonal High Water Table (SHWT) is the shallowest depth to free water that stands in an unlined borehole or where the soil moisture tension is zero for a significant period (more than a few weeks). The depth to the estimated SHWT is the used soil interpretation in Florida. This method of estimating SHWT applies only to areas lacking hydrologic modifications. Hydrologic modifications such as ditches and dikes can make the soil either wetter or drier.

By observing soil features, SHWT predictions can be made for hydric soils as well as other soils.

Field Identification of SHWT

The procedure for field Identification of SHWT is based on the assumption that, when soils are wet enough, for a long enough duration to develop SHWT, they should exhibit certain visible properties that are to be used to determine on-site SHWT. All SHWT determinations should be based on field observations of moist soils.

Procedure

SHWT is determined by examining soils with a hydric soil indicator in a freshly dug pit for the SHWT indicators listed below. Presence of the shallowest of the SHWT indicators listed below indicates the depth to SHWT.

1. Soils with the following hydric soil indicators have SHWT at or above the surface:

A1 (Histosol or Histel), A2 (Histic Epipedon), A3 (Black Histic), A4 (Hydrogen Sulfide), A7 (5 cm Mucky Mineral), A8 (Muck Presence) or A9 (1 cm Muck), S4 (Sandy Gleyed Matrix), and F2 (Loamy Gleyed Matrix).

2. Soils with the following hydric soil indicators have SHWT within 6 inches of the surface:

A5 (Stratified Layers), A6 (Organic Bodies), A11 (Depleted Below Dark Surface), A12 (Thick Dark Surface), S5 (Sandy Redox), S6 (Stripped Matrix), S7 (Dark Surface), S8 (Polyvalue Below Surface), S9 (Thin Dark Surface), F10 (Marl), and F13 (Umbric Surface). Depth to SHWT is the depth at which all requirements of a particular indicator are met.

For example, if S6 (Stripped Matrix) starts at 4 inches, depth to SHWT is 4 inches or if S7 (Dark Surface) starts at the soil surface, depth to SHWT is the soil surface.

3. Soils with the following hydric soil indicators have SHWT within 12 inches of the surface:

F3 (Depleted Matrix), F6 (Redox Dark Surface), and F7 (Depleted Dark Surface). Depth to SHWT is the depth at which all requirements of a particular indicator are met.

For example, if F3 (Depleted Matrix) starts at 8 inches, depth to SHWT is 8 inches.

4. Soils with the following hydric soil indicators lack significant saturation but are inundated for long or very long duration

F8 (Redox Depressions) and F12 (Iron/Manganese Masses).

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Land Resource Region P is typified by gently sloping to steep uplands. Dominate soils are sandy excessively well drained soils like those of Eglin Air Force Base and in Suwannee County and well drained red and yellow soils that extend from Pensacola to Tallahassee. Land Resource Regions T and U have similar soils. The regions are separated climatically by a line from Cedar Key through Alachua County to St. Augustine.