Myakka
Florida State Soil

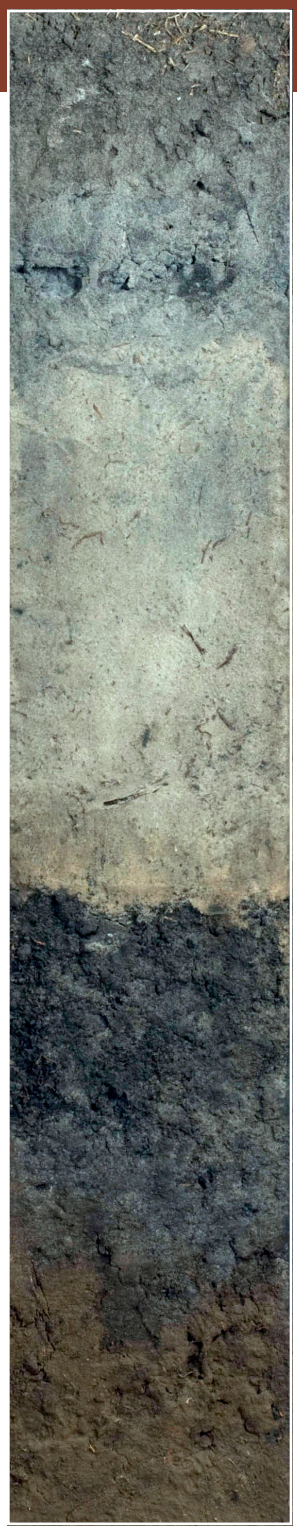

Photo Soil Monolith: Chip Clark/Smithsonian Institution

Soil Science Society of America

Introduction

Many states have a designated state bird, flower, fish, tree, rock, etc. And, many states also have a state soil – one that has significance or is important to the state. The Myakka Fine Sand is the official state soil of Florida. Let's explore how the Myakka is important to Florida.

History

The Florida Association of Professional Soil Classifiers and the Florida Chapter of the Soil and Water Conservation Society worked together to commemorate the state's unique soil legacy. It is very fitting that they adopted Myakka, a typical flatwoods soil, as the state soil to acknowledge the heritage that has made agriculture the state's major industry. Myakka (pronounced My-yakah), an Indian word for Big Waters, is a native soil of Florida and does not occur in any other state. On May 22, 1989, Governor Bob Martinez signed Senate bill number 524 into law, making Myakka Florida's Official State Soil.

What is Myakka Soil?

Every soil can be separated into three separate size fractions called *sand*, *silt*, and *clay*, which makes up the *soil texture*. They are present in all soils in different proportions and say a lot about the character of the soil. Myakka soils contain mostly sand and is a deep, somewhat poorly to poorly drained, acid soil

At the surface of Myakka (**Figure 1**) is the A horizon- it is black in color and can be 15 cm thick (6 in). As you dig deeper, the next layer of soil, the E horizon, goes from 15 to 51 cm (6 – 20 in). This horizon is a very pale brown although it may have streaks of many other colors, especially where old roots have died. This sandy horizon may be acidic and some of the things that were once found in it have been washed down to the next horizon. This next layer, the B horizon, goes from 51 to 91 cm (20-36 in). It can be black to dark reddish brown, strongly acidic, and sandy. From 91 to 142 cm (36-56 in) is an in between horizon, the C/B. It has characteristics of both the C and B horizons. It is brown with dark reddish brown spots. Finally, if you dig deeper than 142 cm (56 in), you will find the C

Fig. 1: Soil profile of a Myakka soil. Credit: Tyler Jones, Florida Association of Environmental Soil Consultants, www.faess.org

Fig. 2. (Above) Location of Myakka Soil in Florida. Credit: Smithsonian Institution's Forces of Change.
Fig 3..(Above right) Florida orange grove in fall. Credit: Adobe Stock

horizon which is dark grayish brown, and like the other horizons, is sandy and acidic. Roots can be found throughout this soil, although most are found in the upper 81 cm (32 in). Not all Myakka soils are exactly the same. Some horizons may be deeper or shallower in different areas. In some cases, these soils may have a layer of muck on the top that is up to 7.5 cm thick (3 in). In areas where this soil is close to limestone, shell deposits, or the beach, Myakka can actually be moderately alkaline (the opposite of being acidic).

Where to dig Myakka

Yes, you can dig a soil. It is called a soil pit and it shows you the *soil profile*. The different horizontal layers of the soil are called *soil horizons*. This does not mean that other types of soil cannot be found there but that the Myakka is the most common. Myakka is the most common soil in the state and can be found in the flatwoods that were covered with pine saw palmetto forests all over the peninsula part of Florida. Early settlers called these areas the flatwoods because the forests were found in nearly level areas. Myakka can also be found in sloughs, depressions, and floodplains as well as tidal areas. Myakka covers more than 1 ½ million acres (600,000 hectares) of land in Florida (**Figure 2**). In all, there are more than 450 named soils (series) in Florida.

Importance

What makes the Myakka soil so important is its use and prevalence in the state. Soils have important socioeconomic value in addition to producing timber, food, and fiber. They have aesthetic values and support open space; wildlife and bird habitats; recreational areas; and serve as an engineering media for constructions purposes. They are instrumental in groundwater recharge and are nature's only acceptable disposal medium. Florida's state soil admirable fulfills most of these functions.

Uses

In general, soils can be used for agriculture (growing foods, raising animals, stables); engineering (roads, buildings, tunnels); ecology (wildlife habitat, wetlands), recreation (ball fields, playground, camp areas) and more. Myakka agriculture is a very important industry in Florida. The state is ranked number one in the nation in the sale of oranges, grapefruit, fresh tomatoes, watermelons, foliage (flowers and ferns), sugarcane, tropical fish, and aquatic plants (**Figure 3**). Florida is ranked nationally as the eighth leading state in overall agricultural sales. Responsible for this phenomenal production is an unusual combination of mild winter climate and well-managed soils. Florida's soils also produce beef and dairy cattle, timber, fruits and nuts, poultry, swine, tobacco, vegetables, and other products.

Buildings, highways, cities and countless other improvements are visual reminders of the long-enduring productivity of Florida's soils. Forest products, agricultural crops and the livestock they nourished finances a sizable portion of these impressive urban improvements.

Limitations

When a soil cannot be used for one or more of the described functions, it is referred to as a limitation. Soil experts, called *Soil Scientists*, studied Myakka soil and identified that it has several limitations. A Myakka soil can be a very wet, acidic, and sandy soil. Because Myakka soils tend to be poorly drained and have high water tables, they often need some kind of modification to control water before they can be used for agriculture. The surface layers of the Myakka soils are also very sandy, which limits their use for recreation and urban development. (**Figure 4**)

Fig. 4. The Myakka soils support most of Florida's pine flatwoods. Credit: Scott Zona

Management

The primary limitation is also the main management concern for the Myakka soils. It is crucial to manage water in Myakka and many other Florida soils. The Myakka soils can be excessively wet during the summer rainy season (June to September) but droughty, or too dry, during the rest of the year. To manage these soils, we need water control systems that remove excess water in the rainy season and add water via irrigation during the dry season.

The sandy nature of the Myakka soils can also make them prone to wind erosion, which is the loss of soil after it is carried away by the wind. To prevent wind erosion, a row of trees or shrubs can be planted around a crop. This row of trees or shrubs is called a windbreak, and it shelters a crop against the force of the wind.

Another important management practice for the Myakka soils is to ensure that fertilizers are appropriately applied. Because the Myakka soils have a sandy texture, they can leach excess nutrients such as nitrogen and phosphorus. Any leached nitrogen and phosphorus can reach the groundwater below the soil and become a source of groundwater contamination. The Florida Department of Agriculture and Consumer Services (FDACS) maintains a set manuals on Best Management Practices (BMPs) for water quality protection in Florida's agriculture industry. Each manual describes numerous activities that farmers can use to prevent leaching of nutrients from their fields.

Myakka Formation

Before there was soil there were rocks and in between, CLORPT. Without CLORPT, there will be no soil. So, what is CLORPT? It is the five major factors that are responsible for forming a soil like the Downer series. It stands for **CL**imate, **O**rganisms, **R**elief, **P**arent material and **T**ime. CLORPT is responsible for the development of soil profiles and chemical properties that differentiate soils. So, the characteristics of Myakka (and all other soils) are determined by the influence of CLORPT. Weathering takes place when environmental processes such as rainfall, freezing and thawing act on rocks causing them to dissolve or fracture and break into pieces. CLORPT then acts on rock pieces, marine sediments and vegetative materials to form soils.

Climate – Temperature and precipitation influence the rate at which parent materials weather and dead plants and animals decompose. They affect the chemical, physical and biological relationships in the soil. North and Central Florida has a humid, subtropical climate. This means there are mild winters, hot summers, and plentiful rainfall.

Organisms – This refers to plants and animal life. In the soil, plant roots spread, animals burrow in, and bacteria break down plant and animal tissue. These and other soil organisms speed up the breakdown of large soil particles into smaller ones. Plants and animals also influence the formation and differentiation of soil horizons. Plants determine the kinds and amounts of *organic matter* that are added to a soil under normal conditions. Animals breakdown complex compounds into small ones and in so doing add organic matter to soil. The plentiful flatwoods plants and trees and the animals that eat them added lots of organic matter to the *topsoil* of the Myakka.

Relief – Landform position or relief describes the shape of the land (hills and valleys), and the direction it faces which makes a difference in how much sunlight the soil gets and how much water it keeps. Deeper soils form at the bottom of the hill rather than at the top because gravity and water move soil particles downhill. Florida is relatively flat, but small changes in elevation have significant impacts due to waterlogging and water availability (**Figure 5**). Slightly lower landform areas in depressions contain as much as 20% more organic matter.

Parent material (C horizon) – Just like people inherit characteristics from their parents, every soil inherits some traits from the material from which it forms. Some parent materials are transported and deposited by glaciers, wind, water, or gravity. Myakka soils are usually underlain by a *spodic* (a specific type of soil layer defined by an accumulation of organic matter), organic stained horizon. Sometimes they are underlain by loamy or clayey materials or limestone.

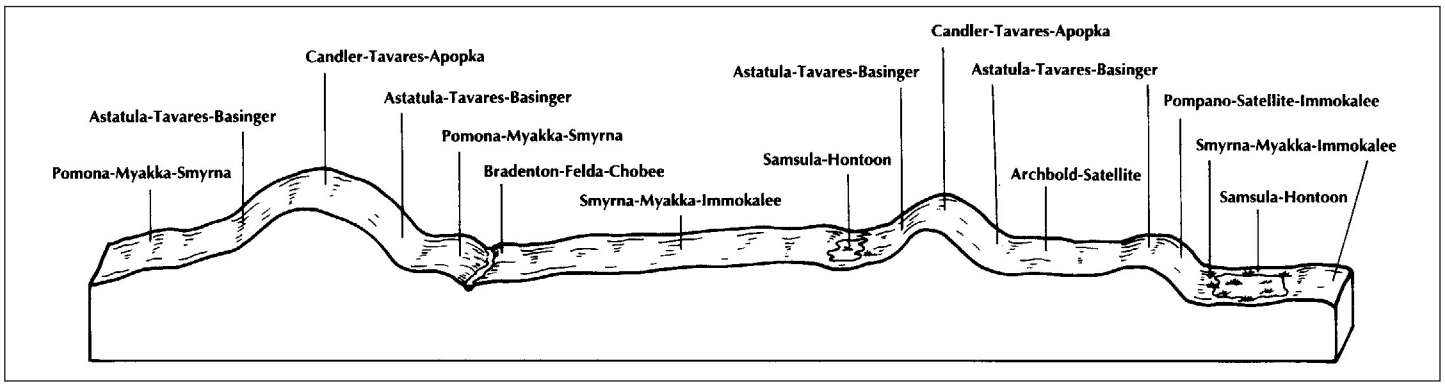

Fig 5. Relationship of Myakka soil to topography. Credit: Polk County Soil Survey

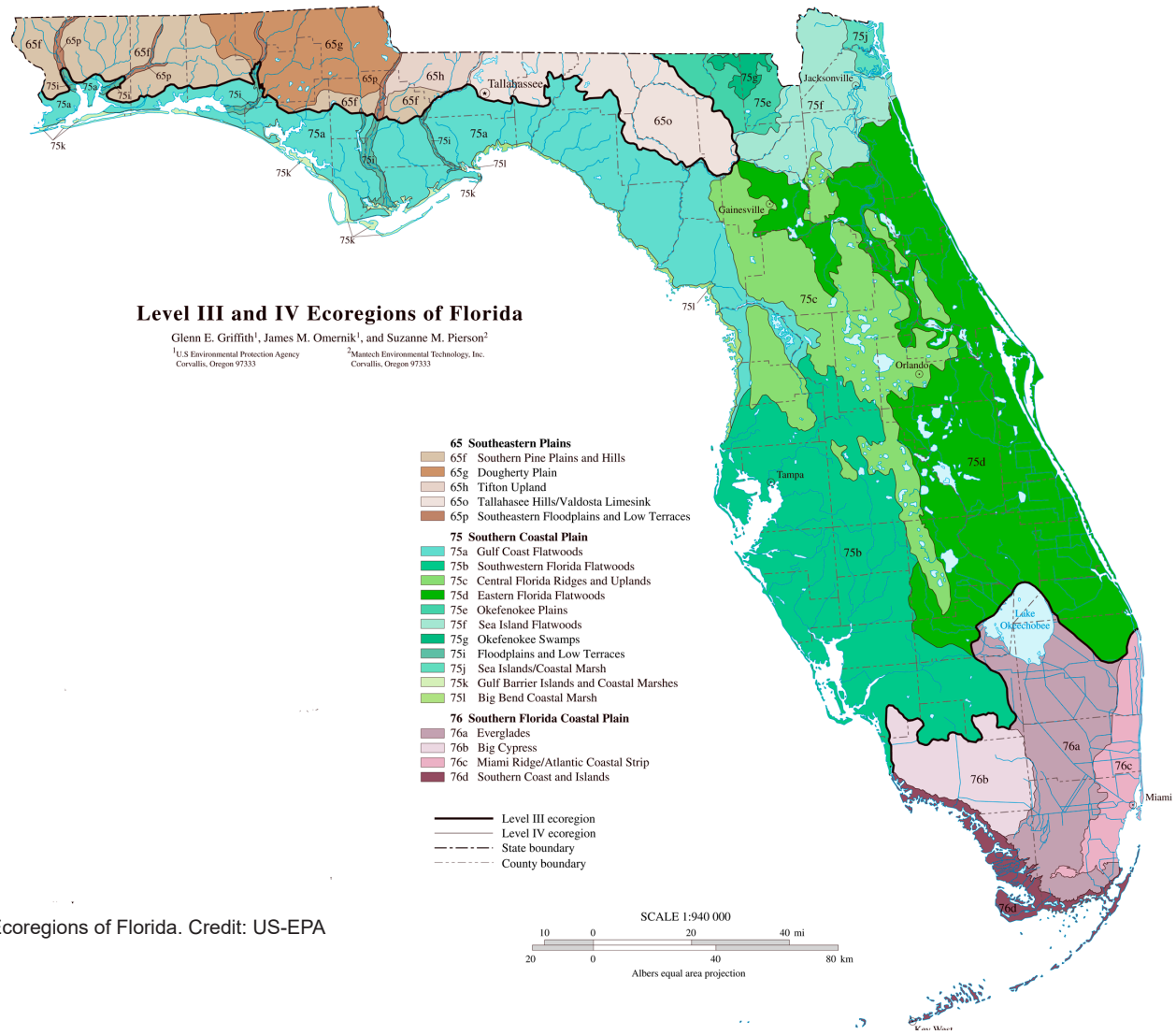

Fig. 6: Ecoregions of Florida. Credit: US-EPA

Time – All the factors act together over a very long period of time to produce soils. As a result, soils vary in age. The length of time that soil material has been exposed to the soil-forming processes makes older soils different from younger soils. Generally, older soils have better defined horizons than younger soils. Less time is needed for a soil profile to develop in a humid and warm area with dense vegetative cover where the Myakka soil is found than in a cold dry area with sparse plant cover. More time is required for the formation of a well-defined soil profile in soils with fine textured material than in soils with coarse-textured soil material.

There are three main ecoregions in Florida (**Figure 6**). Each ecoregion represents an area with similar land cover, climate, and soils. Most of Florida is made up of the Southern Coastal Plain ecoregion, which consists of flat plains with numerous swamps, marshes, and lakes. This region is covered mostly with longleaf-slash pine forests, as well as some oak-gum-cypress forests in low lying areas. Its climate is warm with a long growing season and sandy soils. The Southern Coastal Plain ecoregion is well suited for pasture land and supports much of Florida's cattle industry.

To the north of the Southern Coastal Plain in Florida is the Southeastern Plains ecoregion. This ecoregion has a variety of cropland, forest, woodland, and pasture. The area has been heavily managed for timber, and natural forest species here include pine, hickory, and oak. Even though this region has a long growing period and abundant rainfall, its sandy soils are relatively infertile, or low in nutrients, so it does not have as much agricultural productivity as other parts of the state.

The southernmost part of Florida is made up of the Southern Florida Coastal Plain ecoregion. This is one of the most distinct ecoregions in the United States because of its warm climate, which is almost always frost free. It is characterized by flat plains with wet soils, marshland, and swamp. A warm, dry season from October to May makes this region an important center of winter agriculture in Florida, and sugarcane is also grown extensively here. It is the home of the Florida Everglades, a large area of tropical wetlands that are home to abundant wildlife.

Glossary

Clay: A soil particle that is less than 0.002 mm in diameter. Clay particles are so fine they have more surface area for reaction. They hold a lot of nutrients and water in the soil. A clay soil is a soil that has more than 40% clay, less than 45% sand and less than 40% silt.

Ecoregion: Represents areas with similar biotic and abiotic characteristics which determine the resource potential and likely responses to natural and man-made disturbances. Characteristics such as climate, topography, geology, soils, and natural vegetation define an ecoregion. They determine the type of land cover that can exist and influence the range of land use practices that are possible.

Horizon: see Soil horizons

Organic matter: Material derived from the decay of plants and animals. Always contains compounds of carbon and hydrogen.

Sand: A soil particle between 0.05 and 2.0 mm in diameter. Sand is also used to describe soil texture according to the soil textural triangle, for example, loamy sand.

Silt: A soil particle between 0.002 and 0.05 mm diameter. It is also used to describe a soil textural class.

Soil Horizon: A layer of soil with properties that differ from the layers above or below it.

Soil Profile: The sequence of natural layers, or horizons, in a soil. It extends from the surface downward to unconsolidated material. Most soils have three major horizons, called the surface horizon, the subsoil, and the substratum.

Soil Scientist: A soil scientist studies the upper few meters of the Earth's crust in terms of its physical and chemical properties; distribution, genesis and morphology; and biological components. A soil scientist needs a strong background in the physical and biological sciences and mathematics.

Soil Texture: The relative proportion of sand, slit, and clay particles that make up a soil. Sand particles are the largest and clay particles the smallest. Learn more about soil texture at www.soils4teachers.org/physical-properties.

Spodic: A specific type of soil layer defined by an accumulation of organic matter.

Topsoil: (A horizon) The horizon that formed at the land surface. Mostly weathered minerals from parent material with a little organic matter added.

Additional Resources

Soil! Get the Inside Scoop. David Lindbo and others. Soil Science Society of America, Madison, WI.

Know Soil, Know Life. David L. Lindbo, Deb A. Kozlowski, and Clay Robinson, editors. Soil Science Society of America, Madison, WI.

Soils of Florida. Frank C. Watts and Mary E. Collins. Soil Science Society of America, Madison, WI. https://dl.sciencesocieties.org/publications/books/tocs/acsesspublicati/soilsofflorida

Web Resources

Soils for Teachers—www.soils4teachers.org

Soils for Kids—http://www.soils4kids.org/

Have Questions? Ask a Soil Scientist—https://www.soils.org/ask

Soil Science Society of America—https://www.soils.org/

Natural Resources Conservation Service, Florida Homepage—http://www.nrcs.usda.gov/wps/portal/nrcs/main/fl/soils/

Get the Scoop! Soils Matter Blog: "Florida: Sandbox of the US?"—https://soilsmatter.wordpress.com/2013/12/10/florida-sandbox-of-the-u-s/

Authors: Melanie Szulczewski, Univ. of Mary Washington
Mary Lusk, Univ. of Florida Gulf Coast Research and Education Center

SSSA
Soil Science Society of America

5585 Guilford Road
Madison WI 53711-5801
Tel. 608-273-8080 • Fax 608-273-2021
www.soils.org
www.soils4teachers.org/state-soils

This state soil booklet was developed under the auspices of the Soil Science Society of America's K-12 Committee—their dedication to developing outreach materials for the K-12 audience makes this material possible.