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NEON Site-Level Plot Summary
Ordway-Swisher Biological Station (OSBS)

Document Information

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Site Background

The Ordway Swisher Neon Site (OSBS) is about 20 miles east of Gainesville, FL near the city of Melrose in Putnam Co., FL. The site is in Major Land Resource Area (MLRA) 154 – South Central Florida Ridge. The site consists of about 8,308 acres on landforms that include knolls, ridges, rises, flats, closed depressions, and lakes.

Site Information

Elevation at OSBS ranges from approximately 24 to 46 m (80 to 150 feet) above sea level. The soil parent materials at OSBS are the result of erosional and depositional processes associated with advances and retreat of the sea during Pliocene-Pleistocene time. These materials and landforms are known as Mirren Terraces. Three marine terraces occur within the general area of sampling - Coharie, Sunderland-Okefenokee, and Wicomico. These Terraces are defined by time period and elevation. The name "Coharie" is applied to Pleistocene deposits formed when sea level stood at an altitude 2l5 feet above present, which is the height of the Coharie shoreline or Terrace. The Sunderland-Okefenokee terrace occurs in areas where the sea stood at 170 feet above current sea level. The Wicomico scarp stands at 100 feet above current sea level and the lower limit of the terrace is at 70 feet. The surficial marine sands across the terraces are known as the Anastasia Formation.

At depth, the surficial marine sands are underlain by several marine limestones including the Avon Park Formation and the Ocala Group of Eocene age. The limestone units do not have surface outcrops and do not directly influence soils on the site. The limestones, however, are subject to dissolution that results in a sand-capped karstic topography that is referred to as a karstic marine terrace. The karst processes result is the presence of numerous shallow lakes and closed depression with intervening sloping rises, flats, knolls, and ridges. These landforms, topography, and water table positions are major soil forming factors at OSBS and in the region.

Land use on site is dominated by forest land, natural wetland and/or marshland, and water. In the past, some areas were used as silviculture and possibly rangeland. This area is now a conservation site used for research by the University of Florida. Plant communities are mainly intermixed conifer and hardwood forest, and either grass herbaceous marshland or tree cover

swamp. Major soil series are Adamsville, Apopka, Candler, Placid, Myakka, Okeechobee, and Samsula.

Analysis of Plots for Sampling

The NEON plots occur in a variety of landforms that include lakes, closed depressions, sloping rises, flats, knolls, and ridges on the karstic marine terrace. Vegetation is uniform on each landform position. The subset of NEON plots selected to sample were chosen based on elevation, geomorphology, and vegetative communities. The OSBS site contains 22 soil mapping units (Readle, 1990), and 11 (45%) of these mapping units were sampled. The soil map units sampled at OSBS represent approximately 90% of site area (Table 1). Pedons were described according to the USDA NRCS Field Book for Describing and Sampling Soils (Schoeneberger, et al 2012) and sampled by approved techniques for lab characterization. All pedon descriptions were entered into the NASIS Pedon database. Eleven (11) soil map units at OSBS were not sampled because they contained no NEON plots, or they were of minor extent. The unsampled map units represent 10% of the OSBS site area (Table 2).

Map Unit Symbol	Map Unit Name	GIS Acres	% Total Site Area
1	Candler fine sand, 0 to 5 percent slopes	2,375	28.59
15	Apopka sand, 0 to 5 percent slopes	619	7.46
16	Adamsville sand, 0 to 2 percent slopes	29	0.35
2	Candler fine sand, 5 to 8 percent slopes	1,040	12.51
21	Apopka sand, 5 to 8 percent slopes	348	4.19
27	Samsula muck	705	8.49
43	Placid-Pompano association, frequently flooded	131	1.58
5	Placid fine sand, depressional	508	6.11
63	Okeechobee muck	631	7.60
31	Myakka fine sand, depressional	3	0.04
99	Water	1,061	12.77
	Total	**7,448**	**89.69**

Table 1. Soil map units within the OSBS site that were sampled for characterization.

Map Unit Symbol	Map Unit Name	GIS Acres	% Total Site Area
11	Udorthents, excavated	4	0.05
14	Cassia fine sand	3	0.04
17	Millhopper sand, 0 to 5 percent slopes	72	0.87
18	Lochloosa sand, 0 to 5 percent slopes	43	0.52
25	Narcoossee fine sand	80	0.97
3	Myakka fine sand	62	0.75
30	Hontoon muck	74	0.89
32	Sparr sand, 0 to 5 percent slopes	13	0.16
37	Ona fine sand	61	0.73
44	Candler sand, 12 to 25 percent slopes	23	0.28
6	Tavares fine sand, 0 to 5 percent slopes	421	5.07
	Total	**860**	**10.33**

Table 2. Soil map units within the OSBS site that were not sampled.

The NEON plots selected as sample locations occur in typical settings and as defined in the soil map units. The NEON plots include a wide cross-section of the series named in the map units and similar soils (components or inclusions). For the most part, the soil series identified during sampling are within or near the Range in Characteristics (RIC) of the individual major named soil component. The sample locations were designed to include all geomorphic landform positions across the landscape within the OSBS site.

Plot Findings

A total of twenty-three (23) NEON plots were sampled that represent 10 soil map units. The major soil components by soil series name are Adamsville, Apopka, Candler, Myakka, Okeechobee, Placid, Pompano, and Samsula. These series vary according to hillslope position and presence or absence of diagnostic features and physical characteristics. All plots sampled had forest vegetation.

Summary of Soils

The soils sampled had forest cover and generally had either very thin organic horizons, or these horizons had been eroded due to silviculture. These horizons ranged from 0 to 10 cm in thickness. The thin O horizons were not described or sampled. NEON plots sampled will be discussed by soil map unit in which they occur.

Map Unit 1 - Candler fine sand, 0 to 5 percent slopes, and
Map Unit 2 - Candler fine sand, 5 to 8% slopes.

Both Candler map units occur on knolls and ridge landforms and in summit and shoulder hillslope positions. The Candler soil series classifies as a Lamellic Quartzipsamments and developed in eolian sand and/or sandy and loamy marine deposits. Chandler is an excessively drained soil, and contains thin clay bands called or lamellae that commonly occur at 100 to 200 cm below the soil surface. Presence or absence of and depth to lamellae are important criteria for classification and series placement. The 1-meter pit depth limit for NEON sampling makes series placement and classification difficult for the Candler and Apopka map units. The Apopka soil classifies as a Grossarenic Paleudult and has an argillic horizon that begins below 100 cm. The field classifications for the Candler and Apopka soils are based on observations to a 1-meter depth. Eight (8) of the sampled plots occur in the Candler map units and two plots occur in the Apopka map units.

OSBS_007: Map Unit 2: The sample pedon had A and E horizons that were sand (< 5% clay and silt) to 100 cm. No lamella occurred within 100 cm but are expected to exist deeper in the pedon Thus, the field classification is Hyperthermic, uncoated Lamellic Quartzipsamments. The pedon is within the range of characteristics for the Candler series.

OSBS_008: Map unit 1. The sample pedon had A and E horizons that were sand (< 5% clay and silt) to 100 cm. Lamella occurred within the E horizon from 34 to 100 cm. The field classification is Hyperthermic, uncoated Lamellic Quartzipsamments. The pedon is within the range of characteristics for the Candler series and matches the map unit concepts.

OSBS_010: Map Unit 1. The pedon sampled at this plot is below a narrow ridge summit. Soil color indicates that the pedon is well drained or moderately well drained. No lamellae were observed within 100 cm. Base upon the soil colors and lack of lamella this soil classifies as a Typic Quartzipsamment and fits the Tavares series, which is an expected component within the Candler map unit. The pit location is near a delineation boundary with the adjacent side slope soil mapped as a Grossarenic Paleudult - a soil that has an argillic horizon (clay accumulation) that begins deeper than 100 cm. An argillic may occur below the sampling depth.

OSBS_013: Map Unit 1. The sample pedon occurs on side slope of a secondary hill of a broad ridge. The pedon matches well to the Candler series and the map unit concept. No lamellae were observed within 100 cm. If lamella occur below 100 cm the pedon classifies as a Lamellic Quartzipsamments.

OSBS_014: Map Unit 1. The sample pedon occurs on side slope shoulder above slight depression. The pedon matches well to the Candler series and the map unit concept. No lamella were observed within 100 cm. The field classification is a Lamellic Quartzipsamments.

OSBS_026: Map Unit 2. The sample pedon is on the shoulder of side slope that descends to small lake. A sandy clay loam Bt (argillic horizon) was observed at 103 cm. The Bt was not sampled because of the 100 cm depth limit. The occurrence of the argillic classifies this pedon as a Grossarenic Paleudult and fits within the Apopka soil series. Delineations of Map Unit 21 (Apopka sand, 0 to 5% slopes) occur nearby on lower hillslope positions. It is not unusual for this soil occur with Candler unit.

OSBS_031: Map unit 1. The plot and sample pit occur in large Candler delineation. The pedon lacks lamella within 100 cm. Based on the lack of lamella the field classification is a Typic Quartzipsamment. Lamellae or an argillic horizon could occur below 100 cm. This pedon is within the expected components in the map unit and best soil series match is the Tavares.

OSBS_048: Map Unit 2. The sample pit is on the shoulder of a side slope at the edge of the map unit delineation. The pedon has a Bt horizon (argillic horizon) at about 90 cm. The soil, therefore, classifies as a Grossarenic Paleudult and would fit the Apopka soil series. Apopka is an expected component within the Candler map unit.

Map unit 15 - Apopka 0 to 5 percent slopes, and
Map Unit 21 - Apopka sand, 5 to 8 percent slopes
The Apopka map units occur on lower side slopes along rises and flats. Apopka soils are Grossarenic Paleudults and developed in sandy and loamy marine and/or eolian sands. They are well drained. They have argillic horizons below a depth of 100 cm of the soil surface. They contain between 10 to 40 percent clay on average in the argillic horizon. Plots within this map unit are: OSBS_002 and OSBS_003.

OSBS_002 -Map unit 15. The pedon sampled is closest to the Candler soil series. Candler is a minor component of this map unit. The pedon was on a slight northeast aspect on a 0.5 % gradient. It is in the middle third of a side slope. This Pedon is representative of the Candler series and is within the map unit concept. An argillic horizon may occur below the 100 cm sample depth.

OSBS_003 – Map unit 21. The pedon sampled lacked lamellae or an argillic horizon within 100 cm. Based on the absence of an argillic and the soil colors the pedon is closest to the Taveras series, which classifies as a typic Quartzipsamment. An argillic may occur below the 100 cm sample depth. The pedon is on the lower segment of a side slope and is adjacent to a Tavares map unit. The Taveras is minor component within the Apopka map unit.

Map unit 5 - Placid fine sand, frequently ponded, 0 to 1 percent slopes, and
Map unit 43 - Placid-Pompano association, frequently flooded
Placid soils classify as Typic Humaquepts and Pompano soils as Typic Psammaquents. Both soils are very poorly drained. Placid soils have a thick and dark surface horizon(s) (Umbric epipedon) 25 to 60 cm. Placid differs from Pompano soils in that they contain more organic carbon and are on lower slope positions than Pompano. Pompano soils have thinner dark surface horizon (lack an Umbric epipedon) and occur on slightly higher landform positions than Placid.

OSBS_005 – Map unit 43. The pedon sampled has an Umbric epipedon, classifies as Typic Humaquepts, and fits the Placid series. The pedon was on a northeast aspect on a 2 % gradient. It is on the margin of a small closed depression. The pedon is representative of the map unit concept.

OSBS_016 – Map unit 5. The pedon sampled has an Umbric epipedon, classifies as a Typic Humaquepts, and fits the Placid series. The pedon and map unit delineation are on the margin of an interconnected set of closed depressions. The pedon is representative of the map unit concept.

OSBS_018 - Map unit 5. This pedon is near a soil delineation boundary between map unit 5 and map unit 17 (Millhopper sand, 0 to 5 percent slopes), which is an an unsampled unit. The pedon has a Bt horizon at 51-74 cm depth. The clay increase, however, does not qualify as argillic horizon. The pedon fits the Tavares series and is a minor component in the Placid map unit.

OSBS_021 – Map unit 5. This pedon had an O horizon from 0-34 cm depth. This horizon qualifies as a Histic epipedon and consists dominantly of well decomposed organics (sapric material). The soil fits the Samsula series and classifies as a dysic, hyperthermic Terric Haplosaprists. The pedon is on the edge of a large depression and is near a soil boundary. The pedon is near a delineation boundary that adjoins water. Samsula is an expected component in this setting.

Map unit 16 - Adamsville sand, 0 to 2 percent slopes
Adamsville soils occur along lower side slopes of flats, knolls or rises. Adamsville classifies as an Aquic Quartzipsamment and developed in sandy marine and/or eolian deposits. They are somewhat poorly drained.

OSBS_011- The sampled pedon is representative of the Adamsville series and fits the map unit concepts. The pedon classifies as an Aquic Quartzipsamment. The pedon was on a slight northeast aspect on a 1% gradient and is at the margin of a large closed depression.

Map unit 27 - Samsula muck

Samsula soils are Terric Haplosaprists and developed in well-decomposed (organic) sapric material underlain by sandy marine deposits. They are very poorly drained.

OSBS_015 - The pedon described and sampled contains a spodic horizon at 18-47 cm depth. The pedon classifies as a hyperthermic Oxyaquic Alorthod and best fits the Narcossee soil series. Narcossee is an expected minor component in or near the Samsula. The pedon is on a toeslope at the edge of a small closed depression. Soil properties in this position can change quickly in a small lateral distance (~ 3 m) with little elevation difference.

OSBS_023 - The pedon sampled has a spodic horizon at 25-100 cm depth and best correlates to the Ona soil series, which classifies as a sandy, siliceous, hyperthermic Typic Alaquod. Ona is one of the minor components recognized in the map unit; The map unit delineation is at the edge of a large depression that contains mostly Samsula and Okeechobee (Histisols) soils. This pedon is near a soil boundary to an adjacent Samsula map unit.

OSBS_024 - The pedon sampled contains a histic epipedon from 0-40 cm depth. The pedon is representative of the Samsula series. The classification is a hyperthermic Terric Haplosaprists. The pedon is on the edge of a large depression that is mostly a freshwater marsh.

Map unit 31- Myakka fine sand, depressional
Myakka soils occur on footslopes at the outer margin of closed depressions and floodplains. Myakka soils classify as Aeric Alaquods and developed in sandy marine deposits. They are poorly and very poorly drained soils. They have spodic horizons within 36 to 90 cm of the

surface. Spodic horizons are illuvial (translocated) accumulations of organic matter and aluminum, with or without iron. Spodic horizon formation imparts dark subsurface colors.

OSBS_020 - The pedon sampled has an Umbric epipedon from 8 to 61 cm and classifies as a Typic Humaquepts. The pedon best fits the Placid series. The pedon is within a small delineation of map unit 31 and is near a boundary with a Placid map unit. Placid is a minor component within the Myakka unit. The landform is a low, narrow divide between two closed depressions.

Map unit 63 Okeechobee muck
Okeechobee soils are very poorly drained organic soils that classify as Hemic Haplosaprists. The soils developed in well decomposed sapric and hemic materials that are 200 cm or more inches thick. Okeechobee soils occur in closed depressions that have a water table at or near the surface.

OSBS_017 - The pedon sampled has a thin O horizon and a spodic horizon at 23-100 cm depth. The pedon is very poorly drained, fits the Myakka series, and classifies as an Aeric Alaquod. The map unit delineation is a small unit in a low area adjacent to a lake. Myakka is an unnamed minor component in the Okeechobee unit.

Map unit 99 – Water
Water is a distinct map unit in the Putnam County Soil Survey. The water level in shallow closed depressions that occur at OSBS fluctuates both seasonally and with drought or pluvial episodes. Three NEON plots within this map unit were subaerially exposed at the time of sampling.

OSBS_022 - The pedon described and sampled has a histic horizon from 0 to 32 cm with mineral soil beneath. The soil is very poorly drained; free water observed at 90 cm. The pedon classifies as a Sandy or sandy-skeletal, siliceous, dysic, hyperthermic Terric Haplosaprist and correlates as the Samsula series. The pedon and NEON plot are on the floor of a closed depression.

OSBS_050 - The soil described and sampled has a thick dark surface horizon (Umbric epipedon) from 0 to 94 cm. The pedon classifies as a Cumulic Humaquept and correlates to the Sellers series. This soil is similar to the Placid except the Umbric horizon is more than 60 cm thick. The plot is on the floor of a closed depression, which is a typical position for the Sellers soil.

OSBS_051 - The soil described and sampled has a thick dark surface horizon (Umbric epipedon) from 0 to 58 cm. The pedon classifies as a Typic Humaquept and correlates to the Placid series. This soil is similar to the Placid except that the C horizon lacks low chroma redox features. The pedon and plot are on the floor of a closed depression, which is a typical position for the Placid soil.

References

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