Volume 38, No. 2 December 2020

PROFESSIONAL SOIL SCIENTISTS ASSOCIATION OF TEXAS

Texas Soil Profiles

In this issue:

PSSAT President's Message, from Laurie Kiniry

I trust that you and yours are doing well and looking forward to the holidays--even if your celebrations may be different this year!

Here is some PSSAT news:

As you have probably heard, the Soil Survey and Land Resource Workshop is virtual this year. The PSSAT annual meeting will also be held as a virtual meeting on Wednesday, February 3, 2021, at 7:00 pm. More details about the annual meeting will come at a later date.

We are planning a field tour in Fall 2021. This is a tentative date, but hopefully life will be back to normal so we can enjoy an informative and enjoyable get-together.

The Nominations Committee is working to provide a slate of officers for the next year. The PSSAT Executive Council is attempting to fill vacant committee positions. If you are contacted, please consider serving. Thank you to those who have already accepted. And many thanks to those who have served on committees whose terms are up this year.

There are other ways to serve PSSAT besides being an officer or a committee member. One is to contribute your story to the Soil Scientist Spotlight found on our webpage. Another is to encourage others to join our organization. Perhaps someone with whom you work or someone you know that may have been an active member in the past would be interested in joining. Your contribution to the scholarship fund is an investment in the future of soil science. Also, timely renewal of your dues helps the organization function and entitles you to an active role in PSSAT.

In closing, I sincerely hope each of you have a blessed, safe, and healthy holiday season.

Merry Christmas and Happy New Year!

Best Regards,

Laurie Kiniry

Greetings from Dr. David Weindorf

November 22, 2020

Colleagues and friends, some of you may know that over this past summer, I accepted a position as Vice President for Research and Innovation at Central Michigan University in Mount Pleasant, MI.

It has been an incredible ride over my last 20 years in soil science; wonderful friendships, experiences, and memories for a lifetime. Along the way, I've coached the soils judging team at three different schools, traveled the world, and had wonderful meals and conversations at the PSSAT meeting each year. This new role is an exciting new chapter for me, one that will push me daily to sharpen my skillset and continue to grow in the academe.

I want to thank each of you for the amazing times we've shared together, but also let you know that this is not goodbye – just, until next time. Even though I may not make it to the PSSAT meeting each year, I will surely continue my membership and to advocate for the organization behind the scenes. I'm strongly encouraged by the new generation of talented young soil scientists upcoming who will define the next great generation of our discipline. Be well, be in touch, and if your travels bring you central Michigan, know that a hearty welcome awaits you –

Kind regards,

David W.

Interesting Soil Profile

This photo posted on LinkedIn by Dr. Alfred Hartemink (Chair, and Professor of Soil Science at University of Wisconsin-Madison).

Soil located in the Netherlands. Location coordinates: 52.36772020251385, 6.4417051679629305. As described by Dr. Hartemink: "I guess it is interesting… …because of its visual appearance; partly worked over soil, leaching of some organic matter and iron, remnants of the Saalien ice pushing in the deeper subsoil, it is a feast for the eyes. Umbric perhaps anthropic epipedon, spodic, no tonguing, relic cryo-feautures, lamellae."

Upper Texas Gulf Coastal Pothole Wetlands at Brazos Bend State Park

Charles E Pehl, PhD, CPSS (Retired) PG (Soil Science)

PSSAT member, Volunteer, Brazos Bend State Park

Brazos Bend State Park consists of 4,897 acres located in the Southeastern portion of Fort Bend County approximately 50 miles from the Houston Metropolitan area. The park, formerly the Hale Ranch, is operated by the Texas Parks and Wildlife Department as a wildlife management area which supports a variety of wildlife from bobcats, marsh rabbit, raccoons and armadillos, to barn owls, red tail hawks, black vultures, turkey vultures, whistling ducks, herons, egrets, Ibis, as well as turtles, venomous and nonvenomous snakes, and the Parks most popular, the top predator, the American alligator (*Alligator mississippiensis*).

Park Geology

Late in the Cenozoic Era, a great ice age covered the northern portion of North America with thick glacial sheets advancing and retreating in succession. These periods of extensive glaciation were separated by warmer inter-glacial periods. The most recent glacial advance The Wisconsin stage (115,000 years BP) is the latest glacial advance following the Sangamon interglacial stage. Texas was too far south for the glaciers, but local climate and sea levels underwent major changes with each glacial advance and retreat. Sea levels during glacial advances were from 300 to 400 feet lower than today. Climate was warmer and more humid.

The Prairie grassland soils at Brazos Bend developed from loamy and clayey fluviomarine deposits derived from eroded igneous, metamorphic and sedimentary rock. This material was deposited as the sea levels retreated with the advancing glacier. Larger gravel and sand particles were deposited at or near the shore surf line, silt beyond the surf and smaller clay particles and s beyond the silt. This continuum of particle size deposition moved inland with the rise in sea levels as the glacier retreated. The marine deposits resulted in the horizontal stratification of the gravel, sand, silt, clay found in the Willis, Lissie and Beaumont formations.

The fluvial (river born) deposits came from the major rivers of Texas such as the Brazos, which meandered across the developing coastal plane carrying more water, sand and gravel to the Gulf than currently. These deposits underlie the outer 50 or more miles of the modern Gulf Coastal Plain. The Beaumont Formation was originally laid down during the Sangamon interglacial period. Following the Beaumont deposition, in the late Wisconsin glacial stage, about 20,000 to 17,000 years BP, a returning glacial advance caused sea levels to drop to from 275 to 400 feet below present levels. As the last glacier retreated, the current Gulf Coast sea level stabilized between 5,000 to 3,500 years ago.

Park Ecosystems

Brazos Bend supports the great variety of wildlife previously described in two ecosystems, the products of fire and flood are identified within the Park. The first is riverine immerging wetlands and forested wetlands, developed primarily from surface water delivered by frequent flooding of the Brazos River and its tributary, Clear Creek. These wetlands are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. (CFR § 328.3(c) (4)). Further, these wetlands have a significant nexus with the Brazos River. Significant nexus means that a water, including wetlands, either alone or in combination with other similar saturated waters in the region, significantly affects the chemical, physical or biological integrity of a water identified in paragraphs (a) (1) through (3) (CFR § 328.3 (c) (5)).

The second ecosystem, approximately 500 acres of native Gulf Coast Prairie grasslands is located at the front of the park above the Brazos floodplain, on the Beaumont Formation. The grass successional stage is preserved by conducting prescribed burning every two to five years. The latest burn was conducted recently in early November 2020.

However, within the park prairie grasslands there are small depressions known as Gulf Coast Pothole wetlands (CPW) that hold sufficient water to constitute wetlands (Jacob 2011). The term pothole refers loosely to any coastal freshwater depression which are inundated directly by precipitation and by runoff from the surrounding flats. According to CFR § 328.3 (a) (7) (v) in Texas, CPW are wetlands that occur in a mosaic of depressions, ridges, inter-mound flats, and mima mounds wetlands located along the Texas Gulf Coast. Approximately 30% of the prairies were once wetlands occurring in complexes with pimple mounds, small hummocks 1 to 2 feet in height, and intermound flats which formed thousands of years ago by ancient rivers and bayous modified through time by the action of climate and organisms. However, very little is known about the complex relationship between these wetlands and the coastal prairie grassland ecosystem.

Soils on the Prairie Flats and in Depressions

At Brazos Bend State Park, the soil series primarily associated with the prairie grassland flats developed from parent material of the Beaumont Formation:

(1) Edna, fine, montmorillonitic, thermic Vertic Haplualfs,

(2) Bernard, fine, montmorillonitic, thermic Vertic Argiaquolls and

(3) Lake Charles, fine, montmorillonitic, hyperthermic Typic Hapluderts.

Soils of the prairie pothole depressions are:

(1) Cieno series, fine-loamy, siliceous, active, hyperthermic Typic Vermaqualfs,

(2) Leton series, fine-silty, siliceous, superactive, hyperthermic Typic Glossaqualfs.

Both depression series are hydric soils according to the Web Soil Survey, National Cooperative Soil Survey. Cieno has seasonal water perched from the soil surface to about 24 inches to 36 inches from September to June in normal years. Leton soils are ponded at depths of 2 to 6 inches above the surface from October to June in normal years. Soil of the flats surrounding the Cieno series are primarily the Edna series, while flats surrounding the Leton series are primarily Bernard.

In the Brazos Bend there are several example of prairie pothole wetlands in the grassland area. The pothole with easiest access is at the end of a pier located adjacent to an observation platform at the beginning of the Prairie trail. The pier extends several feet out on to the pothole (Figure 1). The dark areas around the depression, are the results of the recent prescribed burn in early November 2020. The two legumes to the left of the pier are rattlebush (*Sesbania drummondii*) a legume that is characteristic of the more permanent potholes. The area around the depression is mapped as Edna-Cieno complex (Ec) a frequently ponded complex, 0 to 1% slope (Figure 2). The red arrow shows the location of the prairie pothole wetland on the soil map. The Cieno series, a hydric soil, constitutes about 20% of the complex. The surrounding flat, the Edna series is not a hydric soil.

Figure 1. Coastal Prairie Pothole Pier, Brazos Bend State Park

In the past, coastal plain pothole wetlands were assumed to be geographically isolated with no significant nexus to the Gulf of Mexico. They were closed depressions that contributed little or no water to downstream waters. However, two recent studies have demonstrated that runoff from these depressions, although episodic, is a common event (Forbes et al., 2010, Wilcox et al. 2011). The authors of the two articles believed hydrologic connectivity to be clearly present. In the Wilcox study, intermittent runoff from coastal plain wetlands occurred regularly over 45 months, accounting for more than 71% of precipitation with an annual discharge ranging from 0 to 27%. Although runoff from coastal plain wetlands is episodic, it can occur continuously for significant periods. In the Forbes et al. study the longest continuous period of runoff period was three months. An important implication from both studies is that most if not all surface runoff from the natural prairie grasslands or from land converted to agricultural activities, may pass through these coastal prairie depression wetlands. Therefore, if these small coastal prairie pothole wetlands are not isolated, but do have a significant nexus to the Gulf of Mexico, then they are a critical part of the aquatic integrity of the regional bayous and bays of Texas that constitute waters of the United States.

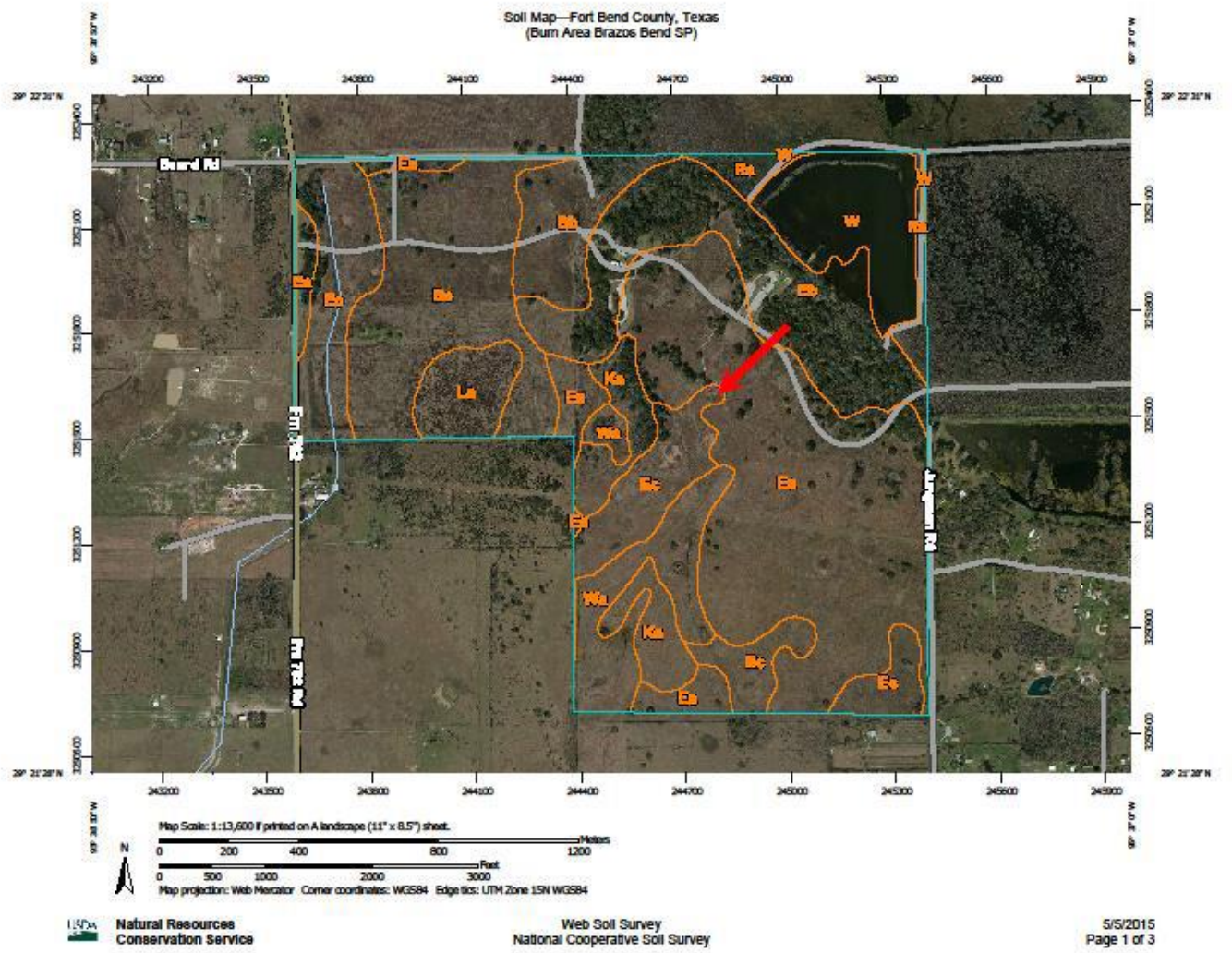

Figure 2. Soil Map, Prairie Trail and Prairie pothole (the red arrow indicates the location of the coastal prairie pothole at the beginning of the prairie trail).

References

Code of Federal Regulations, Title 33- Navigation and Navigable Waters, 328.3 Definitions.

Forbes, M.G., J. Yelderman, R. Doyle, and A. Clapp (2009) Hydrology of coastal prairie freshwater wetlands. Wetland Science and Practice 26:12-17

Jacob, J.S. (2011) Upper Texas Gulf Coast Pothole Wetlands: New Research shows Significant and Profound Hydrologic Connections to Galveston Bay and other Area Waters. Texas Coastal Watershed Program, Texas Sea Grant and Texas AgriLife Extension, TAMU.

Natural Resources Conservation Service, Web Soil Survey, National Cooperative Soil Survey, Map Unit Descriptions: Edna, 0-1% slopes, Edna fine sandy loam, 1-3% slopes, Edna-Cieno frequently ponded complex, 0-1% slopes, Bernard clay loam, 0-1% slopes, Bernard-Edna complex, 0-1% slopes. Soil Survey Area: Fort Bend County, Survey Area Data: Version 17, June 11, 2020

Wilcox, B.P., D.D. Dean, J.S. Jacob, and A. Sipocz (2011) Evidence of Surface Connectivity for Texas Gulf Coast Depressional Wetlands. Wetlands 31:451-458.DOI 10.1007/s13157-011-0163-x

Texas Almanac.com, Geology of Texas. Wisconsin Glacial Stage, Britannica Online Encyclopedia. www.britannica.com

---

Soils News

Reducing solid waste in San Antonio: the city provides green carts just for organic material to be composted. Field tour for agronomists and soil scientists held last year, to view the facilities associated with the Pay-As-You Throw program. “If a worm can’t eat it, it doesn’t go in the cart”
https://soilsmatter.wordpress.com/2020/10/01/how-is-san-antonio-reducing-its-solid-waste/

Upcoming free Soil Health Webinar on December 8, 2020: Standard Measurements for Soil Health. A Soil Science Society of America webinar series produced in partnership with The Soil Health Institute and sponsored by The Walton Family Foundation
https://www.soils.org/education/online-courses/webinar-series-soil-health

Field, Lab, Earth Podcast: Soil Health with 2020 World Food Prize Laureate Dr. Rattan Lal
https://fieldlabearth.libsyn.com/soil-health-with-2020-world-food-prize-laureate-dr-rattan-lal

Call for Newsletter Articles

Please send articles, information, or photos that are suitable for future newsletters to: editor@pssat.org
Thank you!