



Natural Resources Conservation Service
U.S. DEPARTMENT OF AGRICULTURE



2025 SOILS PLANNER MYSTERIES IN THE SOIL

Message From the Deputy Chief

The National Cooperative Soil Survey (NCSS) is a nationwide partnership of Federal, regional, State, and local agencies and private entities and institutions. Together, this partnership, with the Soil and Plant Science Division (SPSD) as the lead, works to cooperatively investigate, inventory, document, classify, interpret, disseminate, and publish soil and ecological site information of the United States and its trust territories and commonwealths. Covering such an expansive area of work, it is no surprise to come upon new or unexpected things within the soil—soil mysteries.

Our knowledge of the nature, distribution, and extent of soils in the United States and its trust territories and commonwealths has expanded because of novel, unusual, and thought-provoking observations, experiences, and adventures. What appears to be a mystery in the soil piques our interest. Scientists want to understand why a certain artifact is located within a specific soil profile, how a soil is formed and used, and why an anomaly exists within the soil.

I hope you enjoy this planner and the 12 soil stories and mysteries surrounding soil properties, characteristics, and features.

Dr. Terron Hillsman
Deputy Chief for Soil Science and Resource Assessment
USDA, Natural Resources Conservation Service



Mysteries in the Soil

Throughout the years, the NCSS has grown exponentially by expanding partnerships to gain experience, expertise, and knowledge and by exploring and assembling an abundance of soil and ecological site information.

Since 1899, the NCSS has built a science-based soil survey to explore the vast amounts of soil properties and site characteristics important to protecting natural resources and feeding the world. In 1928, R.S. Smith, director of the Illinois Soil Survey, said, "...I cannot conceive of the time when knowledge of soils will be complete. Our expectation is that our successors will build on what has been done, as we are building on the work of our predecessors." To this day, this statement rings true because there are still soil properties and characteristics we have yet to fully understand.

Soil scientists know that soil is complex and dynamic and can be a bit of a mystery at times. It can also tell an amazing story. In the 16th century, Leonardo Da Vinci, whose knowledge spanned many subjects, stated, "We know more about the movement of celestial bodies than about the soil underfoot." Today, soil scientists' curiosity has not waned but has emboldened them to explore and understand soils even more to uncover their vast mysteries.

Soil scientists may relate to Les Molloy when he said, "...only rarely have we stood back and celebrated our soils as something beautiful and perhaps even mysterious. For what other natural body, worldwide in its distribution, has so many interesting secrets to reveal to the patient observer." – Soils in the New Zealand Landscape: The Living Mantle, 1988



JANUARY



In 2021, NRCS staff were conducting ecological site inventory fieldwork in the glaciated plains of Toole County, Montana, when they came across a mysterious site with little to no vegetation. Perplexed, the staff wondered why the landscape was so barren.

To unravel the mystery, staff gathered soil samples and shipped them to the Kellogg Soil Survey Laboratory in Lincoln, Nebraska, for analysis. Preliminary test results revealed an unusual soil pH of ultra acid and an electrical conductivity ranging from slightly saline to strongly saline.

The combination of conditions that came together at this location to make this soil so inhospitable is yet to be determined.

FEBRUARY



In 2011, at the request of the town of Norwich, Connecticut, NRCS staff conducted a ground-penetrating radar investigation to look for the presence of unmarked graves in the Ruggles family plot.

David Ruggles maintained a lifelong battle against slavery. He was an antislavery activist and an Underground Railroad conductor who led many people to freedom.

His activism earned him many enemies. Ruggles died in 1849 and was believed to have been buried in an unmarked grave within his family plot.

The final report issued by NRCS staff suggested the presence of unmarked graves in the Ruggles family plot. With this new information, the Norwich city historian is working to put the cemetery on the National Freedom Trail.

MARCH



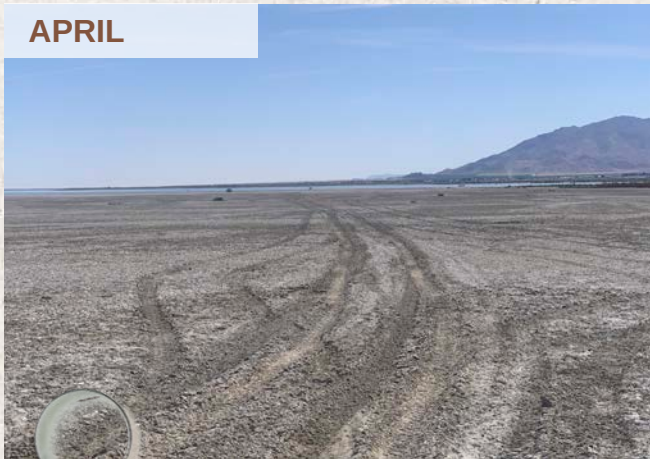
In 2009, NRCS soil scientists started the initial soil survey of Hudson County, New Jersey. During soil investigations at Liberty State Park, soil scientists uncovered mysterious large wooden timbers covering the entire floor of a deep pit.

Park staff were excited about the discovery, as they believed the wooden timbers were part of a web of docks and piers built in the area to accommodate ships. After locating a space in between the foot-wide boards, NRCS staff used a bucket auger to pull up the grayish-colored, sandy, natural soils that contained an occasional large oyster shell. The mystery was solved.

These wooden timbers separated the fill material from what the native Lenape people called Communipaw Cove.

The cove was once home to vast oyster beds, dating back to over 9,000 years ago. These beds were harvested well into the 19th century.

APRIL



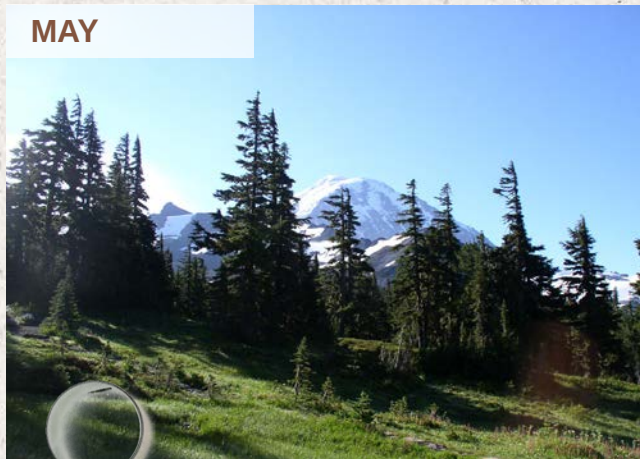
In 2023, at the request of the Bureau of Land Management, NRCS collected soil data on the exposed playas along the margin of the Salton Sea shoreline in Riverside, California, to understand the erosion of soil by wind.

The technical soil services investigation and soil survey inventory is focused along the edge of the Salton Sea. In this area, NRCS soil scientists described soils in shallow, subaqueous and upland areas.

The soils formed in different playa deposits associated with ancient Lake Cahuilla. A playa is a usually dry and nearly level lake plain that occupies the lowest parts of closed depressions.

NRCS staff determined when the Salton Sea's saline water levels drop, finer-textured soils are exposed. These soils are extremely susceptible to wind erosion.

MAY



In 2022, NRCS staff described a soil profile they classified as the Mountwow soil series in an area around Mount Rainier within the Cascade Mountain Range. In this area, soil profiles provide a glimpse into the mysterious, hidden evidence of volcanic eruptions that have occurred over thousands of years.

Within the soil profile, multiple volcanic depositions can be observed.

Barely perceptible below the organic surface is a thin layer of 1980 Mount St. Helens tephra. Between 20 to 45 centimeters is a thick layer of Mount St. Helens tephra from around 3,500 years ago. Between 75 and 80 centimeters is volcanic tephra from the massive Mount Mazama eruption in Oregon (Crater Lake National Park) 7,700 years ago.

Throughout the profile, many thinner layers of tephra can be observed. Tephra is the term for all fragments of rock ejected by a volcano, including ash, that can travel thousands of miles.

JUNE



With over 80 years of inventory, the National Soil Archive at the Kellogg Soil Survey Laboratory provides a unique opportunity to step back in time with soils. One might be surprised to find a room full of soil samples from all over the world. The mystery is, what all is housed there?

The archive contains more than 500,000 specimens collected from across the United States and 70 countries. Representing over 210,000 individual soil layers collected from more than 40,000 soil profiles, the archive captures taxonomic and temporal variability associated with soil formation and changing land use and management practices.

Potentially the world's largest collection, over 95 percent of the archive is cataloged with original data and will serve the public for decades to come.

JULY



During the early days of soil survey, chemists, geologists, and many others shared one mystery surrounding soil: what is the nature of the particles?

The primary soil particles are sand, silt, and clay. Clay, the smallest soil particle, lacked a defined shape and was of unknown structure, composition, and type.

A physicist named Wilhelm Roentgen was investigating vacuum tubes in Germany in 1895 when he discovered X-rays. In 1912, Max von Laue and others developed the idea that X-rays could be used to evaluate crystalline particles, such as clay. Lawrence Bragg extended these observations and identified that X-rays could be used to determine the internal arrangement and structure of minerals, which is fundamental to their behavior.

Today, soil scientists can determine the composition, type, structure, and quantity of clay minerals fairly accurately and can unravel other soil mysteries by using the tools and techniques that scientists have developed over time.

AUGUST



In the fall of 2023, Lake Mattamuskeet National Wildlife Refuge (NWR) staff in North Carolina contacted NRCS to request assistance in identifying a potential cause for a mysterious tundra swan mortality event that occurred during the last migratory season.

Lake Mattamuskeet is the largest natural lake in North Carolina. It is a vital stop along the federally recognized Atlantic Flyway for migratory waterfowl.

In the impoundment where the mortality event occurred, NRCS soil scientists collected soil samples. Samples were taken at a depth of 0 to 15 centimeters, where most waterfowl forage, and at 15 to 30 centimeters, where swans can forage.

Reviewing the results, the NWR staff identified an increase in lead levels at a depth of 15 to 30 centimeters. The NWR staff will use the soil results to improve the conditions for waterfowl.

SEPTEMBER



In 2023, at the request of the Connecticut State Police, NRCS staff staged a mysterious crime scene to help train major crime squad detectives.

NRCS staff trained detectives on how to recognize natural versus disturbed soils and the extent of disturbance in the field. Detectives also learned how to use soil survey properties to identify the likelihood of a burial, the decomposition of bones in soil, soil characteristics that affect the movement of the scent pool when using human remains detection dogs, and when to use ground-penetrating radar.

During the training, NRCS staff and detectives moved to an undisclosed area where detectives searched for staged evidence.

After successfully locating the mock graves, NRCS staff taught the detectives how to properly dig and identify the area of disturbed soil.

OCTOBER



From 2020-2023, NRCS staff worked with the Shoshone-Bannock Tribes to describe and analyze soils from the reservations' grazing lands, hay lands, and fishery. NRCS soil scientists documented six new soils with soil properties and characteristics unlike any current soil series. Most of the new soils are sandy with high organic content, and some have wet subsurface horizons.

These discoveries are unique and somewhat rare in a semidesert landscape, prompting the need for new soil series names. Together, NRCS staff and the Tribes' Language and Cultural Preservation Department used the Tribes' languages to name the new series in honor of the Shoshone-Bannock people.

The soil survey update led to ground-sleuthing new soils and forging stronger partnerships with the Tribes.

NOVEMBER



In 2023, while conducting a coastal zone soil survey of Barnegat Bay in Ocean County, Maryland, NRCS staff identified a new soil. The soil was formed in terrestrial or upland fluviomarine deposits of the coastal plain that transitioned to a salt marsh environment. This soil series was named Barnegat.

The Barnegat soil is the first series in the area to reveal where climate changes are creating coastal marshes over former deposits of the coastal plain that were once above sea level. As sea levels rise rapidly, mysterious ghost forests emerge and spread due to saltwater intrusion.

What is a ghost forest? A ghost forest, like this one at Monkeystump Swamp, is a stand of dead trees—often bleached or blackened—caused by saltwater moving inland and killing the trees. The trees begin to die when conditions become saltier, leaving skeletal trees with room for saltwater marshes to evolve.

DECEMBER



The Tantalus soil series, established in 1949, isn't extensive by any means. It covers about 2,235 acres, which is relatively small when compared to the acreage of the other 25,000 soil series classified in the United States; however, it is rather memorable and mysterious.

The Tantalus soil series is formed in weathered volcanic ash and cinders and receives over 100 inches of rainfall a year. It doesn't grow any crops of consequence and has very little agronomic importance, but it is one of the most significant soils to us.

The Tantalus soil series is extraordinary because it is the soil that overlays the area known to Hawaiians as the "Punch Bowl Cemetery." The Punch Bowl Cemetery is where over 53,000 U.S. soldiers and sailors are interred—some of whom gave their lives on December 7, 1941, during the bombing of Pearl Harbor.



December 2024						
S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

On this barren site in Toole County, Montana, Pursh seepweed (*Suaeda calceoliformis*) is the predominant vegetation. Preliminary testing indicates the area is barren due to high soil pH levels.

February 2025						
S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	

January 2025

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1 New Year's Day	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20 Martin Luther King Jr. Day	21	22	23	24	25
26	27	28	29	30	31	



At Yantic Cemetery in Norwich, Connecticut, NRCS staff conducted a ground-penetrating radar investigation on the Ruggles family plot. David Ruggles, born in 1810, became an important figure in the abolition movement.

January 2025

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

March 2025

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

February 2025

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
	Presidents' Day					
23	24	25	26	27	28	



Soil scientists prepare to sample a soil profile at Liberty State Park in Hudson County, New Jersey.

February 2025

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	

April 2025

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

March 2025

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
Daylight Savings Time Begins						
16	17	18	19	20	21	22
				Vernal Equinox		
23	24	25	26	27	28	29
30	31					



March 2025

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

The Salton Sea, the largest lake in California, is seeing water levels drop, exposing the saline soils of the sea floor. These soils are susceptible to wind erosion.

May 2025

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

April 2025

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29 Earth Day	30			



The Cascade Mountains are part of the volcanic Ring of Fire, which circles most of the Pacific Ocean. In Washington and Oregon, the Cascades include notable volcanoes such as Mount Adams, Mount Baker, Mount St. Helens, Mount Hood, and Mount Rainier.

April 2025

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

June 2025

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

May 2025

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26 Memorial Day	27	28	29	30	31

8645 - 8932 →

← 8068 - 7781

8069 - 8356 →

← 7492 - 7205

7493 - 7780 →

← 6772 - 6341

6773 - 7204 →



The Kellogg Soil Survey Laboratory houses more than 500,000 specimens, representing over 210,000 individual soil layers that were collected from more than 40,000 soil profiles.

May 2025

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

July 2025

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

June 2025

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19 Juneteenth	20	21
22	23	24	25	26	27	28
29	30					



An NRCS soil scientist completes soil screening data collection using a portable X-ray fluorescence (pXRF) device.

June 2025

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

August 2025

S	M	T	W	T	F	S
						1 2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

July 2025

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1	2	3	4 Independence Day	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21 Summer Solstice	22	23	24	25	26
27	28	29	30	31		



An auger (foreground) is a tool used to collect soil samples. Soil scientists sampled soils at Lake Mattamuskeet National Wildlife Refuge in North Carolina to verify the cause of the tundra swan mortality event.

July 2025

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

September 2025

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

August 2025

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						



NRCS staff trained Connecticut State Police detectives on how to recognize natural versus disturbed soils and the extent of disturbance in the field using a buried plastic skeleton.

August 2025

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

October 2025

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

September 2025

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1 Labor Day	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22 Autumnal Equinox	23	24	25	26	27
28	29	30				



An NRCS soil scientist (left) and a research manager (right) for the Language and Cultural Preservation Department of the Fort Hall Shoshone-Bannock Tribes observe soil samples and rock fragments.

September 2025

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

November 2025

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

October 2025

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1	2	3	4
5	6	7	8	9	10	11
12	13 Columbus Day	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	



A rise in sea level brings in salts, creating this ghost forest in Monkeystump Swamp in Maryland.

October 2025

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

December 2025

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

November 2025

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1
2	3	4	5	6	7	8
Daylight Savings Time Ends						
9	10	11	12	13	14	15
		Veterans Day				
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30				Thanksgiving Day		



November 2025						
S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

Identified in 1949 in Honolulu, Hawaii, the Tantalus soil series overlays the “Punch Bowl Cemetery.”

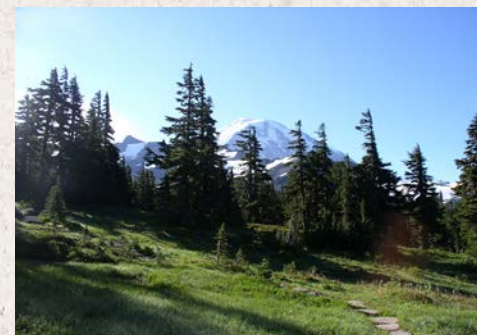
January 2026						
S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

December 2025

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1	2	3	4	5	6
					World Soil Day	
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
Winter Solstice				Christmas Day		
28	29	30	31			
			New Year's Eve			



MYSTERIES IN THE SOIL



Program Aid 2280, September 2024

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