National Cooperative Soil Survey Newsletter

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Editor's Note

Issues of this newsletter are available at http://soils.usda.gov/. Under the Soil Survey tab, click on Partnerships, then on NCSS Newsletters, and then on the desired issue number.

You are invited to submit articles for this newsletter to Jenny Sutherland, National Soil Survey Center, Lincoln, Nebraska. Phone—(402) 437–5326; FAX—(402) 437–5336; email—jenny.sutherland@usda.gov. ■

2021 National NCSS Conference

2021 National Cooperative Soil Survey Conference will be hosted by Auburn University in partnership with the Natural Resources Conservation Service and U.S. Forest Service and held virtually from June 8 to 10, 2021. The 2021 conference theme centers on soil quality and dynamic soil survey. Conference highlights will include NCSS awards and a virtual field tour. There is no cost to attend the conference; however, registration is required to access the virtual event. For more information, go to the NCSS conference website.

Call for Oral and Poster Presentations

The NCSS extends an open invitation for submission of abstracts for presentation. Submission deadline is March 12. All presenters are required to register for the conference. Presenters have the option to submit abstracts for one of the following: (1) live oral presentation, (2) pre-recorded oral presentation, or (3) online poster presentation. Live oral presentations must be related to the conference theme and cover dynamic soil survey, dynamic soil properties (DSPs), soil health, or ecological sites. A total of 10 minutes will be allotted for each oral presentation, including questions. Pre-recorded oral and poster presentations should relate to soils or ecology.

The 2021 NCSS Committee will review the abstracts and notify each primary presenter the second week of April. Live presentations will take place on Wednesday, June 9. Pre-recorded presentations and posters will be available on the conference website. NCSS will run Microsoft Windows with PowerPoint. The NCSS steering committee will provide presentation preparation details upon abstract acceptance notification.

Submission Instructions

1. Email abstracts to kristina.wiley@usda.gov.
2. In subject line, type "2021 NCSS Abstract Submission."
3. Attach a Word document with the following information:
   - Presentation title
   - Presenter's name, affiliation, address, phone number, and email
   - Presenter's and co-authors' names and their affiliations as they should appear in the official program
   - Abstract of 150 to 250 words
   - Preference for presentation: live oral presentation, pre-recorded oral presentation, or poster presentation ■

Stephanie Murphy (Rutgers University), Fred Schoenagel (NRCS), Daniel Gimenez (Rutgers University), and Edwin Muniz (NRCS) pose after filming a soil investigation for students at Duke Farms in Hillsborough.

Digging Up Resources During a Pandemic

By Lauren Finnegan, public affairs specialist, NRCS, Somerset, New Jersey.

For New Jersey NRCS Soil Scientists Edwin Muniz and Fred Schoenagel, one of the highlights of their job is interacting with New Jersey's next generation of soil scientists, who include students at Rutgers University. However, when the Coronavirus pandemic hit and classes moved online, Muniz, Schoenagel, Rutgers University's Soil Testing Laboratory Director Stephanie Murphy, and Professor Daniel Gimenez decided to produce a video to bring the soil pit to the classroom.

"The Coronavirus pandemic has had an effect on nearly every aspect of our lives, but we decided as an agency to not let it stop us from delivering the same level of assistance to our customers and partners that we always provide," Muniz said. "So,

while Fred and I couldn't share our knowledge with the students in-person, we wanted to make sure they received it through a video."

After brainstorming how best to demonstrate specific information about soils, the team decided to film a soil investigation in early November at Dukes Farms in Hillsborough, New Jersey. The film would include explanations from Schoenagel on texture, soil structure, horizons, mapping, and soil color using the Munsell Soil-Color Charts.

"Unfortunately, field conditions were less than ideal on the day of filming," said Schoenagel. "It was cold and windy… but luckily the ground wasn't frozen, so we were able to dig a soil pit without any problems… Using real soil always creates a more meaningful training experience than just using a random collection of soil samples where you have no idea which soil those samples came from."

While the strong winds that day necessitated the use of voice-overs for much of the project and slowed down the editing process considerably, the rest of the half-day shoot went as planned and the video was released in early January.

"The fall semester classes were over before the video editing was completed, but we will definitely be using it for future classes, even when we get back to in-person teaching," Murphy said. "Ideally, we'll use it as a lead-in to actual field visits for an in-person experience. We value the collaboration so much and are so grateful to the NRCS team."

While the pandemic has presented many challenges, Muniz and Schoenagel are glad they could provide the same guidance and resources as any other year.

"Through the creation of this video we were able to overcome this difficult time and continue our 'traditional' lectures for Rutgers and the students," Muniz said.

Schoenagel added, "I know from my own experiences in college that a lot of the concepts related to soil science can be very challenging to understand, especially when real-world examples are not provided to help reinforce learning. I hope the video helps to spark within the students a deeper interest in soil science by showing them what it's like to go out to the field, dig a soil pit, and explore and learn about something as unique and special as soil."

To view the video, please click here. ■

YouTube Playlists

By Shawn McVey, Training Coordinator, National Soil Survey Center (NSSC), NRCS, Lincoln, Nebraska.

Over 200 training videos and archived webinars by the NRCS National Soil Survey Center are available online. Did you know we also have them organized into playlists?

A playlist is a collection of videos. We've grouped our playlists by subject area, such as: Envirothon, Using Web Soil Survey, Ecological Sites, Digital Soil Mapping, Coastal Zone Soil Survey, and more. If you go to our YouTube channel (NRCS NSSC - YouTube) and click on PLAYLISTS at the top of the page, you'll find that many of our webinars are grouped into topics for you. You can pick and choose individual recordings from the group of related webinars. Otherwise, the webinars will play consecutively.

On our videos and webinars page (Videos and Webinars | NRCS Soils (usda.gov)), webinars are listed by NSSC Branch as well by focus team topical area (e.g., Coastal Zone Soil Survey, Digital Soil Mapping, Ecological Sites). One advantage that the videos and webinars page has over our YouTube channel is that it includes PDF files of the presentations. If you don't want to watch the webinar, you can simply access the PDF of the presentation for review. ■

Videos for Conservation Planning

By Shawn McVey, Training Coordinator, National Soil Survey Center (NSSC), NRCS, Lincoln, Nebraska.

Two videos designed to increase knowledge of the Kellogg Soil Survey Laboratory (KSSL) and how its data are used for conservation planning cover soil reaction and the ICP mass spectrometer.

Soil Reaction

Soil Reaction: Supporting Conservation Planning - YouTube

Reaction, also known as soil pH, is one of the most frequently performed determinations used in describing and assessing soils. The KSSL measures multiple types of soil pH using an automatic titrator than can process up to 144 samples every 8 hours. Data from the titrator is used in conservation planning for plant growth and crop production, soil biology, fertility, crop rotations, and multiple interpretations for waste management, construction materials, sanitary facilities, and building site development (such as corrosion potential for concrete and steel).

ICP Mass Spectrometer

ICP Mass Spectrometer: Supporting Conservation Planning and Application - YouTube

One of the major characteristics of the soil is its composition of various elements. The KSSL measures elements using an inductively coupled plasma mass spectrometer, or ICP. Data from the ICP are used in conservation planning for plant

growth and crop production, fertility, aluminum saturation/toxicity, fertility, sodium adsorption ratio, soil biology, and soil health. Additionally, several agriculturally important properties are calculated from ICP measurements, such as base saturation, cation-exchange capacity, and effective cation-exchange capacity.

For more training videos, please see the National Soil Survey Center's YouTube Channel - https://www.youtube.com/user/nrcsnssc. ■

CZSS Team Completes Field Portion of Research Project with NC State

By Greg Taylor (senior soil scientist for special projects, NRCS, Raleigh, North Carolina), Dean Shields (MLRA soil survey office leader, NRCS, Richmond, Virginia), and Matt Duvall (ecological data quality specialist, NRCS, Raleigh, North Carolina).

Figure 1.—Sampling design showing where two samples were taken in subaqueous soil by boat and subaerial soil by McCauley peat sampler. Note that several cores or samples were taken at each subaqueous and subaerial site.

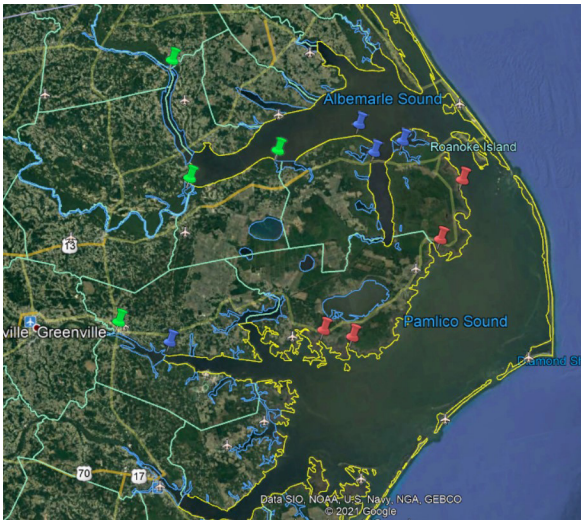

Figure 2.—Pins indicate sample/study sites. This map does not adequately convey the size of this project area, which required many miles on trucks and hours on boats to cover.

Being part of the Coastal Zone Soil Survey (CZSS) team inherently comes with its own list of challenges. Locating suitable boat ramp access, unexpectedly finding that pieces of equipment have been destroyed by saltwater, and continuously hoping that mother nature provides calm waters are just a few of the issues that are addressed daily. Now add COVID-19 and the necessary safety precautions associated with working on a boat and in the field as part of a team, and the degree of difficulty is increased yet again. Despite these challenges, the CZSS staff was able to complete field work associated with a collaborative research project between the NRCS Soil and Plant Science Division and North Carolina State University (NC State).

The Project

This project focused around the Albemarle and Pamlico Sounds of North Carolina and had two primary objectives:

1. Determine how much carbon has actually accumulated and been stored (sequestered) in organic matter along the coastal ocean ecosystems and in nearshore wetlands (blue carbon)

2. Study how saltwater intrusion can alter carbon stocks in coastal environments

Why

When one begins to study such issues as sea-level rise and climate change, a common factor is always carbon. In fact, a common mantra in some circles is “Carbon is king!” However, as one begins to further investigate carbon and the amount stored in coastal environments (known as blue carbon), the ranges of estimates, calculations, and projections are wide at best. Numbers are often based off a few samples taken only to a depth of 10 cm; almost no one has previously sampled below a depth of 50 cm. For soil scientists, who are accustomed to looking to a depth of 200 cm, this leaves a lot of space for improvement. Many other “guesstimations” have been derived from spatial analysis with no basis of actual field-collected data. In addition, no national standards for collecting, analyzing, and reporting blue carbon data appear to exist. For this reason, the CZSS team started the National Coastal Blue Carbon Assessment to research methods and create a source that all scientists can use when sampling carbon in coastal environments. This collaborative project was designed to complement this effort.

Figure 3.—A classic ghost forest created by rising water and increased salinity.

How

The short version of how was simply a “divide and conquer” approach. NC State faculty and students were to focus on sampling the subaerial portions while NRCS Soil and Plant Science Division (SPSD) staff were to work in the nearshore areas. The plan was to select sites ranging from known fresh water to known saltwater and then run transects from the subaqueous to the subaerial. This allowed a view to the past, present, and future of the soil and therefore a little more knowledge as to what to expect in relation to increased salinity and water depth.

Figure 4.—A sample site that clearly indicated the effects of sea-level rise. Notice the original water boundary on the soil survey (of Dare County, North Carolina, 1992) and where vegetation is being burned by saltwater intrusion. These lines are NOT skewed from compilation error.

Results

While the samples are still being processed by NC State and our own Kellogg Soil Survey Laboratory, we were able to make some observations from the field as to how marshes and forests respond to rising sea levels and increasing salinity levels.

Figure 5.—Reuben Wilson (NC State graduate student) taking a break from sampling along the Tar River. Temperature this day was in the upper 90s and accompanied by the typical southern humidity. Air temperatures during the project ranged from 102 degrees F (August 2020) to 32 degrees F (January 2021).

However, the team has agreed to wait and combine our findings into one conclusive paper.

One thing we did discover is that our big blue pontoon boats work great as well as attract attention. On numerous occasions we found ourselves explaining what we do, why, how, and many of the features of our Clark pontoon boats.

Also of note is how this project has resulted in two additional future projects for CZSS. One is a study with NC State to investigate the current and potential impacts of saltwater intrusion on NC agriculture production and to explore possible solutions (funded by private donations). The other is to work with SPSD ecological data quality specialists from the Southeast Regional office to collect soils and subaquatic vegetation data in Currituck Sound, North Carolina.

Moving forward, plans and aspirations for CZSS include building upon an existing collaboration with the Albemarle Pamlico National Estuary Partnership (APNEP) to establish direct field collaboration with Chowan University for the subaquatic vegetation (SAV) and carrying out a soils mapping update in Currituck Sound. We hope that this will be the first leg of a long-term project to produce a subaqueous soil survey of the Albemarle-Pamlico estuary system (APES), including the development of SAV-related ecological site descriptions (ESDs).

Provisional ESDs for MLRAs 153A and 153B are among the highest ESD priorities in the Southeast Region. These two MLRAs entirely encompass all of the landmass that is in direct contact with APES. A significant portion of the “terrestrial” ecological sites (“normal ESD development”) in these MLRAs is in the coastal zone, and these portions of both MLRAs 153A and 153B typically are more easily accessed by water than by land. SAV and coastal zone vegetation data inventory will coincide with and follow the progression of the coastal zone and subaqueous soil survey update. Provisional ESDs for the remaining inland and upland portions of these MLRAs will be developed with assistance from the MLRA soil survey offices in Richmond, Virginia, and Richmond Hill, Georgia, during the non-boating season.

A big THANK YOU to fellow crew and staff who assisted with this project:
Matthew Ricker, Associate Professor of Pedology, NC State
Lori Gorczynski, graduate student, NC State
Reuben Wilson, graduate student, NC State
Jerome Langlinais, MLRA soil survey office leader, NRCS, Loxley, Alabama
Rachael Heisey, soil scientist, NRCS, Loxley, Alabama
Rob Tunstead, senior regional soil scientist, NRCS, Raleigh, North Carolina
Rusty Collins, superintendent of NC State Tidewater Research Station, Plymouth

As always, please reach out to the Coastal Zone Soil Survey Team if you have any questions. ■

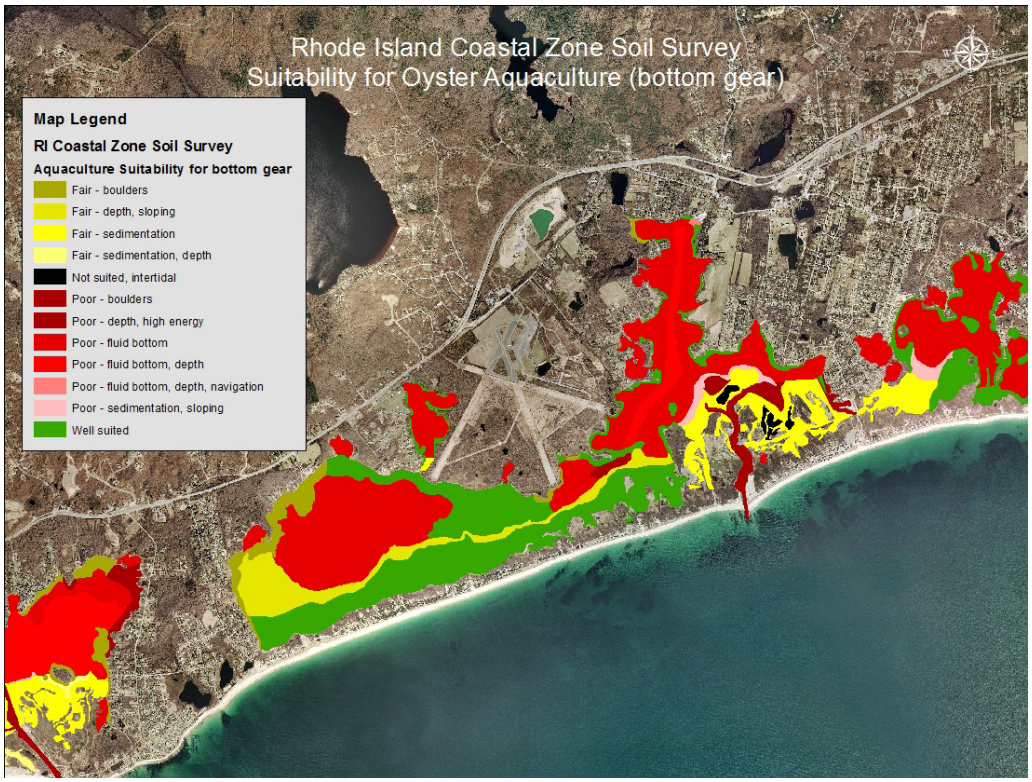

Figure 1.—Map showing soil suitability for aquaculture in Ninigret Pond, Charlestown, Rhode Island.

Soils and (COVID) Oysters

Rhode Island (RI) NRCS has been involved with building oyster reef habitat since 2008 using EQIP's (Environmental Quality Incentives Program) Oyster Reef Restoration State Initiative. For a video about the initiative and other information, go to: https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/ri/programs/financial/eqip/?cid=nrcseprd429442. The initiative was spurred on when RI NRCS adopted a "Working Waters" strategic plan that focused farm bill funds on coastal restoration projects. Part of the plan highlighted the lack of Rhode Island soils data for the coastal zone (dunes, marshes, and beaches) and subaqueous soils—data needed for planning the restoration projects. As a result of this gap in the soil survey data, the State Conservationist of Rhode Island prioritized establishing a coastal zone soil survey (CZSS) initiative for Rhode Island, "The Ocean State."

In 2011, portions of the published RI soil survey SSURGO data included data resulting from the efforts to map the coastal zone and subaqueous soils within the coastal lagoons of Washington County along Rhode Island's south shore. Each year new areas were added with the database refresh, and by 2016 coverage of most of the coastal lagoons, bays, dunes, beaches, marshes, and anthropogenic areas along the coast was complete. Aside from the interpretations and data provided by the CZSS, the equipment, remote sensing tools, and knowledge of the soil-landscape relationships were now available for conducting technical soil services for the coastal zone.

With COVID-19 in full force by the end of February 2020, restaurants in RI were shut down. Local aquaculture farmers could not sell their oysters, which then grew too big to sell, and many of them faced the possibility of closing their operations. The partnership between RI NRCS and the State's Department of Environmental Management (DEM), which had been working for years on the EQIP reef initiative,

decided to buy the oversized oysters from the growers and use them to “seed” the reefs. The goal was to expand the reef building to areas in the open part of Narragansett Bay, areas without soil maps. Sites that had the best chances of recruitment by the large mature oysters needed to be located quickly. The RI soils staff provided technical soil services to help locate the best sites to drop the oysters. They scanned sites with acoustic gear, took core samples to determine soil type, used drop cameras to view the bottom, and made dives. As a result, three new areas for deployment were located in the bay and numerous oyster growers were able to continue their operation. Coastal zone soil survey to the rescue!

More information and a video of the large oyster deployment is at: https://www.nrcs.usda.gov/wps/portal/nrcs/detail/ri/newsroom/features/?cid=NRCSEPRD1727828 ■

Figure 2.—Rhode Island NRCS staff directing a vessel where to drop the single mature oysters on a new reef in Narragansett Bay, Rhode Island.

Posters of Soil Colors

The two-sided poster “Soil Colors of the Continental United States” has arrived! The unique mosaic of colors communicates the variety of soil types, their properties, and the conditions under which they formed, thereby showing how different areas need different conservation practices. You can download a PDF of this poster or order paper copies, as well as download PDFs of soil color posters for each State, at: Soil Education | NRCS Soils (usda.gov). ■

GPR Investigation of Former Bleach Houses in Ivoryton, Connecticut

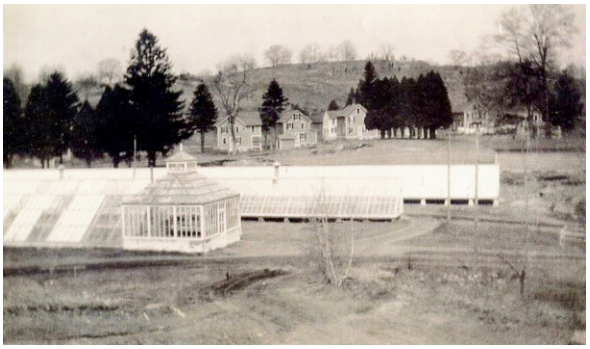

Figure 1.—Bleach houses used for whitening ivory.**

On a brisk October day in 2020, members of the Essex Land Trust, Sarah Sportman (Connecticut State Archaeologist), and Debbie Surabian (State Soil Scientist for Connecticut and Rhode Island) met in the field, wearing face masks and social distancing, in the village of Ivoryton, once the center of ivory milling in Essex, Connecticut. The Essex Land Trust, which owns a portion of the land where milling took place, requested assistance from the Office of State Archaeology and USDA-NRCS to identify the locations of former bleach houses (figs. 1 and 2). In accordance with NRCS's commitment to the protection and enhancement of our Nation's history, Surabian conducted a GPR investigation to provide added insight into the presence of former bleach houses that were used in ivory milling.

In the early 1800s, trade expanded between Africa and the United States, making ivory more readily available and an important part of the Industrial Revolution in the United States. The increased availability of ivory and machinery that could manufacture goods in large quantities boosted the use of ivory for combs, handles, beads, buttons, billiard balls, and veneers for piano keys.

In the mid-1800s, the increased availability of sheet music led to a demand for pianos in American homes and for ivory as the preferred veneer for piano keys. By 1862 and 1863, Pratt, Read & Company (in Deep River, Connecticut) and Comstock, Cheney & Company (in Ivoryton, Connecticut) were both major ivory import businesses, processing up to 90 percent of the ivory imported into the United States*. Their factories supplied the majority of keyboards to the major piano manufacturers*.

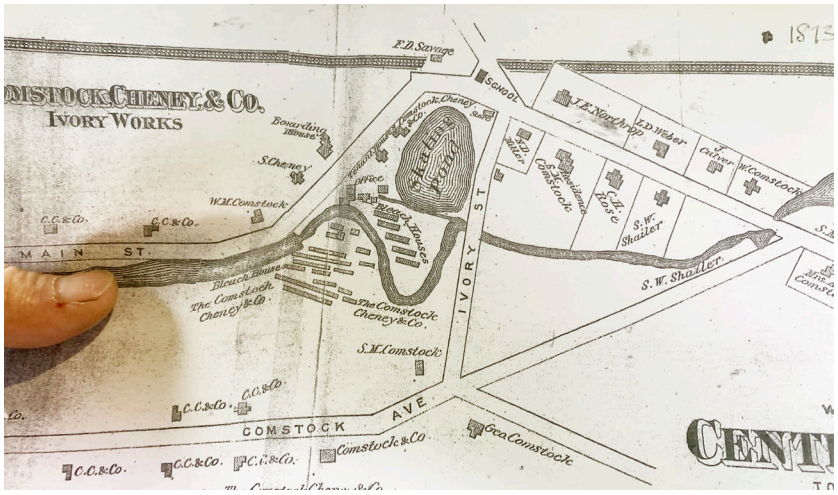

Figure 2.—An 1873 map showing the bleach houses of the Comstock, Cheney & Company factory just below the Skating Pond on both sides of the river.

Figure 3.—A photograph of the GPR unit at the start of a grid survey.

In addition to the production of keyboards for pianos, these companies produced combs, toiletries, toothpicks, billiard balls, and other household items out of ivory. By 1900, the two factories employed more than 1,400 men and women. In the first decade of the 1900s, the annual number of piano sales exceeded 350,000*. However, during the Great Depression, consumer demand for pianos fell. The income of these two businesses declined by 90 percent between 1922 and 1932. As a consequence, in 1936, these two companies merged as Pratt, Read & Company, and centered in Ivoryton*. During World War II the government redirected production toward military needs, and Pratt, Read & Company were tasked with the manufacture of military gliders. By 1954, Ivoryton saw its last shipment of ivory as plastic keys became the new standard. By the late 1980s, the company closed as a piano parts manufacturer and moved its base to Illinois*.

One of the final stages in the processing of ivory into piano keys was the placement of the ivory in bleach houses. Bleach houses were long triangular glass houses in which pieces of ivory were laid out on horizontal racks to be bleached and whitened by the sun**. Pieces of ivory typically remained in the bleach houses for 21 days. The pieces were then brought back into the factory to be glued onto wooden pianos. As seen in figure 1, the Ivoryton bleach houses resembled modern-day greenhouses. These bleach houses appear to be either resting on the ground surface or elevated by footings.

The GPR grid surveys (fig. 3) are located within soil delineations that are labeled 102 (Pootatuck fine sandy loam) and 85C (Paxton and Montauk fine sandy loams, 8 to 15 percent slopes, very stony). The Pootatuck series consists of moderately well drained, coarse-loamy (clay content less than 18 percent) soils that formed in alluvial sediments. They are nearly level soils on flood plains subject to frequent to occasional flooding. The Paxton and Montauk series consist of well drained, coarse-loamy soils that formed in lodgment till derived mainly from schist, gneiss, or granite. Depth to bedrock is commonly more than 6 feet (2 meters) for these soils. Because of their low content of clay, water, and soluble salt, these soils are considered well suited for GPR investigation work. However, GPR interpretations were more difficult in the area of the investigation because a portion of this land was also used by a drug company from 1937 to the 1950s and then by a manufacturing company until 1982.

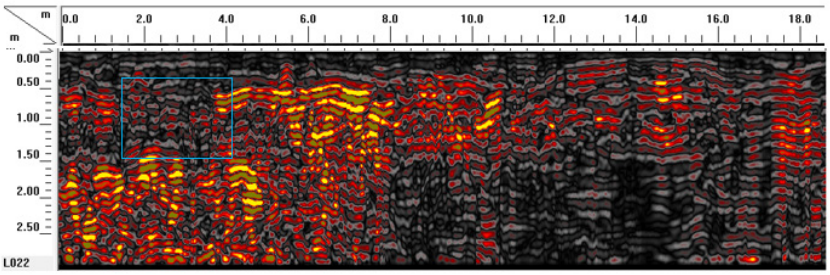

Figure 4.—A 2D radar record from Grid 1. An area of soil disturbance within the blue-colored rectangle is approximately 2 x 3 meters.

Overall, the 2D depth-slices and radar records showed several subsurface patterns suggestive of soil disturbance (fig. 4) and the possible presence of the bleach houses, as well as other anomalous features of potential interest. However, it is probable that most major remnants of the bleach houses have been disposed of, and continuous human disturbances to the land have removed most indications of these structures.

References

* Malcarne, D.L., and B. Milkofsky. 2019. Ivory Cutting: The Rise and Decline of a Connecticut Industry. https://connecticuthistory.org/ivory-cutting-the-rise-and-decline-of-a-connecticut-industry/ [accessed 6 October 2020]

** Deep River Historical Society. History of the Bleach House. http://deepriverhistoricalsociety.org/about-drhs/bleach-house/ [accessed 13 October 2020] ■

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