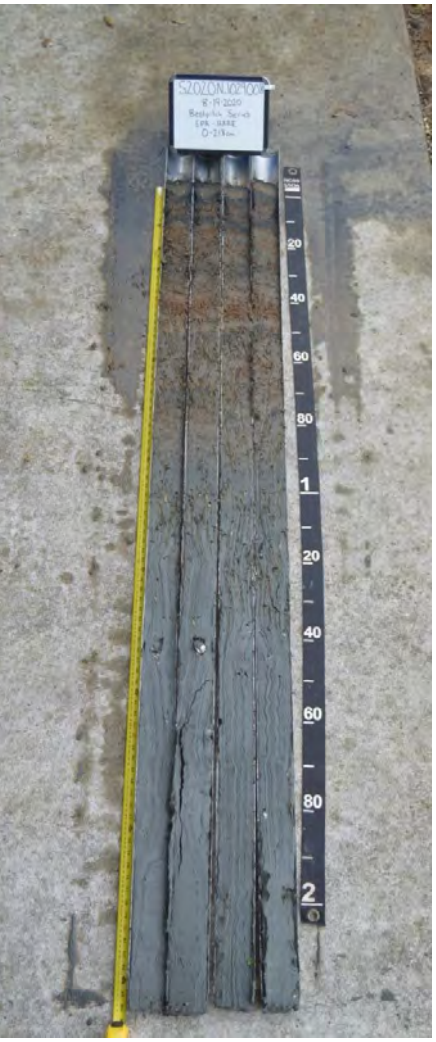
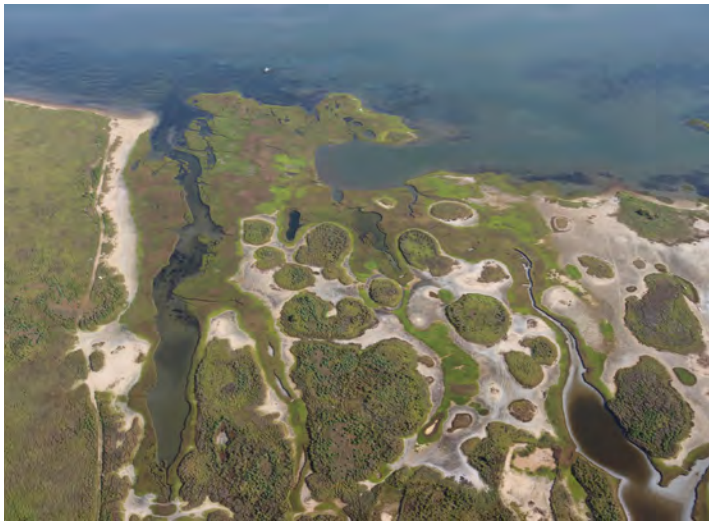
USDA United States Department of Agriculture

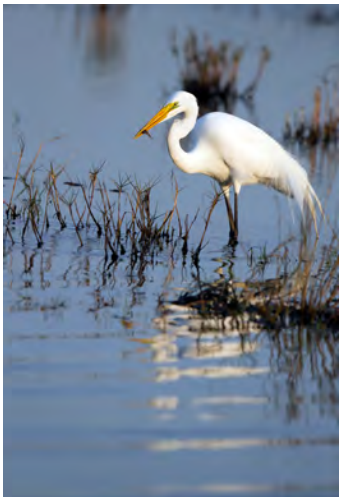
Natural Resources Conservation Service

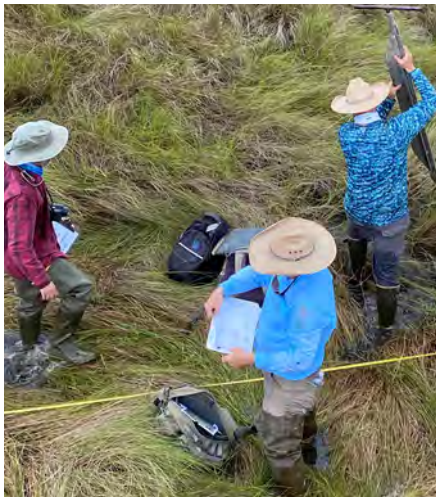
Soil and Plant Science Division

Coastal Zone Soil Survey









Fiscal Year 2021

CONTENTS

Page 3

Helping People Help the Land In Nearshore and Coastal Environments

Page 4

Soil and Plant Science Division Supports USDA Goals

Page 5

Soil – The Best Ally in the Fight Against Climate Change

Page 6

2020 Project Highlights

Page 8

2021 Project Highlights

Page 14

Technical Soil Services

Page 18

Boat Safety

Page 19

National Cooperative Soil Survey

Helping People Help the Land

In Nearshore and Coastal Environments

USDA is a world leader in providing coastal zone soil survey data to deliver science-based conservation planning. For over two decades, Natural Resources Conservation Service soil scientists and partners of the National Cooperative Soil Survey have collected data, conducted research, mapped soils, and developed soil interpretations in the coastal zone.

The coastal zone is where terrestrial land meets bays, sounds, estuaries, tidal rivers, seas, oceans, or other water bodies. It includes dunes, marshes, beaches, and anthropogenic coastal areas.

A coastal zone soil survey (CZSS) is an order 2 soil survey focusing on the coastal zone. A CZSS provides detailed spatial soil maps, a rich database of soil chemical and physical properties, site data, and interpretations for coastal applications and Farm Bill technical and financial assistance.

NRCS MISSION:
We deliver conservation solutions so agriculture producers can protect natural resources and feed a growing world.

NRCS VISION:
A world of clean and abundant water, healthy soils, resilient landscapes, and thriving agricultural communities through voluntary conservation.

The collection of coastal zone soil survey information provides science-based data of the soils and ecological resources to help land managers ensure coastal areas are productive, sustainable, and profitable.

USDA Goals

The Soil and Plant Science Division supports USDA goals by:

- Strengthening conservation planning efforts with science-based coastal soil information by transferring the knowledge into the hands of planners and land managers who want to protect and safeguard our land, water, and other natural resources for future generations.
- Maintaining a high-performance workforce by engaging the knowledge, skills, and expertise of staff from across mission areas to identify innovative opportunities, adapt the latest science and technology, and foster a working environment that continues to serve the public.
- Exploring the opportunities to improve the collection and utilization of coastal zone soil survey data on the delivery, effectiveness, and outcomes of USDA programs and activities.
- Increasing collaboration to develop and streamline technical tools and knowledge by partnering with scientific research institutions and other Federal and state agencies to enhance the conservation planning process and results.
- Providing coastal soil data to help land managers incorporate climate science into real-world natural resource management and conservation projects to address the ecological, social, and economic demands on the landscape.

Soil

The Best Ally in the Fight Against Climate Change

The SPSD is leading coastal zone soil survey efforts to mitigate and adapt to climate change by:

- ★ Providing science-based soil survey information and tools to ensure our working lands are conserved, restored, and made more resilient to climate change.
- ★ Developing the latest soil science and technology to manage the risks, challenges, and opportunities of climate change.
- ★ Partnering with scientific research institutions, other Federal agencies, and industry experts to provide coastal soil survey information about the current status and changes in the natural resources relative to climate change.
- ★ Actively evaluating and updating coastal zone soil information to examine the complex issues of climate change that have implications for U.S. agriculture, such as salinization of agricultural lands and ocean acidification for aquaculture farmers.
- ★ Conducting outreach and education on coastal zone soil surveys to aid policymakers, program managers, agricultural producers, and land managers charged with implementing coastal climate change programs or mechanisms.

NRCS Publishes a Massachusetts Subaqueous Soil Survey

SPSD soil scientists in Connecticut, Massachusetts Assistant State Soil Scientist, and local shellfish constables conducted subaqueous soil coring in Lagoon and Sengekontacket Ponds on Martha's Vineyard. They used soil cores and other observation points to produce a 1:12,000 scale subaqueous soil survey map for the two coastal ponds published to Web Soil Survey in 2020, along with the corresponding database work in the National Soils Information System (NASIS). The Martha's Vineyard shellfish commissions are concerned about water quality in the ponds due to valuable commercial and recreational shellfisheries. Nitrogen loading from the surrounding watershed is of major concern to one of the few remaining bay scallop fisheries in the region. The soil survey will provide critical baseline soils data for the management of the coastal ponds as resource managers now have a valuable tool to analyze the complete landscape from terrestrial to subaqueous.

2020 Project Highlights

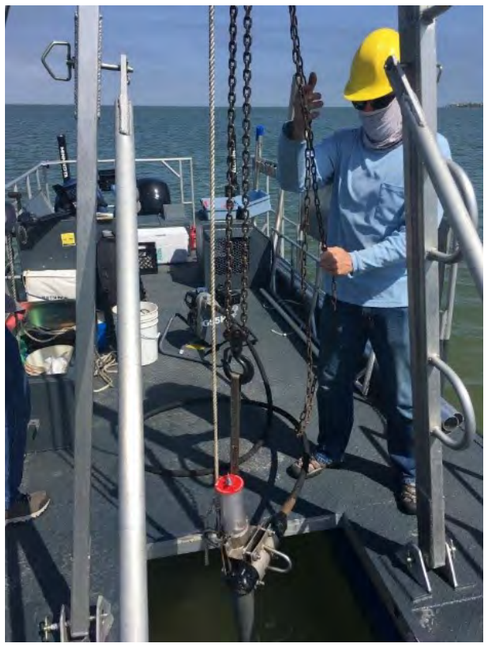
Coastal Zone Soil Survey for Jamaica Bay in New York City is Available on Web Soil Survey

The Soil and Plant Science Division has completed a coastal zone soil survey for Jamaica Bay, New York City. Jamaica Bay is part of the Gateway National Recreation Area and one of the most ecologically sensitive urban estuaries on the eastern seaboard. NRCS soil scientists partnered with many cooperators to complete the work, including Brooklyn College, New York City Soil & Water Conservation District, National Park Service, New York City Urban Soils Institute, and the University of Massachusetts, Amherst (UMASS).

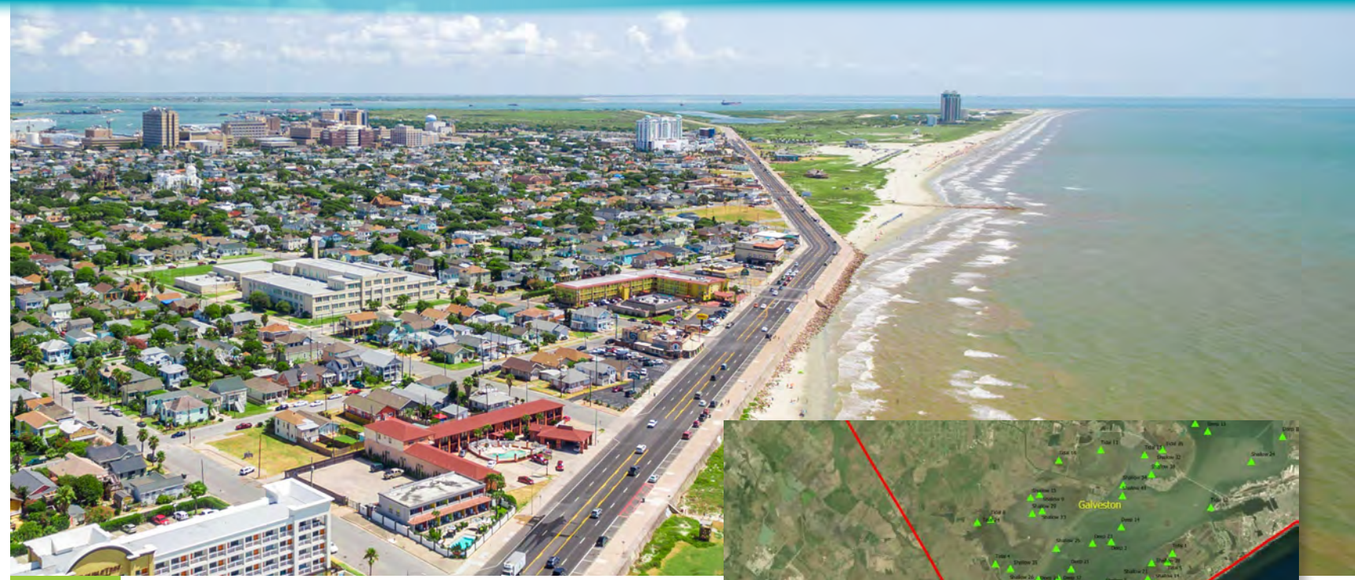
Check out the Jamaica Bay Story Map to learn more about The Coastal Zone Soil Survey of Jamaica Bay, New York.

Coastal Zone Soil Survey and Ecological Sites for West Galveston Bay in Texas

The soil survey office in Rosenberg, Texas, is collecting and analyzing pedon data to produce an updated map of the area encompassing West Galveston Bay in MLRA 150B. The area extends from the City of Galveston to the City of Freeport and includes subaqueous and subaerial soils. Before acquiring the pontoon boat for collecting subaqueous cores, soil survey staff employed various techniques to collect soil samples in the nearshore subaqueous areas. The most successful method to retrieving a soil core was pounding PVC pipe into the soil and then pulling it out (see images below). This worked well but proved to be extremely slow for production soil survey. In January 2020, the pontoon boat arrived at the office. After taking safety courses, acquiring the necessary equipment, and having decent weather, the soil survey staff accessed the project area and retrieved cores in March 2020.



2021 Project Highlights

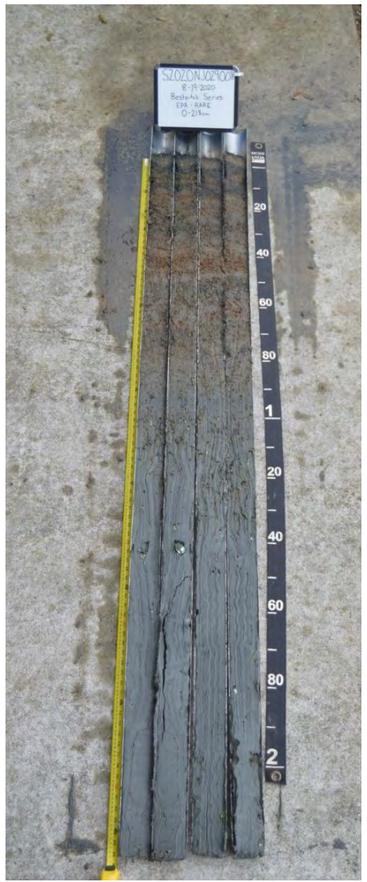


Digital Soil Mapping Delivers Coastal Zone Soil Survey Sampling Plan

During the summer of 2020, the soil survey office staff in Rosenberg, Texas, and the South Central Region GIS specialist decided to use digital soil mapping techniques on a CZSS project. GIS specialist, Alex Stum, devised a conditioned Latin Hypercube Sampling scheme to identify sampling locations. The two main covariates used included water depth based on existing topobathy and tonal pattern from recent satellite imagery. The points, shown in the map below, were generated using R and stratified into tidal areas, shallow, and deep sites. This fiscal year, the office plans to collect soil information at each point and develop soil survey map units.

Hammonton Soil Survey Office Staff Collaborate with Barnegat Bay Partnership

The Hammonton, New Jersey Soil Survey Office staff, Barnegat Bay Partnership, and Ocean County Soil Conservation District staff worked safely together this fiscal year to collect data on tidal marshes in the Barnegat Bay Estuary. The Barnegat Bay Estuary is studying the degradation of coastal tidal wetlands and forming a model to determine areas most valuable to marsh loss. To do this, the Barnegat Bay Estuary received an EPA Regional Applied Research Grant to conduct habitat and biological studies at 25 sites predetermined and located on different geomorphological settings throughout the estuary where current soil mapping consists of Appoquinimink, Transquaking, and Mispillion soils. Soil survey staff collected soil samples at the 25 sites for full soil characterization and coastal blue carbon data to add to the Barnegat Bay Estuary research project.



Pictured to the right is a Bestpitch soil profile sampled at site 8 in southern Barnegat Bay near Tuckerton, New Jersey.

2021 Project Highlights

Albemarle and Pamlico Sounds, North Carolina

The Soil and Plant Science Division staff started collecting soil data with North Carolina State University. There are currently 60 sites that have been sampled, with nine remaining to complete the field portion of the project. This project will help determine carbon stocks and saltwater intrusion effects and potentials in Albemarle and Pamlico Sounds.

National Coastal Blue Carbon Assessment

Blue carbon sampling in Barnegat Bay, New Jersey, was completed in 2020. Plans are to expand into surrounding bays in 2021. Similar cooperative projects are slated to begin in 2021 with the Virginia Institute of Marine Sciences, University of Rhode Island, University of Maryland, University of Massachusetts, and North Carolina State University. The projects' primary focus is to determine the best soil carbon sampling methods to establish accurate soil carbon amounts in coastal areas.

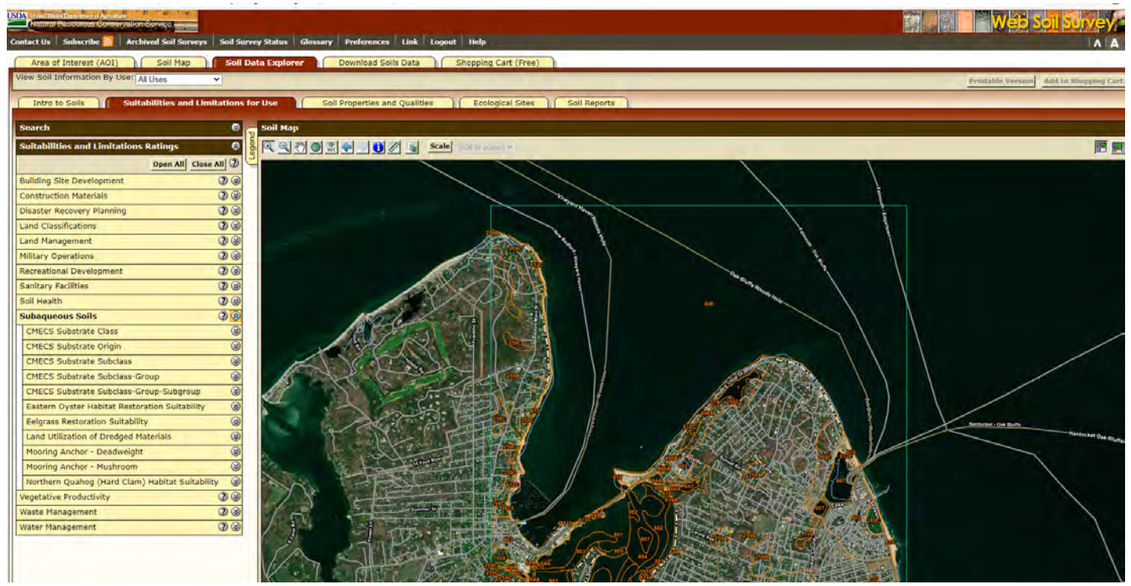
2021 Project Highlights

A few other ongoing projects for 2021 include:

- Albemarle-Pamlico National Estuary, North Carolina
- 100 Acre Cove and Potowomut Cover, Rhode Island
- Great Bay, New Hampshire
- Big Assawoman Bay, Maryland
- Isle of Wight, Maryland
- Shrewsbury River, New Jersey
- South River within Chesapeake Bay courtesy of the University of Maryland
- West Galveston Bay, Texas
- Eastern Long Island Sound, Connecticut
- Mobile Bay, Alabama
- Jobos Bay, Puerto Rico
- Indian River Lagoon and Banana River Lagoon, Florida

Subaqueous Soil Properties to be Available on Web Soil Survey

Users of Web Soil Survey will soon be able to prepare reports listing subaqueous soil properties for their area of interest under the Soil Data Explorer tab, Soil Properties and Qualities tab. The report will provide soil reaction (1:1 water, oxidized, and .01M CaCl2 pH), electrical conductivity (EC 1:5), and calcium carbonates (CaCO3). These properties are important for soil interpretations, such as the land application of dredge material, eelgrass restoration, hard clam habitat restoration, and oyster habitat restoration.



Technical Soil Services

Soil Survey Office Staff Assist with National Resource Inventory (NRI) Onsite Data Collection in Louisiana

Soil survey staff from Loxley, Alabama, and Denham Springs, Louisiana, assisted NRCS Louisiana in collecting onsite data for National Resource Inventory (NRI). Soil survey staff came prepared with an airboat to transport the field crew to two NRI marsh sites. The crew collected the necessary NRI data and verified the ecological site concepts and states at the locations. It provided a great opportunity for field verification with the technical specialists and training to a new Soil Conservationist Trainee. The field crew maintained safety protocols by wearing face coverings and social distancing.

USDA-NRCS soil scientist Jacob Islieb collecting soils data on material that may be dredged and used as TLP material.

Reduced sulfides at the surface of a 2016 TLP site.

Connecticut Interagency Thin Layer Placement Project

Soil scientists from NRCS Connecticut and the SPSD's soil survey office in Tolland, Connecticut, are providing technical soil services to partners from the Connecticut Department of Environmental and Energy Protection, National Oceanic Atmospheric Administration, University of Connecticut, and U.S. Fish and Wildlife Service for a thin layer placement (TLP) project at Bride Brook Salt Marsh in the town of East Lyme. Currently, the soil investigation is focused on two main areas of inventory.

1. Characterizing properties of the subaqueous soil material targeted for dredging and use as TLP material
2. Characterizing soil properties of the degraded marsh slated for TLP

UConn faculty are actively researching marsh response to different TLP soil materials at multiple sites in the region. The Bride Brook TLP project is one of three scheduled marsh restoration projects for which USDA-NRCS Connecticut will be providing technical soil services.

Side-scan Sonar to Improve Shallow-Water Coastal Zone Soil Survey

In November 2020, the CZSS focus team acquired a side-scan sonar to assist with Technical Soil Services and the subaqueous soil mapping initiative of the National Cooperative Soil Survey. The data provided by the side-scan sonar is used to map the soil's bottom type, such as hard versus soft soils (a major interpretation of the subaqueous soils), presence of macroalgae or submerged aquatic vegetation, boulders, anthropogenic features, oyster beds, and archaeological information such as sunken ships.

The CZSS focus team plans to train personnel in various regions to increase the accuracy of the soil survey mapping, lower the costs and amount of fieldwork, and provide a useful dataset to our cooperators and users of the soil survey. The side-scan technology also has numerous applications for technical soil services, such as assessing the EQIP oyster restoration sites.

Picture of the new side-scan sonar to be used by the CZSS staff.

Mention of names or commercial products in this document does not imply recommendation or endorsement by the USDA.

Boat Safety Measures Added to the General Manual

The General Manual has been expanded to include boating safety for Coastal Zone Soil Survey. The new information is available in Title 360 Parts, 420AA and 420BB. The purpose of these sections is to establish policy and guidance for safe operation, training, and maintenance of boats operated by NRCS personnel. Part 420AA provides the background, scope, responsibilities, training, equipment, inspections, and vessel records. Part 420BB provides information about regulations, laws, and checklists for float plans, fueling, powerboat operation, trailering, and maintenance. https://directives.sc.egov.usda.gov.

NCSS
National Cooperative
Soil Survey

The National Cooperative Soil Survey (NCSS) is a nationwide partnership of Federal, regional, State, and local agencies and private entities and institutions. This partnership works to investigate, inventory, document, classify, interpret, disseminate, and publish information about soils.

The Soil Science and Plant Division (SPSD) provides leadership for NCSS activities. SPSD continues to develop and streamline soil survey activities by partnering with scientific research institutions and private industry experts to enhance the CZSS.

By completing coastal zone soil surveys, the NCSS is:

- ★ Developing the latest soil science and technology needed to sustain economically sound operations in upland and nearshore environments.
- ★ Partnering with scientific research institutions and industry experts to provide conservation-system solutions in coastal areas.
- ★ Gathering data on the status and trends of soils in coastal zone areas to meet present and future demands for USDA programs such as the Emergency Watershed Protection Program–Floodplain Easement and EQIP-funded oyster restoration efforts.
- ★ Actively evaluating and updating coastal zone soils information to examine issues, such as saltwater intrusion and inundation, that have implications for U.S. agriculture.

www.soils.usda.gov

Natural Resources Conservation Service

SOIL AND PLANT SCIENCE DIVISION

Providing Conservation Support Backed by Data-Driven Science

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