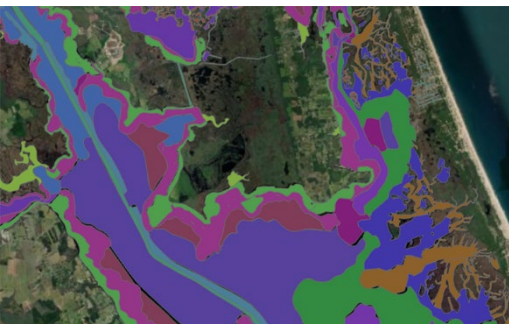
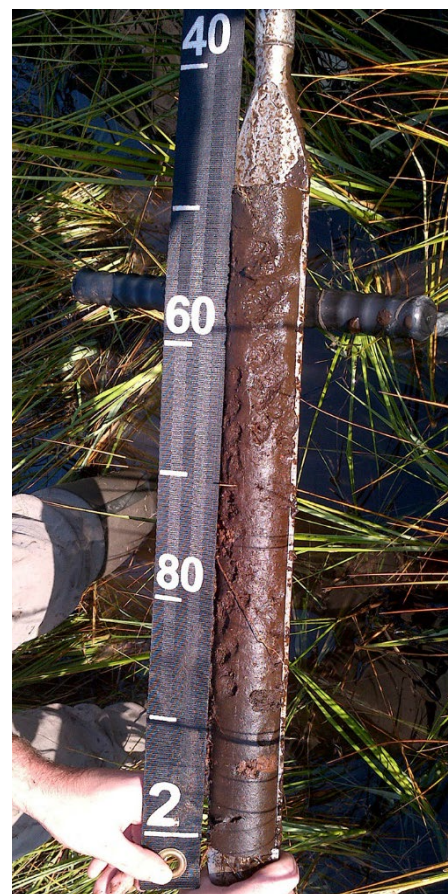
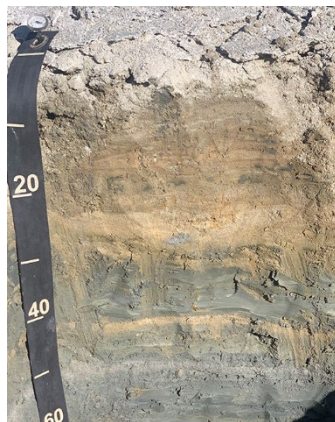




Natural Resources Conservation Service
U.S. DEPARTMENT OF AGRICULTURE



Coastal Zone Soil Survey Focus Team Fiscal Year 2023 Report



*Helping People Help the Land
in Nearshore and Coastal Environments*

Table of Contents

USDA Natural Resources Conservation Service	2
Soil and Plant Science Division	3
National Cooperative Soil Survey	3
Coastal Zone Soil Survey Projects	4
Quantifying Blue Carbon Stocks in the Chesapeake Bay Watershed	5
CZSS of Great Bay and Mullica River, New Jersey, Highlighted in The Sandpaper	6
Estimating Blue Carbon and Investigating Marsh Degradation in Ocean County, New Jersey.....	7
Congressionally Directed Spending Provides a CZSS of Long Island Sound	8
Partnerships of the CZSS of Long Island Sound	9
National Oceanic and Atmospheric Administration and NRCS Partner to Acquire Ocean and Coastal Mapping Data	10
CZSS of Lake Mattamuskeet National Wildlife Refuge in North Carolina Helps Reestablish Subaquatic Meadows	11
CZSS of Jobos Bay, Puerto Rico, Assists with Conservation Management Planning.....	12
CZSS of Currituck Sound, North Carolina, Helps Mitigate and Adapt to the Effects of Climate Change	13
CZSS Reveals Effects of Sea Level Rise in North Carolina	14
CZSS of Indian River Lagoon in Florida Helps Address Local Concerns.....	15
Investigating Dynamic Soil Properties at the Pamet River Marsh Restoration Site in Truro, Massachusetts	16
Technical Soil Services Help Aquaculture Producer Experiencing Major Decline in Productivity in New Jersey	17
Partnership Conducts Submerged Aquatic Vegetation Monitoring in the Albemarle-Pamlico Estuary in North Carolina	18
Soil Survey Assists with Reducing Wind Erosion around the Salton Sea in Riverside, California	19
CZSS of West Galveston Bay in Galveston, Texas, to Assist with Habitat Conservation, Restoration, and Protection Efforts	20



USDA Natural Resources Conservation Service

The U.S. Department of Agriculture (USDA) is a world leader in providing the public with coastal zone soil survey (CZSS) information. 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.

For over two decades, the USDA Natural Resources Conservation Service (NRCS) soil scientists and partners of the National Cooperative Soil Survey (NCSS) have been conducting CZSSs. 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.

CZSSs support USDA goals:

USDA Strategic Goal 1 – Combating Climate Change to Support America’s Working Lands, Natural Resources, and Communities by investing in CZSSs that assist producers, partners, landowners, and urban communities with tackling climate changes.

USDA Strategic Goal 2 – Ensure America’s Agricultural System is Equitable, Resilient, and Prosperous by providing CZSS information that supports aquaculture farmers’ ability to increase productivity and mitigate the impacts of climate change.

USDA Strategic Goal 3 – Foster an Equitable and Competitive Marketplace for All Agricultural Producers by conducting conservation technical assistance and technical soil services to individuals or groups of decision makers, communities, States, Tribal and local governments, and others to voluntarily conserve, maintain, and improve natural resources in coastal areas.

USDA Strategic Goal 6 – Attract, Inspire, and Retain an Engaged and Motivated Workforce that is Proud to Represent USDA by building partnerships with a diverse set of coastal stakeholders, listening to and engaging customers, collecting critical soil data needs, and ensuring our workforce has the knowledge, skills, and ability to deliver accurate CZSS products.



Soil and Plant Science Division

The Soil and Plant Science Division (SPSD) provides conservation support backed by data-driven science.

By completing CZSSs, the SPSD—

- Communicates and delivers comprehensive technical soil services and soils information to underserved communities and producers living in coastal areas.
- Plays a key role in actively examining coastal zone soils in areas where farming operations are experiencing climate impacts such as increasing frequency and severity of storms and storm surges.
- Cultivates a diverse, well-trained workforce with a unique area of expertise pertaining to tidal marsh, subaqueous and submerged soils, and vegetation.
- Leverages innovative partnerships to expand NRCS' ability to conduct CZSS laboratory analyses and research.
- Provides coastal blue carbon analysis and carbon stock information to a depth of two meters for terrestrial, tidal marsh, shallow subaqueous, and submerged soils.
- Helps people understand carbon loss, identifies prime soils for carbon sequestration, and provides an accurate way to map carbon within bays, estuaries, marshes, and other coastal areas.



National Cooperative Soil Survey

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



Coastal Zone Soil Survey Projects

NRCS recognizes the importance of the CZSS in expanding the delivery of Farm Bill programs to coastal communities.

By providing accurate and useful CZSS data, NRCS can enhance programs like the Environmental Quality Incentives Program and Emergency Watershed Protection Program–Floodplain Easements.

In support of Farm Bill programs and Congressionally Directed Spending, CZSS projects help address NRCS resource concerns such as soil erosion of shorelines or riverbanks, soil quality degradation, coastal flooding, and habitat degradation and loss.

Current CZSS projects:

Indian River Lagoon, Florida

Jobos Bay, Puerto Rico

Long Island Sound, Connecticut and New York

Salton Sea, California

Lake Mattamuskeet, North Carolina

Great Bay and Mullica River, New Jersey

West Galveston Bay, Texas

Pamet River, Massachusetts

Chesapeake Bay Watershed, Virginia

Cape Fear River, North Carolina

See project highlights on the following pages.





Quantifying Blue Carbon Stocks in the Chesapeake Bay Watershed

As part of a cooperative research project, the Virginia Institute of Marine Sciences and SPSD sampled 73 soils on a variety of coastal ecosystems in the lower Chesapeake Bay watershed to estimate carbon stocks in subaerial marsh and subaqueous soils. Then through a working agreement, the SPSD staff sent the samples to North Carolina State University to complete laboratory analyses on 20 subaqueous and 53 subaerial pedons. With this information, the SPSD staff are quantifying carbon stocks for each pedon, developing new mineral and organic soil series, establishing a baseline of soils data to update the soil survey, and entering data into the National Soil Information System (NASIS) to complete the project in 2023.





CZSS of Great Bay and Mullica River, New Jersey, Highlighted in The Sandpaper

The CZSS project in Great Bay and Mullica River, New Jersey, was highlighted in [The Sandpaper](#), a newspaper for Long Beach Island and Southern Ocean County, New Jersey. The project is a partnership of State and local government agencies, aquaculture producers, local universities, private nonprofit groups, and the SPSPD to help promote aquatic habitat on shellfish leases and enhance water quality throughout the Barnegat and Great Bay Region of New Jersey. Stockton University and the New Jersey Bay Islands Initiative are also interested in the CZSS for eelgrass and marsh restoration.

The CZSS in this area will support the New Jersey Conservation Opportunities Advancing Sustainable Technologies for Aquaculture Leases Aquaculture Project and a Regional Conservation Partnership Program (RCPP) project awarded to the Ocean County Soil Conservation District. The RCPP project will use the CZSS to identify additional shellfish leases, pinpoint ideal shellfish reef restoration areas, and provide soils information to the conservation planners and estuarine restoration managers. The RCPP project seeks to implement new conservation practice scenarios by connecting local farmers with NRCS and Farm Bill conservation programs.





Estimating Blue Carbon and Investigating Marsh Degradation in Ocean County, New Jersey

The Barnegat Bay Partnership, U.S. Environmental Protection Agency (USEPA), and SPSD collected twenty-five tidal marsh pedons for full laboratory characterization for an USEPA Regionally Applied Research Effort grant project. The project focuses on the effects of excess nutrients on marsh degradation and erosion in the Barnegat and Little Egg Harbor estuaries in Ocean County, New Jersey. The laboratory and field data will be used to update the tidal marsh soil survey mapping, which includes bulk density and total carbon data to improve estimates of blue carbon stocks. Ongoing marsh restoration efforts, such as living shorelines, thin layer deposition, beneficial reuse of dredge materials, and marsh enhancement, will also benefit from the CZSS information.

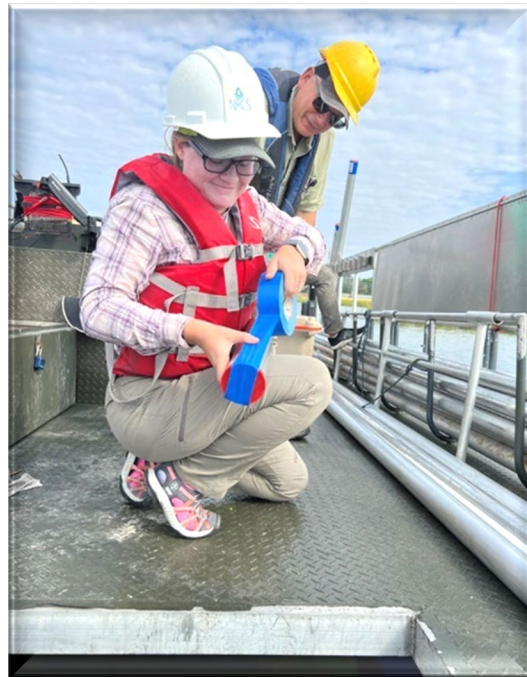




Congressionally Directed Spending Provides a CZSS of Long Island Sound

On Friday, March 11, 2022, President Biden signed a bill into law authorizing congressionally directed spending for USDA NRCS to collaborate with partners to conduct and publish a CZSS for the shallow water and nearshore mainland areas of the Long Island Sound Estuary System in Connecticut and New York. Managed by the SPSP, this NCSS project will provide crucial information to help manage, restore, and protect the Long Island Sound and its coastal areas.

In April 2022, SPSP soil scientists began collecting subaqueous soil cores from diverse landforms around Stonington Harbor in New London County, Connecticut. Working from east to west across the Connecticut portion of Long Island Sound, the fieldwork progressed throughout the year and ended by winter in Southport Harbor in Fairfield, Connecticut. Under the guidance of the SPSP Special Projects Office, 40 SPSP soil scientists and ecologists from across the country shared equipment, expertise, and knowledge to collect over 350 subaqueous cores.





Partnerships of the CZSS of Long Island Sound

NCSS partners, the University of Connecticut, and the University of Rhode Island, worked with the CZSS Focus Team to develop two cooperative agreements to complete time-sensitive and project-specific soil sample analyses in their labs along with research activities. Analyses include, but are not limited to, soil organic carbon (total and organic carbon), incubated or oxidized pH, routine pH for mineral or organic soil materials, bulk density, electrical conductivity (1:5 EC and EC for halinity classes), calcium carbonate, particle size analysis, and others that support the collection of data related to mapping soils of coastal and subaqueous areas of Long Island Sound. These analyses support the collection of data related to mapping soils of coastal and subaqueous areas of Long Island Sound.





National Oceanic and Atmospheric Administration and NRCS Partner to Acquire Ocean and Coastal Mapping Data

Today, 52 percent of the U.S. Exclusive Economic Zone, including our oceans and coasts and Great Lakes, remains unmapped to modern standards and have no topobathymetric lidar available. In an effort to rectify this lack of data, National Oceanic and Atmospheric Administration (NOAA) and NRCS signed a memorandum of agreement to acquire topobathymetric lidar along the coast of Long Island Sound in 2023 to be used as a base map for CZSS mapping. Topobathymetric lidar, the science of measuring and recording land, water, and submerged land using airborne laser-based sensors, is a critical factor in mapping coastal zone soils. Other important applications include assessing and preparing for potential impacts of threats such as sea level rise, flooding, and storm surge to coastal communities.





CZSS of Lake Mattamuskeet National Wildlife Refuge in North Carolina Helps Reestablish Subaquatic Meadows

The Lake Mattamuskeet CZSS was initiated at the request of the Lake Mattamuskeet National Wildlife Refuge and North Carolina Wildlife Resources Commission to help guide efforts on reducing lake turbidity and reestablishment of its once extensive subaquatic meadows. The refuge features the largest freshwater lake in North Carolina and a historic abundance of submerged aquatic vegetation, making it a vital stop on the Atlantic Flyway for migratory waterfowl. It is a popular destination for fishing and birdwatching. The Lake Mattamuskeet CZSS is scheduled to be published in 2023, making it the first publicly available subaqueous soil survey in North Carolina and the Southeast Region.





CZSS of Jobos Bay, Puerto Rico, Assists with Conservation Management Planning

In 2022, the Puerto Rico Natural Environmental Resources Department, Sea Grant, and SPSD organized a CZSS of Jobos Bay in Puerto Rico and collected twenty subaqueous soil cores based on benthic communities and maps. Jobos Bay is on the south coast of Puerto Rico. It contains mangrove islands and coral reefs within the boundaries of the Jobos Bay National Estuarine Research Reserve, along with mangrove forests, lagoons, salt flats, dry forests, and seagrass beds. These ecosystems provide habitat for a great diversity of flora and fauna, including several rare and endangered species along with a variety of species of tropical fish. Jobos Bay is an excellent example of a tropical estuarine and marine system ideally suited to research and education, as well as the development and implementation of sound conservation management planning.





CZSS of Currituck Sound, North Carolina, Helps Mitigate and Adapt to the Effects of Climate Change

Beginning this year, the Albemarle-Pamlico National Estuary Partnership, National Audubon Society, North Carolina Coastal Reserve and National Estuarine Research Reserve, East Carolina University, Virginia Department of Wildlife Resources, U.S. Fish and Wildlife Service, and SPSPD will be conducting a CZSS and submerged aquatic vegetation (SAV) inventory of the Currituck Sound located in northeast North Carolina and southeastern Virginia. SPSPD staff have started the CZSS by preparing a soil sampling design and delineating subaqueous landforms using bathymetry.

This project will study marsh migration, saltwater intrusion, and SAV decline to better prepare land managers with mitigating and adapting to the effects of climate change. Analyzing and mapping SAV, along with its associated decline, is aimed at protecting and revitalizing aquatic plant communities and the associated fisheries in the economically valuable and unique area. The SAV inventory and CZSS are scheduled to be completed by 2025.

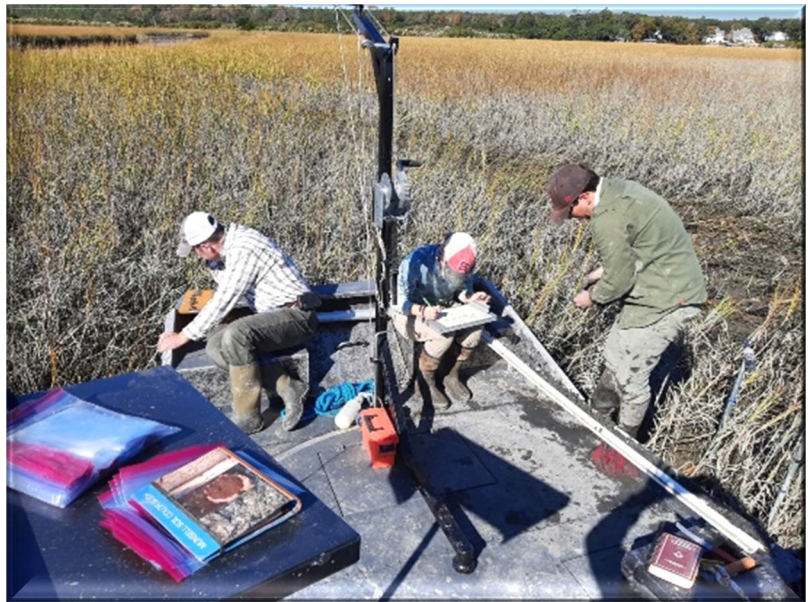




CZSS Reveals Effects of Sea Level Rise in North Carolina

North Carolina State University (NCSU) and SPSD are investigating soil blue carbon stocks and the effects of saltwater intrusion in North Carolina's Albemarle-Pamlico Sound. The project proposed by NCSU focuses on collecting soil data along salinity gradients to quantify the impacts of saltwater intrusion, accretion rates, and blue carbon stocks in soils. It is the first project to quantify soil organic carbon stocks to a consistent depth of two meters. This project is important due to the current lack of studies that quantify the effects of sea level rise on soil salinization and the storage and sequestration of soil carbon.

The soil data from this project will be used to generate regional maps displaying the extent of saltwater intrusion into previously freshwater areas. NCSU will further use the data to define linkages between saltwater intrusion, soil accretion, and carbon sequestration rates to predict ecological changes from the transition of forested freshwater systems to ghost forests and salt-marsh systems. The SPSD will use the data to update soil survey mapping along the Albemarle-Pamlico coastline for delivery to Web Soil Survey in 2023.





CZSS of Indian River Lagoon in Florida Helps Address Local Concerns



Initiated by the St. Johns River Water Management District researchers, University of Florida's Whitney Lab leaders, and the SPSPD, the first CZSS project in Florida for the Indian River Lagoon (IRL) was established as a first line of defense to address local resource concerns. The IRL is known for its biodiversity, supporting more than 4,300 species of plants and animals, making it one of the top fishing destinations in the world for Speckled Seatrout and Red Drum. A popular tourist destination, the IRL is also home to National Aeronautics and Space Administration's (NASA's) Cape Canaveral, beautiful beaches, and local seafood.

The constant increase of freshwater discharges into the IRL has depleted the shellfish habitat and carried soils and pollutants into the lagoon, fostering harmful algal blooms and promoting seagrass destruction. Over the years, these factors have destroyed the fishery balance and diversity, reducing and eliminating the lagoon's natural capacity for restoration. Since 2011, algal blooms have dramatically increased, devastating the local economy, ecology, and culture. In 2011, an unprecedented number of manatees died due to starvation in the IRL.

This CZSS is a multiyear cooperative effort that involves various partner agencies, including the Florida Department of Environmental Protection, St. Johns River Water Management District, University of Florida's Whitney Lab, NASA, U.S. Air Force, U.S. Fish and Wildlife Service, Florida NRCS, and the SPSPD. The final product will be the first CZSS in Florida published to the Web Soil Survey and will provide soil data and interpretations needed to address the local natural resource concerns.



Investigating Dynamic Soil Properties at the Pamet River Marsh Restoration Site in Truro, Massachusetts



The National Park Service and the SPSP are conducting the first Dynamic Soil Properties (DSP) project that will document changes in soil properties with the restoration of the Pamet River marsh system in Truro, Massachusetts. Funding provided by the NRCS Watershed Protection and Flood Prevention Program and the Cape Cod Water Resources Restoration Project will develop a restoration plan to reestablish tidal and saltwater flow to this area.

The Pamet River is an estuarine system that cuts across lower Cape Cod starting from Cape Cod Bay and extending almost all the way to the Atlantic Ocean. Tidal estuarine water enters the system from Cape Cod Bay to the west, maintaining the western section of the system as tidal salt-marsh habitat. Over 150 years ago, a dike was installed that restricts tidal flow to nearly half of the system. With this restriction, areas that were once salt marsh were converted to a freshwater marsh system. Recent overwash events during storms have caused salt water to enter the system from the Atlantic Ocean and inundate this freshwater system, causing temporarily elevated salinity levels and impacting freshwater marsh vegetation and drinking water wells.

The DSP project will compare soil properties in an unrestricted estuarine salt marsh to those properties of a marsh that has experienced limited tidal influence for over 150 years. The project will provide insight into changes in DSP, such as bulk density, conductivity, and organic carbon content, that influence important parameters, such as carbon stocks and habitat resiliency, with sea level rise. It will also provide baseline data to monitor changes over time after tidal influence is restored to the upper Pamet River and possibly show that restoring and preserving degraded salt marshes can increase carbon sequestration.



Technical Soil Services Help Aquaculture Producer Experiencing Major Decline in Productivity in New Jersey

NOAA and New Jersey Department of Environmental Protection (NJDEP) requested technical soil services from the SPSP to obtain subaqueous soil data in a set of aquaculture leases in Barnegat Bay, New Jersey. A large-scale aquaculture grower was experiencing a dramatic decrease in clam survivorship and growth over the last 3 to 5 years. To determine the cause of the decrease in aquaculture productivity, NOAA shellfish biologists were interested in gathering soil and water quality data.

The SPSP collected subaqueous soil samples and provided data on soil pH, texture, and the presence of sulfidic materials, specifically monosulfides, within the lease areas. The data showed normal soil pH levels, monosulfides present in all but one location, and very dark soil colors in areas where clam growth and survivorship had declined the most. Water quality and more in-depth studies are being performed by NOAA and NJDEP to further assist the aquaculture producer.





Partnership Conducts Submerged Aquatic Vegetation Monitoring in the Albemarle-Pamlico Estuary in North Carolina



Each year in spring and autumn, the Albemarle-Pamlico National Estuary Partnership (APNEP) collects tier-1 and tier-2 monitoring of submerged aquatic vegetation (SAV) in high-salinity areas of the Albemarle-Pamlico Estuary System. Tier-1 monitoring is done by collecting and reviewing imagery, and tier-2 monitoring consists of in-the-water confirmation of remotely sensed seagrass meadows as well as species composition and benthic cover classification. To complete the tier-2 monitoring, at least 150 locations are inventoried each cycle with the same points being sampled twice, once in spring, and once in autumn. The inventory work is divided among partners, and the data is shared across the partnership. By dividing the work and sharing the data, APNEP provides an outstanding framework for increasing efficiency and effectiveness of shared data interests. The CZSS Focus Team has been a member of the APNEP SAV Team since 2006 and participated in tier-2 monitoring since it began in the spring of 2021.

In 2022, CZSS Focus Team members participated in collecting tier-2 field data during both the spring (38 points) and autumn (83 points) inventory cycles. This SAV monitoring data will help the SPSD with ecological site concept development including identification of the landforms, soils, and aquatic edaphic environments where SAV meadows can or cannot be found. It will contribute to the development and description of state-and-transition models for subaqueous soils including species composition, stocking, and related ecological dynamics within and between states and communities. The SAV monitoring data could also help develop habitat suitability interpretations.



Soil Survey Assists with Reducing Wind Erosion around the Salton Sea in Riverside, California

The Bureau of Land Management, Formation Environmental, and the SPSD are completing a soil survey on the exposed playas along the margin of the Salton Sea shoreline in Riverside, California. The Salton Sea's water level dropped, reaching a new elevation of equilibrium following reallocation of surface water from Imperial Valley to nearby cities, which exposed a vast amount of sea floor. With this large amount of exposed sea floor, wind erosion of the soil is creating dust storms and air quality issues.

The exposed former sea floor of this shallow, saline lake (with salt levels double that of the Pacific Ocean) created a soil data gap between the published soil survey data and new shoreline of the Salton Sea. To fill in the missing soil survey information, soil cores collected by a private company provided a comprehensive collection of soil data and laboratory analysis to support expanding the soil survey mapping. This soil survey project is scheduled to be completed in 2024.





CZSS of West Galveston Bay in Galveston, Texas, to Assist with Habitat Conservation, Restoration, and Protection Efforts

West Galveston Bay is the largest estuary in Texas and the second most productive estuary in the United States behind the Chesapeake Bay. Between 1950 and today, the area has experienced enormous wetland, seagrass, and habitat losses. To help conserve, restore, and protect this area, a CZSS of West Galveston Bay was initiated.

SPSD staff used a stratified random sampling technique called Conditioned Latin Hypercube Sampling (cLHS) to select soil sample locations in the bay, marsh, and surrounding water bodies. After collecting, describing, and sampling the soils, analyses were completed at the local SPSPD laboratory and Texas A&M University's Soil Characterization Lab. From this sampling technique, eight new subaqueous soil series were proposed. In 2023, more soils information will be collected to fill in data gaps, like the presence of sulfidic materials. In 2025, the CZSS will be available on Web Soil Survey to assist with improving the long-term health and productivity of West Galveston Bay.





USDA is an equal opportunity
provider, employer, and lender.

Soil and Plant Science Division • July 2023

