

# From Land to Shallow Water: The Evolution of Soil Mapping

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Photo courtesy MapCoast.

Soil scientists working under the National Cooperative Soil Survey (NCSS) have been conducting detailed inventories of the nation's soil resources for over 100 years. The importance of soil maps and data—collectively known as soil surveys—became critically clear early in the history of the NCSS following the catastrophic dust storms of the 1930s caused by poor land management and conservation practices. As a result, the Soil Conservation Service (now Natural Resources Conservation Service (NRCS)) was created by President Franklin D. Roosevelt to be the lead federal agency of the NCSS.

Soil mapping is conducted by a field soil scientist trained to understand the interaction of soil forming processes and soil-landscape relations. By understanding how soil properties and characteristics change across the landscape, a soil scientist can map out the various soil types in an area quickly, usually mapping several hundred acres in one field day. This requires extensive field work, with the soil mapper traversing the landscape and digging many holes (sometimes 2 meters (m) deep) to observe soil properties (e.g., color, texture, and horizonation) and conditions (e.g., wet versus dry). The boundaries of the soil map units are then delineated on an aerial photograph. The final product of such efforts is a soil survey that includes maps showing the distribution of different soil types and a series of tables that explain the classification, use, and management of the various soils types. These tables identify attributes of the soil types; for example, soil suitability for septic systems, houses, wildlife habitat, wetlands, forestry, and agricultural uses.

Soil survey data are requested by a wide variety of users, including land developers, realtors, environmental consultants, individual land-owners, farmers, and scientists. Numerous state and federal regulations rely on soil survey information in their efforts to identify and protect critical fish and wildlife habitat, wetlands, and prime agricultural lands. These data are used by towns for implementation of land-use planning and zoning ordinances. Soil survey information is one of the most highly requested resource datasets by



MapCoast scientists Jim Turene (left) and Mark Stolt (right) flank WJAR-TV reporter R.J. Heim during a feature on MapCoast work on the weekly Channel 10 News "URI Watershed Report." Photo courtesy MapCoast.

GIS data users. Thus, soil surveys are not only a critical data layer for wise land-use planning, but also for development of natural resource conservation plans, global climate change, and natural disaster mitigation.

Recognizing the value of soil survey data for various use and management issues, scientists working in coastal environments began to develop methods and approaches to create soil survey information for benthic habitats in shallow estuarine environments (typically less than 5 m of water). As on land, similar techniques and tools were used by these scientists to map permanently submerged, shallow-water soils (subaqueous soils). The earliest work was done in Maryland, with similar research following shortly afterwards in Rhode Island. Over the last 10 years, subaqueous soil inventories have been made in Maine, Rhode Island, Connecticut, New York, Delaware, Maryland, Florida, and Texas. These subaqueous soil surveys are being used to make management decisions related to restoration of aquatic vegetation such as eelgrass, locating areas suitable for aquaculture, deciding whether an area should be dredged and the fate of the dredged materials once they are applied to the land, and determining locations for shellfish restoration.

Understanding the need for such information in the Ocean State, the Rhode Island office of the NRCS took the lead in establishing the institutional framework necessary to begin mapping coastal and subaqueous soils and coastal and marine habitats in Rhode Island. This institutional framework, now known as the MapCoast Partnership, is made up of the Rhode Island NRCS, URI researchers and scientists, as well as other state and federal agencies.