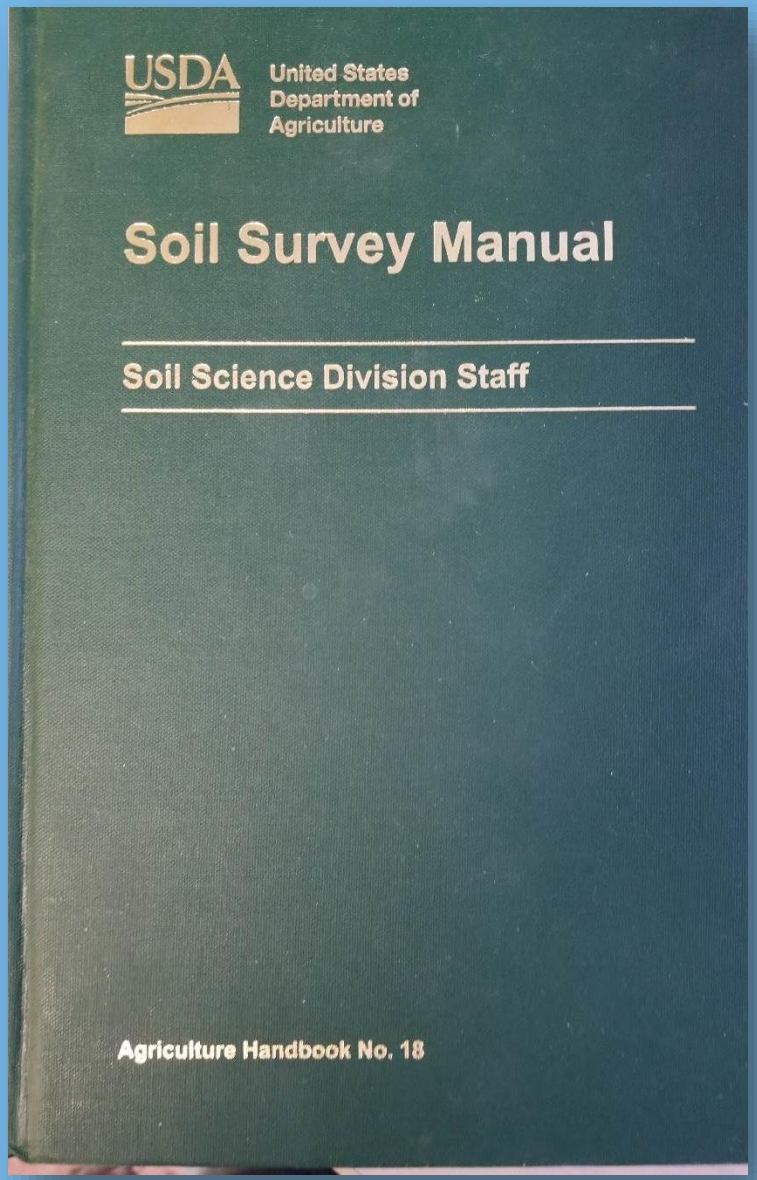
Subaqueous Soil Sampling – NCSS standards

Natural Resources Conservation Service

Maggie Payne, Resource Soil Scientist

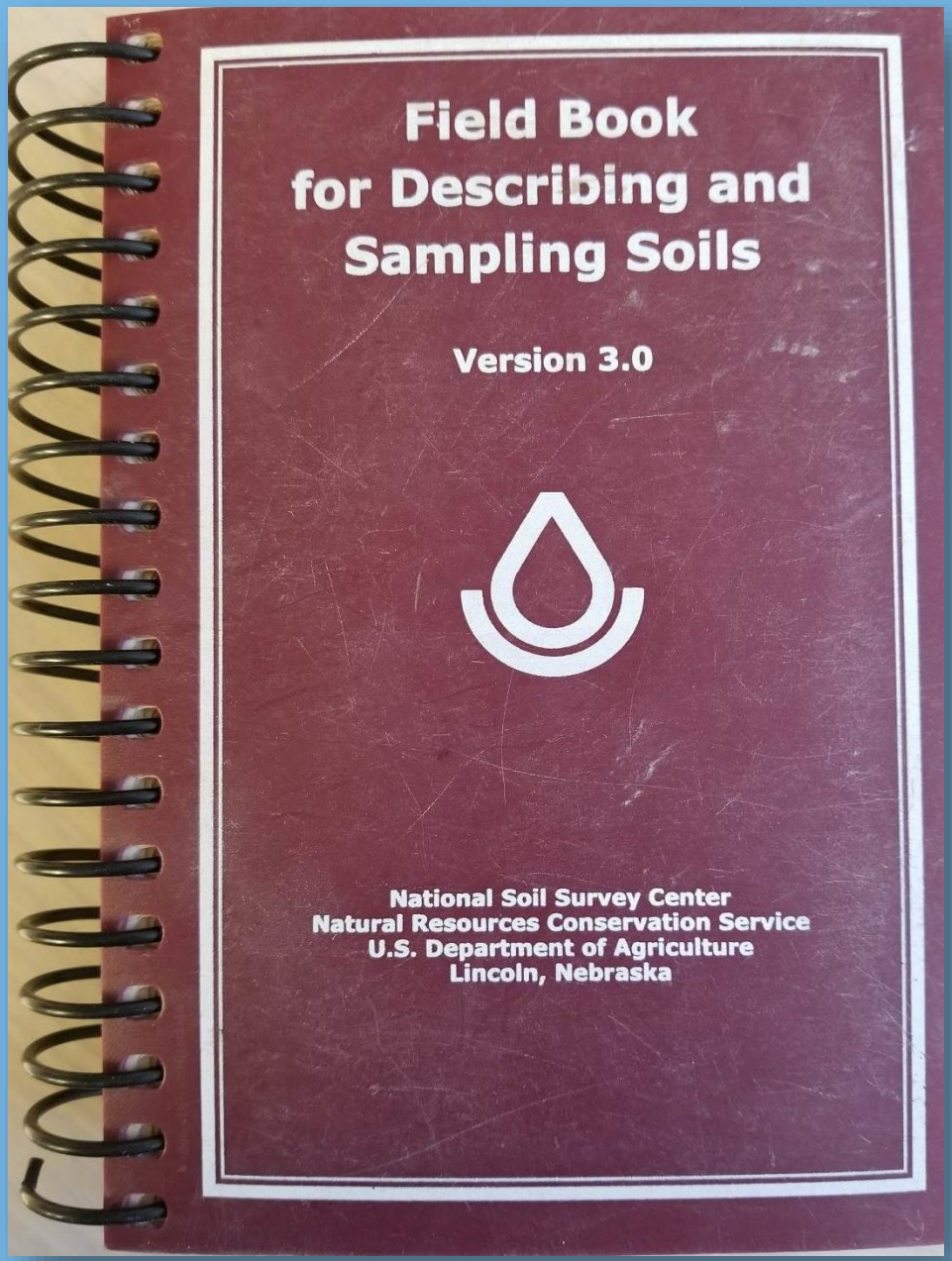
Helping People Help the Land

NCSS National Cooperative Soil Survey



Chapter 10: Subaqueous Soil Survey

- Standards for mapping and sampling



SUBAQUEOUS SOILS (SAS) DESCRIPTION

S. McVey, P.J. Schoeneberger, J. Turenne, M. Payne, and D.A. Wysocki, NRCS, and M. Stolt, URI

DISCUSSION: Permanently submerged mineral or organic substrates covered by relatively shallow water display recognizable soil morphology and meet Simonson's soil formation (1959) model in that chemical and physical additions, losses, transformations, and translocations created the morphology. Such soils are informally known as "subaqueous soils." Kubiena (1953) proposed a comprehensive classification that included subaqueous soils. More recently, Demas (1993, 1998) and Demas et al. (1996) reintroduced subaqueous soil concepts in the U.S. Recent reviews (Stolt and Rabenhorst, 2012; Soil Survey Staff, 2012d) provide comprehensive treatment of subaqueous soil settings and processes. Payne (2010) presents operational methods for subaqueous soil inventory. The 11th edition of *Keys to Soil Taxonomy* (Soil Survey Staff, 2010) presently recognizes subaqueous soils as suborders of Entisols and Histosols (Wassents and Wassists) that meet the criterion of "a positive water potential at the soil surface for more than 21 hours of each day in all years."

The description of subaqueous soils is similar to that of terrestrial soils but differs in several important ways. Many subaqueous soil parameters (color, texture, RMF, etc.) fit traditional descriptive conventions outlined in this Field Book. The unique setting and morphology of subaqueous soil coupled with its recent scientific import warrant a separate section that presents all descriptors in one place. This section includes description forms and subaqueous soil description examples. (***NOTE:*** The most prevalent subaqueous settings are coastal marine or brackish estuarine. The descriptive conventions presented here reflect this. Freshwater subaqueous settings may require additional descriptors.)

SUBAQUEOUS SOILS DESCRIPTION—Record subaqueous soil profile information using the following parameters. (***NOTE:*** Field Book soil descriptors presented elsewhere [e.g., horizon] have page number references. Please refer to the cited page for complete choice lists.)

BATHYMETRY

Bathymetry is the measurement of sea- or lake-floor or river bottom relief. Because of nautical importance, bathymetric data are commonly expressed as a depth from the water surface at Mean Lower Low Water (MLLW) tidal datum to the bottom. The water surface reference in a coastal setting is commonly Mean Low Water (MLW) or Mean Tide Level (MTL) (see graphic on p. 2–99). Lack of bathymetric data often requires field collection of such data during

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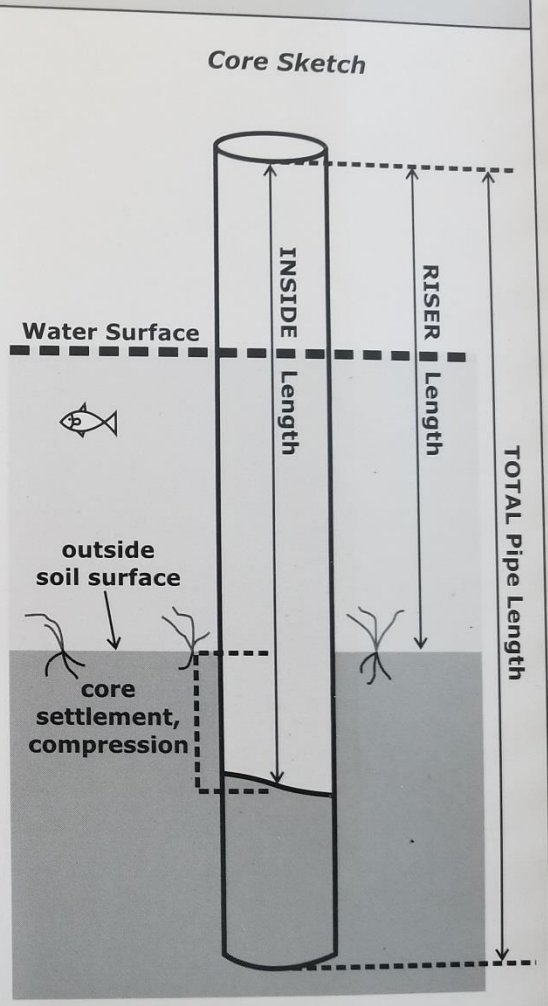
VIBRACORE LOG SHEET EXAMPLE

SITE

Site/Pedon ID *(YYYYSTFIPS###)*	S2011RI009014A
Date/Time Sampled	8/16/2011 8:30 AM
Soil Type	Frankensoil
Map Unit	Frankensoil mucky silt loam
Location *(geographic)*	Ninigret Pond: 1000 m E. of intersection of Route 1 and Route 1A at Ninigret Park, RI
Waypoint *(#)*	4
GPS *(model/unit #)*	Trimble Geo XH
Lat.	41° 22' 13.0"
Lon.	W 71° 39' 4.0"
UTM Easting	721720 m
UTM Northing	4583254 m
UTM Zone	19
Elevation *(NAVD 88)*	- 1.2 m
Water Depth *(cm)*	120 cm
Tidal Period	Outgoing

CORE LOG

a) TOTAL Pipe Length *(before coring)*	390 cm
b) RISER Length *(after coring)*	260 cm
c) INSIDE Length *(sinker length: surface to bottom)*	264 cm
d) Core Settlement *(= c - b)*	4 cm
Final Core Length *(after core completed: = a - c)*	126 cm
Where Is Core Stored?	URI Bay Campus cold storage
Date Described	8/17/2011



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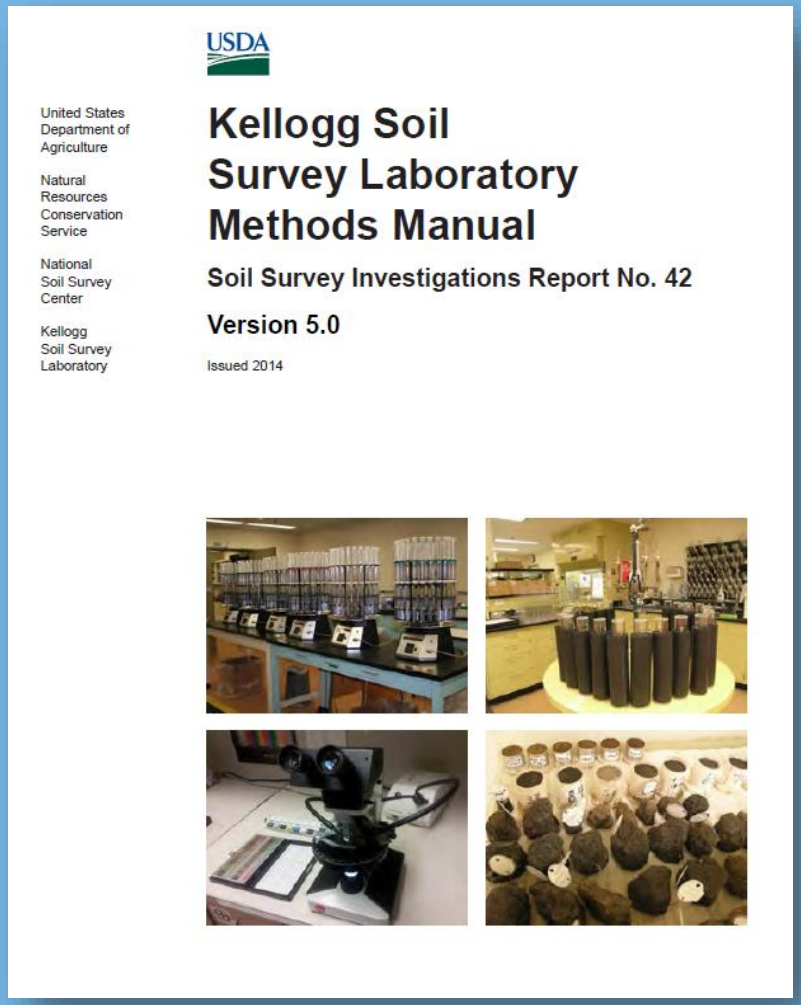
Laboratory analysis



- Routine analyses:
  - particle-size,
  - cation exchange capacity,
  - base saturation,
  - organic carbon,
  - pH,
  - calcium carbonate equivalent,
  - salt,
  - bulk density,
  - water retention, and
  - clay mineralogy

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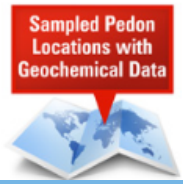
USDA
United States Department of Agriculture

National Cooperative Soil Survey
Universities, State Agencies,
Federal Agencies, and Private Members

National Cooperative Soil Survey
Soil Characterization Data



Welcome

Welcome to the website for the National Cooperative Soil Survey (NCSS) Soil Characterization Database. This application allows you to generate, print, and download reports containing soil characterization data from the National Soil Survey Center (NSSC) Kellogg Soil Survey Laboratory (KSSL) and cooperating laboratories. The data are stored and maintained by the NSSC–KSSL. Data can be viewed onscreen or downloaded in comma-delimited text files for use in other applications.

If you are a first-time user, please read the Data Usage information before accessing the database.

Sign up for E-mail updates on the NCSS Lab Data Mart

NCSS Soil Characterization Basic Query

Clear All Search Criteria

Site Information

Country	State or Other Administrative Division	County
United States (US)	Rhode Island (RI)	Washington (RI009)

Lab Pedon Number
User Pedon ID
Soil Series

Execute Query

*** Primary Characterization Data ***

(Washington, Rhode Island)

Pedon ID: RI009-2000-009-NP-P

Print Date: Jan 5 2018 1:43PM

Sampled as on Sep 16, 2000: Anguilla ; Sandy or sandy-skeletal, mixed, mesic Aeric Haplowassents
Revised to :

SSL - Project RI201701 University of Rhode Island Data
- Site ID RI009-2000-009-NP-P Lat: 41° 22' 7.93" north Long: 71° 38' 35.85" west MLRA: 149B
- Pedon No. URI0009NP
- General Methods 1B1A, 2A1, 2B

State of Rhode Island
University of Rhode Island
URI Department of Natural Resources Science
1 Greenhouse Road
Kingston RI 02881

Layer	Horizon	Orig Hzn	Depth (cm)	Field Label 1	Field Label 2	Field Label 3	Field Texture	Lab Texture
RI0009NP1	A		0-10				VFS	VFS
RI0009NP2	C1		10-15				COS	COS
RI0009NP3	2C1		15-26				GR-LCOS	LCOS
RI0009NP4	2C2		26-36				LCOS	LCOS
RI0009NP5	2C3		36-56				GRX-LCOS	COS

PSDA & Rock Fragments

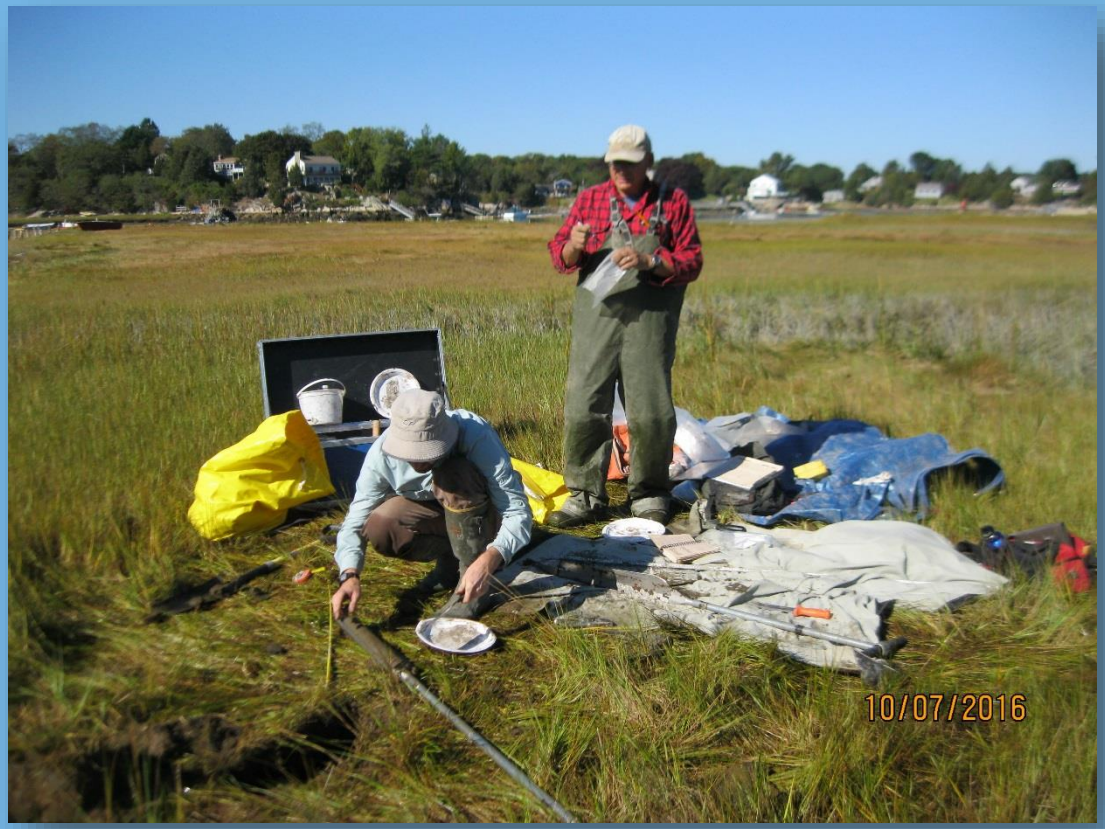
				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-
					(- - - - - Total - - - - - -)			(- - Clay - - -)		(- - - - Silt - - - - -)		(- - - - - - - - - - - - Sand - - - - - - - - - - - -)					(Rock Fragments (mm))				
Layer	Depth (cm)	Horz	Prep	Lab Texture	Clay < .002	Silt .002 -.05	Sand .05 -2	Fine < .0002	CO_3 < .002	Fine .002 -.02	Coarse .02 -.05	VF .05 -.10	F .10 -.25	M .25 -.50	C .5 -1	VC 1 -2	(- - - - - - - - Weight - - - - - - - -) 2 -5	5 -20	20 -75	.1- 75	>2 mm wt % whole soil
					(- % of <2mm Mineral Soil -)												(- - - - - - - % of <75mm - - - - - -)				
					3A1							3A1	3A1	3A1	3A1	3A1					
RI0009NP1	0-10	A	S	vfs	1.1	8.6	90.3					58.0	0.5	13.0	13.6	5.2					
RI0009NP2	10-15	C1	S	cos	1.0	3.9	95.1					26.1	12.4	11.2	19.6	25.8					
RI0009NP3	15-26	2C1	S	lcos	1.0	17.0	82.0					14.0	14.2	10.3	20.7	22.8					
RI0009NP4	26-36	2C2	S	lcos	2.1	15.2	82.7					7.0	6.2	16.2	32.7	20.6					
RI0009NP5	36-56	2C3	S	cos	1.0	9.0	90.0					14.9	0.1	18.5	32.2	24.3					

Carbon & Extractions

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-	-19-
				(- - - - - Total - - - - -)			Est			(- - - Dith-Cit Ext - - -)			(- - - - - - Ammonium Oxalate Extraction - - - - - -)						(- - - Na Pyro-Phosphate - - -)				
Layer	Depth (cm)	Horz	Prep	C	N	S	OC	OC (WB)	C/N Ratio	Fe	Al	Mn	Al+½Fe	ODOE	Fe	Al	Si	Mn	C	Fe	Al	Mn
				(- - - - - - - - - - % of <2 mm - - - - - - - - - -)						(- - - - - - - - - - - - - - - - - - - % of < 2mm - - - - - - - - - - - - - - - - - -)								mg kg^{-1}	(- - - - - - % of < 2mm - - - - -)			
				-)	6B4b			6A2d														
RI0009NP1	0-10	A	S		--			0.63														
RI0009NP2	10-15	C1	S		0.03			0.38														
RI0009NP3	15-26	2C1	S		--			0.56														
RI0009NP4	26-36	2C2	S		0.07			0.84														

Sampling issues for coastal and subaqueous soils

- Minimum 3 quarts for characterization
- Sulfides
  - Will oxidize and change pH if exposed to air in shipment



Sampling

- Soil moisture
- Bulk density

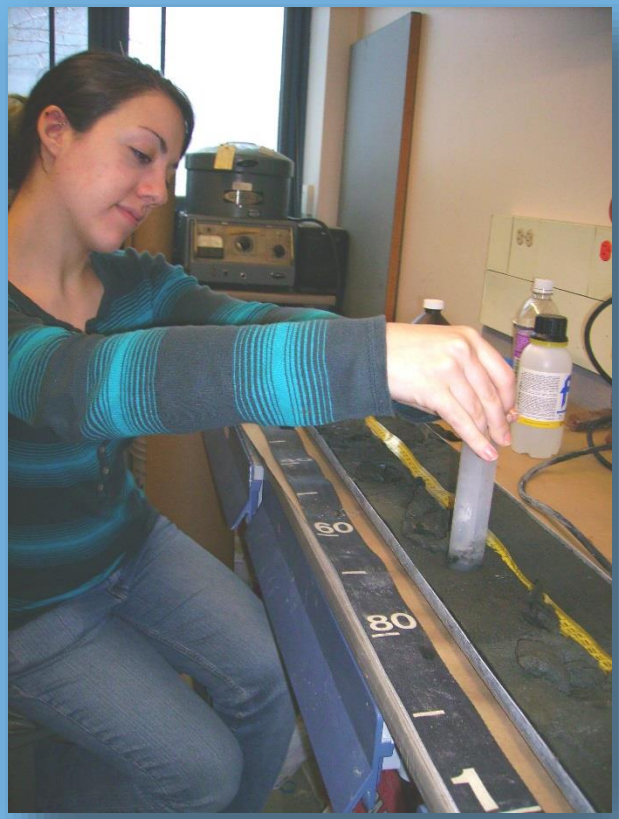


Photo by Jaclyn Fiola

Need for partner laboratories

- Refrigerated storage
- Incubation pH
- Soil conductivity