Issues that need to be considered by the Northeast Subaqueous Soils Committee (2008)

1) Proposed revised definition of sulfidic materials for Soil Taxonomy (Del Fanning).

Sulfidic materials contain oxidizable sulfur compounds (elemental S or most commonly sulfide minerals such as pyrite or iron monosulfides).
They are mineral or organic soil materials that have a pH value
of more than 3.5 and that, if incubated as a layer 1 cm thick
under moist aerobic conditions (repeatedly moistened and dried on a weekly basis) at room temperature, show a drop in pH of 0.5 or more units to a pH
value of 4.0 or less (1:1 by weight in water or in a minimum of
water to permit measurement) within 16 weeks, or longer until the pH reaches a nearly constant value if the pH is still dropping after 16 weeks;
and/or they are mineral or organic soil materials that have a pH (1:1 in water) of 4.0 or more and contain 0.75 percent or more S (dry mass), mostly in the form of sulfide, and less than three times as much calcium carbonate equivalent as S.

Fanning will continue to seek suggestions before finalizing the proposal. Questions were focused on

Is 16 weeks enough?

What rate is enough to continue you to monitor after 16 week?

2) Subordinate distinction for horizons with sulfides (Mark Stolt)

si sulfidic materials

This symbol indicates the presence of sulfidic materials in mineral horizons. The typical color is black that changes color almost immediately following the application of weak (3%) hydrogen peroxide.

Agreed that the symbol is needed. Discussion focused on several issues:

Is "si" the best to use? Or could other symbols be used. "s" and "i" are never used together so one is used for organic soils and the other mineral. Sulfides has an "s and an "i" in the word, so seems appropriate.

Should be able to use for organic soils id they meet the criteria of sulfidic materials.

Is 3% peroxide strong enough? Is 30% too strong? How about 10%. (will be tested)

Are there other morphologic characteristics that we could use? (none were suggested)

3) Thickness of sulfidic horizon for use for classification purposes. (Mark Stolt)

Most agreed that some thickness should be required. The thickness was debated. 15 cm was agreed upon.

4) Proposed amendments to Soil Taxonomy to accommodate subaqueous soils.

Copy provided at the meeting

Most discussion focused on the order the great group and subgroup classes were placed. Similar concerns were voiced at the meetings in 2006 and previous recommendations will be followed.

Stolt will consider the comments and suggestions from other regions and adjust accordingly.

5) NASIS proposals focused on Subaqueous Soils (Debbie Surabian and Maggie Payne)

The following are brief summaries of proposals that have been sent in to the NSSC for adding attribute information to NASIS and Pedon PC for subaqueous soils.

a) Manner of Failure Proposal (Surabian):
Definition of attribute: The manner in which soil specimens fail under increasing force. (SSM)

Purpose (Why it is necessary, how it is used)
Modified the choice definitions to include the approximate equivalent n-values by Pons and Zonneveld (1965). In soil taxonomy, n- values are used as a criterion for the proposed great groups and subgroups in the Wassents. Choice List and Choice Definitions: (modified)

Nonfluid: None flows through the fingers after exerting full compression. (SSM) The approximate equivalent n-value is less than 0.7. (Pons and Zonneveld, 1965) Slightly Fluid: After exerting full compression, some flows through the fingers, but most remains in the palm of the hand. (SSM) The approximate equivalent n-value is 0.7 to 1. (Pons and Zonneveld, 1965) Moderately Fluid: After exerting full pressure, most flows through the fingers; a small residue remains in the palm of the hand. (SSM)The approximate equivalent n-value is 1 to 2. (Pons and Zonneveld, 1965) Very Fluid: Under very gentle pressure, most flows through the fingers like a slightly viscous fluid; very little or no residue remains in the palm of the hand. (SSM) The approximate equivalent n-value is equal to or greater than 2. (Pons and Zonneveld, 1965)

Already accepted. Rabenhorst suggested the n-value equation or values should be investigated some more based on recent findings.

b) Oxidized pH Proposal (Payne):
Definition of attribute:
The negative logarithm to the base 10, of the hydrogen ion activity in the soil using the oxidized pH method. A numerical expression to identify the presence of sulfidic materials of a soil sample.

Purpose (Why it is necessary, how it is used)

To identify the presence of sulfidic materials in mineral or organic soil horizons that have a pH value of more than 3.5 and that, if incubated as a layer 1 cm thick under moist conditions (field capacity) at room temperature, show a drop in pH of 0.5 or more units to a pH value of 4.0 or less (1:1 by weight in water or in a minimum of water to permit measurement) within 8 weeks (USDA NRCS, 2006).

If soil containing sulfidic materials is drained or otherwise exposed to air, the sulfides oxidize and form sulfuric acid. The pH value, which normally is near neutral before drainage or exposure, may drop below 3 (USDA NRCS, 2006). For every ton of sulfidic matter that is oxidized, 1.6 tons of sulfuric acid is produced (NWPASS, 2000).

Will be added once the proposed revision to the definition of sulfides is accepted.

c) pH Oxidized Laboratory Method

The intent of the method described is to determine if known or suspected sulfidic materials will oxidize to form sulfuric acid. The pH oxidized method can be used in field offices.

In soil taxonomy, oxidized pH values are used as a criterion for proposed great groups and subgroups in the Wassists and Wassents and are evidence of a sulfuric horizon.

Summary of Method

Place 5 grams of soil sample in a beaker and add enough deionized water to make a slurry. Stir the slurry thoroughly to introduce air. Determine the initial pH immediately. Keep at room temperature. Stir occasionally and add more deionized water if needed. After 8 weeks determine the oxidized pH.

Report the initial pH and oxidized pH to the nearest 0.1 pH unit.

Change as mentioned above and add.

d) Reaction to Peroxide Proposal (Payne):
Definition of attribute:

The presence of reduced monosulfides is indicated

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Monosulfides, often in the form of Fe(II) monosulfides, are visible in reduced soil as a dark black color. When a sulfidic soil is oxidized, either in place due to oxidized water conditions, or when the soil is drained, Fe(III) is formed, and the typical black color is lost, leaving a gray or brown color (Lyle, 1983). An example of a common monosulfide oxidation reaction: $FeS + O2 + H2O = Fe(OH)3 + H+ + SO4$

Sulfidic materials are typically determined in the laboratory using incubation pH measurement in which a soil is kept in incubation for 8 weeks and the initial and final pH measurements are made. Hydrogen peroxide has also been used in determination of the presence of reduced sulfides in soil samples with pH measurements made after complete oxidation with $H2O2$ (Finkelman and Giffin, 1986; Jennings et al., 1999). Hydrogen peroxide speeds up the natural oxidation reaction and can be represented in the following reaction: $FeS + H2O2 = Fe(OH)3 + H+ + SO4 + H2O$

In the field, the application of 3% hydrogen peroxide solution enables determination of the presence of reduced sulfides as monosulfides are oxidized and quickly change color upon exposure to peroxide. Presence of sulfide is defined as an immediate (within 10 seconds), discernable color change upon addition of $H2O2$, as seen below (Fig. 2G).

See "si" horizon designation.

e) Multiple Primes Proposal (Surabian):
Definition of attribute:
A character used to indicate that this horizon has an identical horizon designation as some overlying horizon. The two horizons in question are separated by at least one other horizon.

Purpose (Why it is necessary, how it is used)

If two or more horizons of the same kind are separated by one or more horizons of a different kind in a pedon, identical letter and number symbols can be use for these horizons that have the same characteristics, e.g. A-E-Bt-E-Btx-C, identifies two E horizons.

To emphasize this characteristic, the prime symbol is added after the master horizon designation of the lower of the two horizons that have identical designations, e.g. A-E-Bt-E'-Btx-C. The prime symbol, when appropriate is applied to the master horizon designation, and any lowercase letter symbols follow it: Bt: B't. In cases when three to five layers have identical letter symbols, three to five prime symbols can be used for the other horizons, e.g. A, C, Ab, C', A'b, C", A"b, C'". These situations exist in soils of the proposed Wassents and Wassists suborders.

Will be included in NASIS.

f) Mean Water Depth Proposal (Surabian)
Definition of attribute:
Mean water depth is the average vertical column of water above the subaqueous soil surface.

Purpose (Why it is necessary, how it is used)

The mean water depth is used for subaqueous soils that are found in shallow, permanently flooded environments.

In soil taxonomy, soils that have a positive water potential at the soil surface for 90 percent of each day are used as criterion for the proposed Wassents and Wassists suborders.

Relationship to other data, validation, calculations

This property is related to the Surface Water Depth, the observed depth of water on the soil surface, in the Site Observation table.

This soil property should be placed in the Component table, with entries for low, RV, and high. No default value is required, but validation scripts may be required. The following data element explanations are
proposed:

Suggested that depth be recorded as part of the profile description, as well as elevation. The depth should be a phase attribute in the mapping unit.

6) Additions of landform, landscape unit, and anthropogenic feature terms to subaqueous soils glossary and NSSH (Debbie Surabian)

Proposed list of new landforms.

Navigation Channel: A roughly linear, deep water area for navigation purposes (after Wells et al., 1994; dredged hole). This deep channel has steep sides and a parabolic shape and strong currents in places.

River Bottom: A nearly level or slightly undulating riverbed or channel in which a river flows.

Shore Face: A nearly level to gently sloping dynamic and unstable landform seaward of the barrier island that may have small areas exposed at low tide.

Submerged Headlands: Bouldery, submerged glacial deposits adjacent to glaciated uplands with numerous boulders and stones, some of them above the high tide mark.

Submerged Stream Valley: Linear feature occupying a former stream valley submerged by sea level rise.

Hardened Shoreline: Need definitions and symbology to identify these areas. Should hardened shoreline data be reported in linear dimensions (i.e., linear miles for the entire estuary and linear feet for critical natural resource areas)?

HARDENED SHORELINE TYPES

Breakwater - exposed or submerged rock structure that is usually constructed to protect a shore, harbor, or basin from wave action; often built more or less parallel to the shoreline

Bulkhead and Seawall - wood, steel, or concrete structure or stone rubble to provide limited protection of shoreline from wave action

Groin - rock, steel, timber, or concrete structure constructed more or less perpendicular to the beach for the purpose of trapping sand for the beach

Jetty - dumped stone or rubble mound constructed at the mouth of an inlet to stabilize the opening and prevent inlet migration

Permanent Pier - solid stone or concrete pier (not suspended on piling) that restricts water circulation

Other Significant Pier - large piers or wharves on solid fill or piling

Revetment - rock or concrete riprap placed along the shore to form a gentle sloping feature for stabilizing shoreline and reducing wave-caused shoreline erosion

Dock -** small wooden structure built on pilings and typically consisting of a boardwalk and floating platform for mooring a boat

**Not actually a hardened shoreline, but may be included in analysis

Shoreline modification can have a significant impact on aquatic resources. If modifications include hardening, such as seawalls, bulkheads or berms, SAV beds and habitat may be harmed by the resultant amplified wave energy. These barriers may have detrimental effects on adjacent salt marshes: enhancing erosion and changing grain size distribution by reflecting wave energy; raising the fresh groundwater table; trapping wrack; and contributing to long term salt marsh loss through coastal squeeze. Other structures such as groins or breakwaters can alter natural circulation changing sediment deposition, or cause beach loss further along the shoreline. Softer solutions involving grading of the shoreline and riprap may remove the existing woody vegetation or organic marsh vegetation in a buffer, eliminating habitat and losing the binding quality of woody or herbaceous roots.

Terms will be reviewed and proposed accordingly.

7) Proposed new Drainage Class (Debbie Surabian)

Subaqueous: Free water is at or above the soil surface. The occurrence of internal free water is permanent having a positive water potential at the soil surface for 90 percent of each day. The soil is permanently submersed. Peraquic feature - all soil layers are permanently saturated.

Subaqueous is now used.

8) Measurement of Salinity/Conductivity (Debbie Surabian)

How to accurately measure this in each horizon.

Salinity will likely change if the soils are not kept frozen. The sulfides, mainly as monosulfides,