

Hydric Soil Research

John Galbraith
Virginia Tech

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Conference

Research Areas

1) Hydric Soil Detection

- Ag lands
- Under heavy forest canopy
- Seasonally-saturated wet flats

2) Hydrology of Clayey Soils

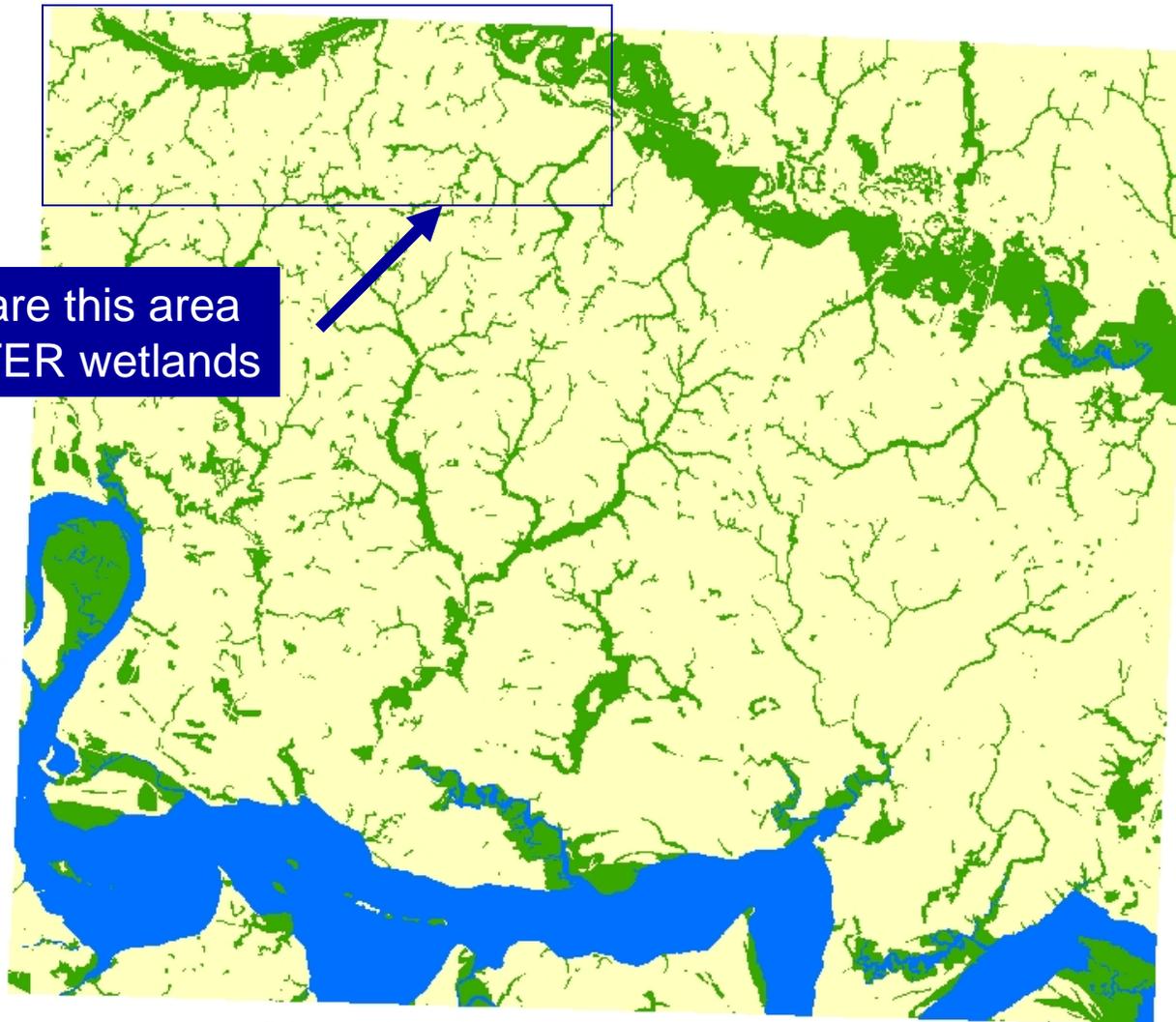
1) Hydric Soil Detection

- Problems –
 - NWI did not survey many Ag lands
 - Information not readily available from NRCS
 - Privacy Issues? Use passive sensing
 - Hydric under heavy forest canopy are hard to detect using conventional aerial photo interp. And most shortwave (visible) remote sensing active signals are intercepted by tree canopy
 - Seasonally-saturated wet flats are only wet near surface for a few weeks/months

Solutions – Remote Sensing

- ASTER
 - Has passive sensors for spectral and thermal and microwave reflectance
 - C band is shortwave, absorbed by water, so it detects relative soil moisture differences at the surface by indicating relative darkness or lack of reflectance (darker = wetter)
 - Taken in March, this band detects most (~79%) hydric soils

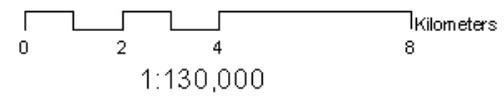
National Wetland Inventory Map



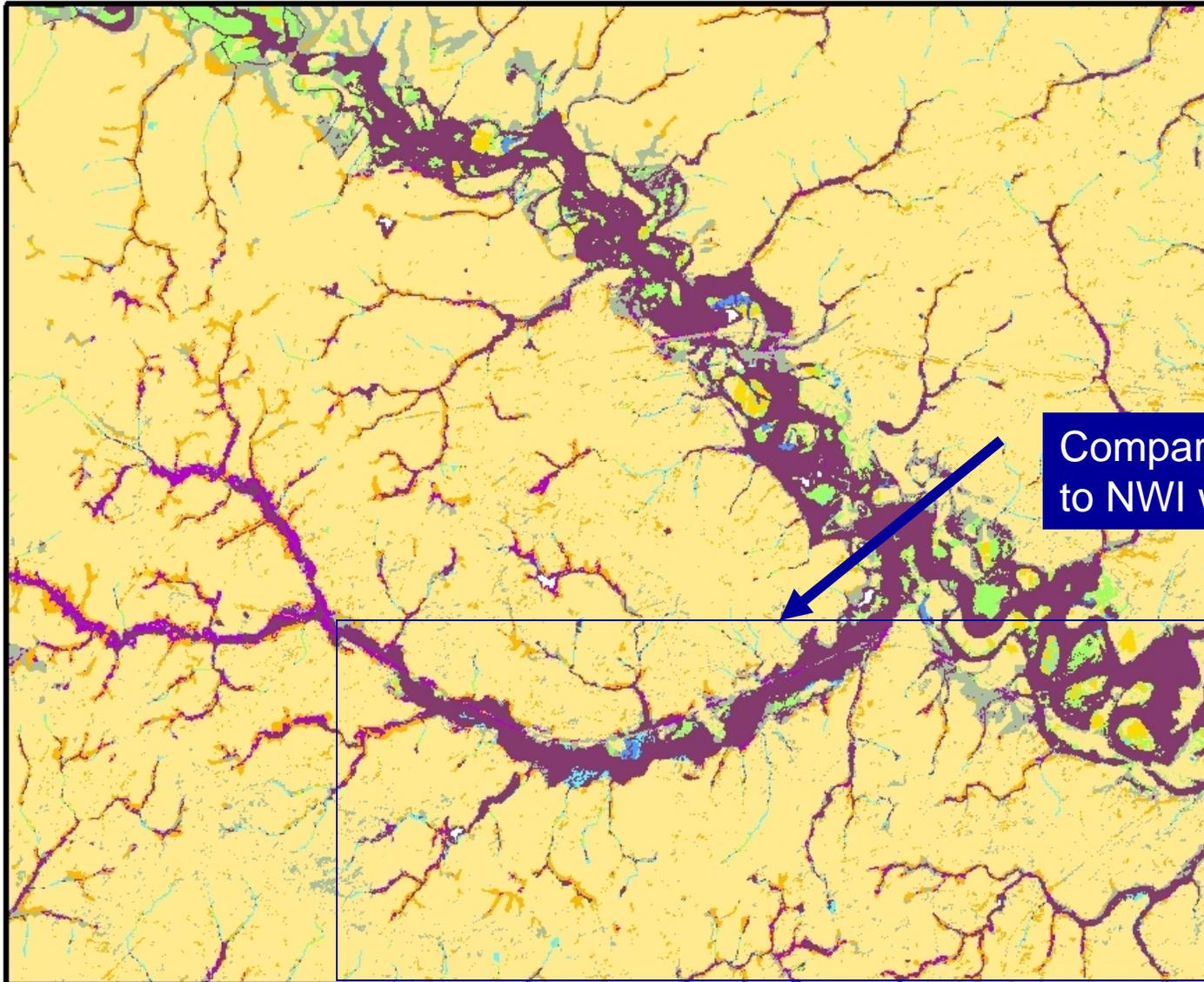
Legend

-  upland
-  wetland
-  water

Compare this area
to ASTER wetlands



Wetland Probability Map



Compare this area
to NWI wetlands

Legend

Probability
<VALUE>

0.02 - 0.10
0.102 - 0.40
0.40 - 0.50
0.50 - 0.60
0.60 - 0.70
0.70 - 0.80
0.80 - 0.85
0.85 - 0.90
0.90 - 0.95
0.95 - 0.99

0 0.5 1 2 Miles

Solutions – Remote Sensing

- GeoSAR - Has active microwave sensors
 - Large contrast between the dielectric properties of liquid water and dry soil.
 - An increase in soil moisture content results in higher dielectric constants.
 - At L-band frequencies, the dielectric constant of water is 80 and that of dry soil is 3 to 5, and the dielectric constant can increase to over 20 in soil with increasing moisture content.

Solutions – Remote Sensing

- GeoSAR – Experiment in Virginia
 - P band is long wavelength and penetrates dense vegetation and possibly into soil
 - For active microwave remote sensing of soils, the measured radar backscatter is related directly to soil moisture but is also sensitive to surface roughness (potential problem).
 - May detect soil water tables at or below the surface, esp. if the surface is dry and not clayey or high elec. conductivity

2) Clayey Soil Hydrology

- Problems
 - Clayey soils have slow response time
 - Vertical macroflow in cracks and slow conductivity within larger aggregates
 - **Slow** lateral movement
 - Water tables in wells may not reflect that in soil
 - Well packing is sand, huge difference in pore size and hydraulic conductivity rates
 - Well diameter is a factor
 - Smearing on boring hole sides may be important

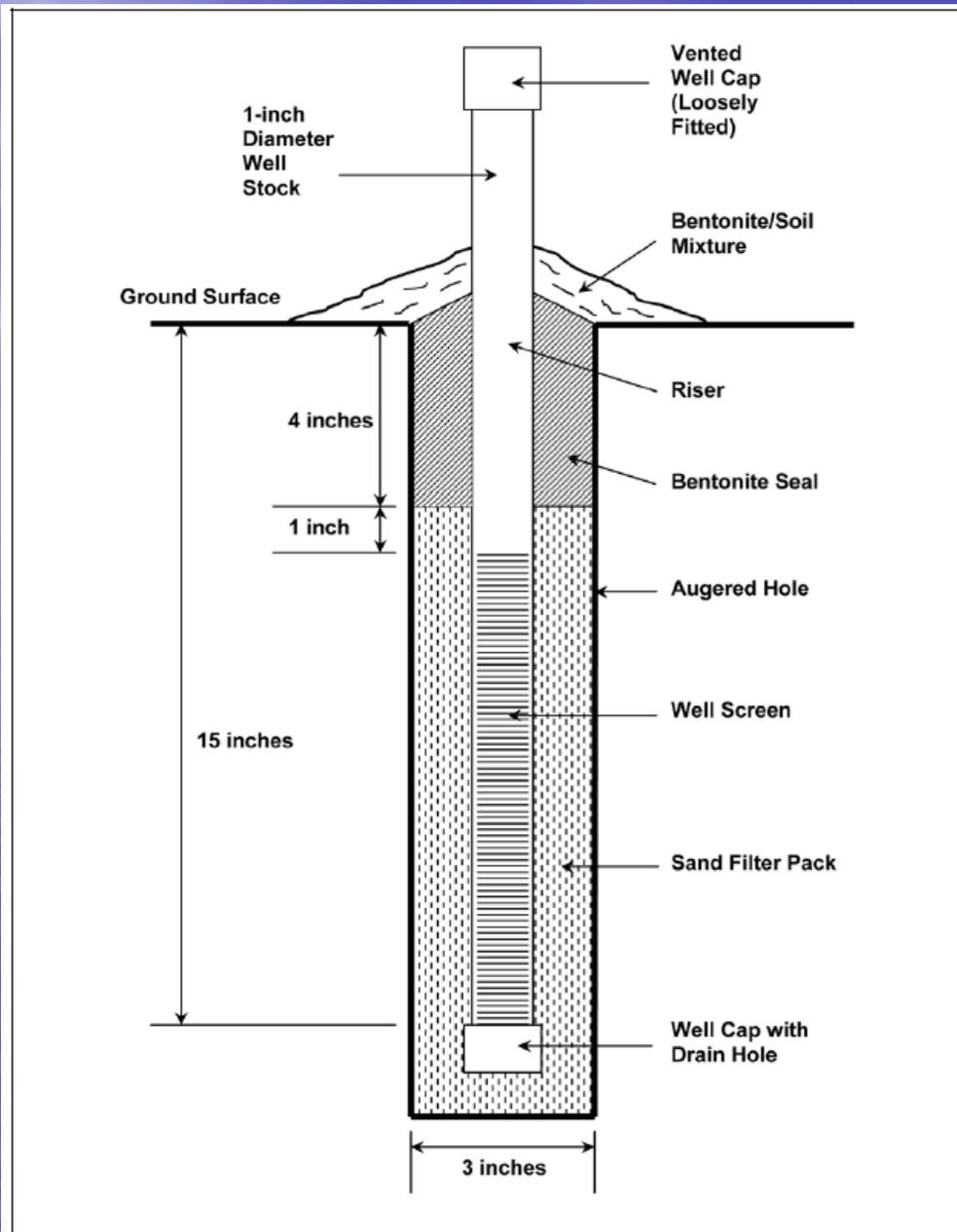


Figure 2. Standard 15-in. monitoring well installed by augering

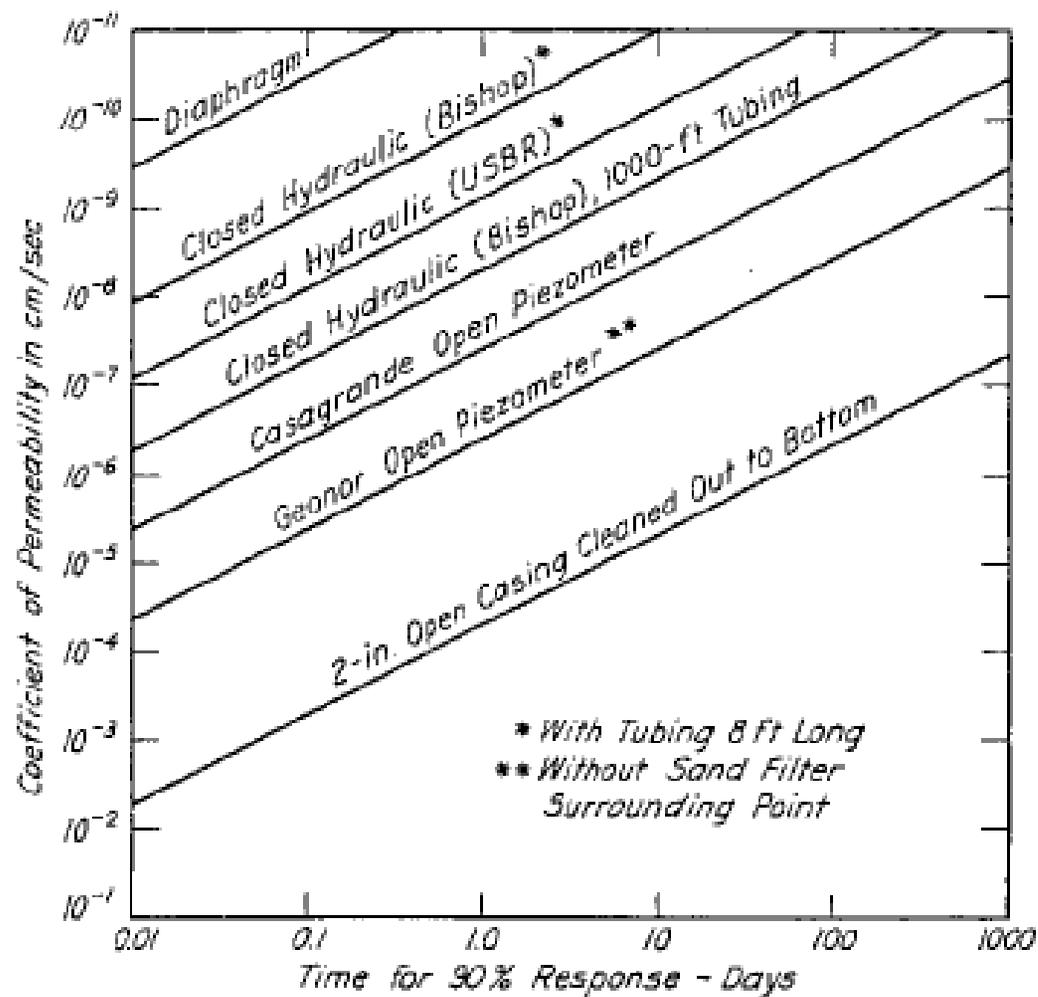


Fig. 68.5. Approximate response times for various types of piezometers (after Hvorslev 1951, Penman 1961, Brooker and Lindberg 1965, and others).

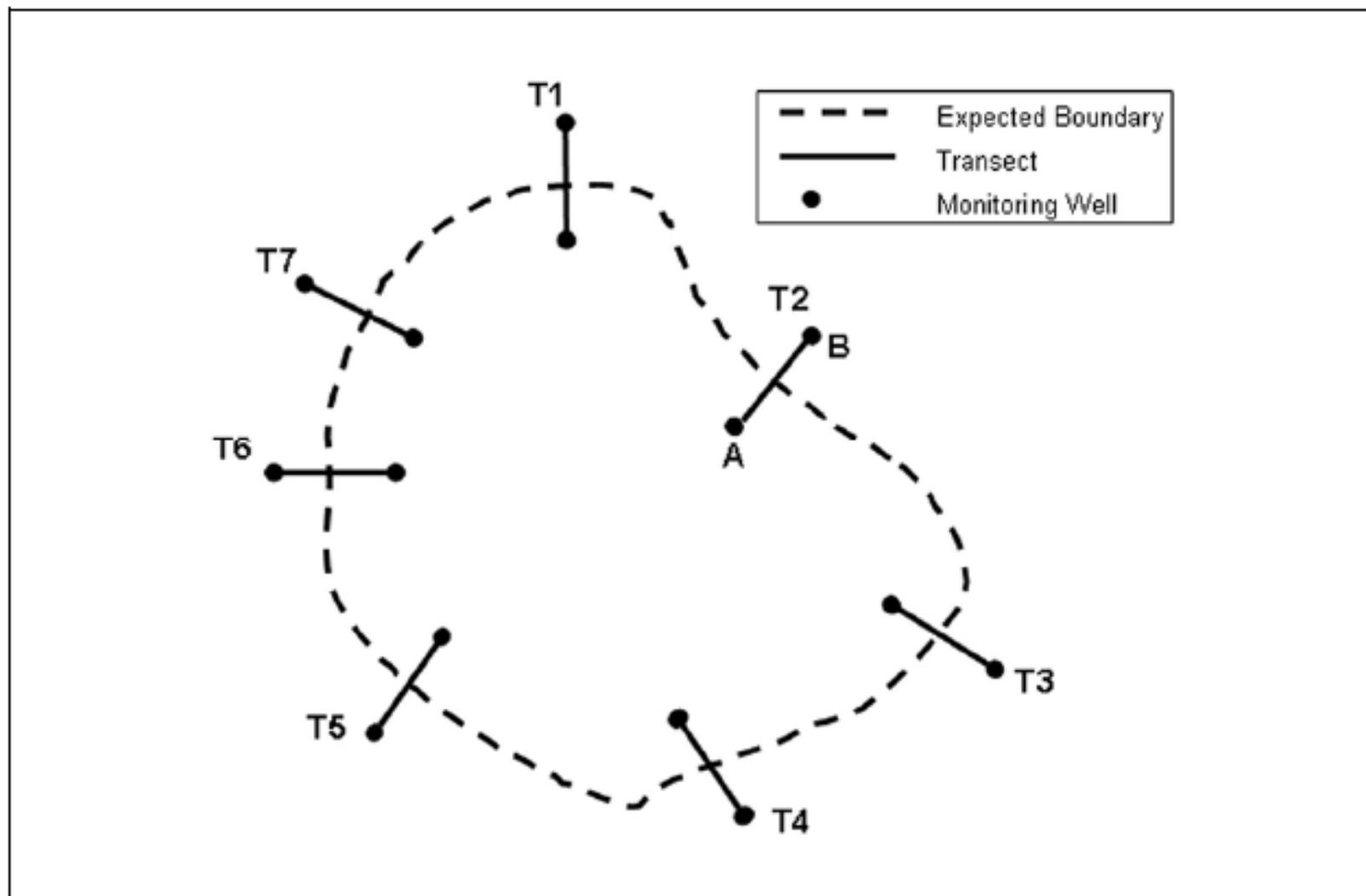


Figure 1. Example of monitoring wells located along transects across the expected wetland boundary. Transects extend from obvious upland to obvious wetland. Two or more wells are needed along each transect (e.g., at locations A and B).

Clayey Soil Hydrology

- Solutions - Replicated study in Virginia to compare:
 - Wells versus piezometers
 - Uniformity of elec. Conductivity and clay content (soil moisture) across the wetland before well placement
- Measure actual water levels in soil to relate to well, piezometer, and pressure transducer measures
- Different well packing besides sand, or different sand and well slot sizes
- Different piezometer diameters
- Wire brush to roughen boring hole sides