

Determining Season High Water Tables

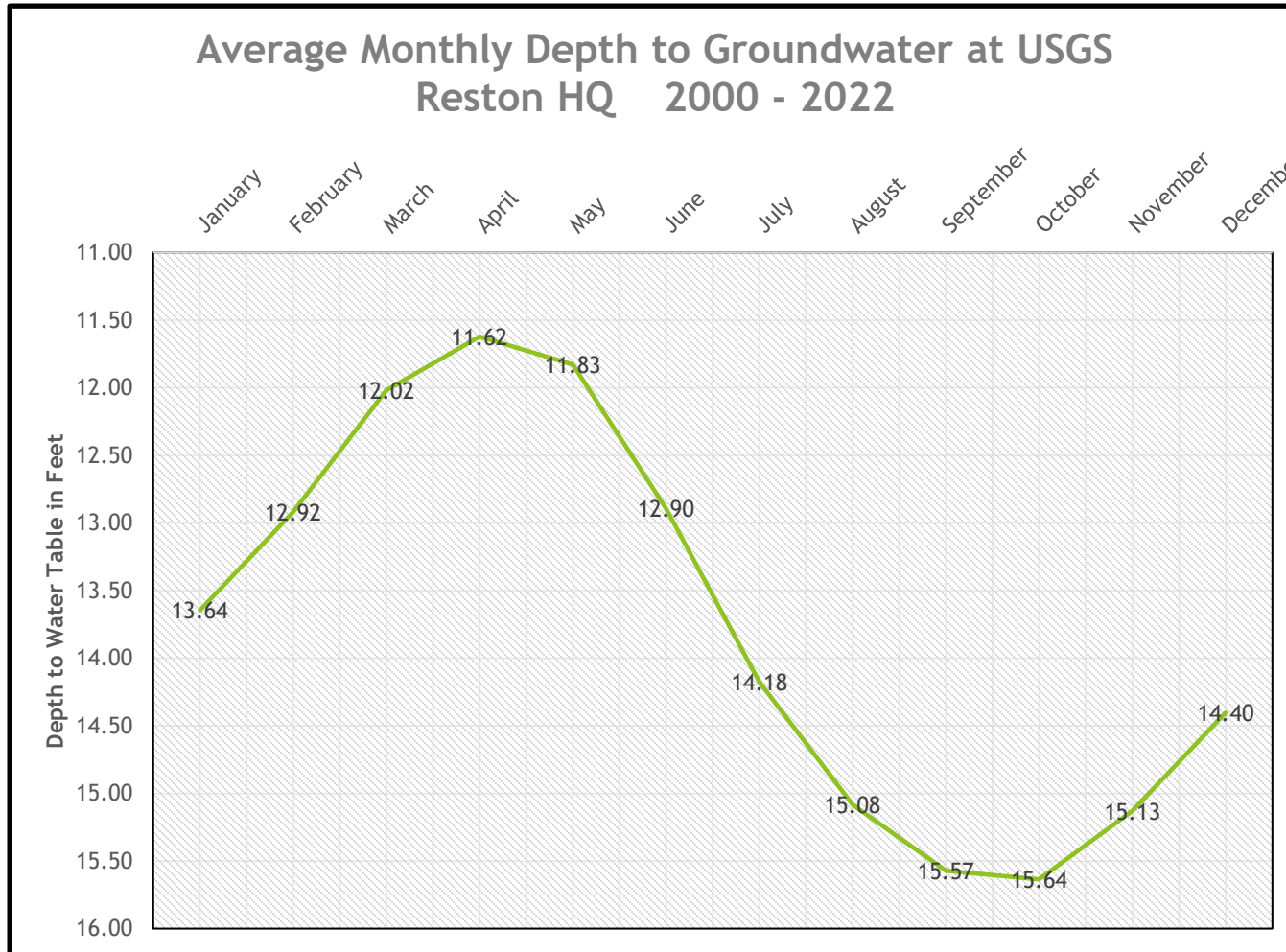
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Sometimes It's Obvious



But Often, It's Not



What To Do?

- Check the Soil Survey First:
<https://websoilsurvey.nrcs.usda.gov/>
- Set you area of interest

The screenshot displays the USDA Web Soil Survey interface. At the top, a navigation bar contains several tabs: "Area of Interest (AOI)", "Soil Map", "Soil Data Explorer", "Download Soils Data", and "Shopping Cart (Free)". The "Area of Interest (AOI)" tab is highlighted with a red circle. Below the navigation bar, the interface is divided into a left sidebar and a main map area.

Left Sidebar:

- Search** (dropdown arrow)
- Area of Interest** (dropdown arrow)
 - Buttons: "Open All", "Close All"
- AOI Properties** (dropdown arrow)
 - Button: "Clear AOI" (with help icon)
- AOI Information** (dropdown arrow)
 - Field: "Name" (text input)
 - Section: "Map Unit Symbols"
 - Radio button selected: "Use Soil Survey Area Map Unit Symbols"
 - Radio button: "Use National Map Unit Symbols"
 - Text: "Area (acres) 170.1"
- Soil Data Available from Web Soil Survey** (dropdown arrow)
 - Section: "Fairfax County, Virginia (VA059)"
 - Text: "Data Availability Tabular and Spatial, complete"
 - Text: "Tabular Data Version 19, Aug 25, 2023"

Main Map Area:

- Area of Interest Interactive Map** (title)
- Legend** (vertical label)
- Map navigation tools: zoom in, zoom out, pan, AOI, home, print, layers, AOI, AOI, AOI
- View Extent: "Contiguous U.S." (dropdown menu)
- Map content: An aerial photograph of a residential area with a red hatched area of interest overlaid on a portion of the map.

What To Do?

- Check the Soil Survey First:
- Open the Soil Data Explorer
- Select Water Features → Depth to Water Table

The screenshot shows the Soil Data Explorer web application interface. At the top, there are navigation tabs: "Area of Interest (AOI)", "Soil Map", "Soil Data Explorer" (highlighted with a red circle), "Download Soils Data", and "Shopping Cart (Free)". Below these tabs is a dropdown menu for "View Soil Information By Use:" set to "All Uses".

The main navigation bar includes tabs for "Intro to Soils", "Suitabilities and Limitations for Use", "Soil Properties and Qualities" (highlighted), "Ecological Sites", and "Soil Reports".

On the left side, there is a "Search" section and a "Properties and Qualities Ratings" section. The "Water Features" section is highlighted with a red circle and contains the following items:

- Depth to Water Table
- Flooding Frequency Class
- Ponding Frequency Class

The main content area is titled "Soil Map" and features a toolbar with icons for search, pan, zoom, and other map functions. A "Scale" dropdown is set to "not to scale". The map itself shows an aerial view of a campus area with orange outlines indicating soil boundaries and labels such as 95, 39C, 30A, 88D, 93B, 102, 105C, 105B, and 39B. Street names like "Ridge Heights Rd" and "Whispering Green Ln" are also visible.

The Grey Zone

- Using Soil Morphology in the field
- Fe and Mn are your clues



Red, Yellow, Orange & Brown
= Iron Oxide



Black Colors = Mn Oxide

Photos courtesy of Dr. John Galbraith, Virginia Tech

The Grey Zone

- Without Fe/Mn oxide staining, most soil is grey.



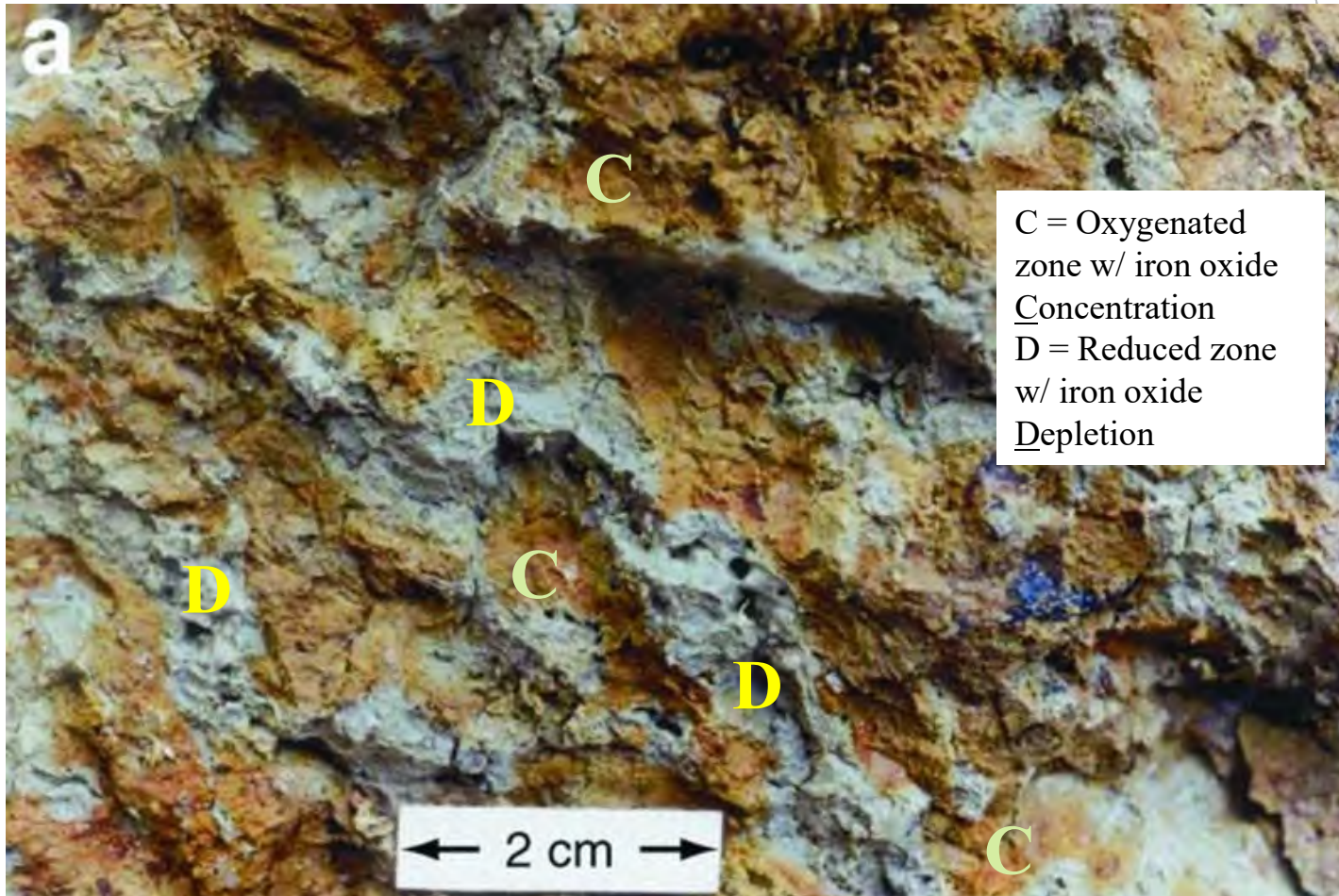
Photos courtesy of Dr. John Galbraith, Virginia Tech

The Grey Zone

- Fe and Mn are your clues
 - Following approx. 2 weeks of saturation, Fe and Mn reduce
 - When they reduce, they become soluble/invisible. Soil turns grey.
 - When they re-oxidize elsewhere in soil, they return to their original color. Soil turns red, orange, black.
 - Colors caused by reduction and oxidation of Fe and Mn called “redox” features or mottling

The Grey Zone

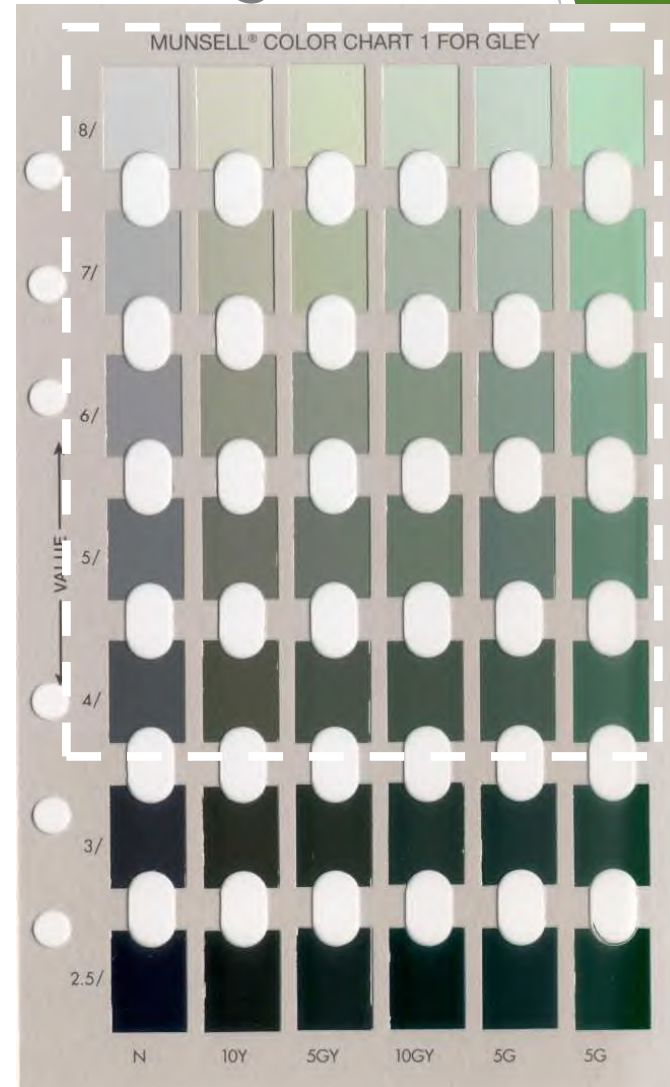
➤ Redox “mottling”



Photos courtesy of Dr. John Galbraith, Virginia Tech

The Grey Zone

- This creates redox “mottling”



Munsell colors with value of ≥ 4 and chroma ≤ 2 or colors on the Gley page with value ≥ 4 used as the definition of “redox” grey colors.

The Grey Zone

- Complications: not all greys are redox
 - Redox?
 - No - lithochromic!
 - Lithochromic = colors inherited from the parent rock or sediment.
 - Lithochromic colors often have sharp boundaries, not gradational changes. Can also mimic the original banding of the parent material.



Photos courtesy of Dr. John Galbraith, Virginia Tech

The Grey Zone

- Complications
 - Redox?
 - No - relict!
 - Relict = evidence of past, not current saturation
 - Relict colors have sharp boundaries, not gradational changes



Photos courtesy of Dr. John Galbraith, Virginia Tech

The Grey Zone

- What is redox and what is not?
 - Around carbon source
 - Microbes use up O_2 during decomposition. Cause Fe/Mn reduction.



Grey colors caused by iron reduction around decomposing roots in a soil.

The Grey Zone

- What is redox and what is not?
 - Around flowing water
 - Pores saturate first and lead to Fe/Mn reduction



Grey colors caused by iron reduction along soil pores

The Grey Zone

- What is redox and what is not?
 - If you find grey colors in the soil, but not next to a carbon source or water flow path, it might not be redox.



**Grey colors in the soil, but not along a carbon rich root channel.
Grey colors here are lithochromic, not redox.**

The Grey Zone

- What is redox and what is not?
 - Redox is heavenly
 - Features “halo” with diffuse boundaries



A halo surrounds the root channel. Colors gradually change from grey to yellow to orange to red with distance from the channel.

The Grey Zone

- What is redox and what is not?
 - Redox is heavenly
 - Features “halo” with diffuse boundaries



Grey colors with no halo. Color transitions abruptly from grey to red. These colors are relict or lithochromic, not redox.

Photos courtesy of Dr. John Galbraith, Virginia Tech

Use Judgement

- Look around - use the landscape
- Use the web soil survey
- Use soil morphology

- Do all point to a wet soil?
 - Most likely redox
- Does only one?
 - May not be redox

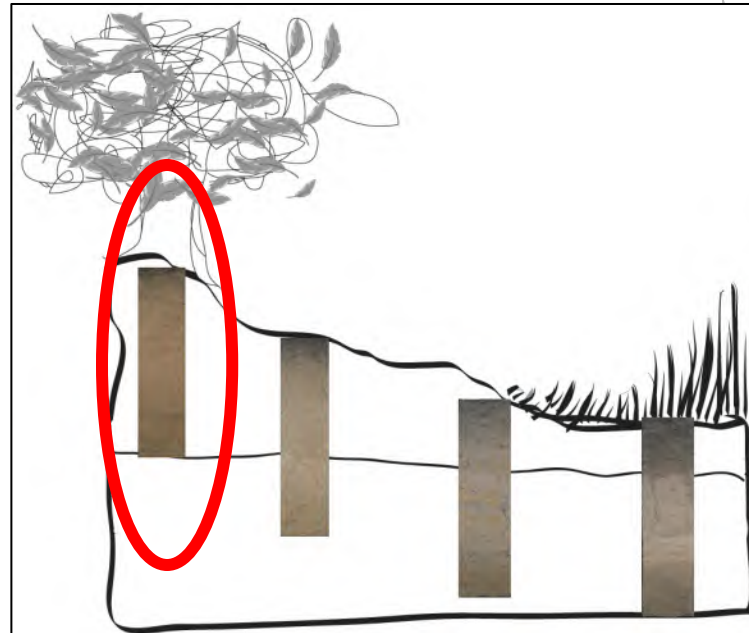
- Use the preponderance of the evidence

Use Judgement

- Preponderance of the evidence



Photos courtesy of Dr. John Galbraith, Virginia Tech



Grey colors with sharp borders found in soil at the top of the hill and in an area marked as having deep groundwater in the soil survey?

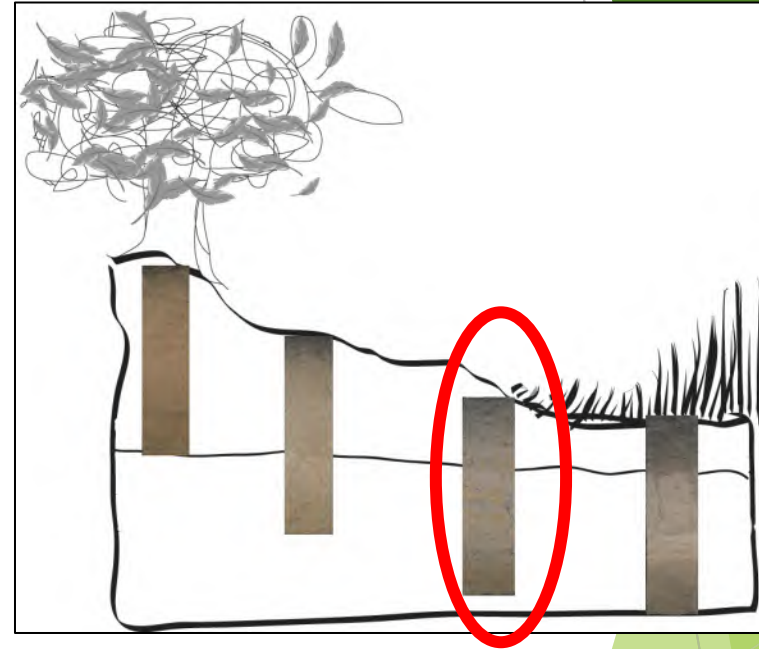
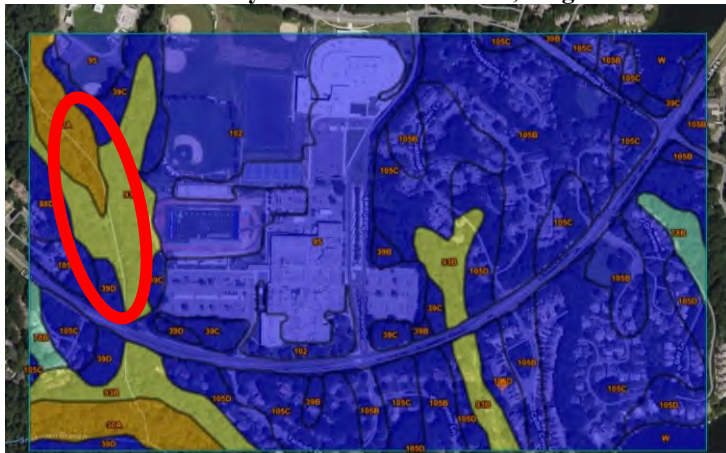
Probably not redox.

Use Judgement

➤ Preponderance of the evidence



Photos courtesy of Dr. John Galbraith, Virginia Tech



Grey colors with gradual halo along root channel in soil near bottom of the hill and in an area marked as having deep groundwater in the soil survey?

Probably redox.

More Information

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