Why include the Soil Scientist on an ACEP team?

No one can know ENOUGH about the soil . . . Even the Soil Scientist – is in need-of ever-increasing historical and technical understanding to improve the outcome of his/her own efforts.

Soils are the unwitting composite where-upon is recorded all the end-results of ALL the ***inputs*** and ***impacts*** *by* ***nature*** *and* ***humans*** upon a natural ecosystem. When the soils significantly change . . . The vegetation changes and thus, impacts every other player in the natural ecosystem.

Wetlands are both ***unique*** **between types** . . . (riverine from playa or rain-water basin; hardlands versus Sand Hill wetlands versus sloping wetlands; episaturated versus endo-saturated wetlands; artificial versus natural)

-and from **each other within the same general type.** Thus, **playas** are neither **formed** nor **created equally.**

In other words – **"one size does not fit all" [One management system will not work for every playa.]**
[Management of most wetland types must adapt over time as inputs (and/or impacts) change the soil.
This is nowhere more-true than in the Nebraska Sand Hills --- where even ecological sites change over time.]

. . . As well, **all wetlands are dynamic** to varying degrees -- according to ever-changing inputs and impacts.

It is the job of the soil scientist to **STUDY**, **PREDICT**, and **BEST EXPLAIN** to the team these unique and dynamic soil & climate differences that may be encountered.
Include the Soil Scientist EARLY in the planning—well before the first B-team visit.

ACEP (. . . Soils)

Soils are the foundation of every Restoration

Chuck Markley,

USDA-NRCS Resource Soil Scientist

Entisols / Inceptisols / Alfisols / Mollisols / Histosols / Vertisols

Entisols / Inceptisols / Alfisols / Mollisols / Histosols / Vertisols

Entisols / Inceptisols / Alfisols / Mollisols / Histosols / Vertisols / Entisols / Inceptisols / Alfisols / Mollisols / Histosols / Vertisols

Why include the Soil Scientist on an ACEP team?

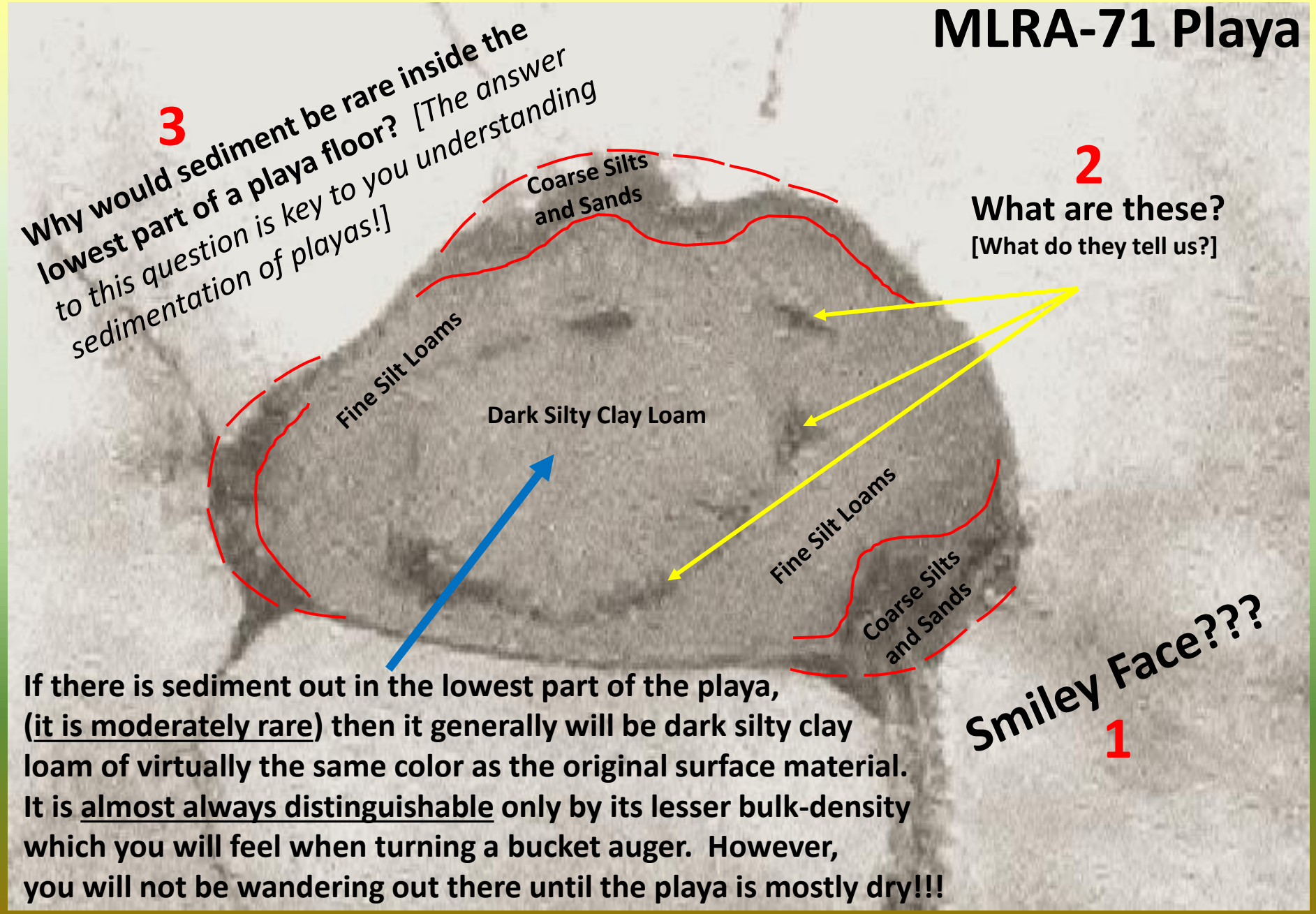
- Soil Scientists provide technical soil knowledge applicable to:
  - Eligibility
  - Ranking
  - Restoration

It is the job of the soil scientist to **STUDY**, **PREDICT**, and **BEST EXPLAIN** to the team these unique and dynamic soil & climate differences that may be encountered.
Include the Soil Scientist EARLY in the planning—before the first B-team visit.

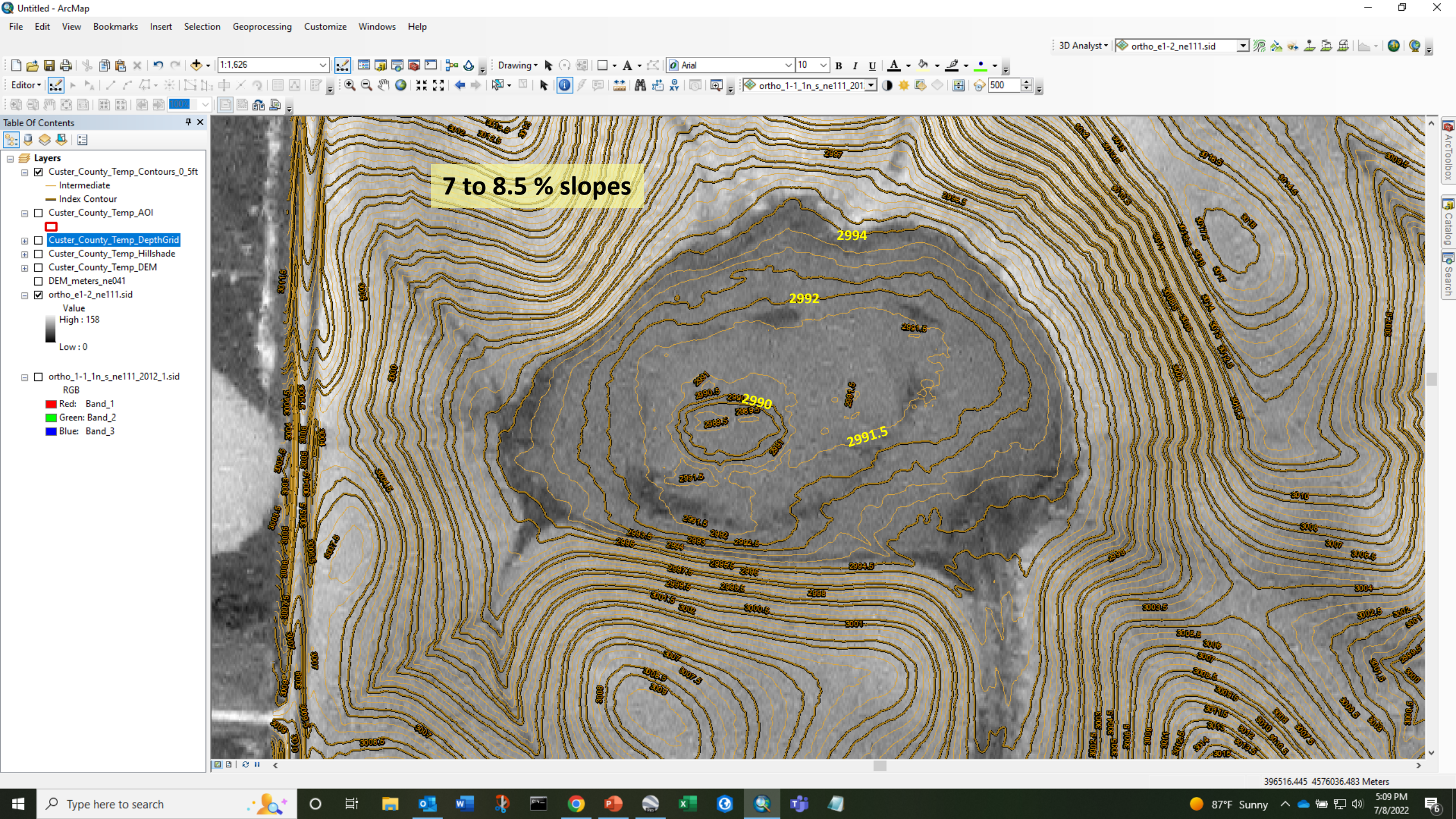
Sedimentation

- What is it?
- Where is it?
- The science behind the NRCS's surficial buffer guidelines.

MLRA-71 Playa



If there is sediment out in the lowest part of the playa, (<u>it is moderately rare</u>) then it generally will be dark silty clay loam of virtually the same color as the original surface material. It is <u>almost always distinguishable</u> only by its lesser bulk-density which you will feel when turning a bucket auger. However, you will not be wandering out there until the playa is mostly dry!!!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Layers
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Intermediate
Index Contour
Custer_County_Temp_AOI
Custer_County_Temp_DepthGrid
Custer_County_Temp_Hillshade
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Editor

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- Custer_County_Temp_Hillshade
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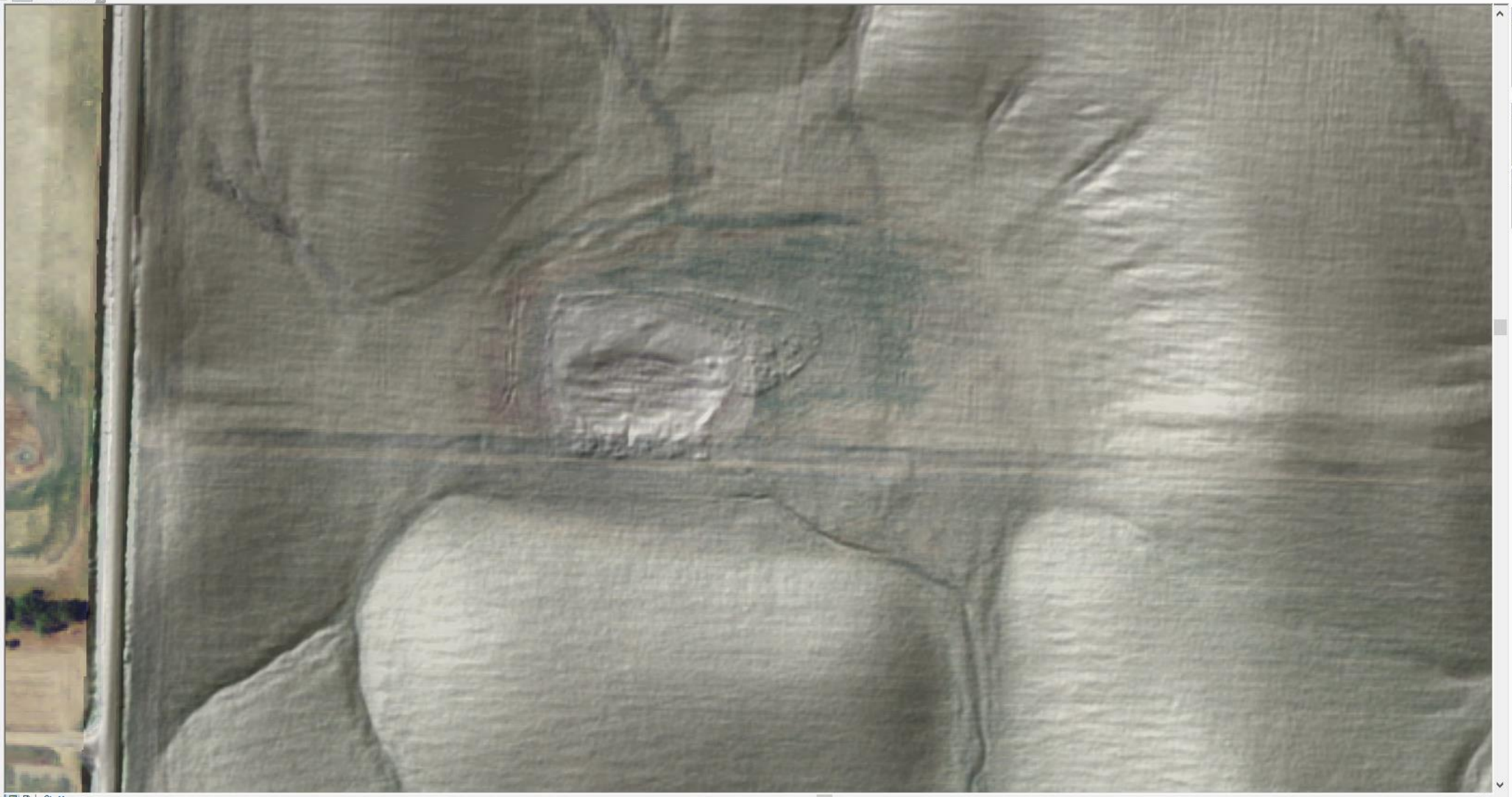

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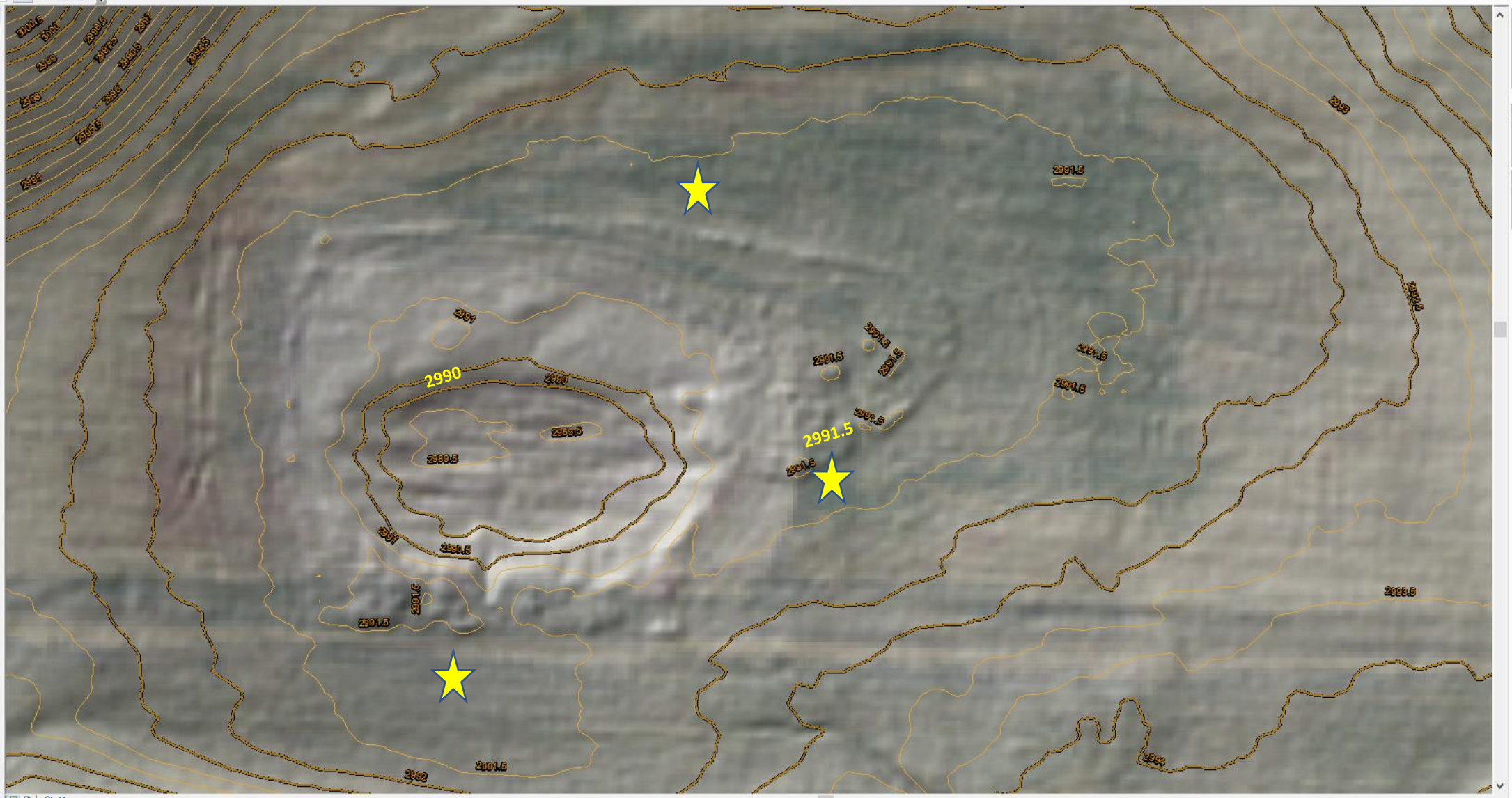

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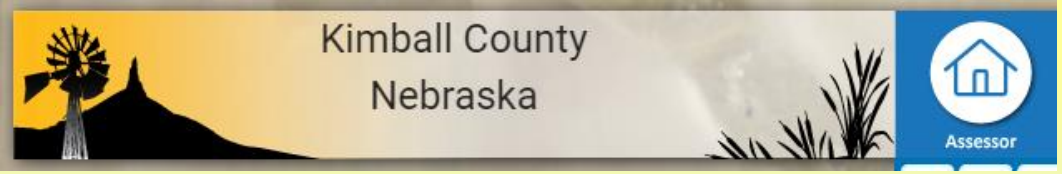


- There is evidence of ***growing season hydrology*** ponding 2005, 2009, 2010, 2018; slight saturation some other years

- The landform is a **closed depression**

- The soil has a **silty clay aquitard**

- There is **only 2 inches** of silty clay loam surface over the silty clay aquitard where it should be 6-8" (I.e., there is hardly a speck of run-in sedimentation and the surface is ***strongly deflating***, not sediment-accumulating)

- **Precipitation is so limited** (and or **evaporation is so great**) that the ponding is too brief and prevents the germination and/or survival of hydrophytes. The seedbank is there, but there wasn't one hydrophyte on the entire depression. (And five other depressions we also described.)

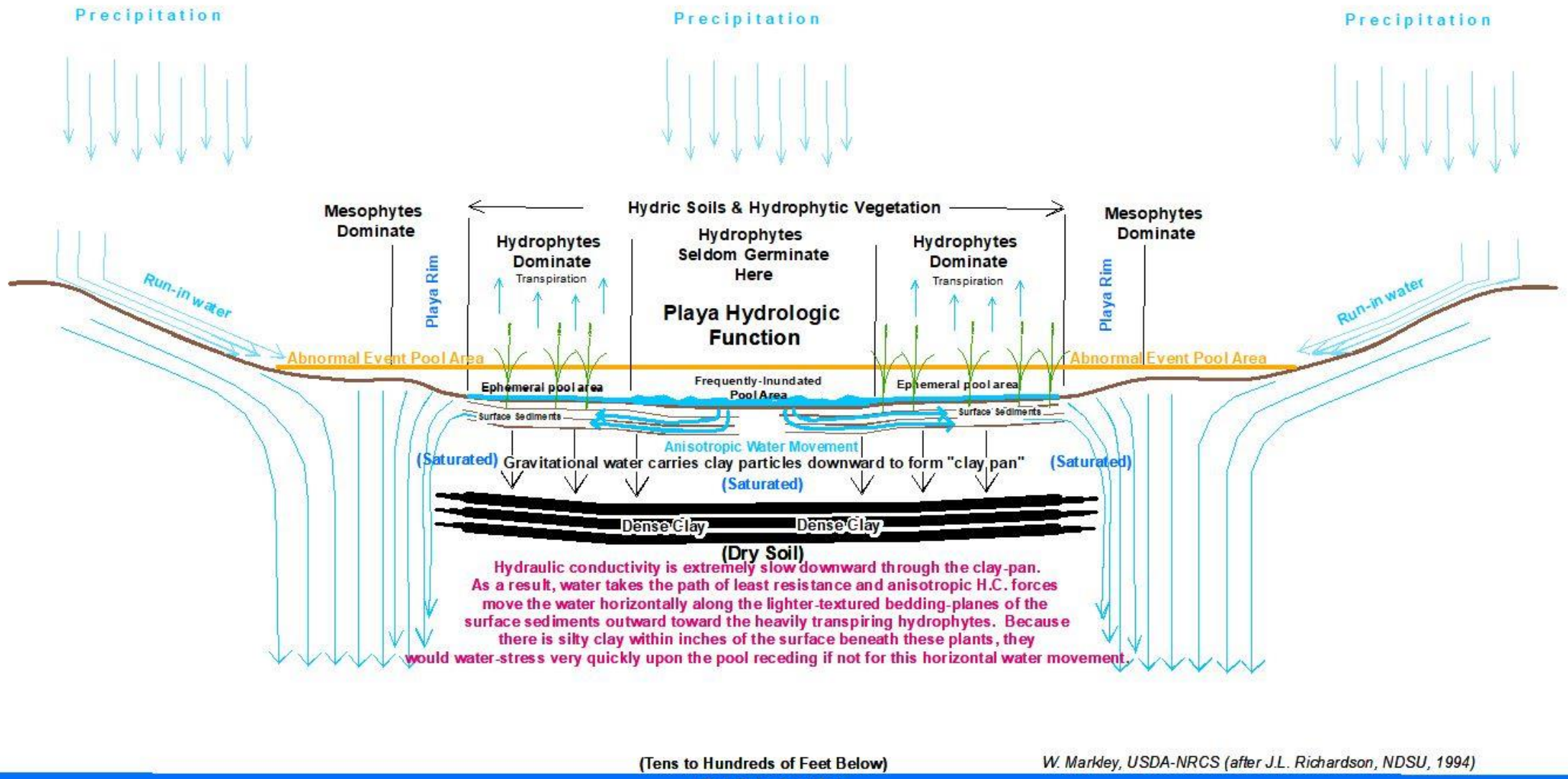
By far, a greater number of playas in this western panhandle are non-wetlands. . . . However, not all!!! Soil scientist field-visits are critical *west of about Ogallala, NE*.

1 Which two are **Playas** and which two Are **Prairie Potholes**?

2 What ***3 physical things*** do both Nebraska playas and prairie potholes have in common?

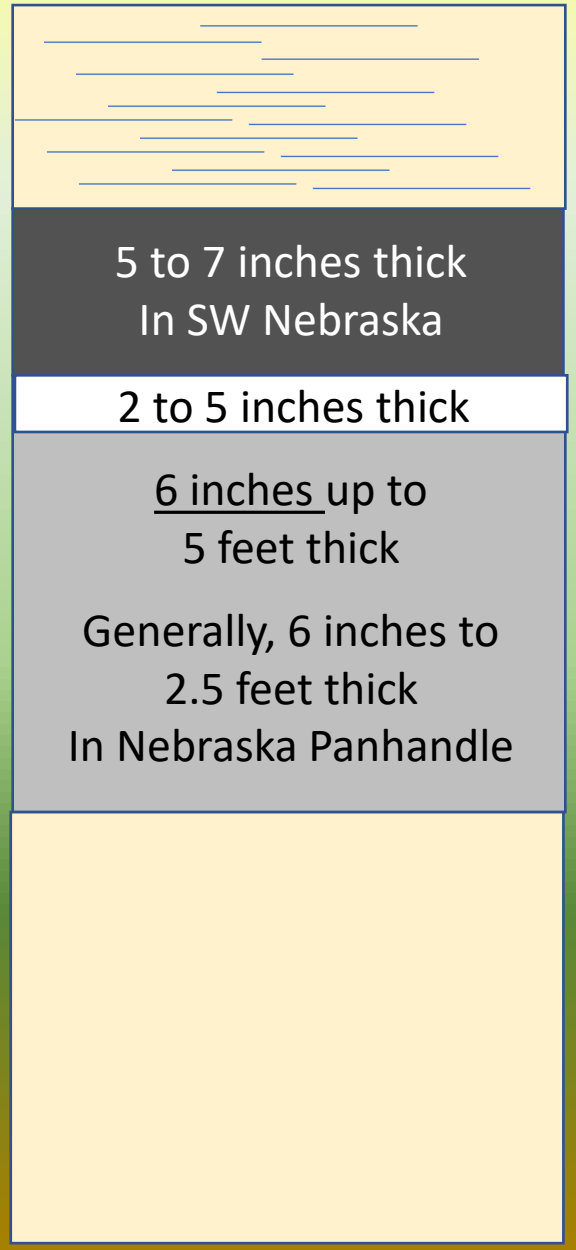
Playa Hydrology – Aquifer Recharge

Answers to question 2: (last slide)
They both share 1) Banded perimeter or "rim"-vegetation 2) Frequently inundated inner pool
3) Anisotropic (horizontal flow) Hydraulic conductivity



In an "ideal world"!!!

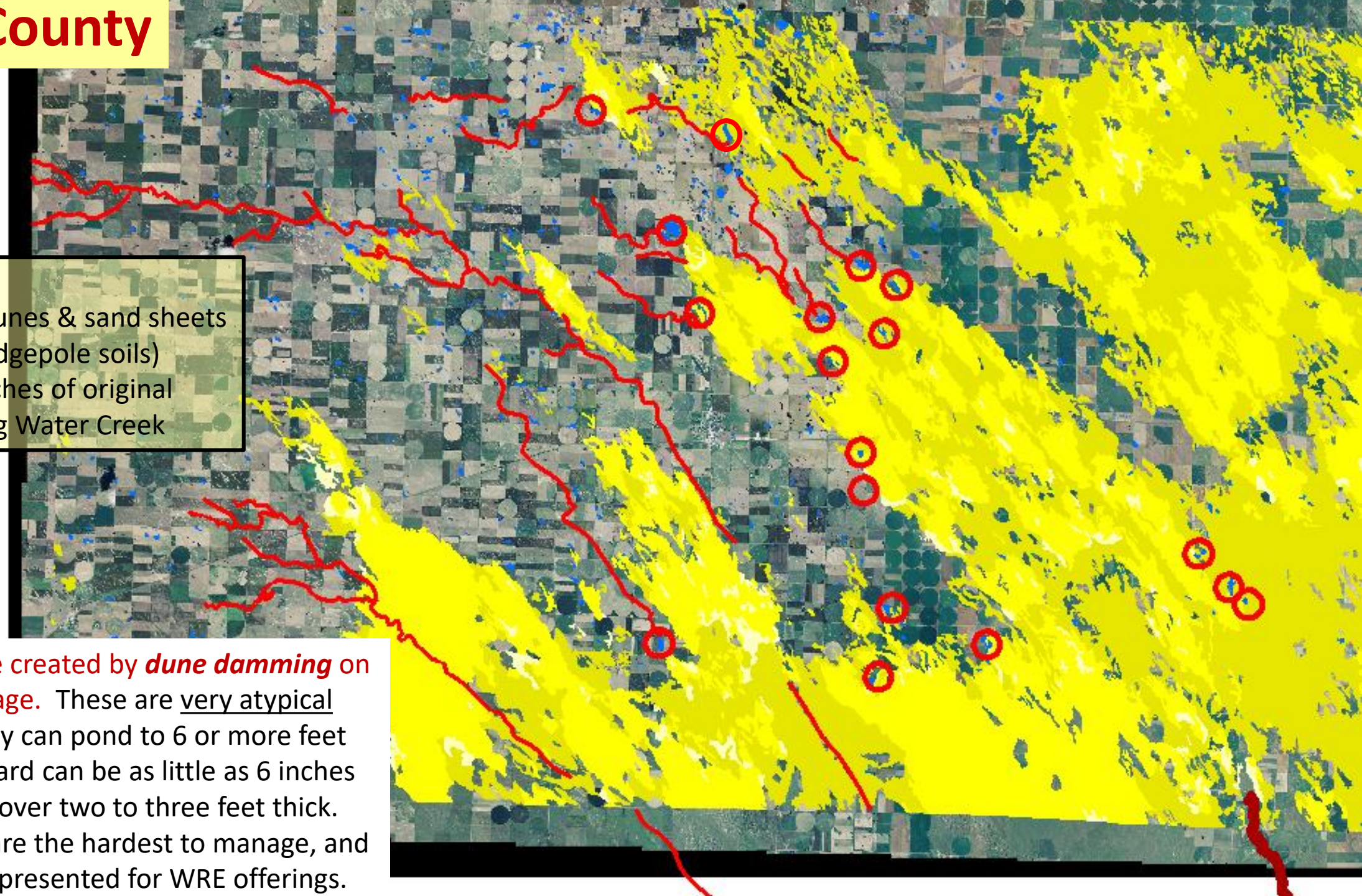
Thanks to Becca Hodges for this great picture!!!



A [Sed] ***Erosional deposition*** **is almost always most apparent around the outer rim of a playa with alluvial fans below incoming drains**

A [Fill] ***Human deposited*** **fill material is almost always most apparent spread around pits within a playa floor and in the deeper, central floor of a playa—where erosional sediment seldom ever reaches.**

Perkins County

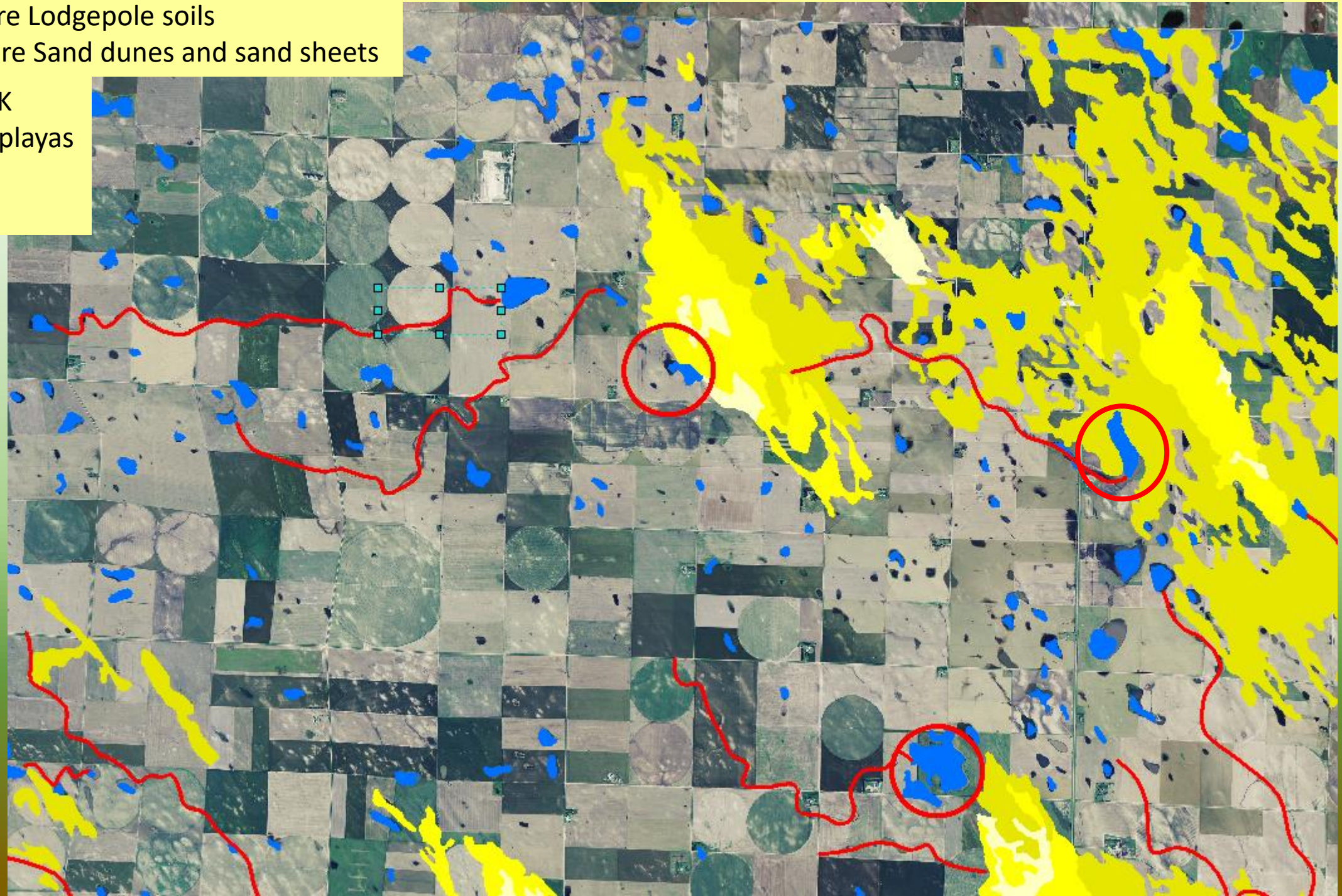


Legend:
Yellows – Sand dunes & sand sheets
Blue – Playas (Lodgepole soils)
Red – Upper reaches of original Stinking Water Creek

Circled playas are created by ***dune damming*** on a dendritic drainage. These are very atypical playas in that they can pond to 6 or more feet deep; their aquitard can be as little as 6 inches thick . . . Seldom over two to three feet thick. Ironically, these are the hardest to manage, and most likely to be presented for WRE offerings.

Areas in BLUE are Lodgepole soils
YELLOW areas are Sand dunes and sand sheets

BLACK and DARK GRAY areas are playas not mapped as Lodgepole

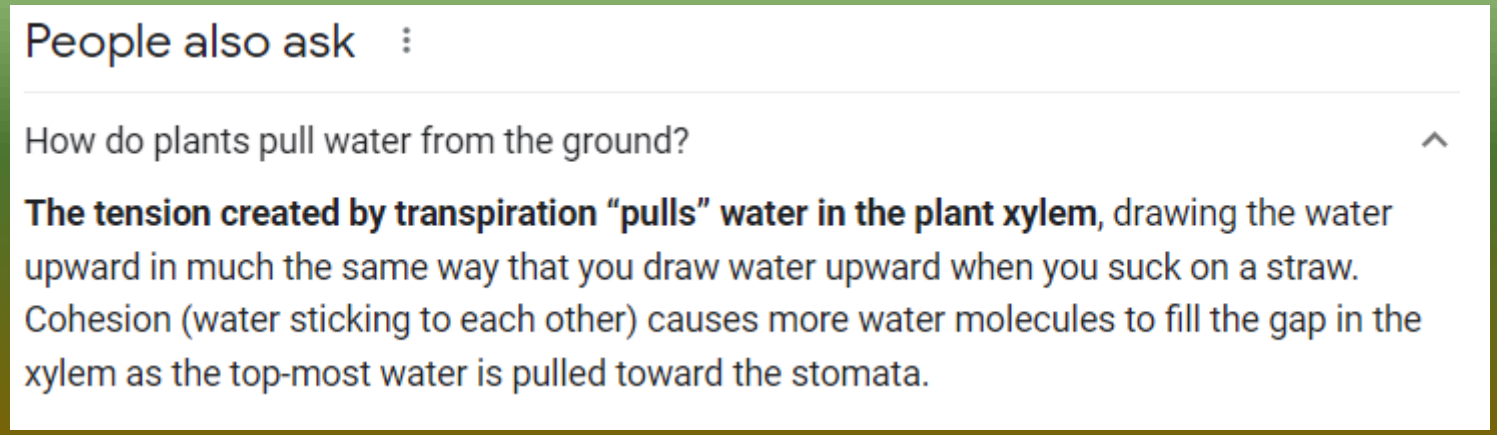


Food for Thought:

In Extreme western Nebraska the corn planted through playa floors is graying and curling up only on the flat portion of the floor where the silty clay aquitard is close to the surface. Meanwhile, on the sloping surfaces that surround the playa floor, the corn is healthier and not showing signs of water-stress. Why?

The corn is water-stressing there because the plants cannot exert enough energy to pull the hydroscopic water away from the fine pores of the silty clay. What little water remains in this drought, is held too tightly by the fine-textured soil.

So, if a thicker (6 or more inches) silt loam A horizon was present the plants would need to exert less suction pressure to pull the water away from and out of the coarser soil pores. When we remove the A-horizons from our playas during "restoration," we damage the ecosystem hydrologic mechanisms that sustain the plant life. Water is moved outward from the longer-term pool area through ***anisotropic*** hydraulic conductivity via the A-horizon through the suction created by the heavily transpiring hydrophytic vegetation.



Riverine Wetlands

- **Flooding frequency should be the first cut [No WREs within the 100-year floodplain]**
  - Too many structures are wiped out after only several years of easement
  - Costly and Inefficient Use of USDA Funds

- **Database remains inaccurate [water table data] for significant percent of modern (present day) hydric soils for western Platte River soils (and for western playas)**
  - Down-cutting (South Platte = 80 to 100 inches; North Platte up to 10 or more feet below Kingsley dam)

United States Department of Agriculture

NRCS Natural Resources Conservation Service

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