

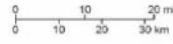
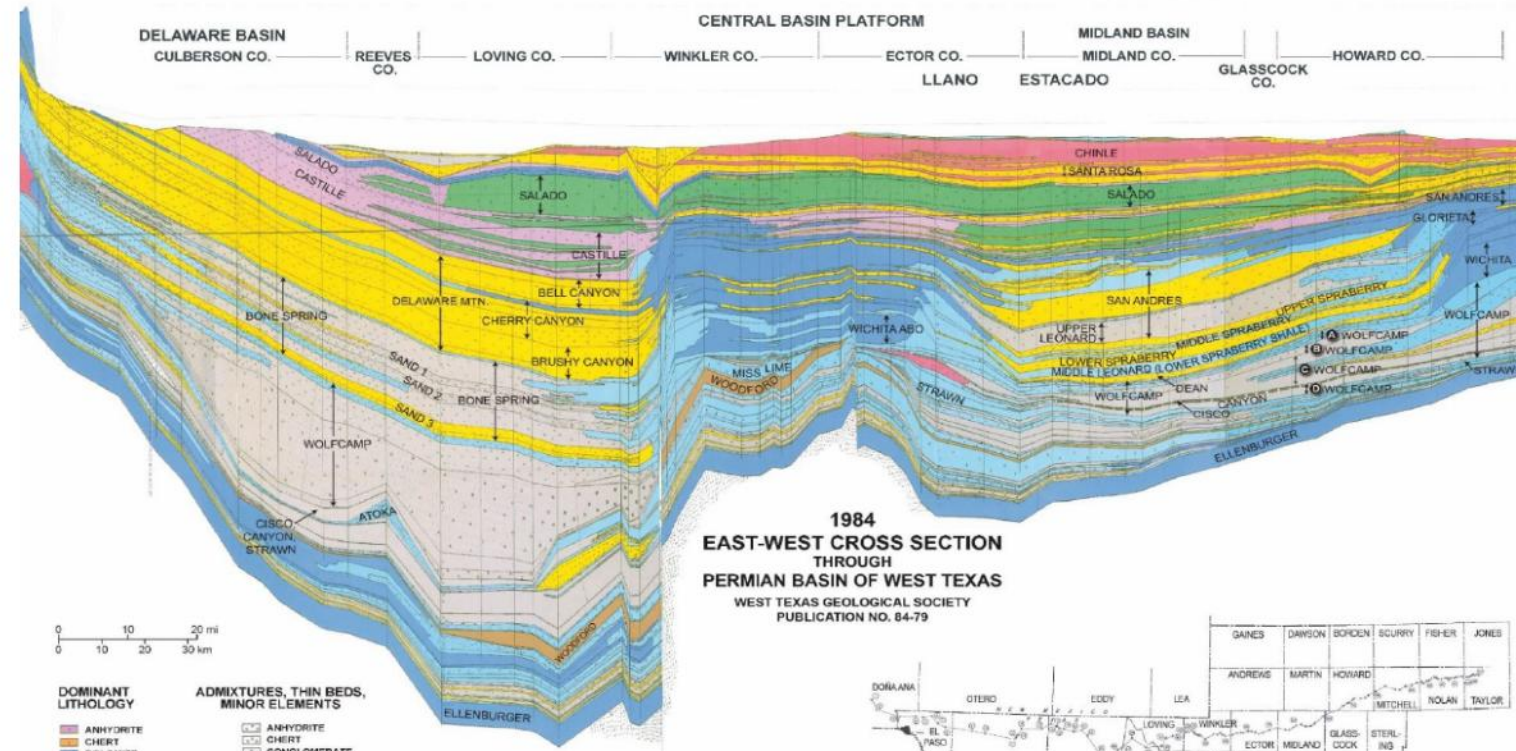
# Exploring Downstream End Users of Polished Desalinated (Purified) Produced Water

UTPB Water in Energy 2026 Conference

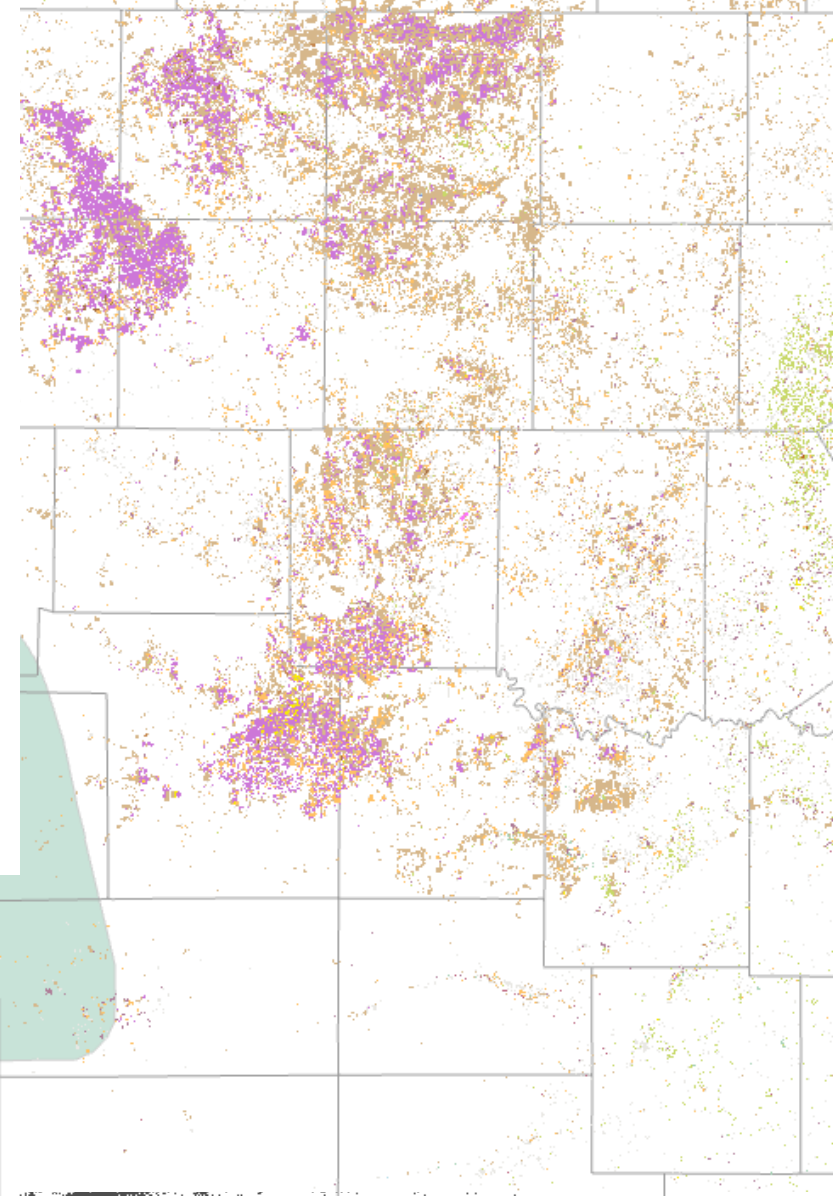
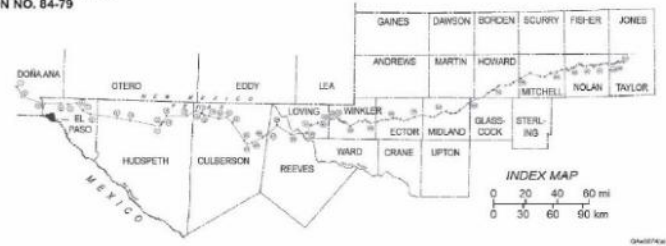
Thursday, April 2026

2:30-3:15 PM

# Crop Data Layer



- DOMINANT LITHOLOGY**
- ANHYDRITE
  - CHERT
  - DOLOMITE
  - LIMESTONE
  - SALT
  - SANDSTONE
  - RED SHALE
  - SHALE OTHER THAN RED
  - PRECAMBRIAN UNDISPERSED
  - TERTIARY VOLCANICS
- ADMIXTURES, THIN BEDS, MINOR ELEMENTS**
- ANHYDRITE
  - CHERT
  - CONGLOMERATE
  - DOLOMITE
  - LIMESTONE
  - SALT
  - SAND
  - SHALE



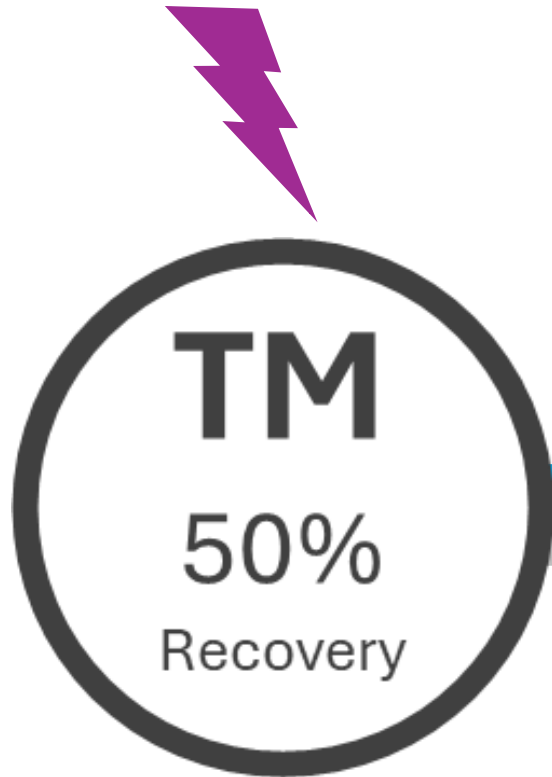


# Permian **PW** *PDPW* Potential



Raw  
PW

25M



PDPW

12.5M

Concentrated  
PW Waste

12.5M

# Texas Permian PDPW Volume Potential

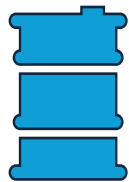
**PDPW**



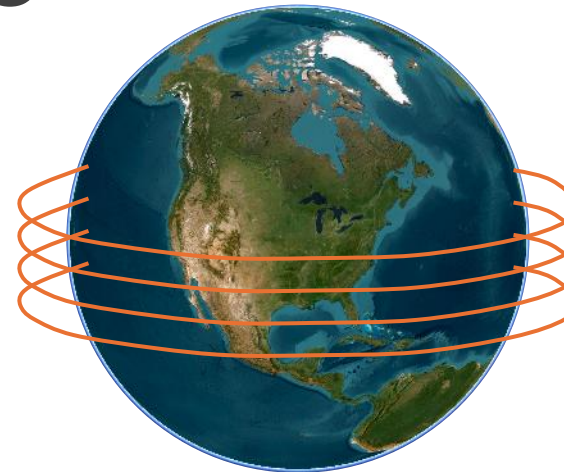
**12.5M**

**22,340**

**11**



**3.6X**



**4.6B**

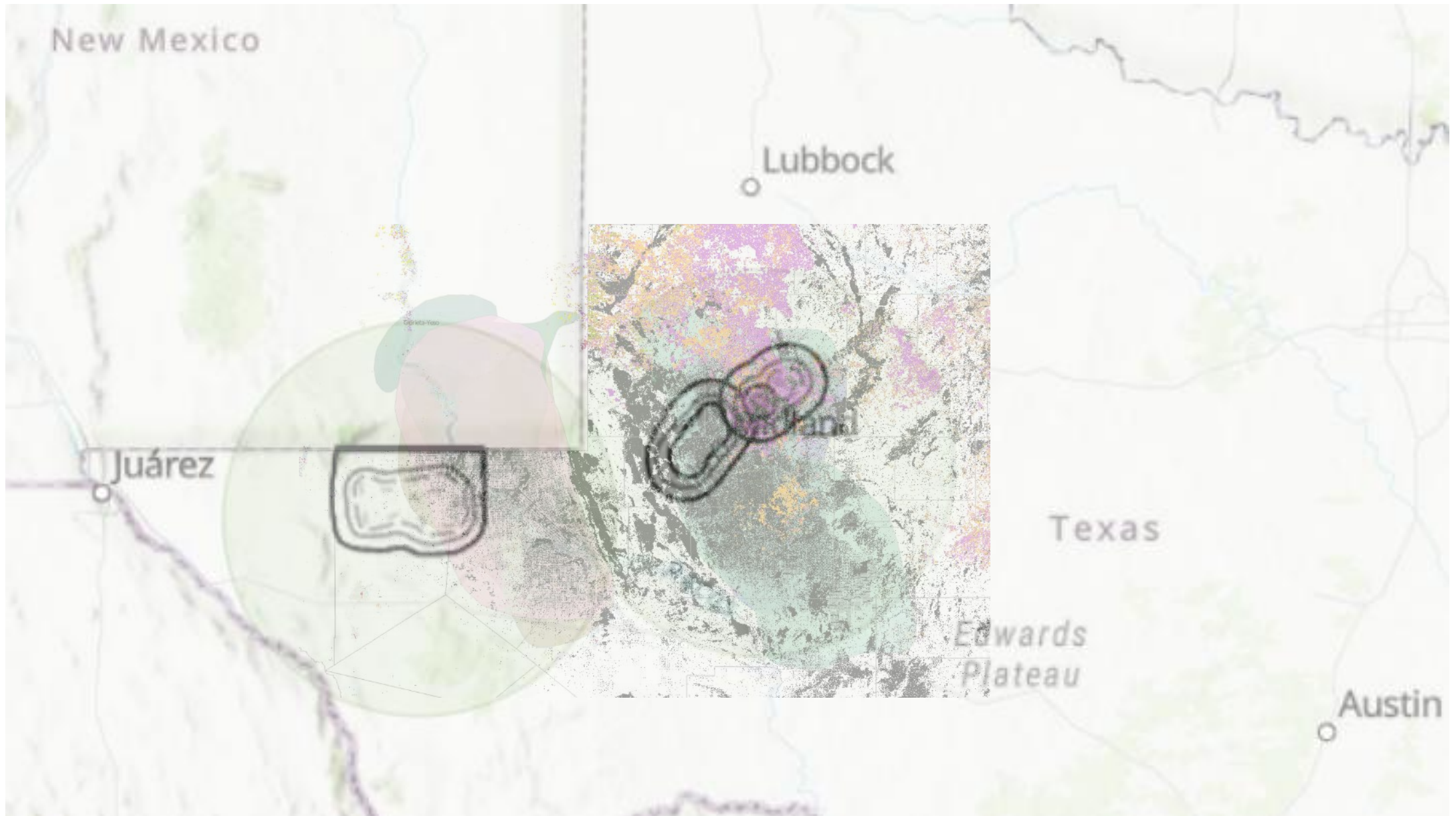
**7.6m**

**4069**





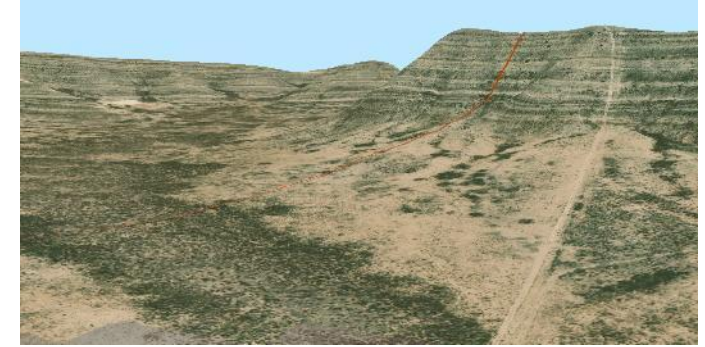
# Seismicity Response



# Permian Basin Existing Ecosystem Conditions



*Sparse + Invasive  
Vegetation*



*Fast Runoff  
Soil Erosion*











*Rapid Runoff  
Soil erosion  
Dry between  
Precipitation Events*

# MAP ILLUSTRATING THE EXTERMINATION OF THE AMERICAN BISON

PREPARED BY  
W. T. HORNADAY.

## EXPLANATION.

-  Boundary of the area once inhabited by the American Bison (Mainly after J. A. Allen.)
-  Approximate boundary between the area of desultory extirpation and that of systematic destruction for robes and hides
-  Area of gradual extermination by desultory methods
-  Area of wholesale slaughter by systematic methods
-  Range of two great herds in 1870
-  Range of the herds in 1880.
-  Range of the scattered survivors of the southern herd in 1875, after the great slaughter of 1870-1873
-  Range of the northern herd in 1884, after the great slaughter of 1880-1883.

*Dates in red figures represent the year of the Bison's extermination in the localities over which the figures are placed.*

*Figures in green represent the locality and number of wild Bison in existence January 1<sup>st</sup> 1889.*

*Compiled under the direction of Henry Coville, F.M.*

120°

115°

110°

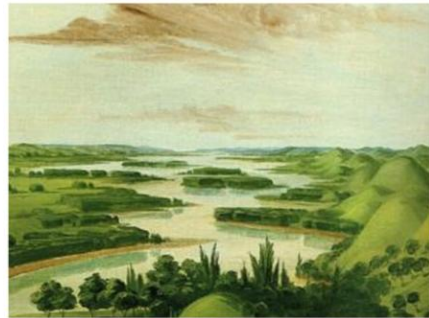
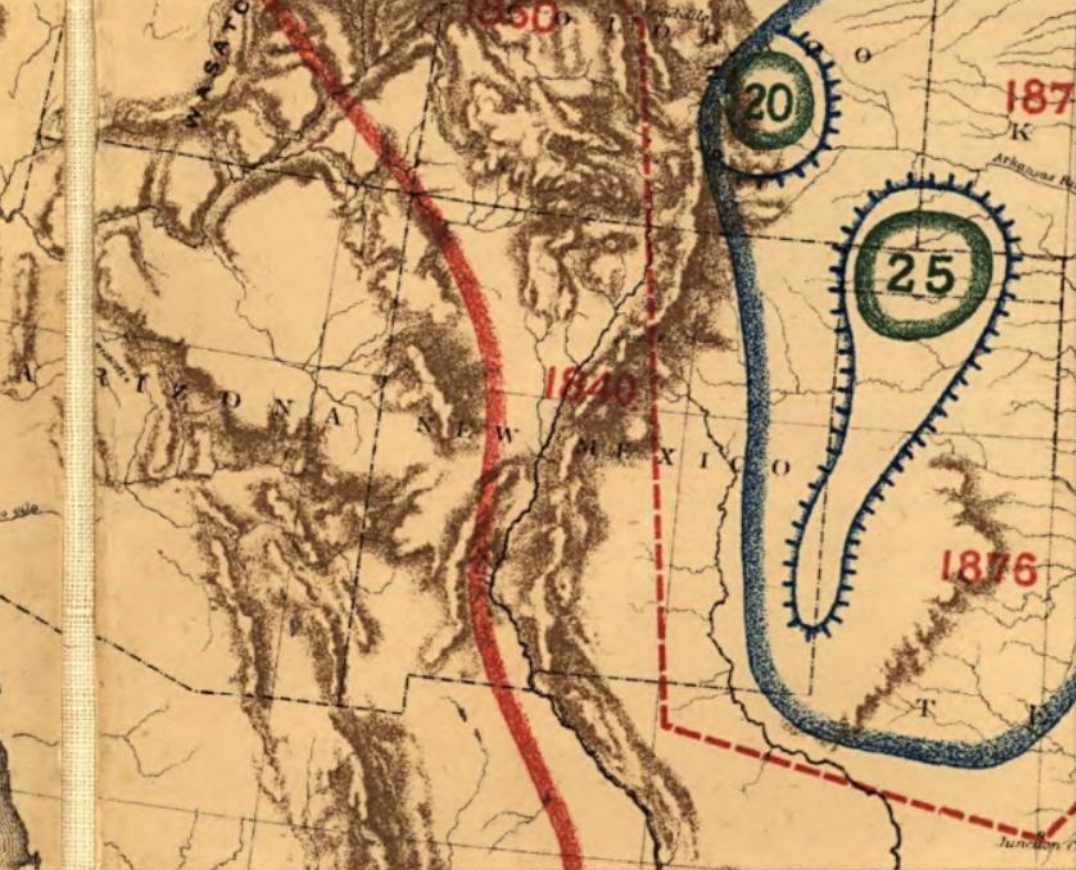


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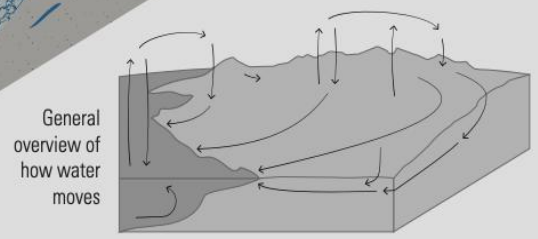
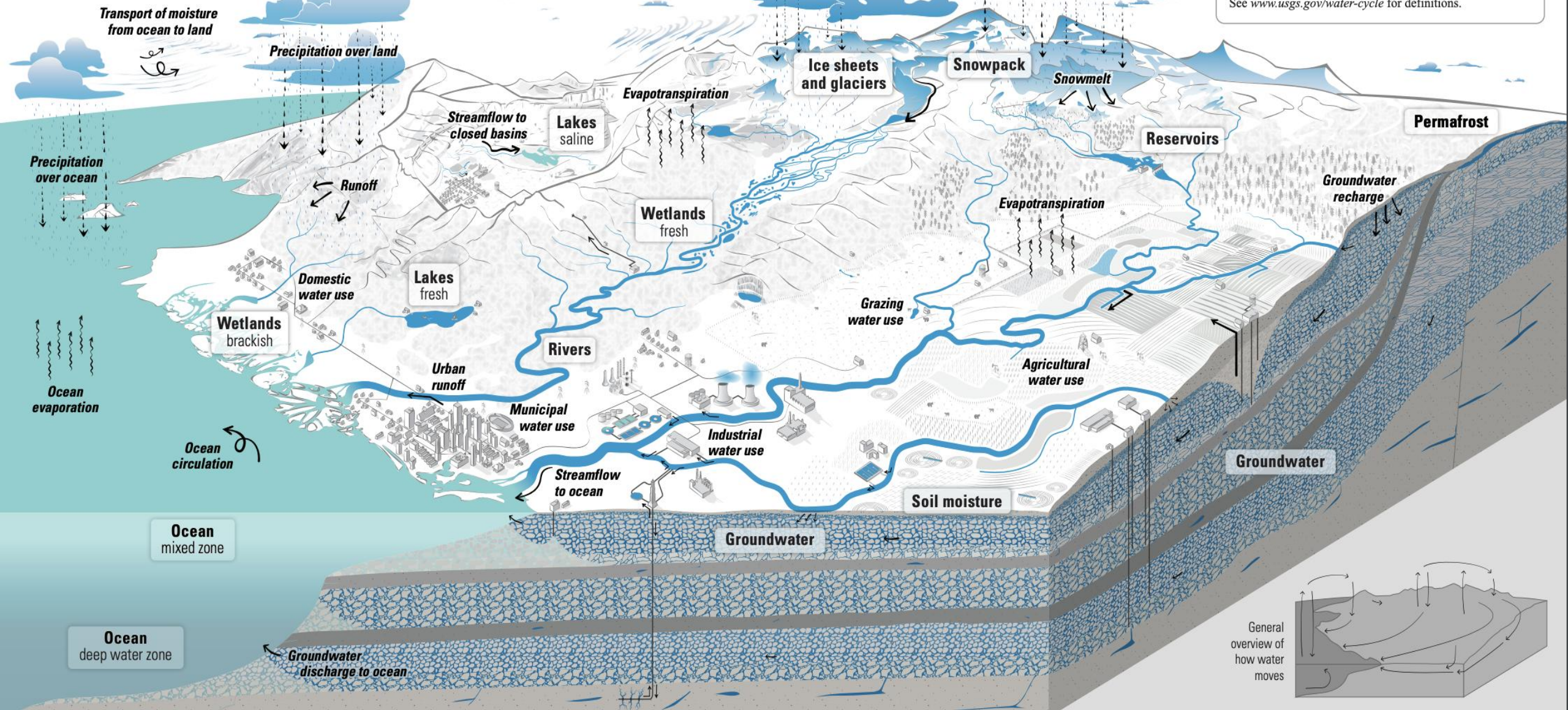
Atmospheric moisture over ocean

Atmospheric moisture over land

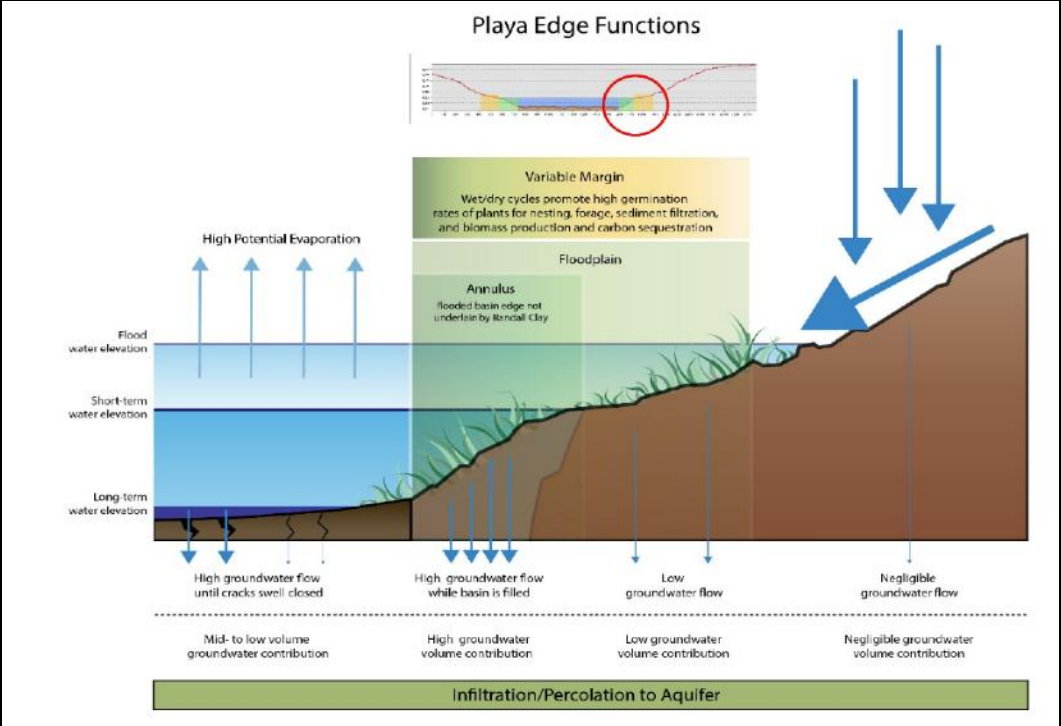
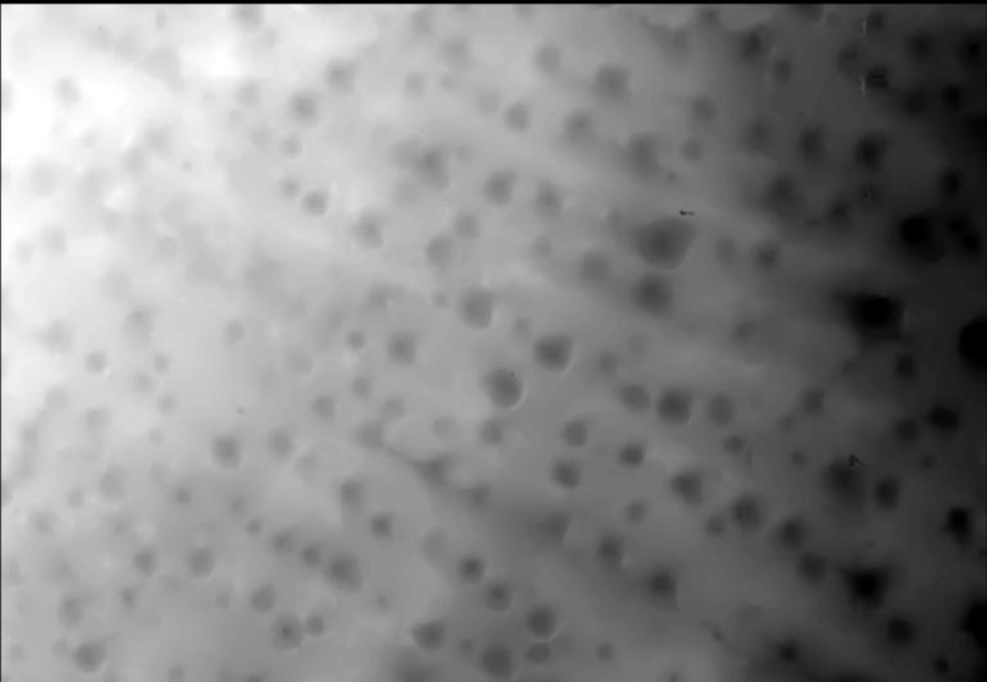
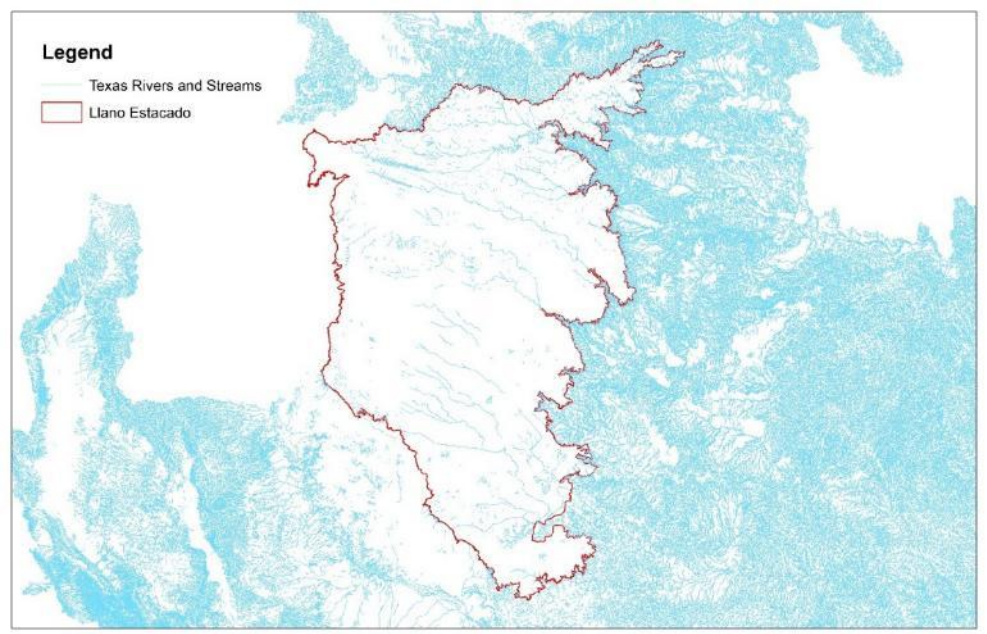
**Pools and Fluxes**

On Earth, water can be **fresh, saline**, or a mix of both. **Pools** are places where water is stored, like the ocean. **Fluxes** are the ways that water moves between pools, such as evaporation, precipitation, discharge, recharge, or human use.

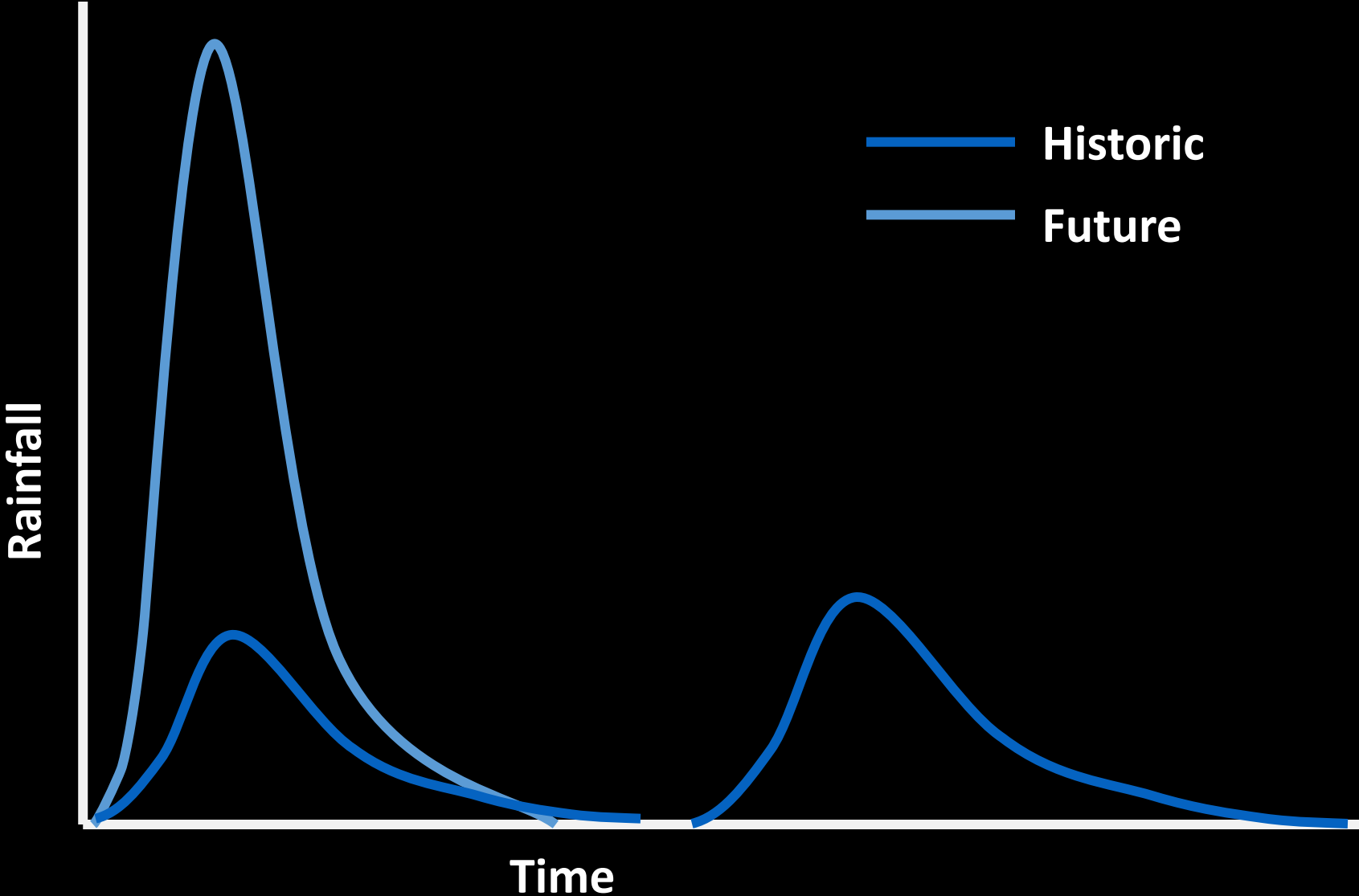
See [www.usgs.gov/water-cycle](http://www.usgs.gov/water-cycle) for definitions.



# Llano Estacado Hydrologic Complexity and Playas

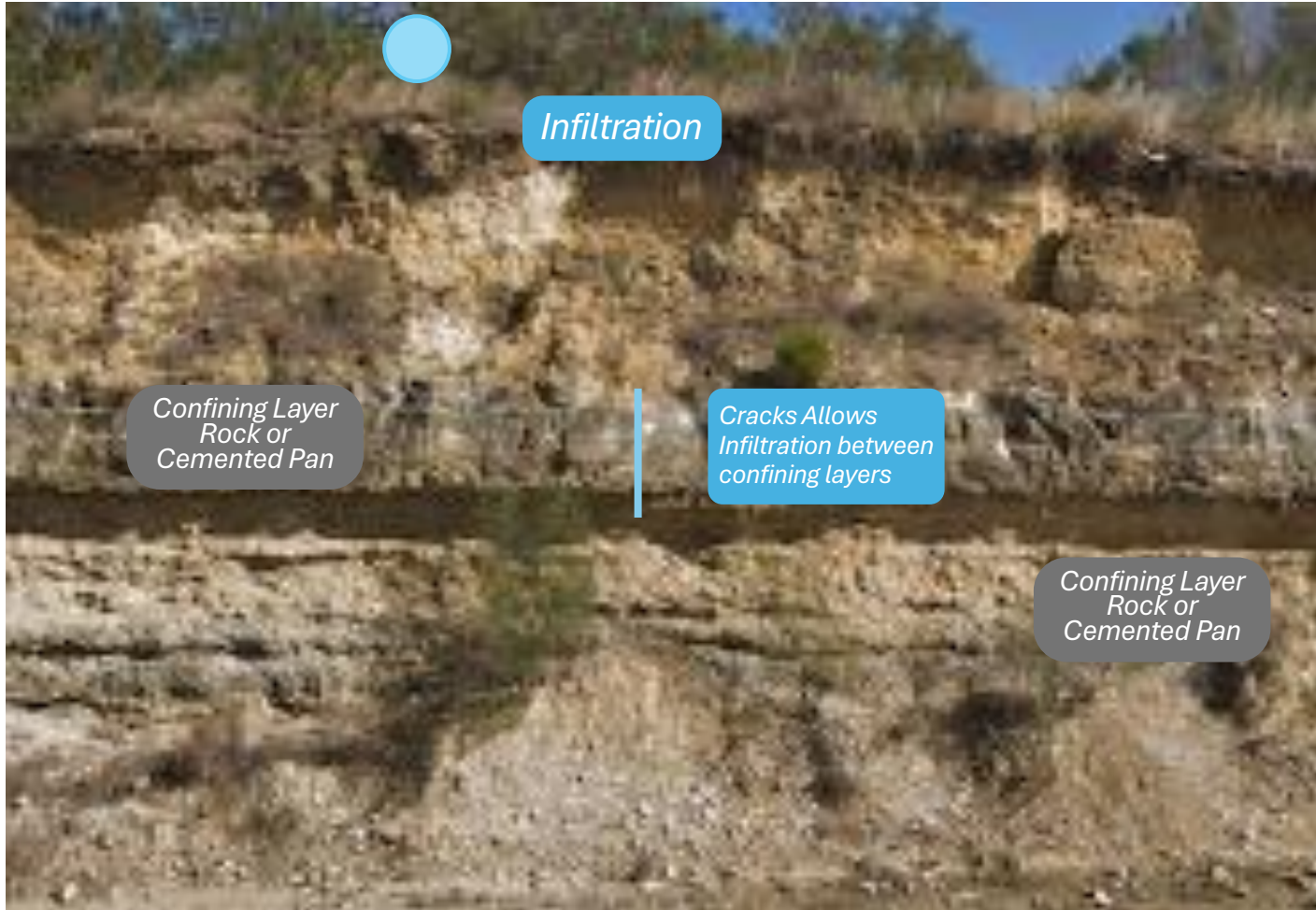


# Hydrologic Events



*What is*  
**Base Flow?**

# Natural **Water** Movement

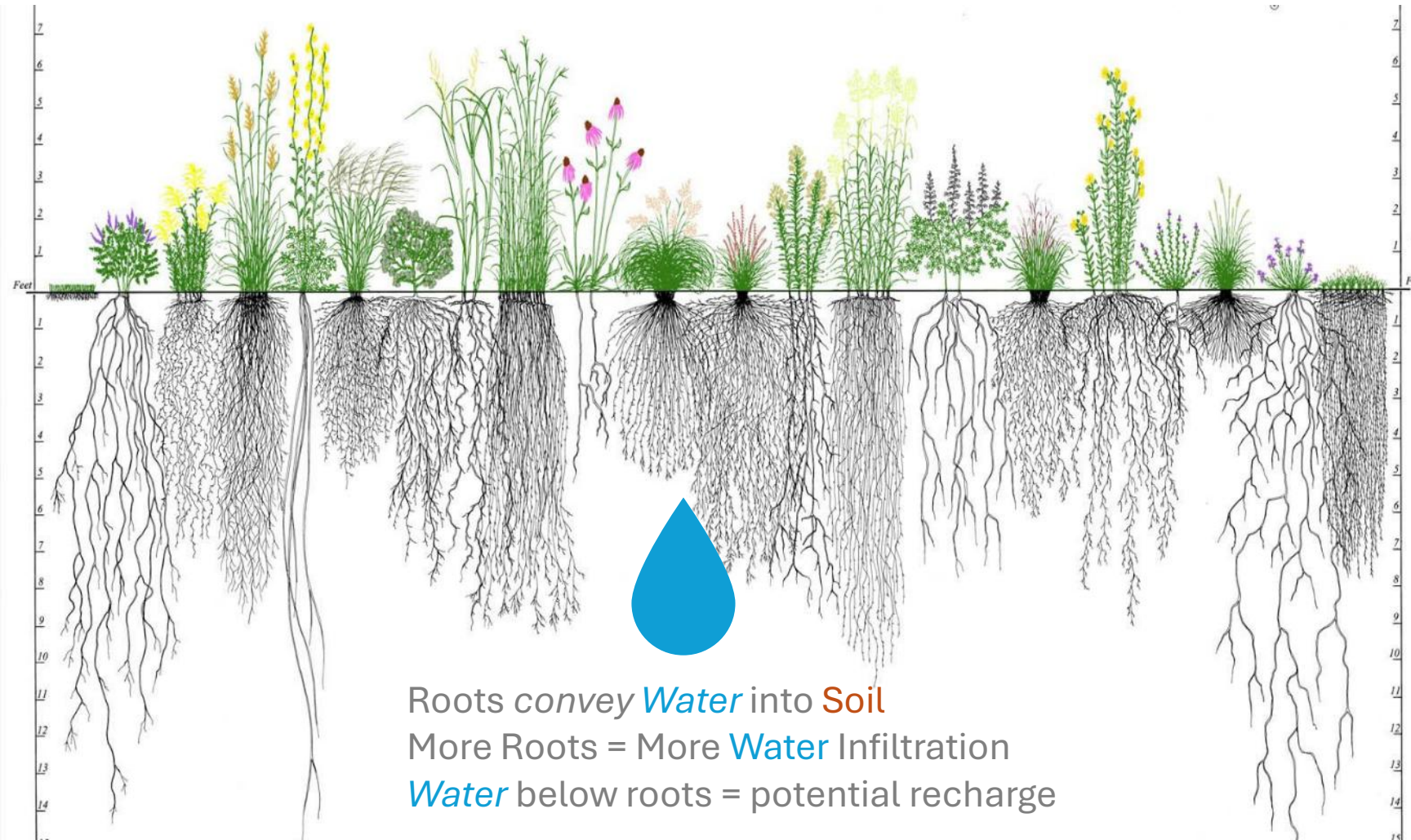


*Plant material coverage of soil surface determines infiltration into soil profile*

*Infiltration into soil profiles sustains Base Flow and Plants between precipitation events*

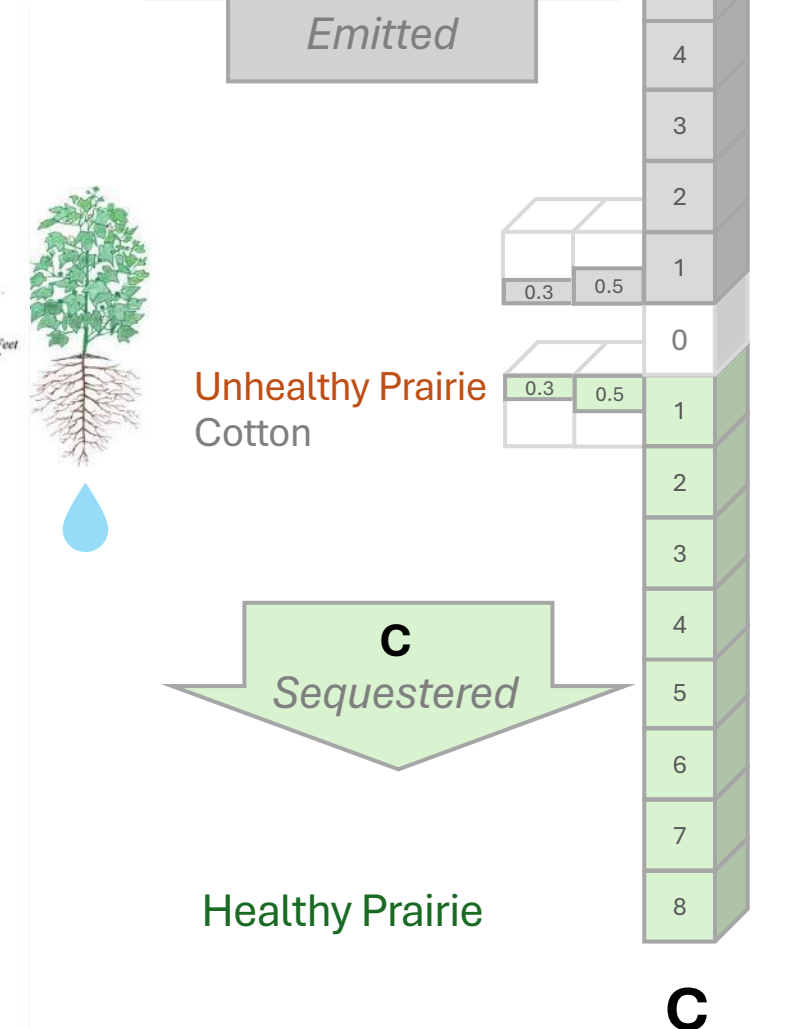
*Base Flow is infiltrated water flowing in soil and geology over time adding to groundwater, streams, rivers, and lakes between precipitation events*

# Water movement into Soil + C Sequestration



Roots convey **Water** into **Soil**  
 More Roots = More **Water** Infiltration  
**Water** below roots = potential recharge

Native Prairie Plants



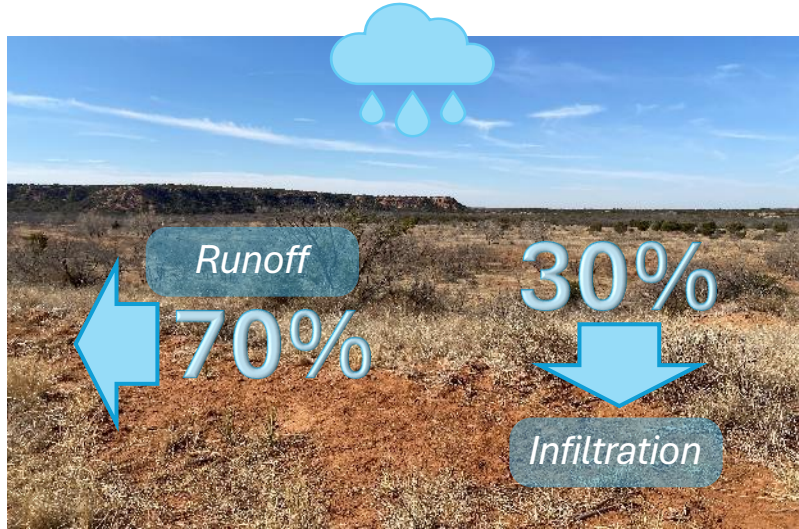
Unhealthy Prairie  
 Cotton

Healthy Prairie

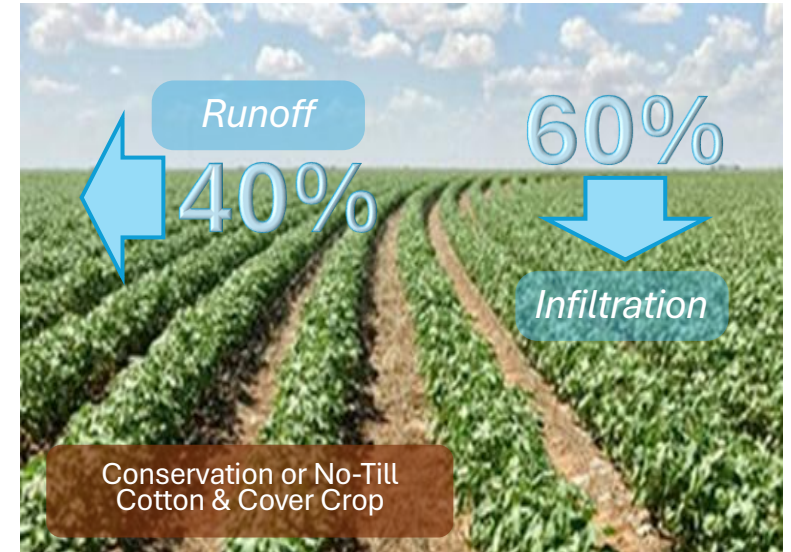
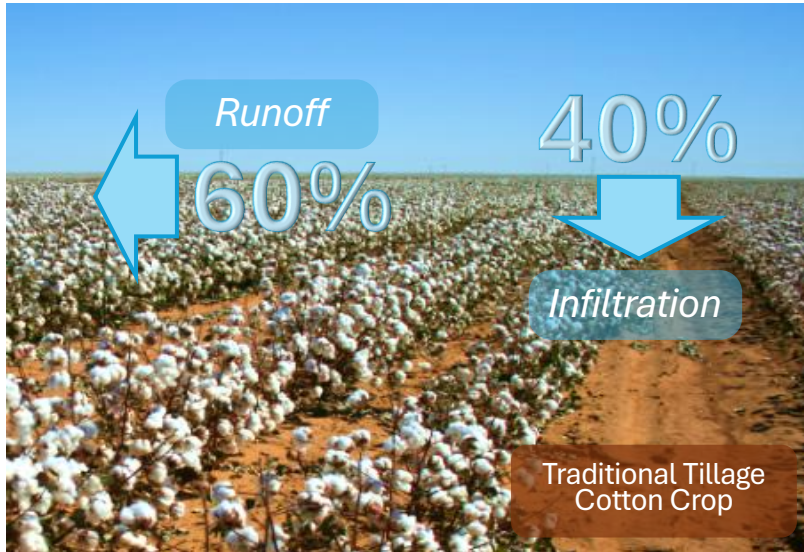
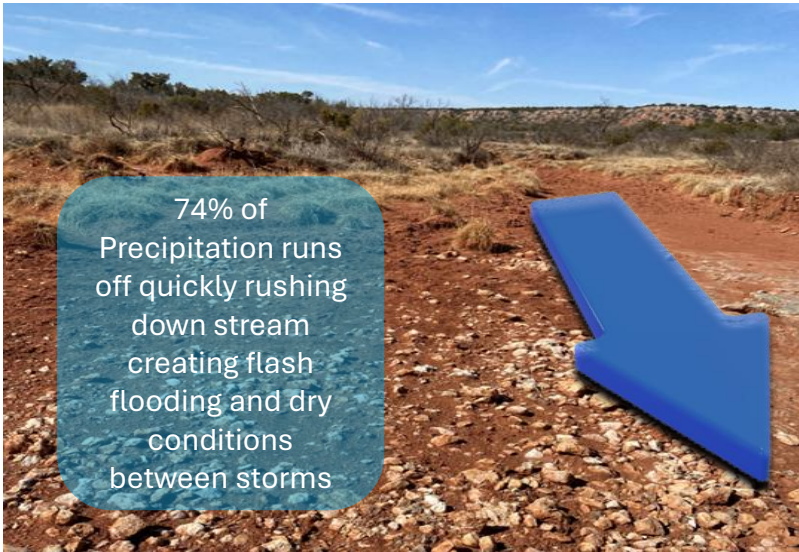
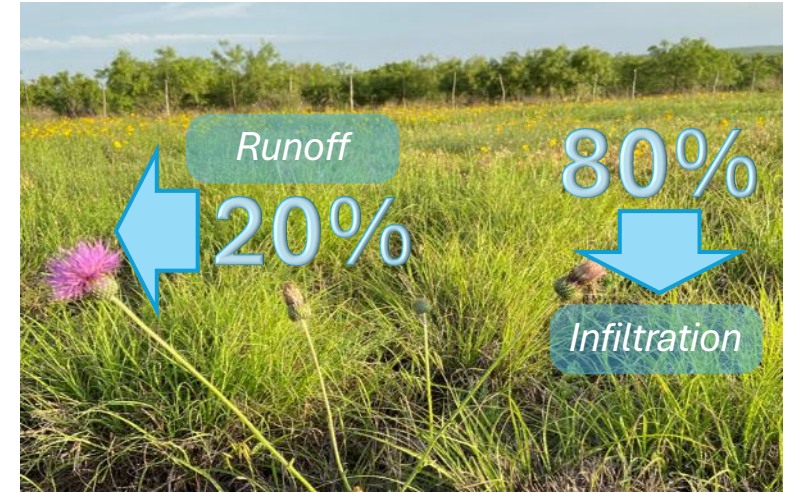
Cotton

**C**  
 tons/acre

# Existing Conditions: **Water**

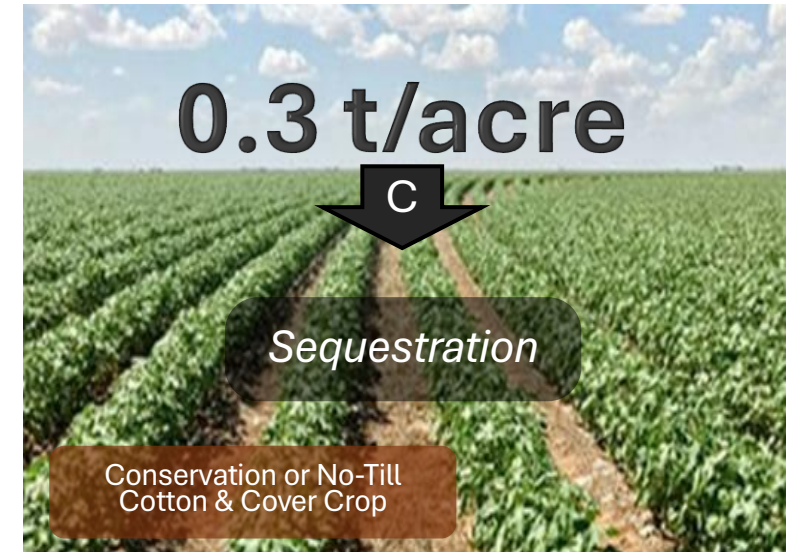
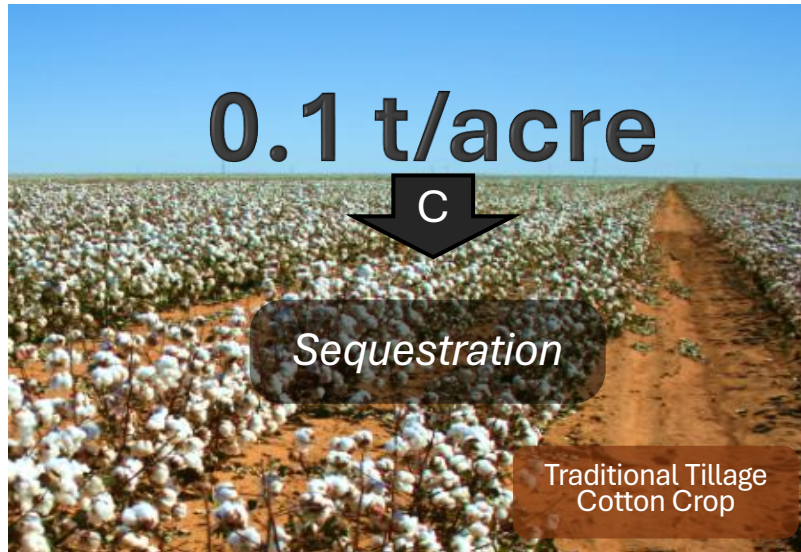
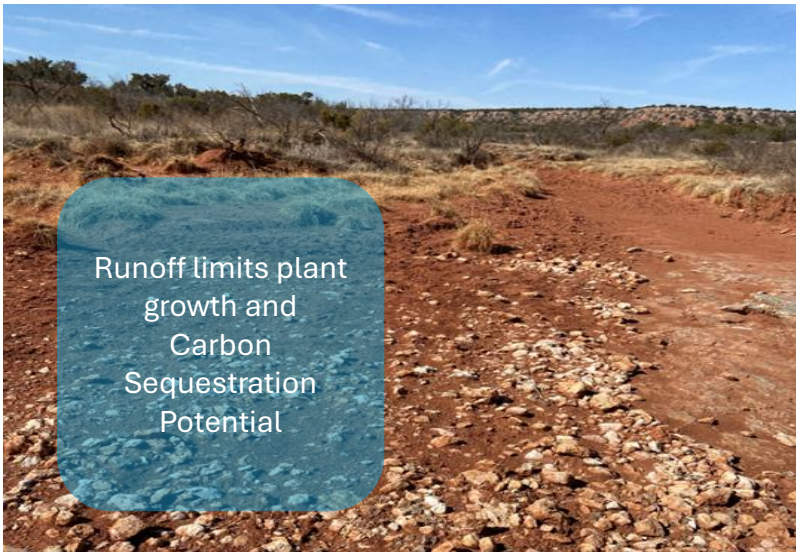
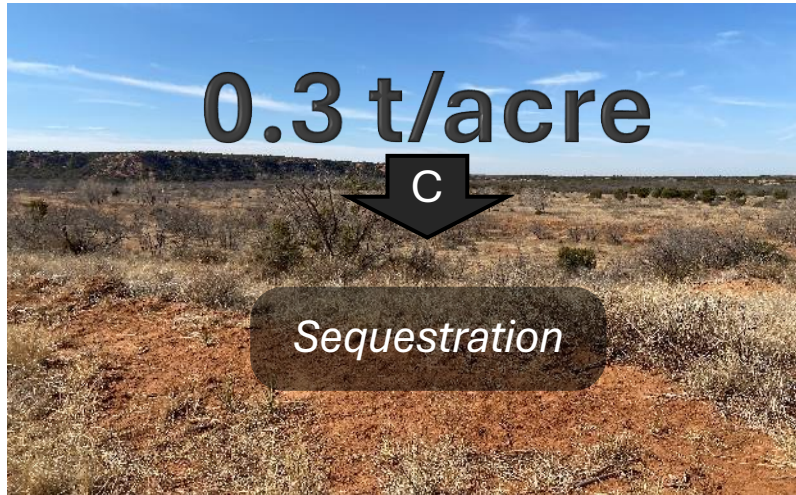


# Potential Conditions

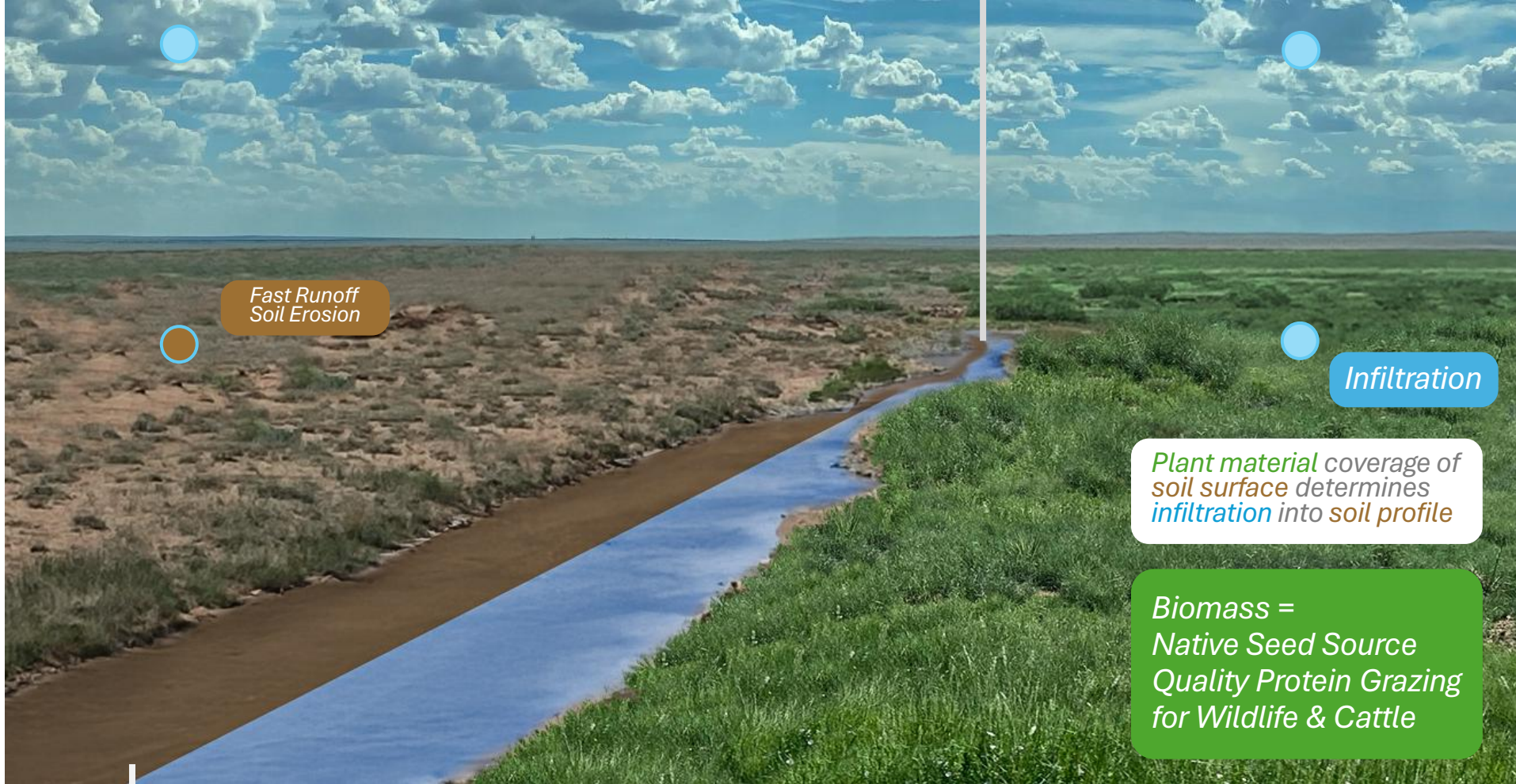


# Existing Conditions: **Carbon**

# Potential Conditions



# Restore Natural Water Movement



Fast Runoff  
Soil Erosion

Infiltration

Plant material coverage of soil surface determines infiltration into soil profile

Biomass =  
Native Seed Source  
Quality Protein Grazing  
for Wildlife & Cattle

Infiltration into soil profiles sustains Base Flow and Plants between precipitation events

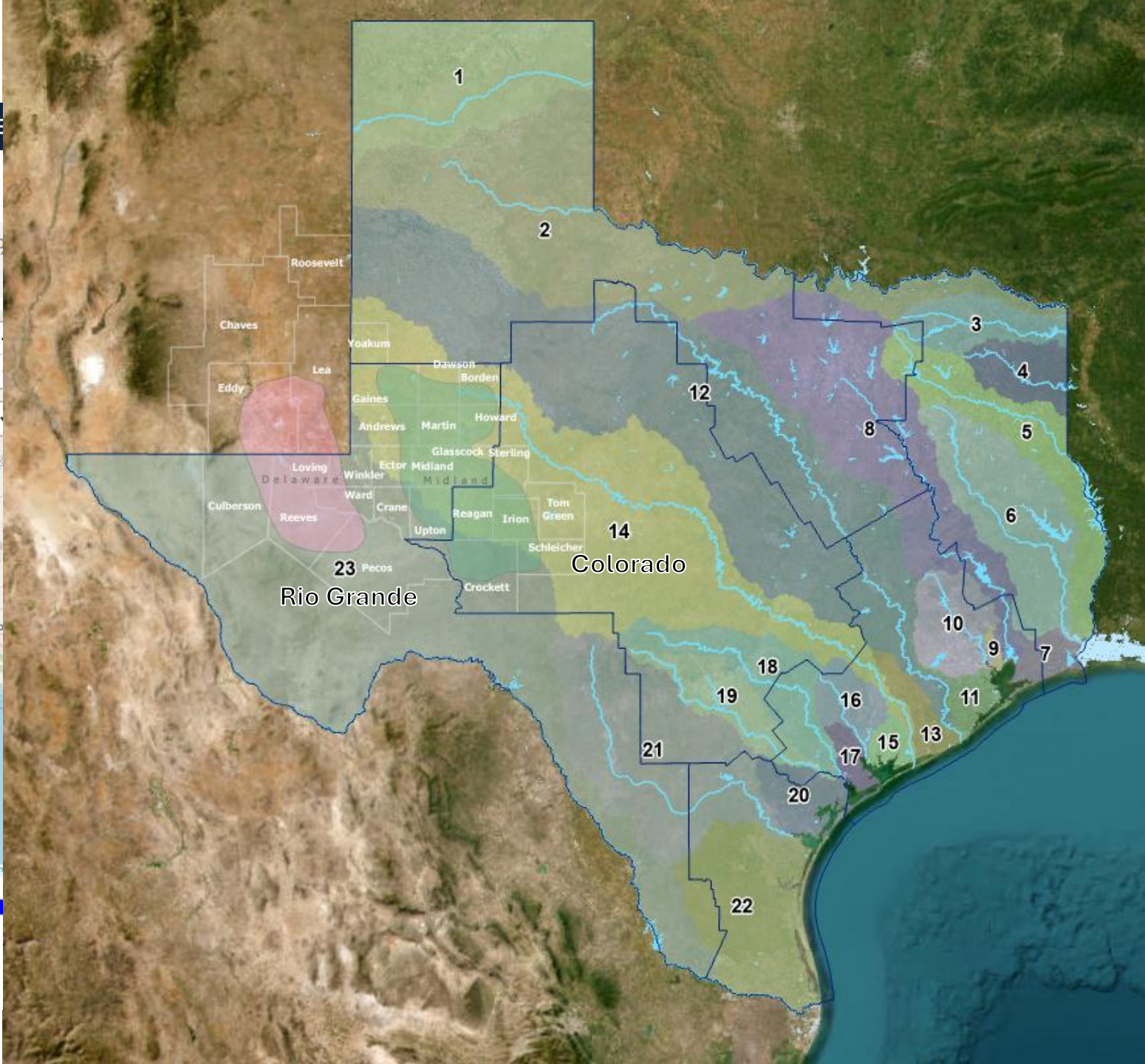
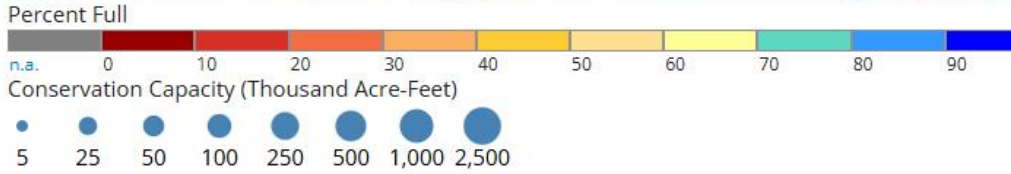
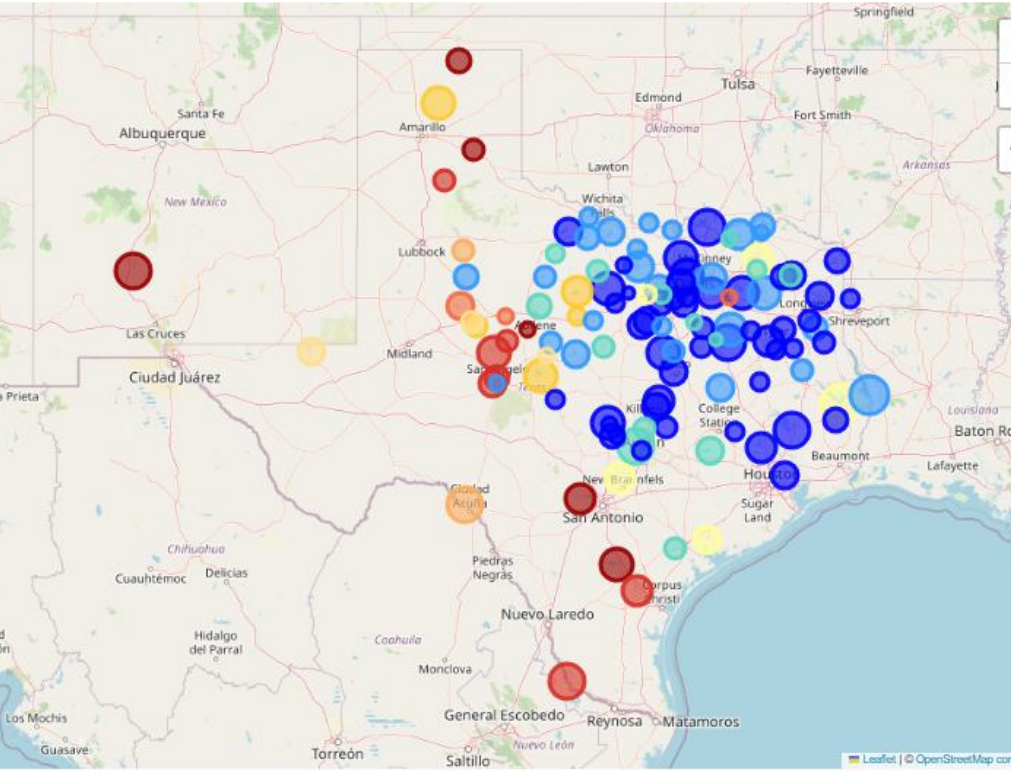
Base Flow is infiltrated water flowing through soil and geology and mineralizing over time adding to groundwater, streams, rivers, and lakes between precipitation events

Rapid Runoff  
Soil Erosion  
Dry between  
Precip Events

Base Flow into  
stream between  
Precip Events

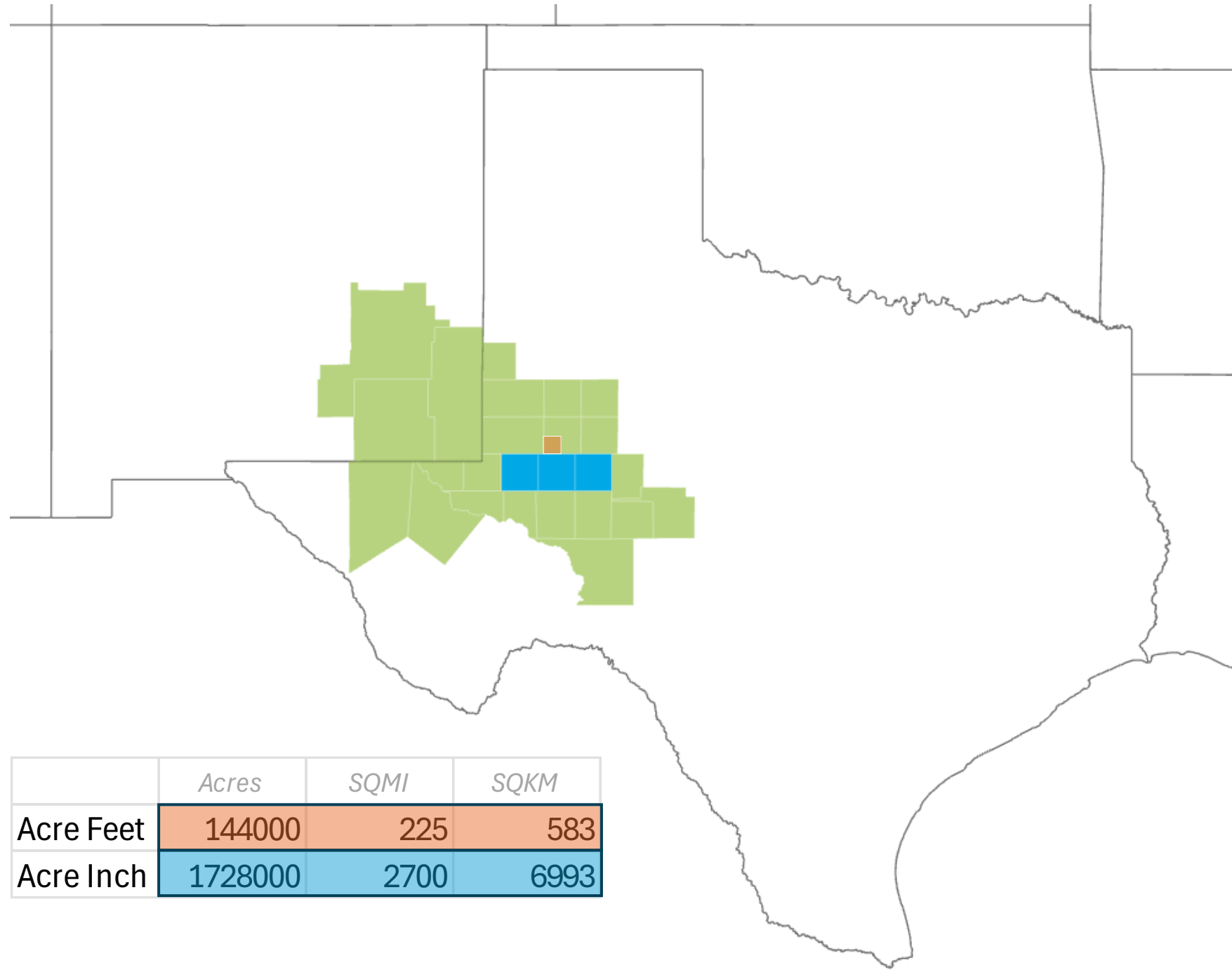
# DPW Potential

Texas Reservoirs: Monitored Water Supply Reservoirs are 73.09% full on 2026-01-20



# Texas Permian Purified PW

Annual  
Volume  
*Potential*



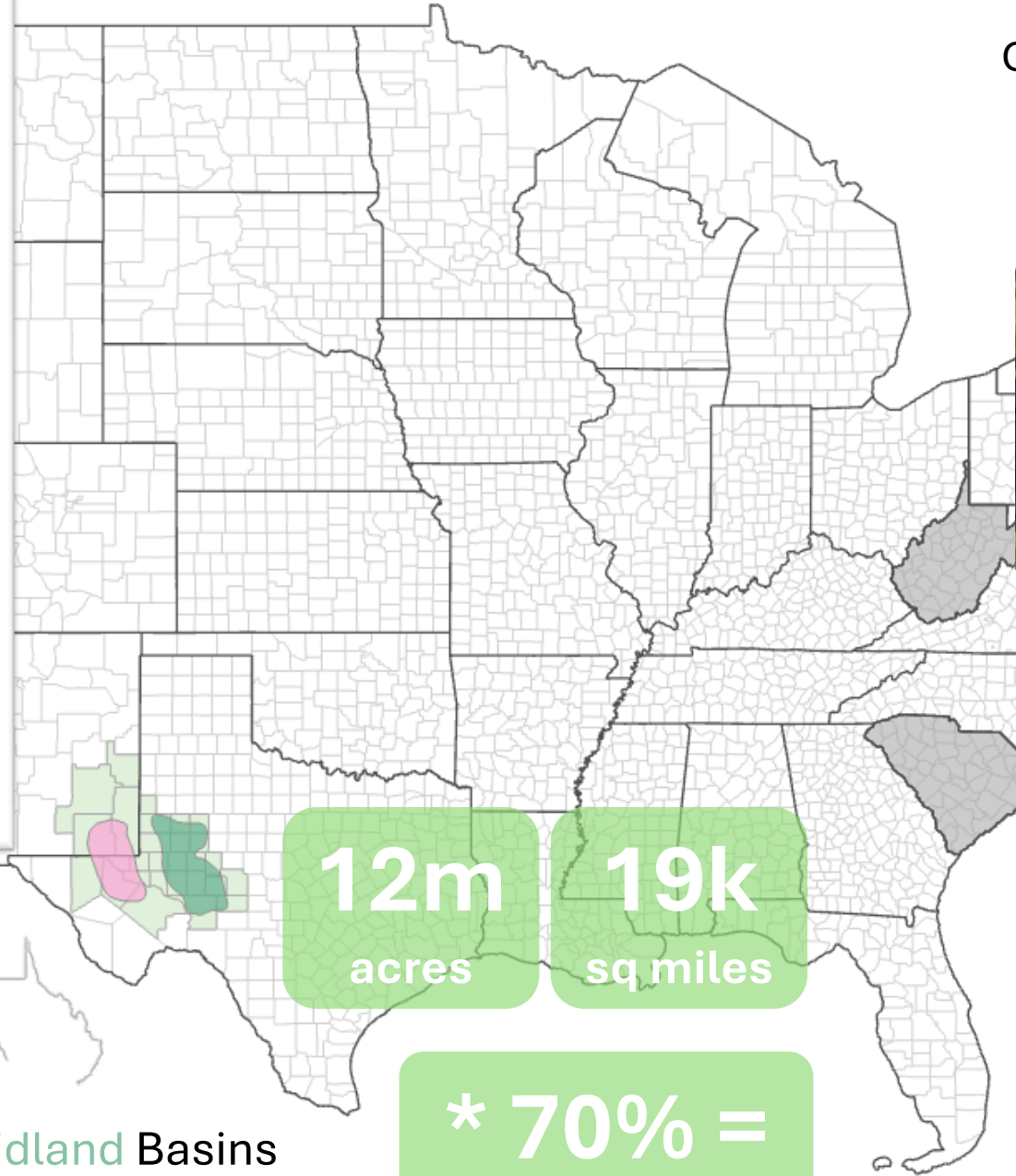
# Greening China's Loess Plateau

John D Liu

<https://youtu.be/UAmal36XJDk>



**\$ = 10x**  
**20 years**



**12m**  
acres

**19k**  
sq miles

**8.6m**  
acres

**13k**  
sq miles

**Permian Basin = Delaware + Midland Basins**

**28 Counties** = New Mexico 4 + Texas 24

~ Area of South Carolina or West Virginia

Stacked & Co-Benefits Credit Value	Acres in Permian	Estimated Regen %	Est Acres	Annual Estimate Y3	10 Year
\$20 Acre	1	1	1	20	200
	160	1	160	3,200	32,000
	640	1	640	12,800	128,000
	12,000,000	0.7	8,400,000	168,000,000	1,680,000,000

\$100 Acre	1	1	1	100	1,000
	160	1	160	16,000	160,000
	640	1	<b>640</b>	<b>64,000</b>	<b>640,000</b>
	12,000,000	0.7	<b>8,400,000</b>	<b>840,000,000</b>	<b>8,400,000,000</b>

\$300 Acre	1	1	1	300	3,000
	160	1	160	48,000	480,000
	640	1	640	192,000	1,920,000
	12,000,000	0.7	8,400,000	2,520,000,000	25,200,000,000

# How?

## **Work together to do something extraordinary!**

Ensure the water is clean and safe to apply to the land,

Determine places high in watersheds capable of regeneration,

Move the water there and apply it,

Monitor and report soil and plant health.

Monitor ecosystem functions and health over time,

Work together to understand the impacts from diverse perspectives,

Adjust when necessary,

## **Achieve a global first to re-water a river, while greening the desert!**