Restoring Nature-based Processes Provides A Framework for Resilient Restoration

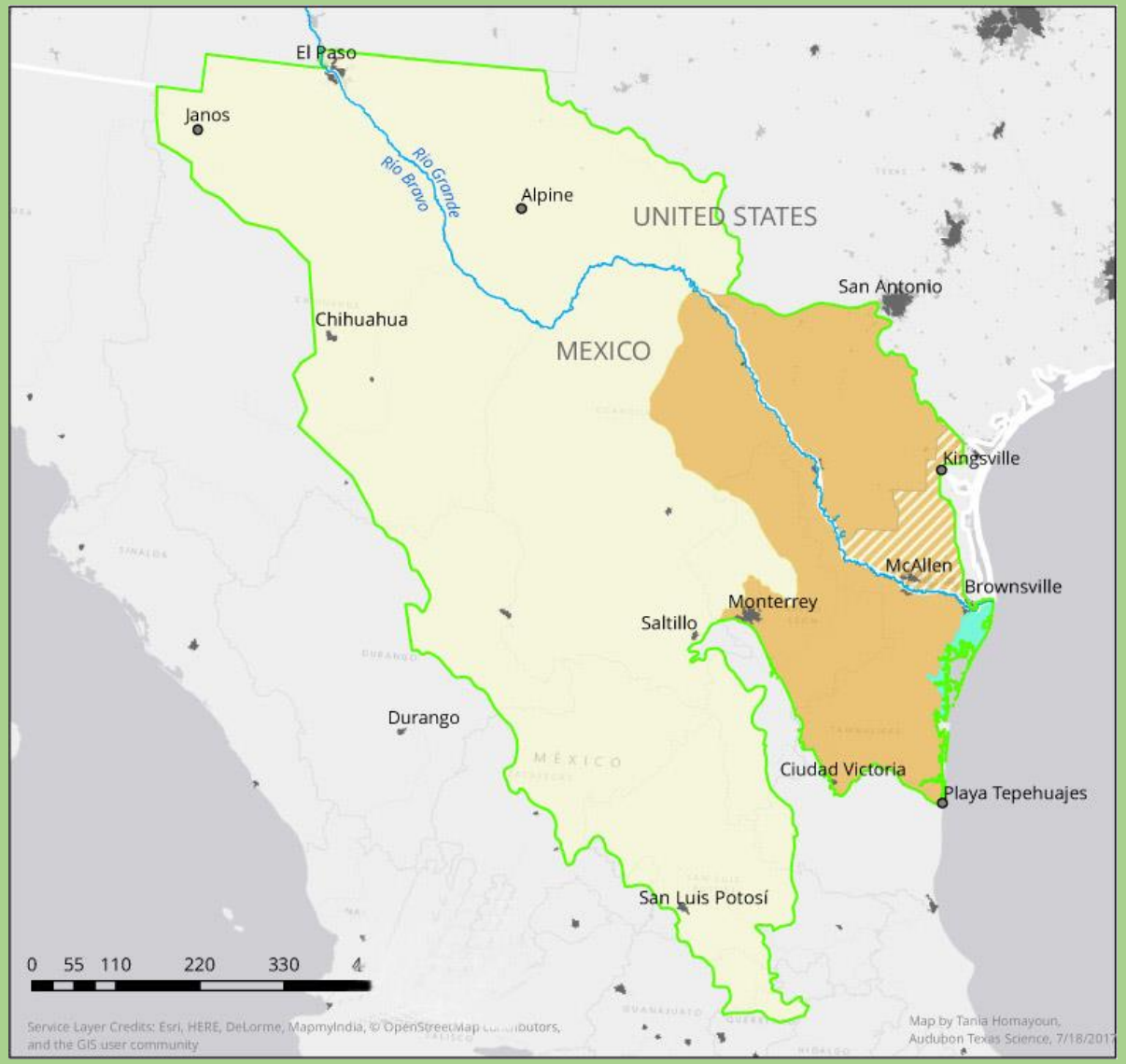
TX Waters Specialist, 2024 Webinar series

RIO GRANDE JOINT VENTURE

Management Board

The mission of the Río Grande Joint Venture is to conserve birds and their habitats across the JV geography in the U.S. and Mexico.

Our Geography



Rio Grande Joint Venture

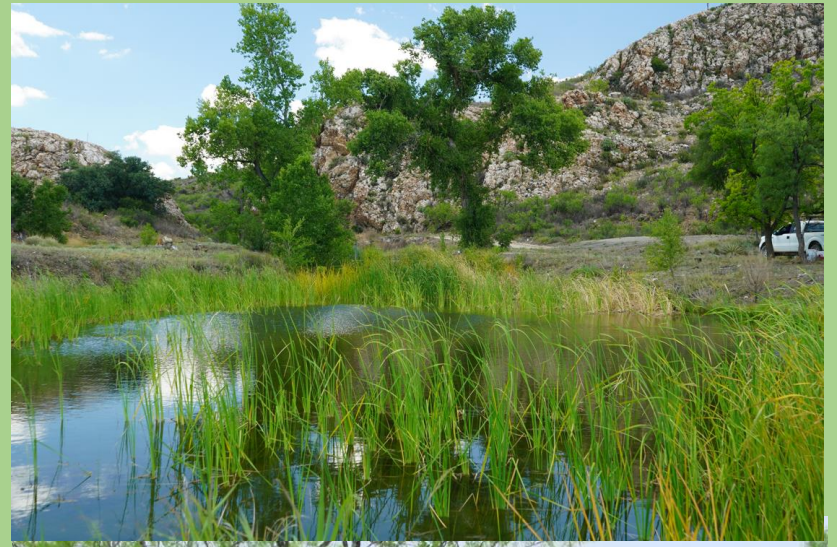
- Rio Grande Joint Venture

Bird Conservation Regions

- Chihuahuan Desert
- Gulf Coastal Prairie
- Tamaulipan Brushlands
- Tamaulipan Brushlands - Shared Management*

Priority Bird Habitats

- Chihuahuan Desert
  - Grasslands
  - Riparian corridors and wetlands
- Tamaulipan Brushlands
  - Grasslands
  - Riparian corridors
- Gulf Coast Prairie - México
  - Laguna Madre
  - Riparian corridors
  - Coastal habitats



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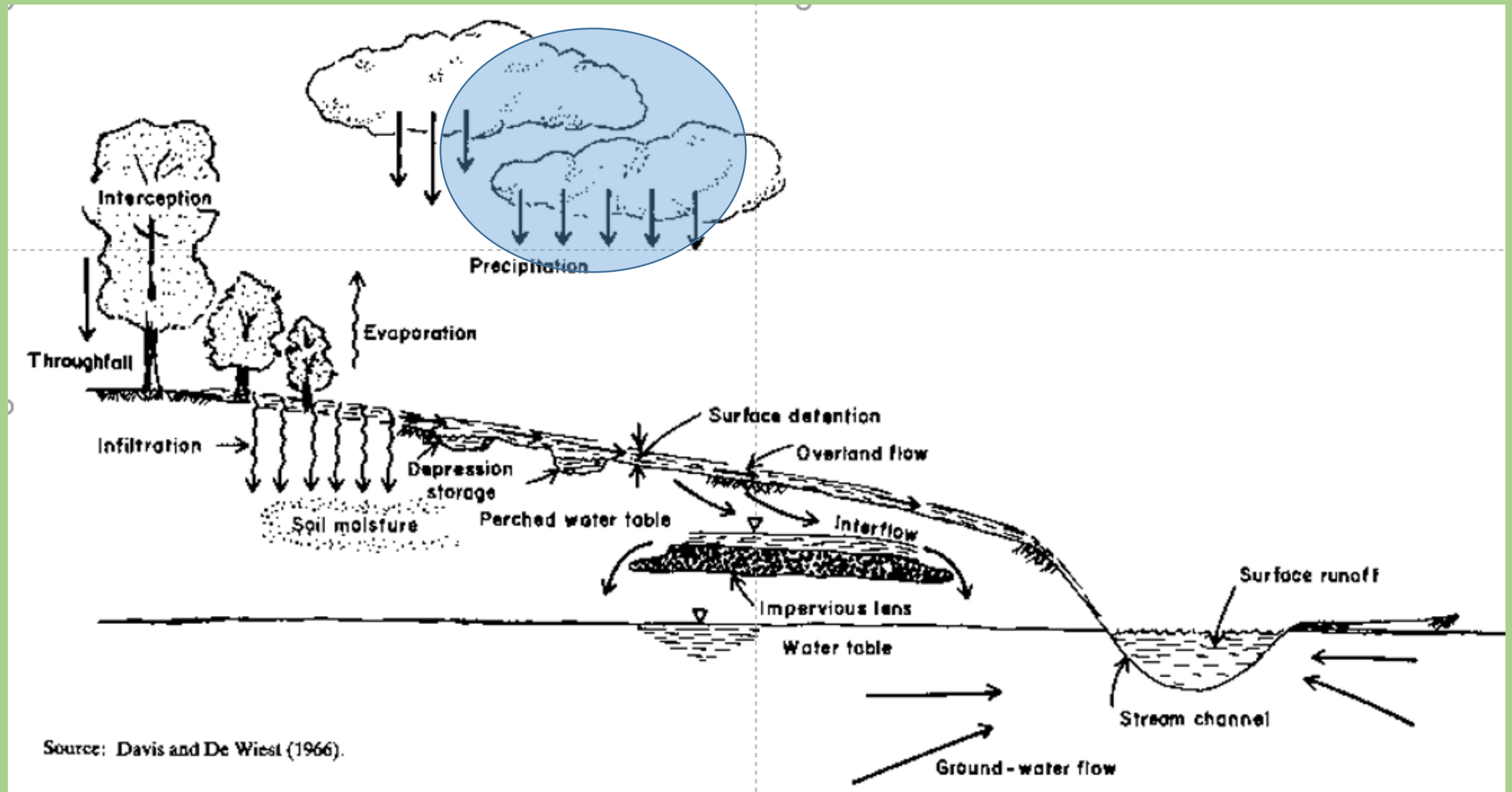
Why Water for Wildlife?

- The presence of surface water or near-surface groundwater provides valuable year-round wildlife habitat
- 70% of avian species depend on riparian habitats1
- 40% of all birds in the Southwest are riparian obligates1
- Amphibians depend on open water to complete their life cycle and many reptiles occur primarily in riparian zones2
- Riparian corridors facilitate the maintenance of genetic continuity between populations
- The future of wildlife is tied to the health of streams and riparian habitats
- Water sources are threatened – <20% of riparian habitat in the west still exists




The Hydrologic Cycle



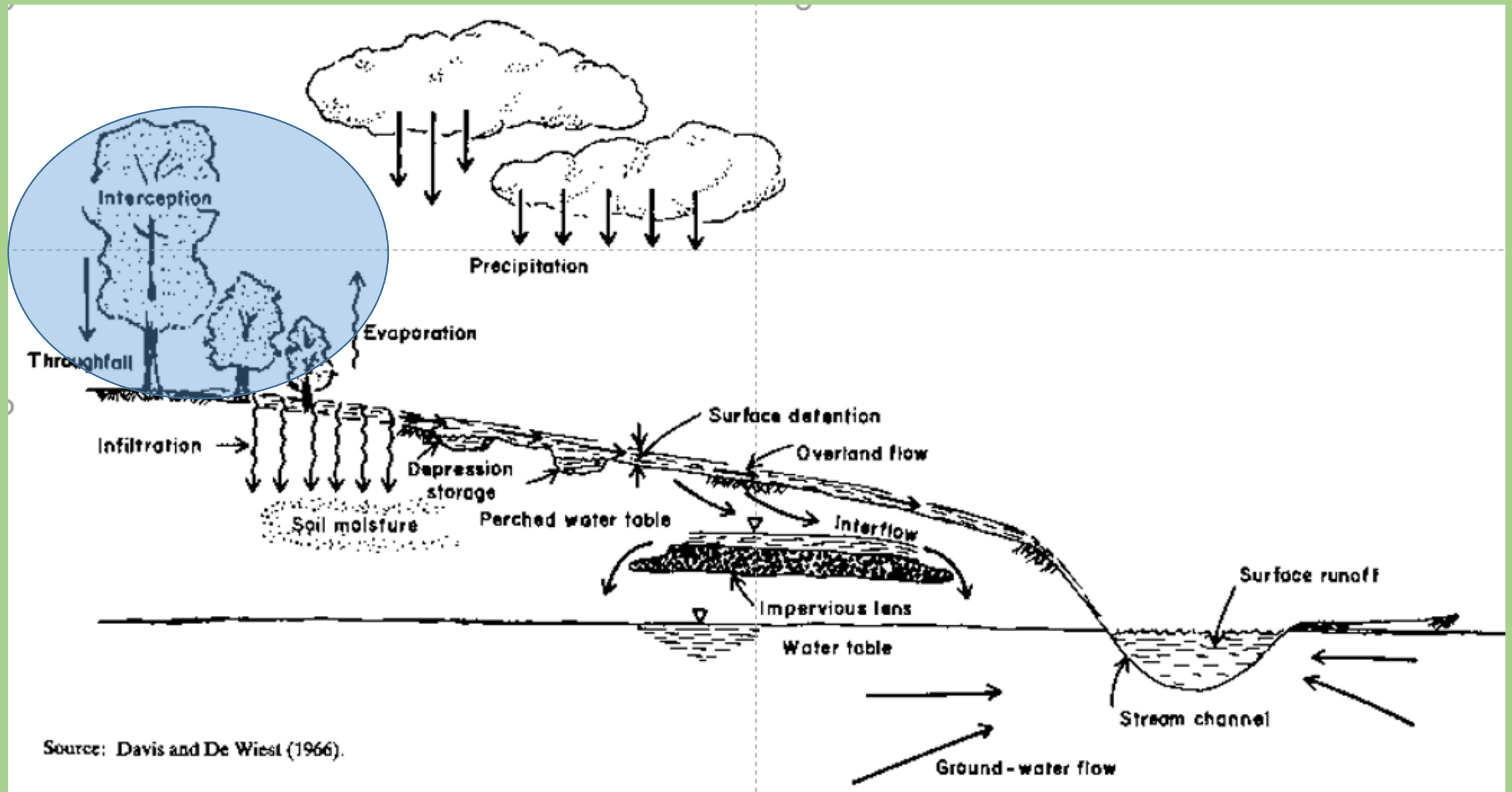
Source: Davis and De Wiest (1966).

Precipitation - new 30 year climate normal = shifting baselines

- Precipitation for the Davis Mountains is reported to range from 18.5 inches at Mount Locke, 13.59 inches in Marathon, to 11 inches at Kent
- New 30 climate normal for 7 regional stations show a general warming and drying trend.
- Dryden weather station increase in temperature and a *loss of 5.5 inches* of annual rainfall
- The temperature normal at Fort Stockton stayed relatively the same, *more than 2 inches lost in annual precipitation* (14.77" down to 12.76").
- Guadalupe National Park *lost 3.56*" in annual precipitation and an average *increase of 1.4 degrees* (13.34" to 9.78"
- Alpine *lost 1"* in annual precipitation (17" to 16")
- Fort Davis went from 17.47" to 15.51"

https://noaa.maps.arcgis.com/apps/MapJournal/index.html?appid=34dcccdbd9ed4735beb4c90a91fc309f

The Hydrologic Cycle



Source: Davis and De Wiest (1966).

Interception and *Throughfall* protect the soil

"Large raindrops, up to six millimeters in diameter, have terminal velocities of about 10 meters per second and so may cause considerable compaction and erosion of the soil by their force of impact" - "Climate." Encyclopedia Britannica.2007, Encyclopedia Britannica Online. 25 May 2007

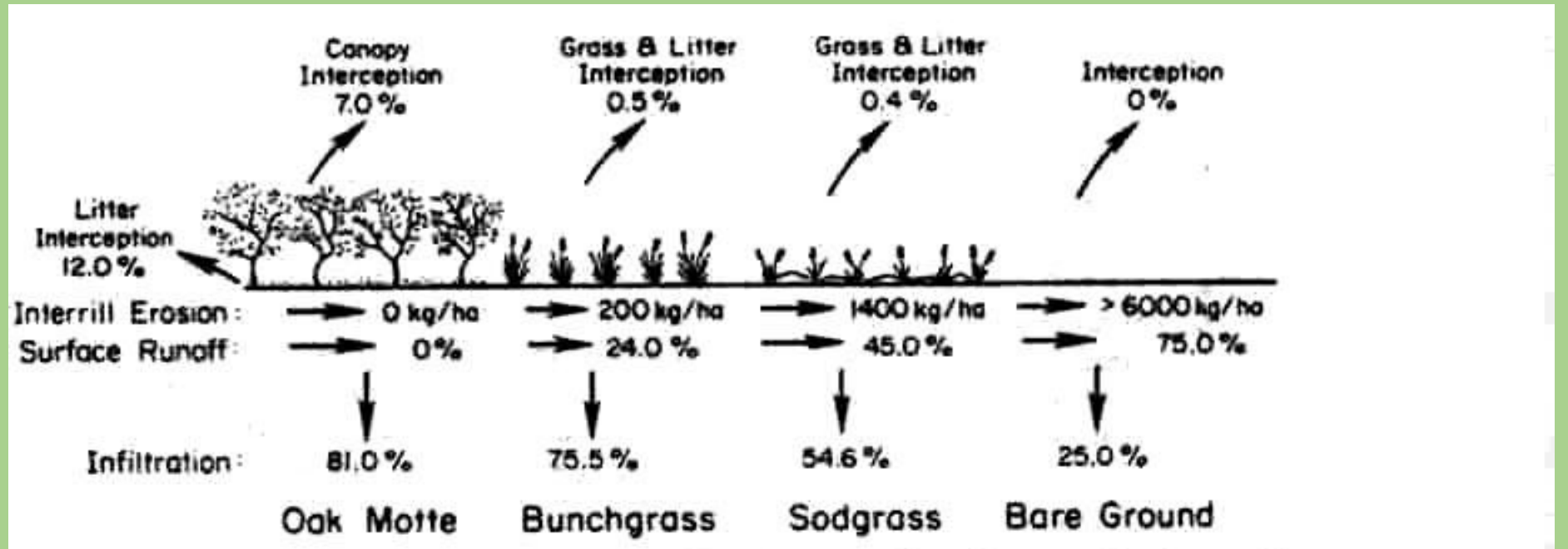


Figure 6.4. Water budgets and amount of interrill erosion, runoff, and interception from oak, bunchgrass, sodgrass, and bare ground dominated areas, Edwards Plateau, Texas. Based on 10 cm of rainfall in 30 minutes (from Blackburn et al. 1986).

Watershed vs Water catchment

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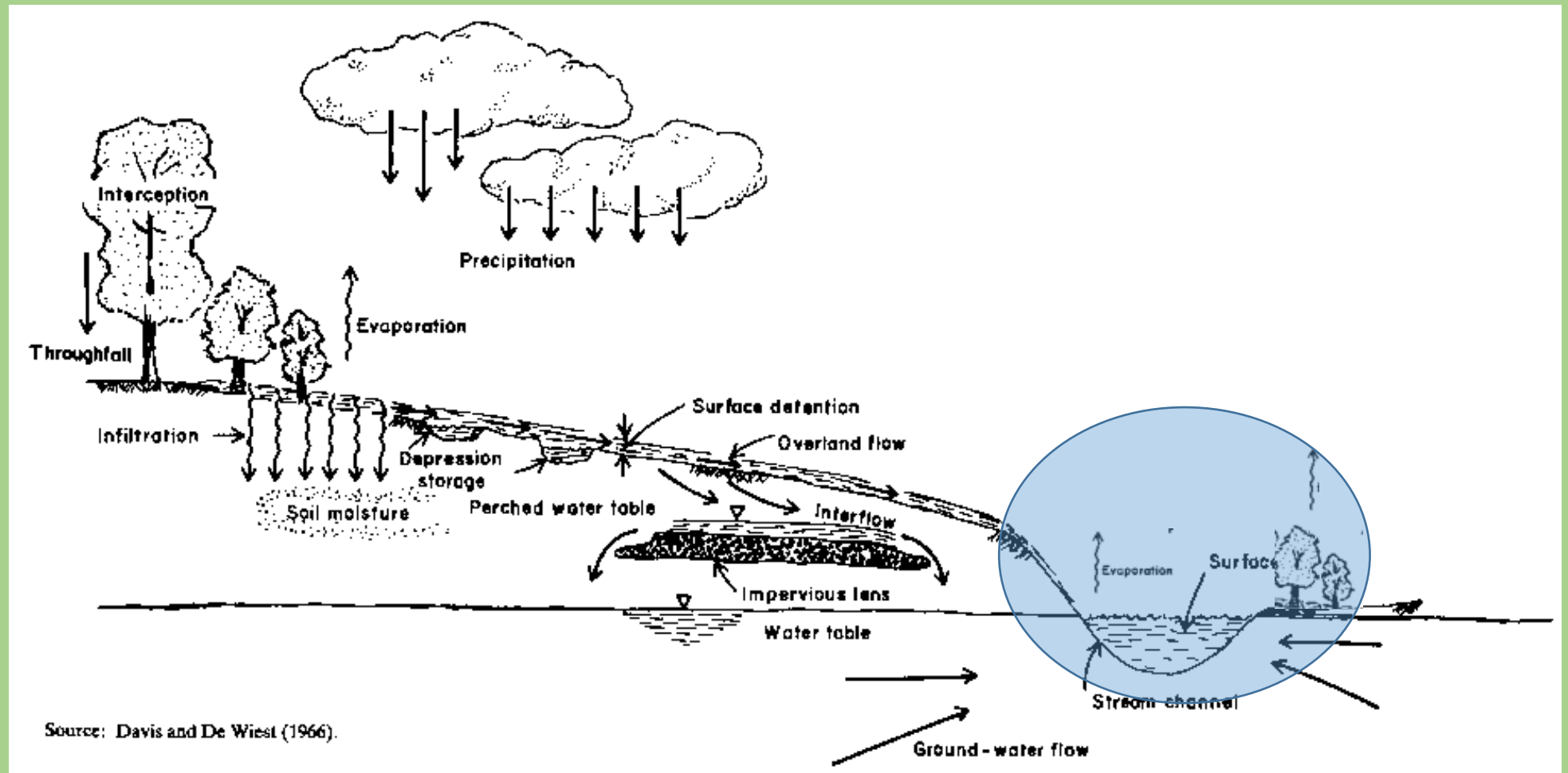
The Hydrologic Cycle
Evaporation + Transpiration = Evapotranspiration



Evapotranspiration in Texas

- No systematic variation in ET rates among different vegetation types
- Actual ET is usually less than potential ET
- ET is higher in riparian obligates phreatophytes than in facultative phreatophytes such as mesquite
- ET in Alpine is 70-75 inches/year
- ET in Marfa is 75-80 inches/year

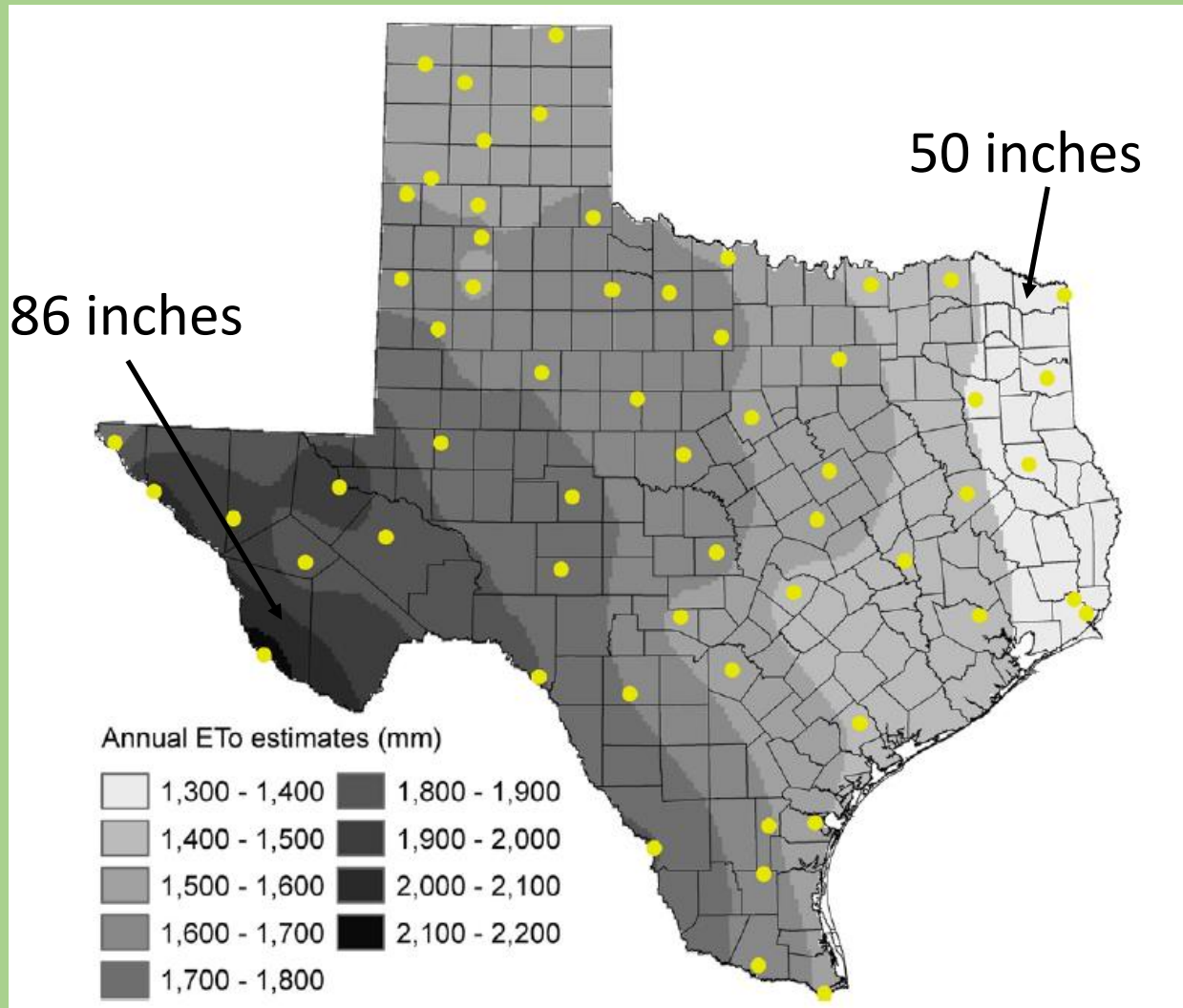
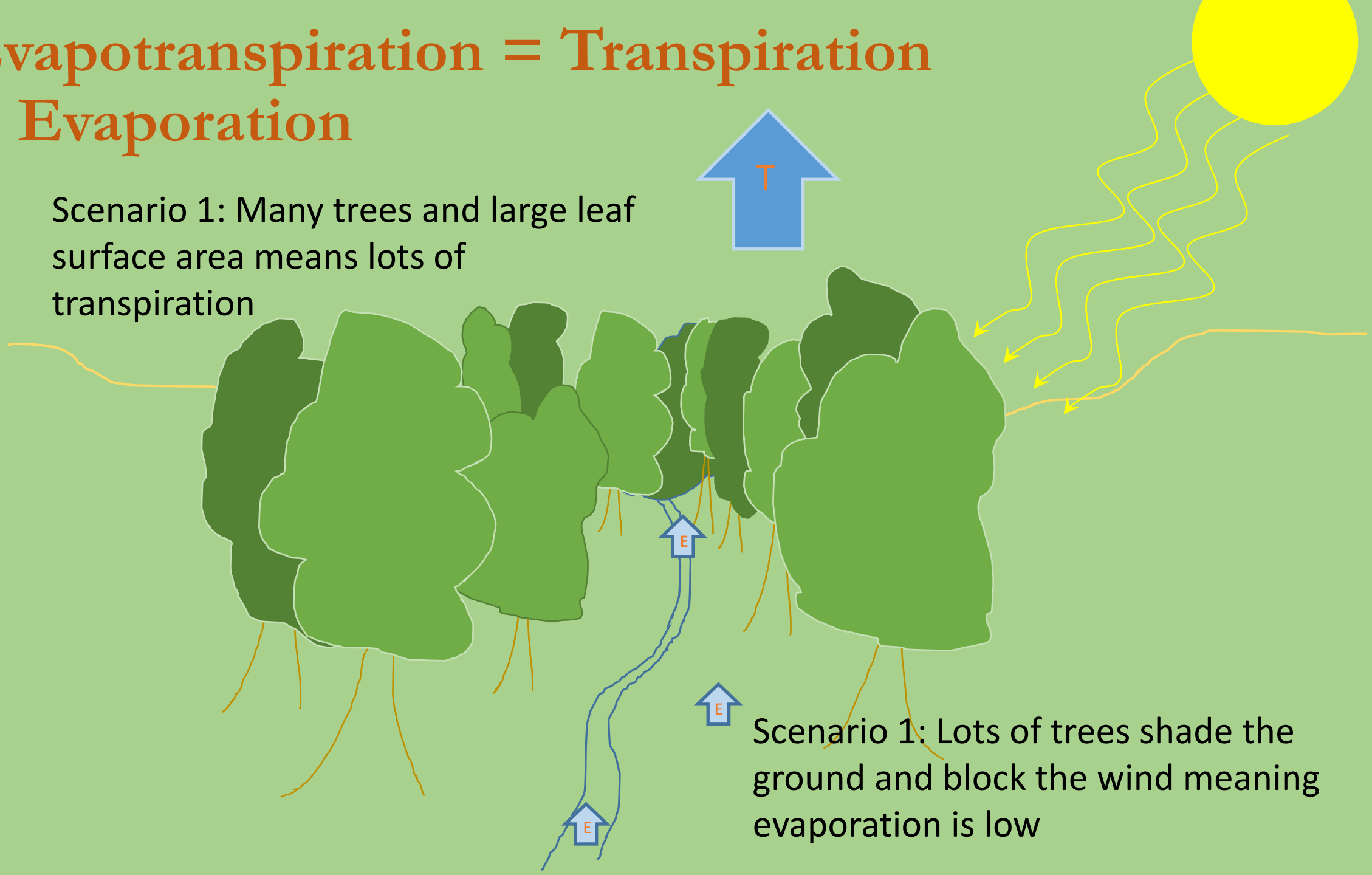


Figure 2.6. Long-term (30-yr) annual grass reference crop ET (ET_o) based on calculations using the Penman-Monteith equation for 58 sites in Texas and 7 sites in neighboring states (Borrelli and others, 1998). Values for each location are provided in Table 2.1.

Partitioning evapotranspiration
Evaporation (E) vs Transpiration (T)

Evapotranspiration = Transpiration + Evaporation

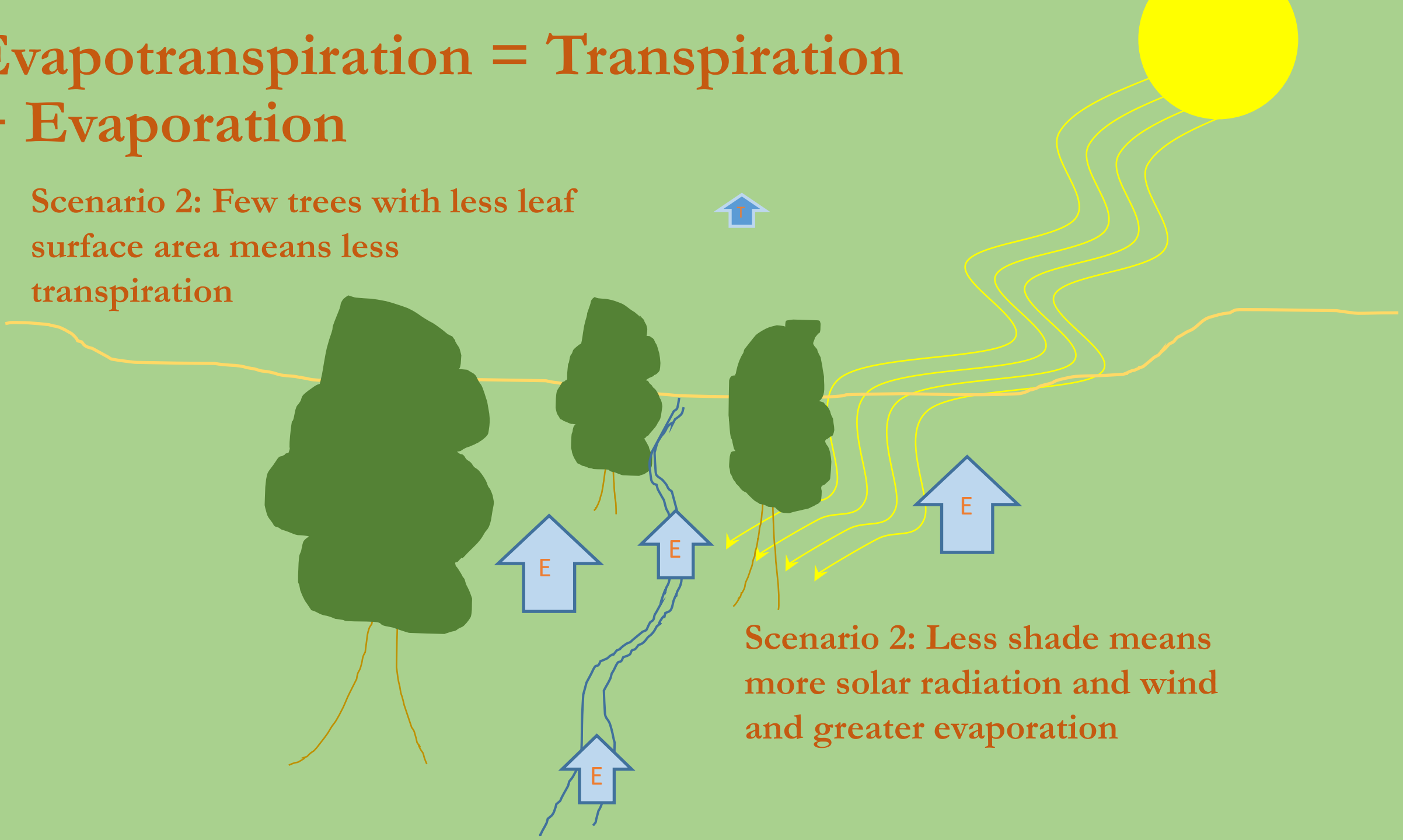
Scenario 1: Many trees and large leaf surface area means lots of transpiration



Scenario 1: Lots of trees shade the ground and block the wind meaning evaporation is low

Evapotranspiration = Transpiration + Evaporation

Scenario 2: Few trees with less leaf surface area means less transpiration



Scenario 2: Less shade means more solar radiation and wind and greater evaporation

Historical accounts indicate significant alteration of streams in the Big Bend

- we “could park 1000 head of cattle in the shade” and Terlingua Creek was a “bold running stream, studded with cottonwood timber as was alive with beaver” (James G. Gillett, 1885)
- Cinnabar and silver mining in the area required timber for operations.
- Records from the Study Butte Mining Company for a three year period show 2,522 chords purchased for the kilns.
- In recent years aggregate mining has contributed to degradation of streams in the Big Bend.

≈1970

Stream Incision, down cutting, or gullying – lower stream bottom results in:

A disconnection between annual flows and floodplains

Less recharge to alluvial or regional aquifer

2018

Stream Incision, down cutting, or gullying

- Aquifer recharge
- Lower stream bottom results in a disconnection between annual flows and floodplain
- Degraded riparian forests/habitat

Cienega Creek, Jeff Davis County

What can we do?

Loose rock dam captures sediment

New deposition can support vegetation

Beaver Dam Analogs, Brush Weirs, and Post Assisted Log Structures

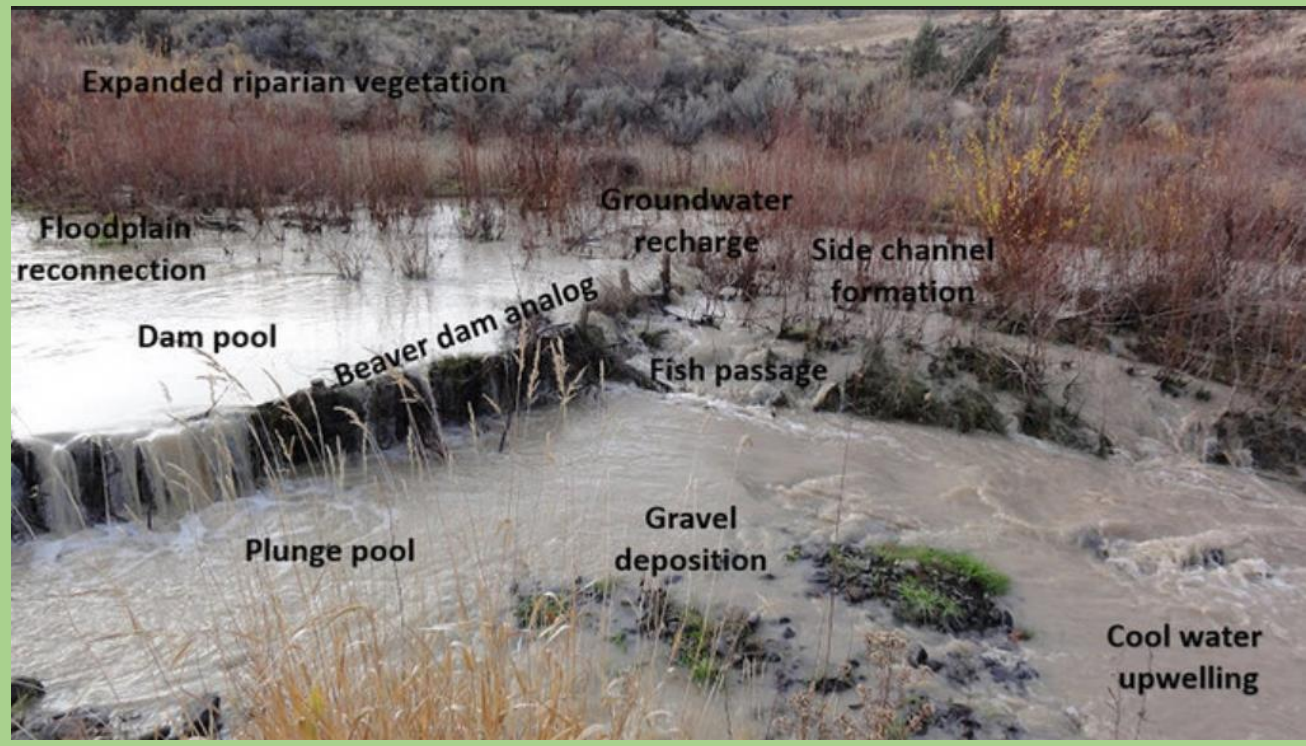
- repair incised streams
- increase recharge
- increase riparian sponge
- increase wet season
- increase riparian vegetation and habitat

Rancher greens arid site with beaver dam analogs

By BRAD CARLSON Capital Press Aug 28, 2019

Chris Black near a beaver dam analog on his southwest Idaho property.

Steve Stuebner



Cienega Creek, Jeff Davis County

These structures have been overtopped and did not fail.

Stream bottom has aggraded by 1’

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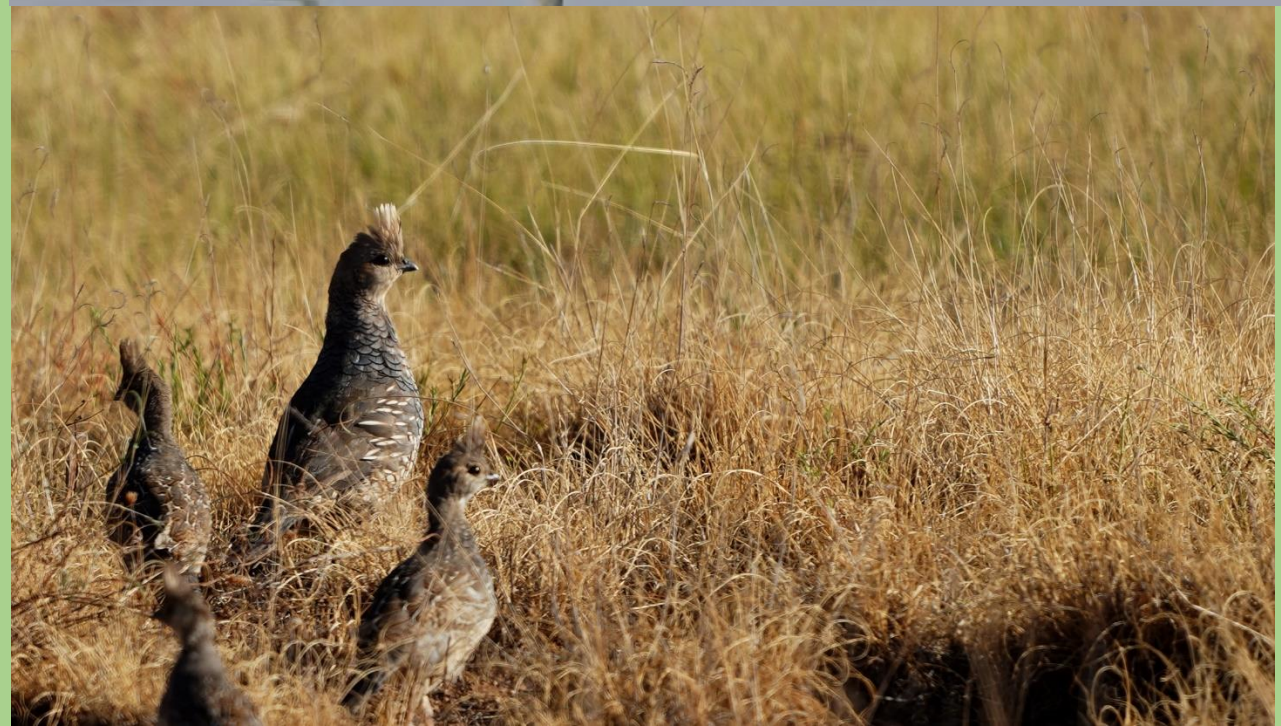

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