

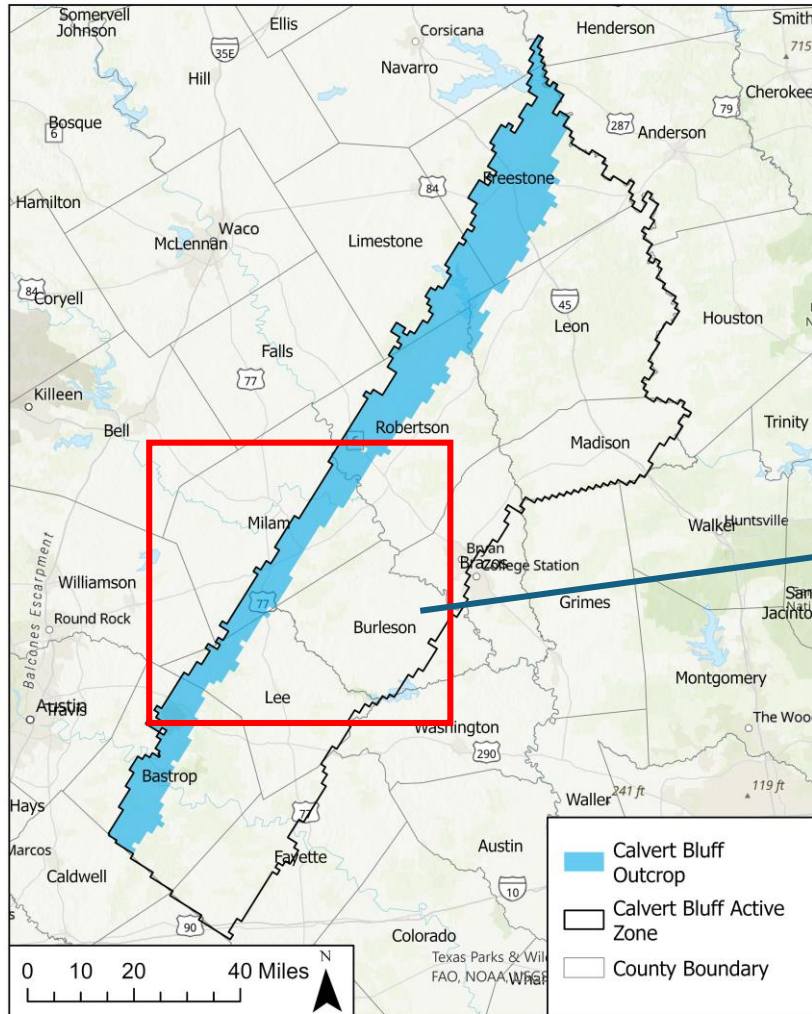
GMA12 Joint Planning

Documentation of Approach Used to
Calculate Average Drawdowns for Desired
Future Conditions

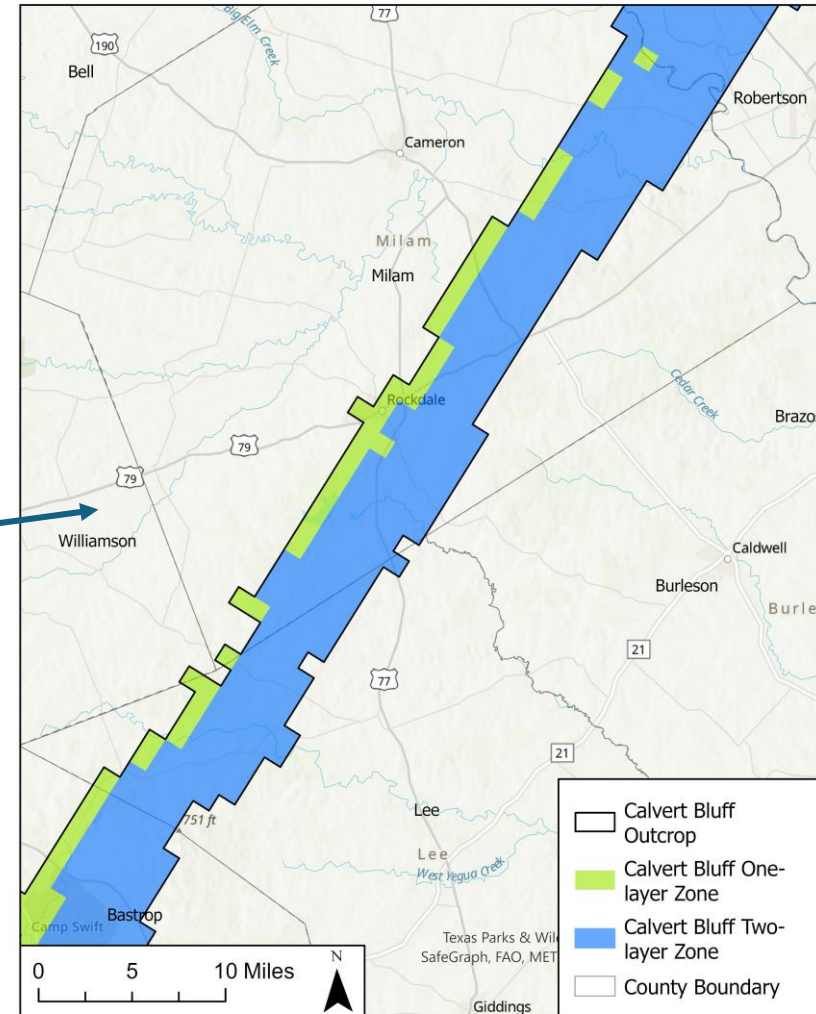
9/3/2025

Example Aquifer: Calvert Bluff

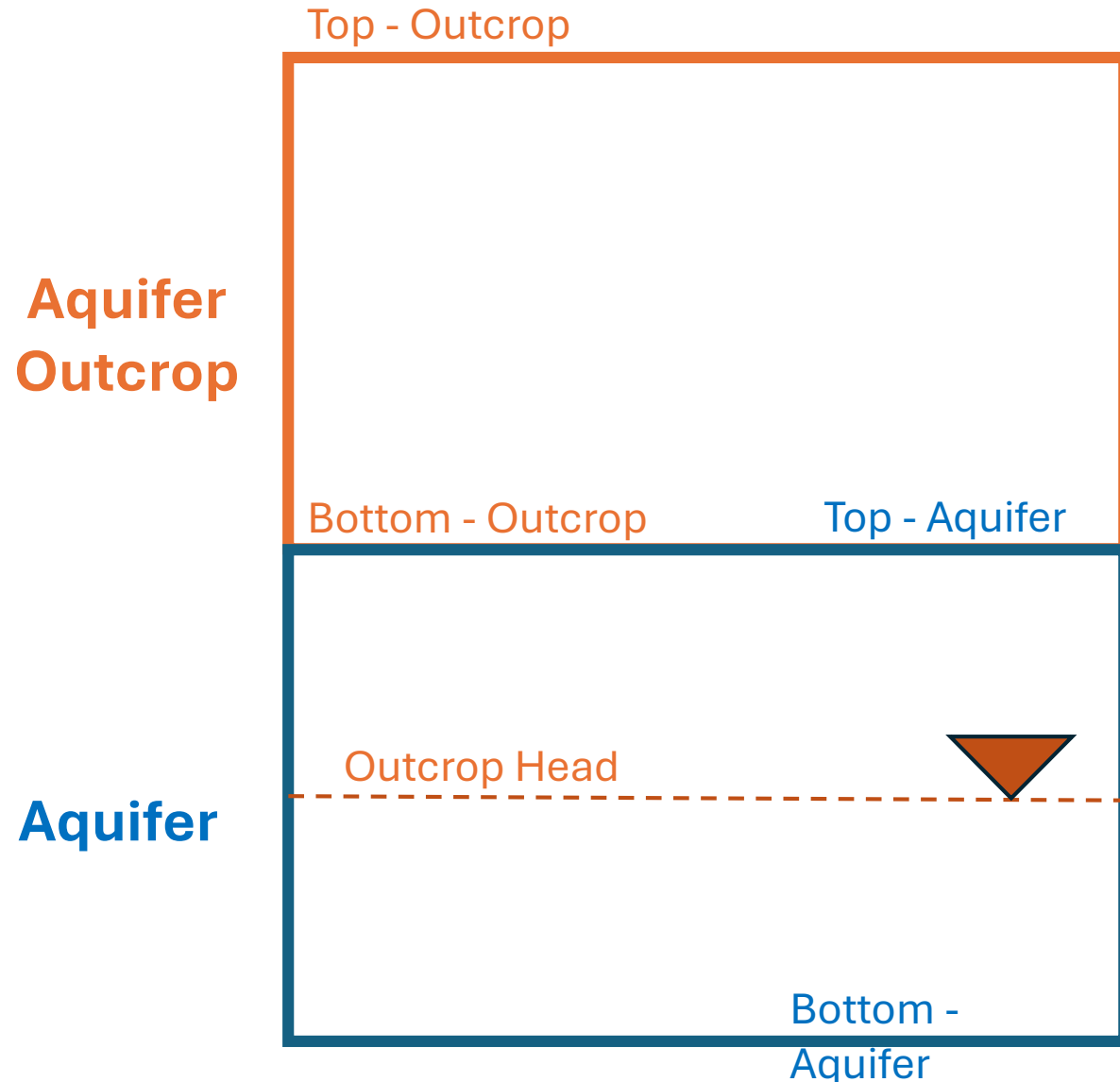
**GMA 12 model
Outcrop**



**Inset
Aquifer Composition**



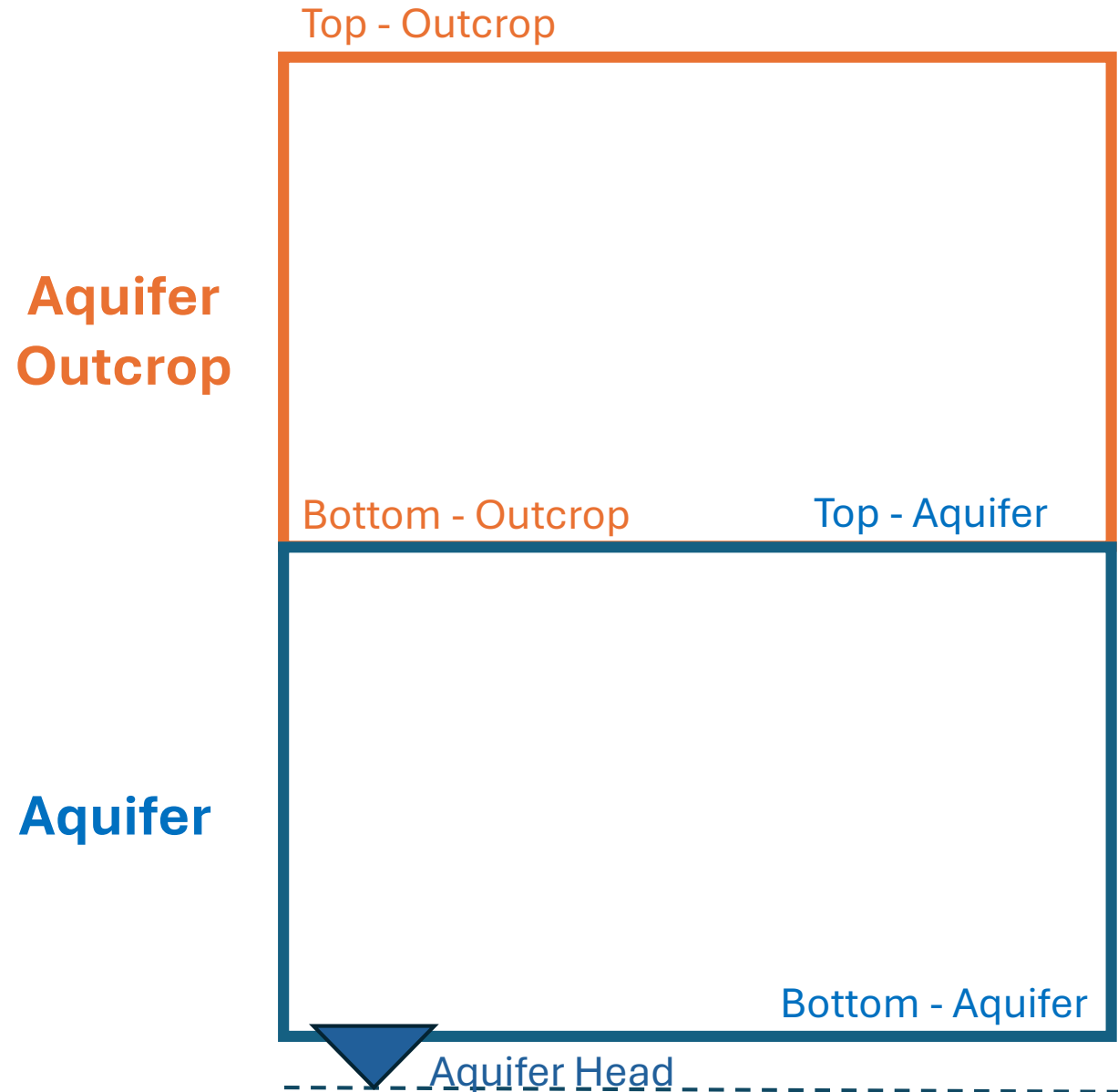
Case for 2 Layers: Water Table below Outcrop Bottom and Above Aquifer Bottom



When the outcrop head ($h_{outcrop}$) is below the outcrop bottom elevation, the final head (h) defaults to the aquifer head ($h_{aquifer}$)

$$h = h_{aquifer}$$

Case for 2 Layers: Aquifer Water Table Below Aquifer bottom

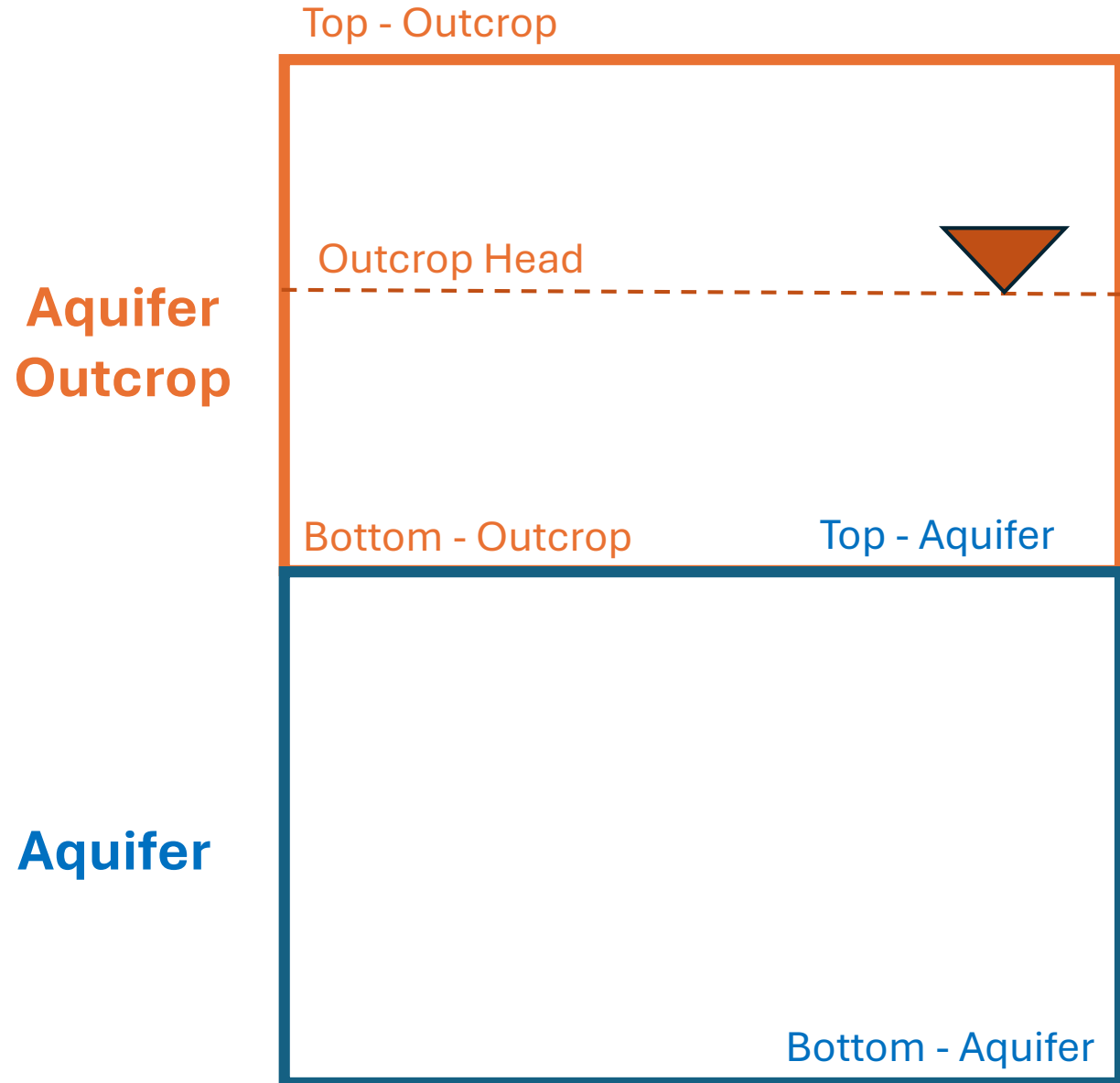


When the aquifer head ($h_{outcrop}$) is below the aquifer bottom elevation ($b_{aquifer}$), the final head (h) defaults to the aquifer bottom elevation ($b_{aquifer}$)

if $h_{aquifer} < b_{aquifer}$, then:

$$h = b_{aquifer}$$

Case for 2 Layers : Water Table above Outcrop Bottom



When outcrop head ($h_{outcrop}$) is above the outcrop bottom elevation ($b_{outcrop}$), the final head (h) is a weighted average of aquifer head ($h_{aquifer}$) and outcrop head ($h_{outcrop}$).

if $h_{outcrop} > b_{outcrop}$, then:

$$h = \frac{h_{outcrop} \times weight_{outcrop} + h_{aquifer} \times weight_{aquifer}}{weight_{outcrop} + weight_{aquifer}}$$

Options for Weights:

- Transmissivity
- Saturated Thickness
- No Weighting

General Workflow

- Delineate the active zone using active cells (TDS < 3000 mg/L) in TWDB model grid file for each aquifer (Carrizo, Calvert Bluff, Simsboro, Hooper);
- Locate zones with two model layers (Layer 2 and the layer below) for each aquifer;
- Average the simulated head/drawdown of layer 2 and the layer below in the two-layer zones; Uses three methods for averaging:
 - No weighting
 - Weighted by Transmissivity
 - Weighted by Saturated Thickness

$$weight = Transmissivity$$

$$weight = Saturated\ Thickness = h_{aquifer} - b_{aquifer},$$

Where $h_{aquifer}$ represents the aquifer head, and $b_{aquifer}$ represents the aquifer bottom elevation

- Calculate averaged drawdown for DFC, drawdown calculation for the target zones is weighted by model grid size, from January 2011 to December 2069.