
Resolving Aquifer Correlations from Subsurface to Outcrop: The Yegua-Jackson Aquifer of the Texas Gulf Coastal Plain

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ABSTRACT

A subsurface stratigraphic study of the Yegua-Jackson Aquifer, completed in 2007, brought to light conflicts between outcrop boundaries derived from subsurface data and the existing aquifer boundary, which was based on surface geology from the existing Geologic Atlas of Texas map. The current aquifer boundary, established by the Texas Water Development Board (TWDB), is used to calculate available resources and establish future use plans for individual Groundwater Conservation Districts (GCDs). Changing an aquifer boundary might significantly modify resources and plans for the affected GCDs, so any suggested change requires significant substantiation. To assess the conflict, we undertook several methods intended to clarify surface lithology, outcrop strike and dip, and shallow subsurface correlation.

The 2007 study was regional in scope and lacked closely spaced well control at aquifer outcrop boundaries. Additional wells with geophysical logs starting shallower than 300 ft below ground level were added to constrain more tightly the shallow subsurface. Individual geologic boundaries were projected in a geographic information system (GIS) from the last two subsurface control points to the land surface. Additionally, outcrop boundaries and surface elevations were used to calculate average formation dip at the outcrop. Finally, Landsat 7+ETM and characteristics of surface topography were used to attempt to distinguish major sand and shale regions in the outcrop. These could then be tied to major lithologic bodies identified in the subsurface.

Results will be forwarded to TWDB for their consideration in revising official aquifer boundaries. These methods have been comparatively simple to apply and should be considered in future aquifer characterization and modeling efforts.