

SALT THICKNESS AND OTHER GEOLOGIC FACTORS IMPORTANT TO SALT CAVERNS IN THE MIDLAND BASIN, TEXAS

SUMMARY

Geologic studies provide basic information required for siting, development, and regulation of salt caverns. This case study area, consisting of 26 counties in West Texas (figure 1), is underlain by bedded Permian salt of the Salado Formation as well as older salt beds (figure 2). Four variables that provide screening criteria for separating areas where the salt is potentially heterogeneous, complex, and less stable from areas where salt is more homogeneous were mapped regionally.

- Figure 3—Structure on top of the salt interval shows areas of structural complexity that correspond to variability in salt quality, thickness, and stability. Two areas of salt dissolution are identified.
- Figure 4—Salt thickness shows the thickness of the salt-bearing interval and serves as a proxy for the thickness of the usable salt beds.
- Figure 5—Depth to salt identifies areas suitable for different types of utilization.
- Figure 6—Extent of older salt shows where alternative salts underlying the Salado formation might be considered.

In summary, figure 7 shows the distribution of salt caverns and disposal facilities and highlights some areas of thinner salt.

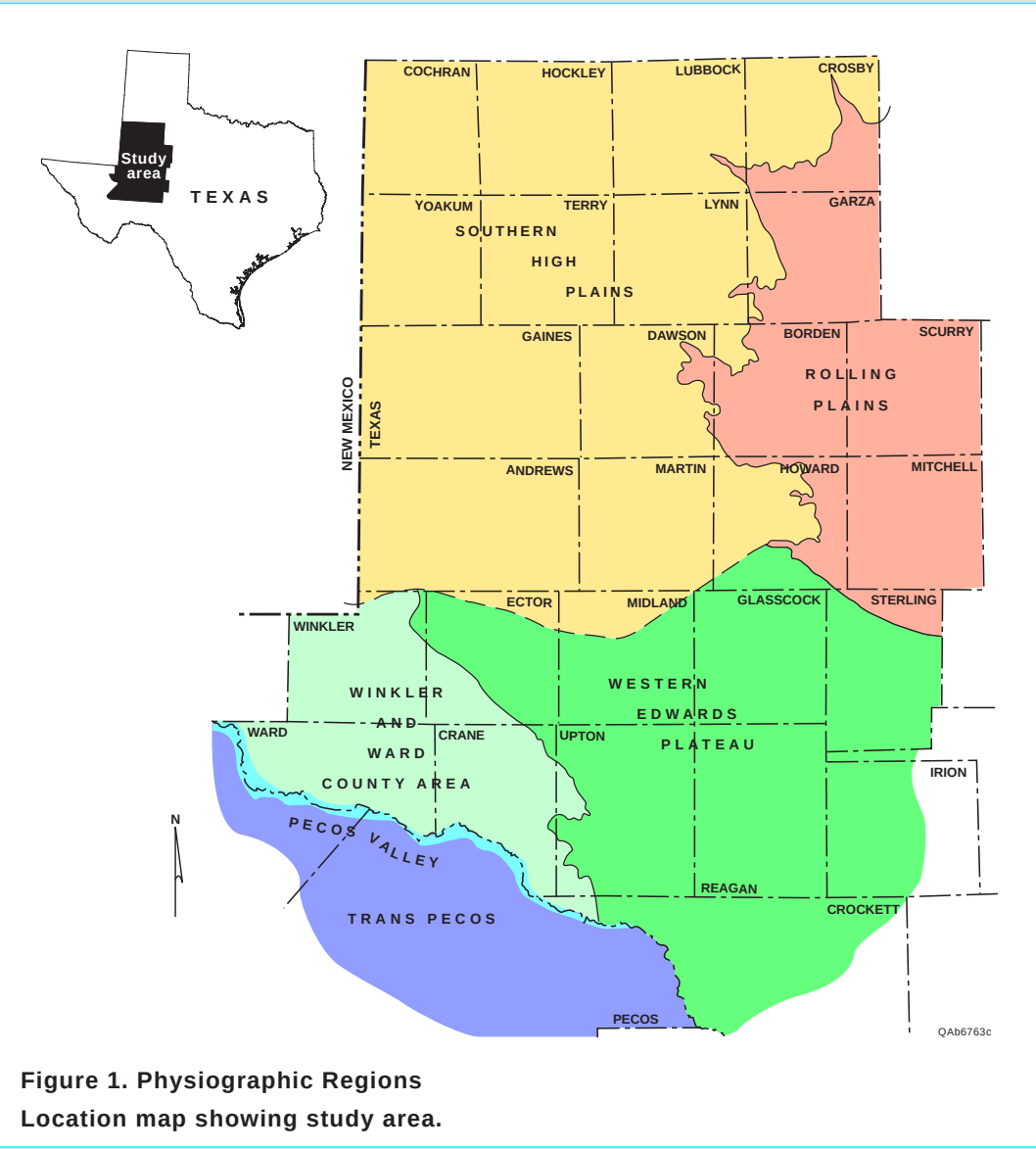


Figure 1. Physiographic Regions
Location map showing study area.

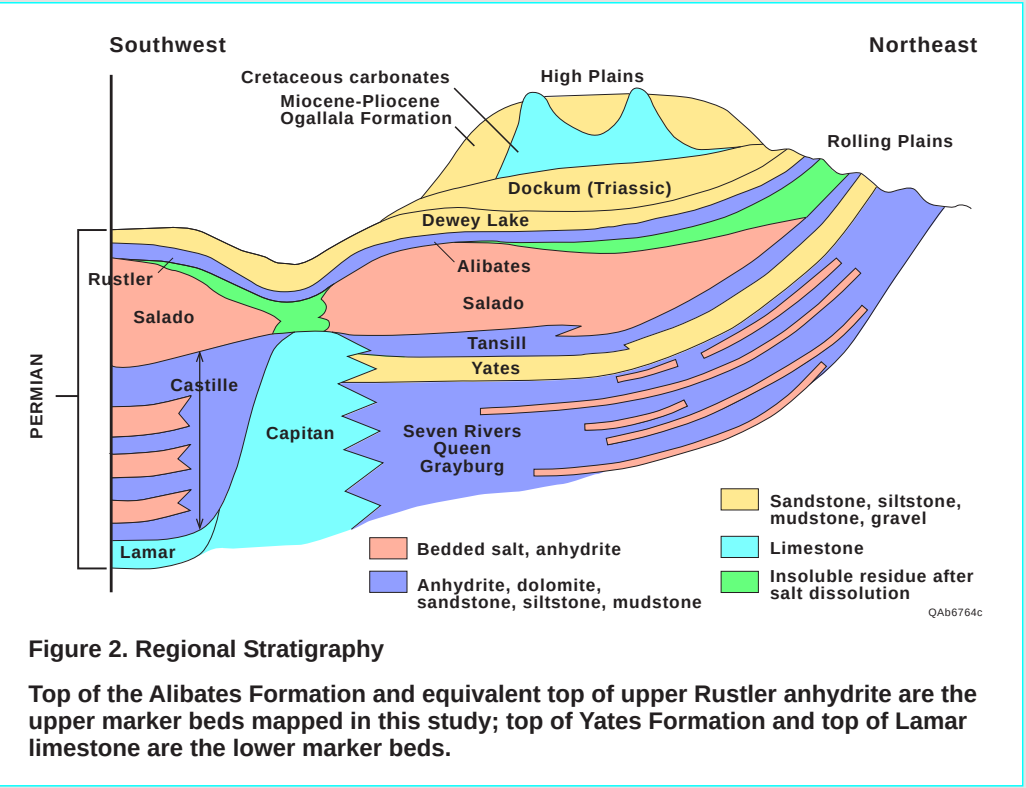


Figure 2. Regional Stratigraphy
Top of the Alibates Formation and equivalent top of upper Rustler anhydrite are the upper marker beds mapped in this study; top of Yates Formation and top of Lamar limestone are the lower marker beds.

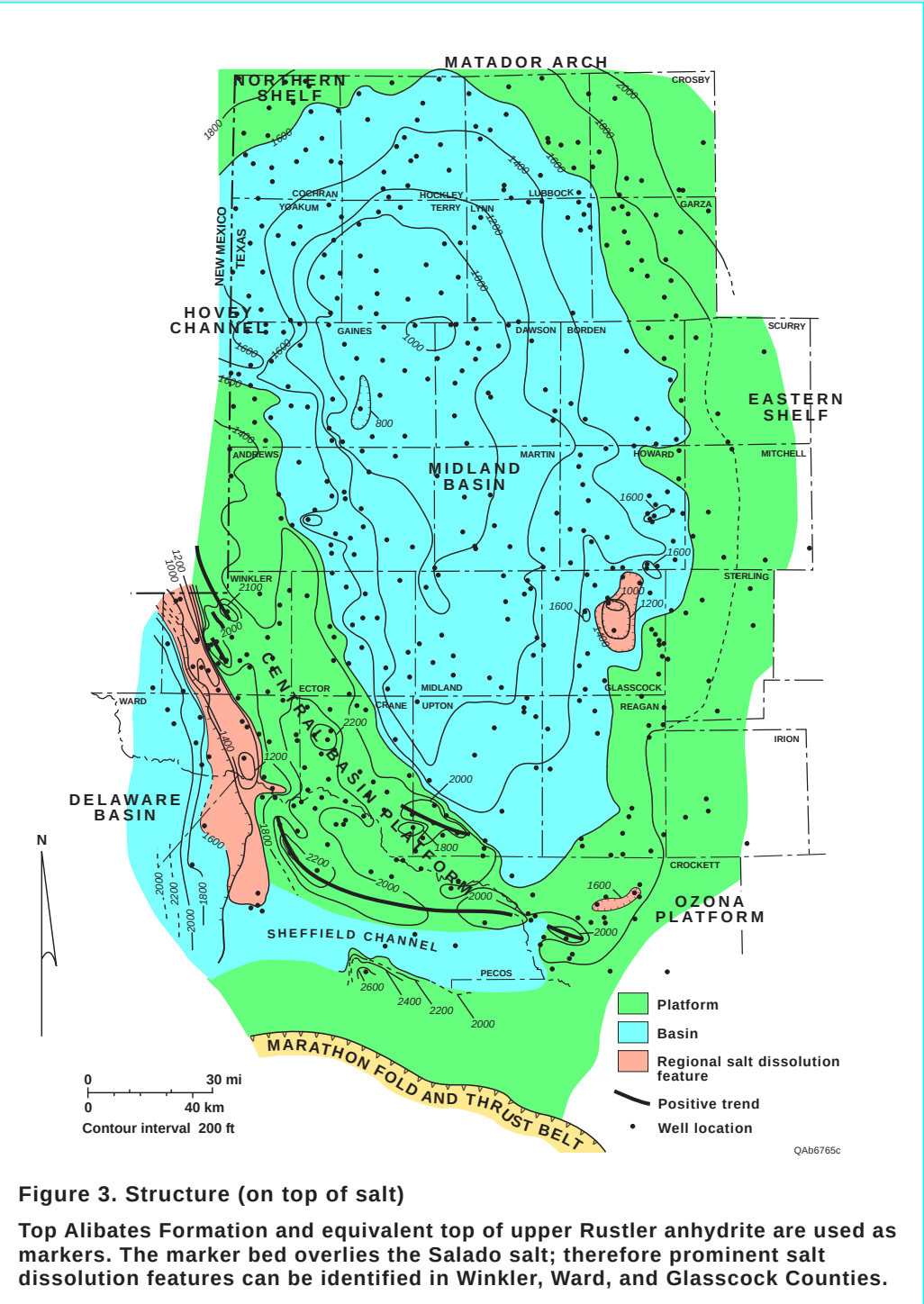


Figure 3. Structure (on top of salt)
Top Alibates Formation and equivalent top of upper Rustler anhydrite are used as markers. The marker bed overlies the Salado salt; therefore prominent salt dissolution features can be identified in Winkler, Ward, and Glasscock Counties.

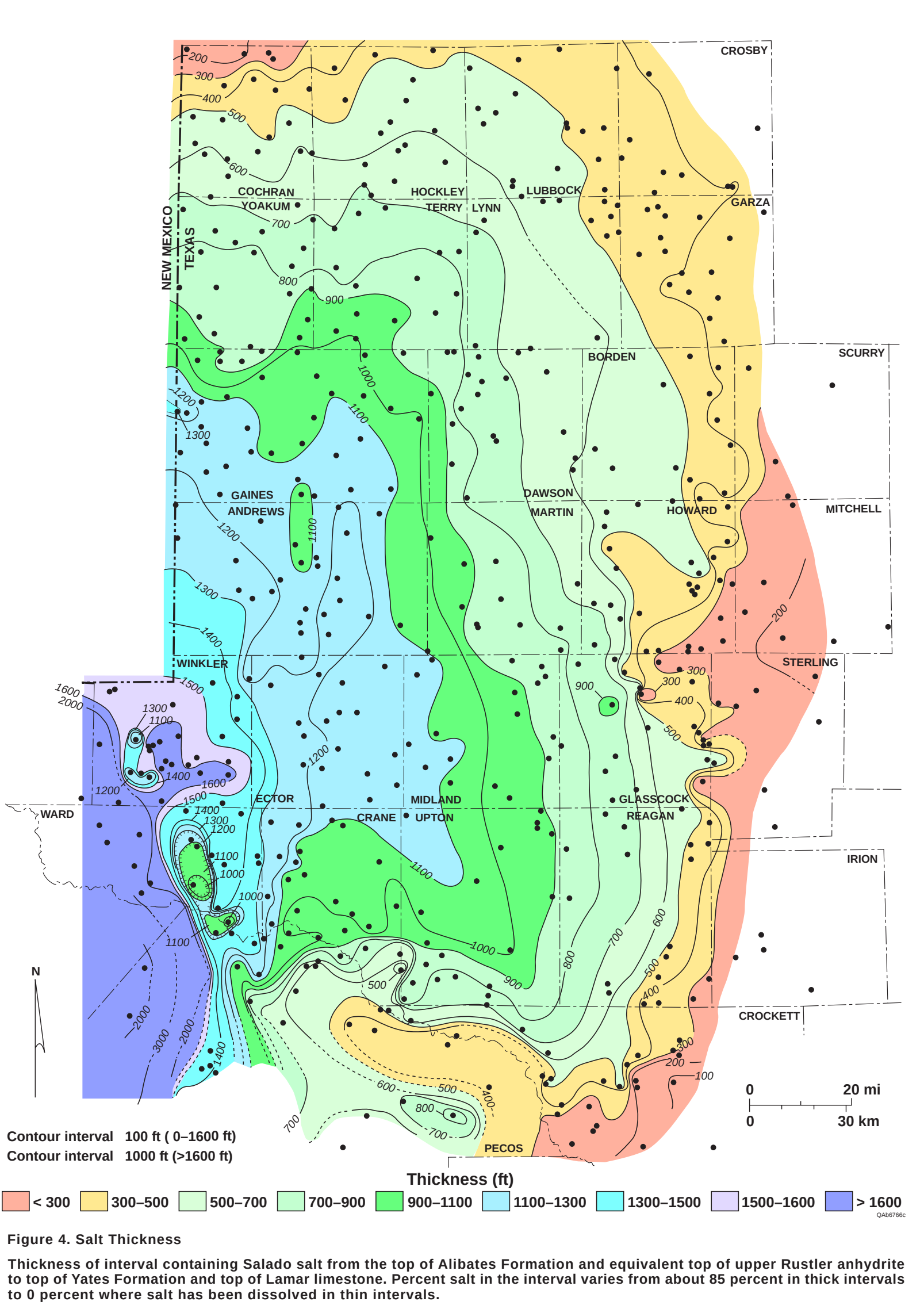


Figure 4. Salt Thickness
Thickness of interval containing Salado salt from the top of Alibates Formation and equivalent top of upper Rustler anhydrite to top of Yates Formation and top of Lamar limestone. Percent salt in the interval varies from about 85 percent in thick intervals to 0 percent where salt has been dissolved in thin intervals.

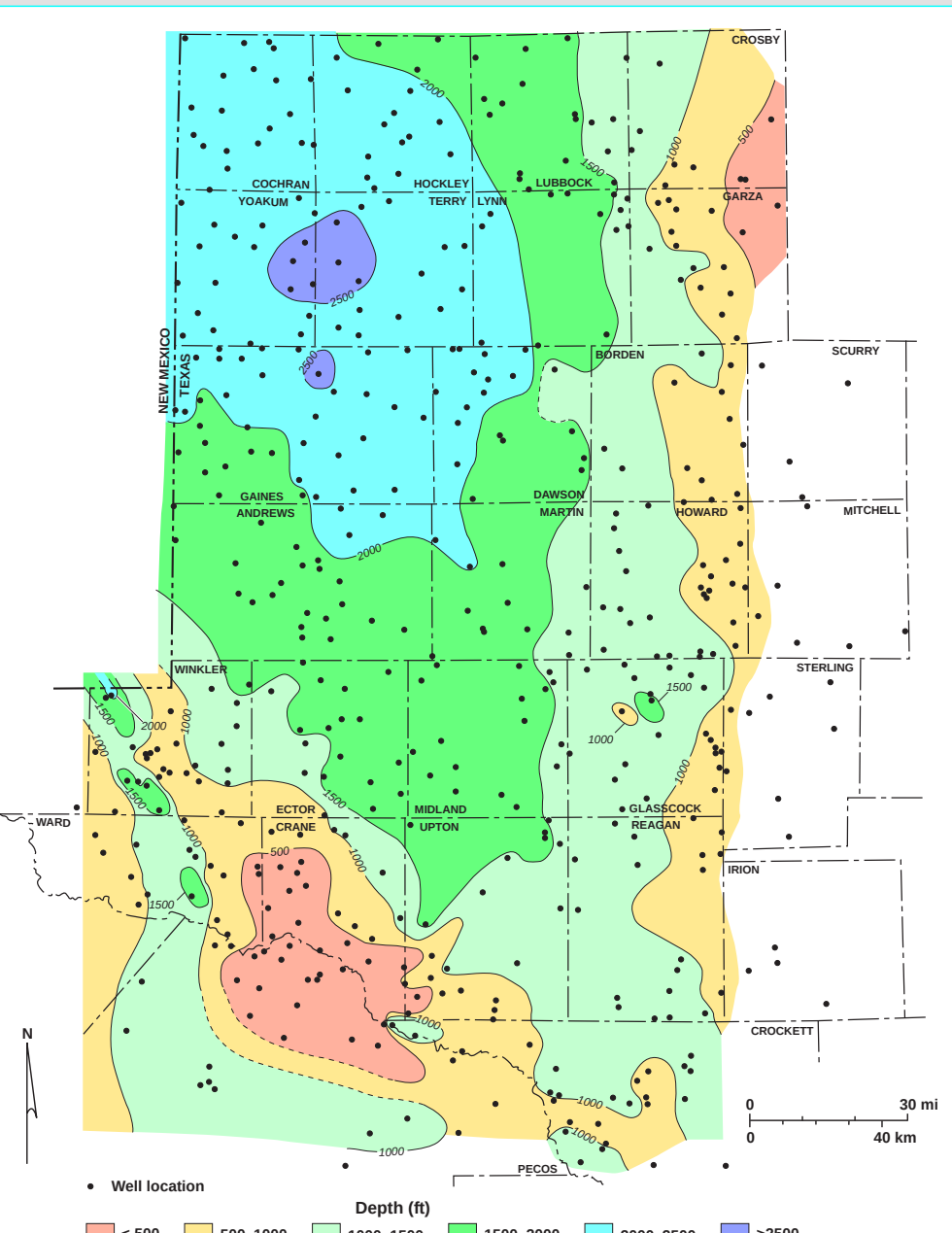


Figure 5. Depth to Salt
Depth to top of Salado salt-bearing interval from approximate land surface (log datum, typically kelly bushing) to top Alibates Formation and equivalent top of upper Rustler anhydrite.

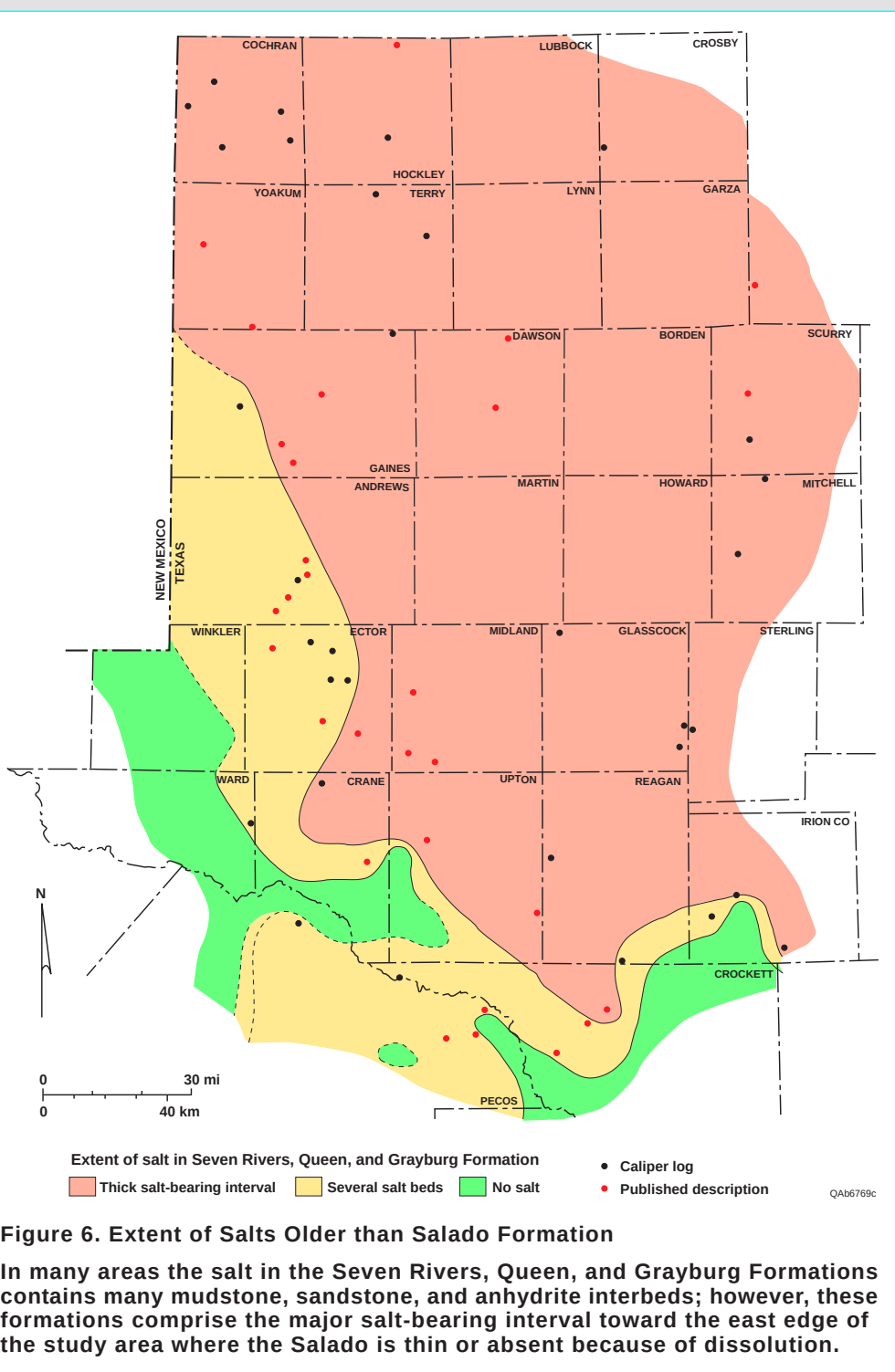


Figure 6. Extent of Salts Older than Salado Formation
In many areas the salt in the Seven Rivers, Queen, and Grayburg Formations contains many mudstone, sandstone, and anhydrite interbeds; however, these formations comprise the major salt-bearing interval toward the east edge of the study area where the Salado is thin or absent because of dissolution.

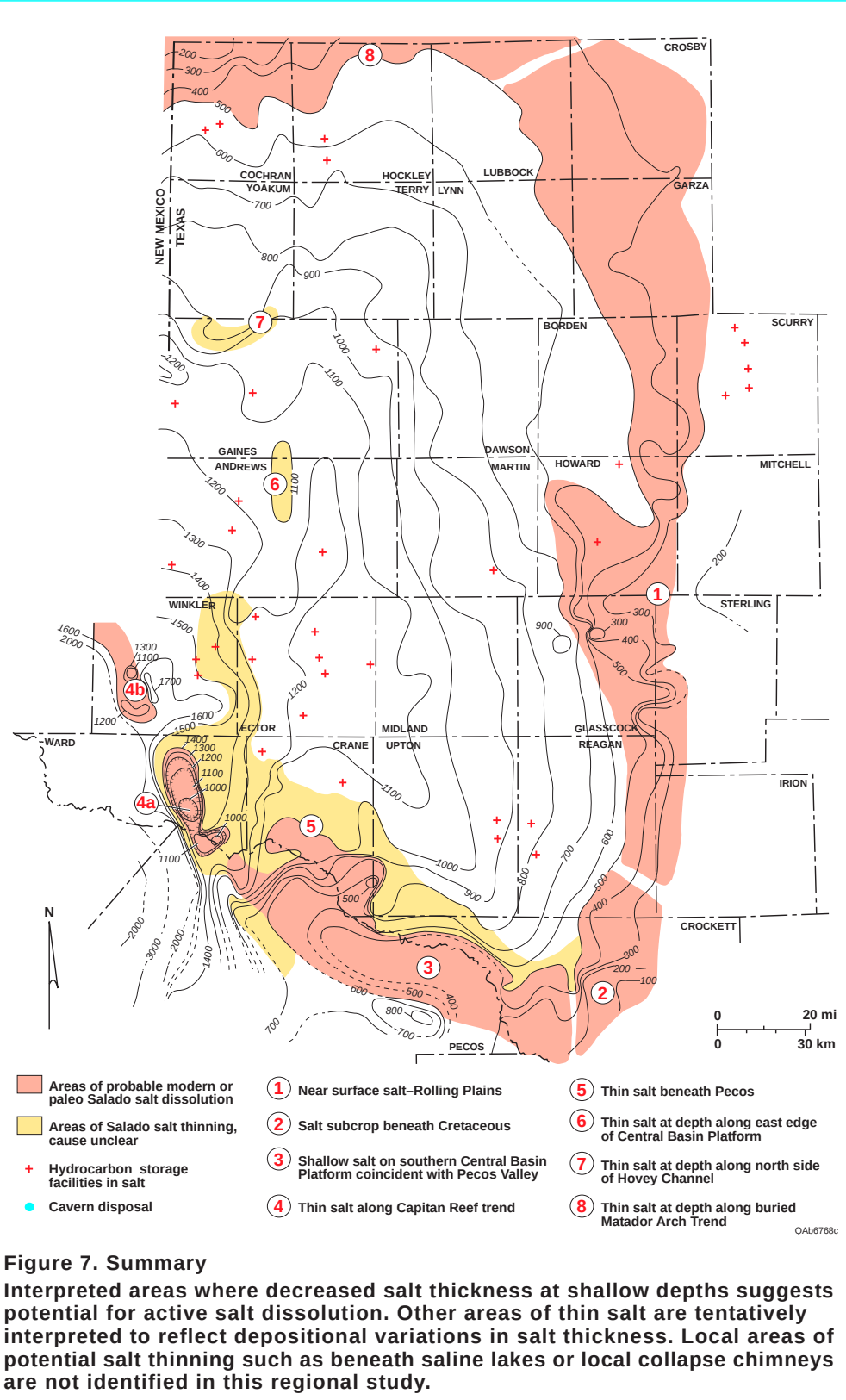


Figure 7. Summary
Interpreted areas where decreased salt thickness at shallow depths suggests potential for active salt dissolution. Other areas of thin salt are tentatively interpreted to reflect depositional variations in salt thickness. Local areas of potential salt thinning such as beneath saline lakes or local collapse chimneys are not identified in this regional study.