



Figure 1. Map showing approximate water-level altitudes in the Chicot aquifer, Houston-Galveston region, Texas, January-February 1999.

**INTRODUCTION**

This report is one in an annual series of reports that depicts water-level altitudes and water-level changes since 1977 and compaction since 1973 in the Chicot and Evangeline aquifers in the Houston-Galveston region, Texas. The report, prepared in cooperation with the City of Houston and the Harris-Galveston Coastal Subsidence District, presents maps for the Chicot and Evangeline aquifers showing the approximate water-level altitudes in wells in 1999 (figs. 1, 4) and approximate water-level changes in wells from 1977 to 1999 and from 1998 to 1999 (figs. 2, 3, 5, 6), a map showing extensometer site locations (fig. 7), and graphs showing measured compaction of subsurface material at selected sites from 1973 to 1998 (fig. 8). The most recent previously published water-level-altitude maps and water-level-change maps for the two aquifers in the region are by Coplin (1998). The Houston-Galveston region comprises Harris and Galveston Counties and adjacent parts of Brazoria, Fort Bend, Waller, Montgomery, Liberty, and Chambers Counties.

**GEOHYDROLOGY**

The Chicot aquifer comprises sediments of Holocene and Pleistocene age, and the underlying Evangeline aquifer comprises sediments of Pliocene and Miocene age. The sediments are discontinuous fluvial-deltaic deposits of sand, silt, and clay that thicken to the southeast (Williams and Ranzau, 1987). The Chicot and Evangeline aquifers are confined beneath Galveston Bay and Lake Houston by the Beaumont Clay. The aquifers are unconfined in the western and northern parts of the region where they crop out. The aquifers are confined in the southern and eastern parts of the region. The water in the aquifers is fresh (less than 1,000 milligrams per liter dissolved-solids concentration) in most of the region. The Chicot aquifer is differentiated from the geologically similar Evangeline aquifer on the basis of hydraulic conductivity (Carr and others, 1985, p. 10). A weak hydraulic connection between land surface and the Chicot aquifer and between the Chicot and Evangeline aquifers allows vertical movement of water into and between the aquifers; the aquifer system thus is characterized as "leaky" (Gabrysch and Coplin, 1990, p. 2). The water-level surface in the Houston-Galveston region is the result of many coalescing cones of depression caused by water withdrawn from numerous wells throughout the area.

**WATER-LEVEL MEASUREMENTS**

Water-level measurements used to prepare this report were obtained by steel tape, airline, electronic sensor, and from reports by well operators. Most wells are pumped once daily, but some are pumped more frequently. Multiple measurements were made when wells were not being pumped. However, antecedent pumping conditions were not always known. Water-level measurements were made in January and February, the months when water levels usually are highest. The wells selected for water-level measurements had comparable depths and screened intervals. Some water-level measurements from wells outside the study area are obtained to increase water-level-contour control.

**MEASURED COMPACTION**

Compaction of subsurface material is measured continuously by 13 borehole extensometers (wells equipped with compaction monitors) at 11 sites (fig. 7). Compaction measured by the shallower of two extensometers at the Clear Lake site is not shown because it is similar to that measured by the deeper extensometer at the site. Graphs of long-term compaction for 12 extensometers are shown in figure 8.

**REFERENCES CITED**

Carr, J.E., Meyer, W.R., Sandeen, W.M., and McLane, I.R., 1985, Digital models for simulation of ground-water hydrology of the Chicot and Evangeline aquifers along the Gulf Coast of Texas: Texas Department of Water Resources Report 289, 101 p.  
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Gabrysch, R.K., 1979, Approximate altitude of water levels in wells in the Chicot and Evangeline aquifers in the Houston area, Texas, spring 1977 and spring 1978: U.S. Geological Survey Open-File Report 79-334, 4 sheets.  
Gabrysch, R.K., and Coplin, L.S., 1990, Land-surface subsidence resulting from ground-water withdrawals in the Houston-Galveston region, Texas, through 1987: Harris-Galveston Coastal Subsidence District Report of Investigations 90-01, 53 p.  
Williams, J.F., III, and Ranzau, C.E., Jr., 1987, Ground-water withdrawals and changes in ground-water levels, ground-water quality, and land-surface subsidence in the Houston district, Texas, 1980-84: U.S. Geological Survey Water-Resources Investigations Report 87-4153, 56 p.

**VERTICAL DATUM**

Sea level: In this report, "sea level" refers to the National Geodetic Vertical Datum of 1929 (NGVD of 1929)—a geodetic datum derived from a general adjustment of the first-order level nets of the United States and Canada, formerly called Sea Level Datum of 1929.

**EXPLANATION**

- -50 --- Water-level contour—Shows altitude at which water level would have stood in tightly cased well. Contour intervals 50 and 100 feet. Datum is sea level
- Boundary of study area
- o Well used for control—Can represent more than one well
- < indicates less than

