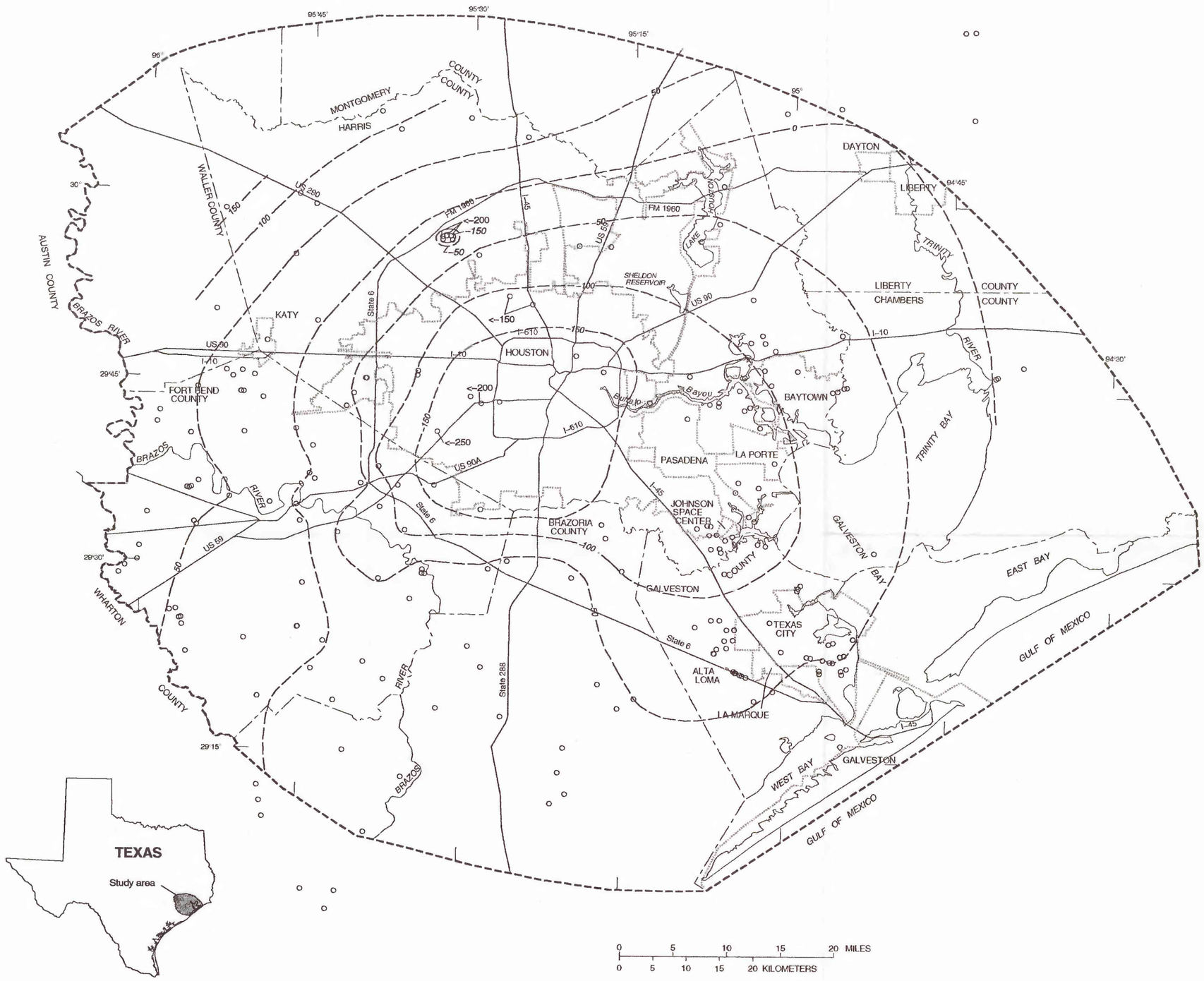
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH THE
CITY OF HOUSTON
AND THE
HARRIS-GALVESTON COASTAL SUBSIDENCE DISTRICT

OPEN-FILE REPORT 95–182
Approximate altitudes of water levels, Chicot aquifer, 1995—SHEET 1 OF 8
Kasmarek, M.C., and others, 1995, Water-level altitudes 1995, water-level changes 1977–95 and 1994–95, and compaction 1973–94 in the Chicot and Evangeline aquifers, Houston-Galveston region, Texas



LOCATION MAP

Figure 1. Map showing approximate altitudes of water levels in the Chicot aquifer, Houston–Galveston region, Texas, January–February 1995.

INTRODUCTION

This report is one in an annual series of reports that depicts altitudes of water levels and water-level changes since 1977 and compaction since 1973 in the Chicot and Evangeline aquifers in the Houston-Galveston region, Texas. It was prepared in cooperation with the City of Houston and the Harris-Galveston Coastal Subsidence District. The report presents maps for the Chicot and Evangeline aquifers showing the approximate altitudes of water levels in 1995 (figs. 1, 4), approximate changes in water levels in wells from 1977 to 1995 and from 1994 to 1995 (figs. 2, 3, 5, 6), extensometer site locations (fig. 7), and graphs showing measured compaction of subsurface material at selected sites from 1973 to 1994 (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 Barbie and others (1993) and Kasmarek and others (1994), respectively. The Houston-Galveston region includes Harris and Galveston Counties and adjacent parts of Brazoria, Fort Bend, Waller, Montgomery, Liberty, and Chambers Counties.

GEOHYDROLOGY

The Chicot aquifer and the underlying Evangeline aquifer are composed of discontinuous 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 separated from the underlying, geologically similar Evangeline aquifer on the basis of differences in hydraulic conductivity. The differences in hydraulic conductivity in part cause differences in water levels in the two aquifers (Carr and others, 1985, p. 10); water levels in the Chicot aquifer are higher than water levels in the Evangeline aquifer. 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 reflects a system of 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 discernible. 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. Additional wells were measured in 1995 to obtain a better understanding of aquifer water levels along the boundary of the study area. This expanded coverage provides water levels for areas not affected by large rates of ground-water withdrawal, which could increase the accuracy of the maps.

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 second extensometer 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

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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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Kasmarek, M.C., Coplin, L.S., and Santos, H.X., 1994, Approximate changes in water levels in wells completed in the Chicot and Evangeline aquifers, 1977–94 and 1993–94, and measured compaction, 1973–93, in the Houston-Galveston region, Texas: U.S. Geological Survey Open-File Report 94–346, 6 sheets.

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.

CONVERSION FACTORS AND VERTICAL DATUM

Multiply	By	To obtain
foot	0.3048	meter
mile	1.609	kilometer

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 DATA POINT—Well in which water–level measurement was made. One point can represent more than one well

Base from U.S. Geological Survey digital data, 1:100, 000
Universal Transverse Mercator projection
Zone 15

WATER-LEVEL ALTITUDES 1995, WATER-LEVEL CHANGES 1977–95 AND 1994–95, AND COMPACTION 1973–94 IN THE CHICOT AND EVANGELINE AQUIFERS, HOUSTON-GALVESTON REGION, TEXAS

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