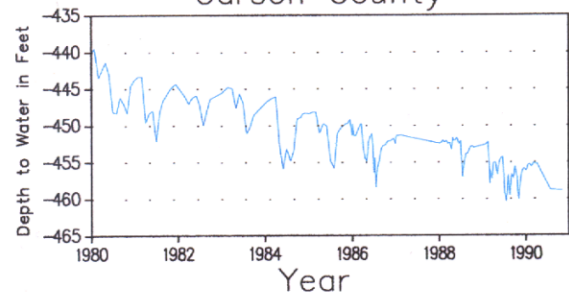


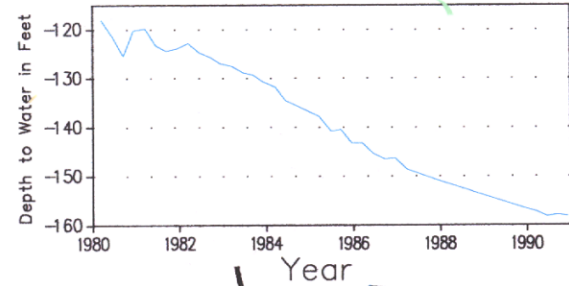
AREAS EXPERIENCING SIGNIFICANT
GROUND-WATER LEVEL DECLINE,
1980-1990

BY
JANIE PAYNE, GEOLOGIST
1991

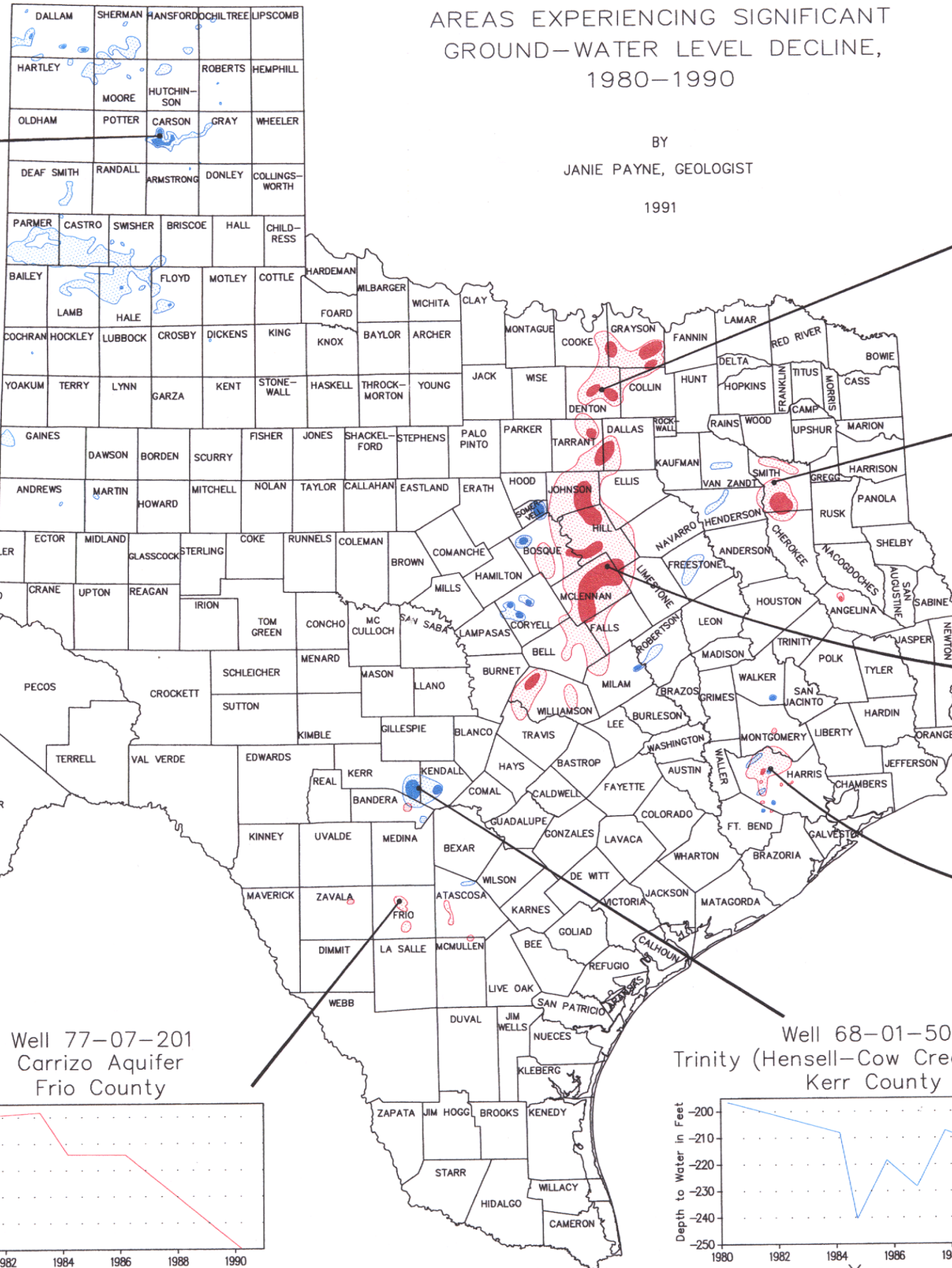
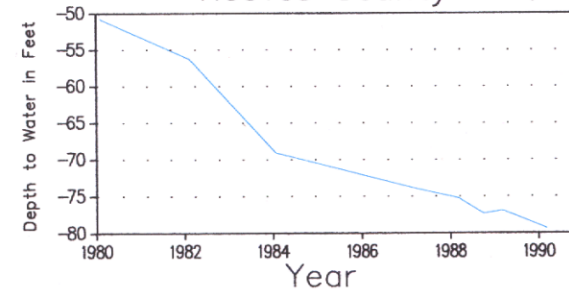
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Ogallala Aquifer
Carson County



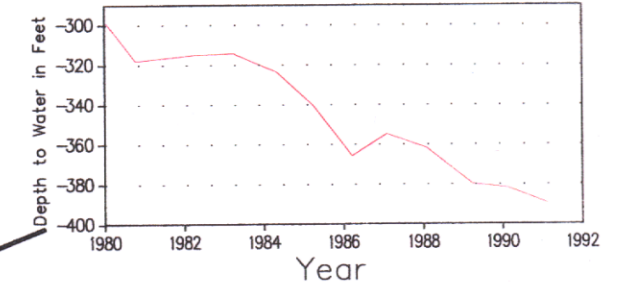
Well 49-14-720
Hueco Bolson Aquifer
El Paso County



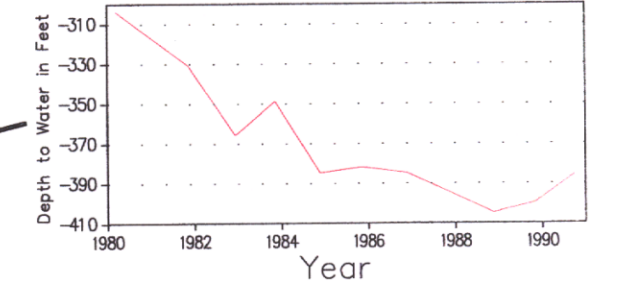
Well 46-44-803
Cenozoic Pecos
Alluvium Aquifer
Reeves County



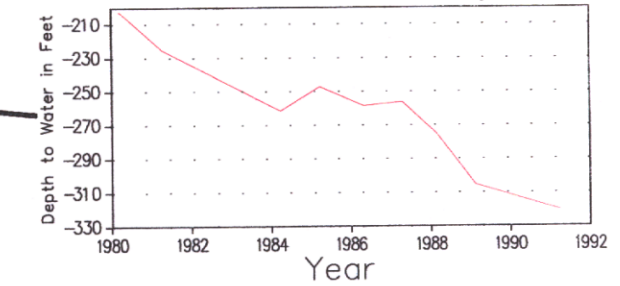
Well 18-49-101
Trinity (Paluxy) Aquifer
Denton County



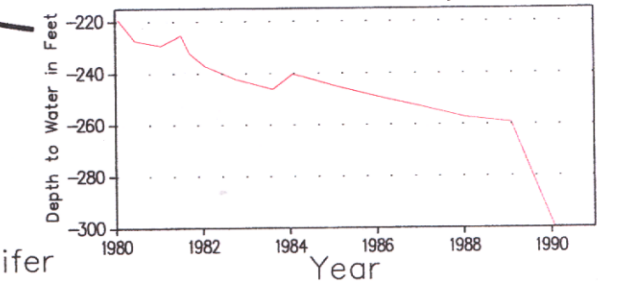
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Carrizo-Wilcox Aquifer
Smith County



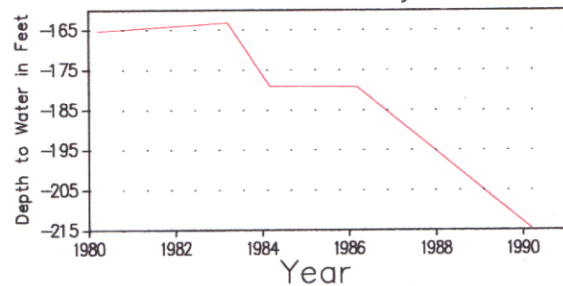
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Trinity (Hosston) Aquifer
McClennan County



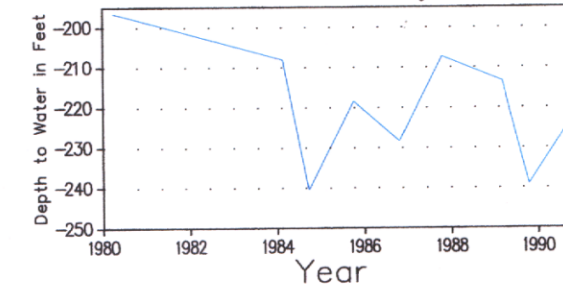
Well 65-04-310
Gulf Coast (Evangeline) Aquifer
Harris County



Well 77-07-201
Carrizo Aquifer
Frio County



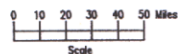
Well 68-01-505
Trinity (Hensell-Cow Creek) Aquifer
Kerr County



EXPLANATION

Based on decline of water levels in wells, 1980-1990

- Declines of 20-40 feet in water table areas
- Declines greater than 40 feet in water table areas
- Declines of 50-100 feet in artesian areas
- Declines greater than 100 feet in artesian areas



EXPLANATION

This map is the third in a series that depicts areas of water-level decline in Texas. Water-level measurements were made when wells were not being pumped in order to portray changes in static water levels. Contour intervals of 20 and 40 feet describe water-level declines in water-table, or unconfined, aquifers. A 20-foot decline under such conditions is more significant than the same decline in an artesian aquifer; therefore, larger contour intervals of 50 and 100 feet were used to illustrate declines in the artesian, or confined, aquifers where water exists under pressures greater than atmospheric. The portion of the map covering the High Plains was first published as Hydrologic Atlas No. 1 (Ashworth, 1991). The remainder of the map was prepared using measurements from 683 wells.

The following were the only areas in the state to have experienced declines in the static water levels of major aquifers. Localized cones of depression in areas not depicted on the map had no static water level measurements for comparison. Calculations of areas affected by water-level declines delineated on the 1980-1990 map are approximate.

- El Paso County - The combination of small amounts of naturally occurring recharge (rainfall) with historically large amounts of artificial discharge (pumpage) created large water-table declines in northwest El Paso County. The 1980 to 1990 water-level decline rates in the Hueco bolson ranged from 0.5 feet/year near the eastern boundary of the regional cone of depression to greater than 5 feet/year near the municipal pumpage areas. Declines in excess of 40 feet within the City of El Paso were also displayed on the 1970-1980 and 1975-1985 decline maps. Water levels in the Mesilla bolson continued to decline in the same area (between Anthony and Canutillo) as depicted on the 1975-1985 decline map due to continued heavy irrigation and municipal pumpage.
- High Plains - Artificial discharge from pumping wells often exceeded recharge, especially in heavily irrigated areas (e.g. Gaines, Parmer, Dallam, Hartley, and Moore Counties) and in municipal wheat fields (e.g. near Amarillo in Carson County). From 1980 to 1990, approximately 20 percent of the Texas High Plains experienced a water-level decline in the Ogallala aquifer greater than 20 feet; from 1975 to 1985 approximately 27 percent of the area was so affected. Greater amounts of rainfall, particularly from 1985 to 1988, more efficient irrigation techniques, and a decrease in irrigated acreage (due in part to landowners' participation in the Conservation Reserve Program) were responsible for rising water levels during this period.
- Reeves County - Twelve square miles of irrigated land in south-central Reeves County continued to experience a water-table decline from 1980 to 1990. This area was part of the decline in the Cenozoic Pecos Alluvium aquifer covering 25 square miles as illustrated on the 1975-1985 map.
- Hill Country - In the 1980-1990 period, locations of water-level declines in excess of 40 feet in the Trinity outcrop area coincided with the Kerrville/western Kendall County region that is growing in population. Decline in the Middle Trinity (Hensell-Cow Creek) aquifer in excess of 20 feet covered 350 square miles in the Hill Country of south-central Texas. The only cone of depression in the artesian portion of the Lower Trinity (Hosston) aquifer, present from 1975 to 1985 around Bandera, continued to exist from 1980 to 1990.
- Winter Garden - Intensive irrigation pumpage drastically lowered water levels in the artesian portion of the Carrizo aquifer in Zavala, Frio, and Atascosa Counties. Water-level declines during the 1980-1990 period in excess of 50 feet covered 125 square miles. These were not depicted on the 1975-1985 decline map, but were shown as having existed from 1970 to 1980 covering slightly different areas in Zavala, Frio, La Salle, and Dimmit Counties. One small area of water-table decline in excess of 20 feet also existed in the outcrop portion of the Carrizo in northern Atascosa County.
- North Texas - This region extends from the Texas-Oklahoma border in the north to Hood, Johnson, and Ellis Counties, inclusive, in the south. From 1980 to 1990, water-level declines in excess of 50 feet characterized approximately 23 percent of the region underlain by the artesian portion of the Trinity aquifer in north Texas. By contrast, 31 percent of the area experienced declines in excess of 50 feet from 1975 to 1985. Although the Dallas-Fort Worth metropolitan area no longer uses as much ground water as in the past, outlying municipalities began to rely increasingly on ground water, thus the locations of significant decline in the Trinity aquifer shifted slightly from their previous positions on the 1975-1985 decline map.

Declines in excess of 100 feet in the Antlers aquifer occurred in the City of Sherman well field, in the communities of Luella and Cannon, and in Collinsville. In the Twin Mountains portion of the aquifer, declines greater than 100 feet developed in the Denton-Lincoln Park vicinity, in Bedford northeast of Fort Worth, and in Johnson County east of Alvarado and Grandview. Wells completed in the Paluxy aquifer experienced declines of less than 100 feet, as illustrated in the accompanying hydrograph of a well in Denton County. Long-term declines did not occur in the outcrop area of the Trinity aquifer in Montague, Wise, Parker, and Hood Counties.

Central Texas - In this report, the central Texas region extends from the southern borders of Hood, Johnson, and Ellis Counties in the north to Travis, Williamson, and Milam Counties, inclusive, in the south. The extensive area of water-level decline in excess of 50 feet in the artesian portion of the Trinity aquifer present in north Texas extended south to Travis County. From 1975 to 1985, 81 percent of the region using the artesian portion of the Trinity aquifer experienced this decline, as compared to 70 percent from 1980 to 1990.

In the 1980-1990 period, heavy pumpage from the high concentration of large capacity public supply and industrial wells caused localized cones of depression to develop in the Middle and Lower Trinity sands in excess of 100 feet. The largest of these, a 270-foot decline in the Hosston (Lower Trinity), occurred beneath the City of Lorena in McLennan County; a second, centered around Itasca in Hill County, was the extension of the Johnson County cone of depression; a third included the communities of Aquilla (Hill County) and Laguna Park (Bosque County); and a fourth, characterized by a 130-foot decline in the Hosston, occurred beneath Florence in Williamson County.

During the 1980-1990 period, four cones of depression developed in the outcrop areas of the Trinity aquifer. Two of these were in western Coryell County, a third occurred in the western corner of Bosque County, and a fourth encompassed the eastern third of Somervell County.

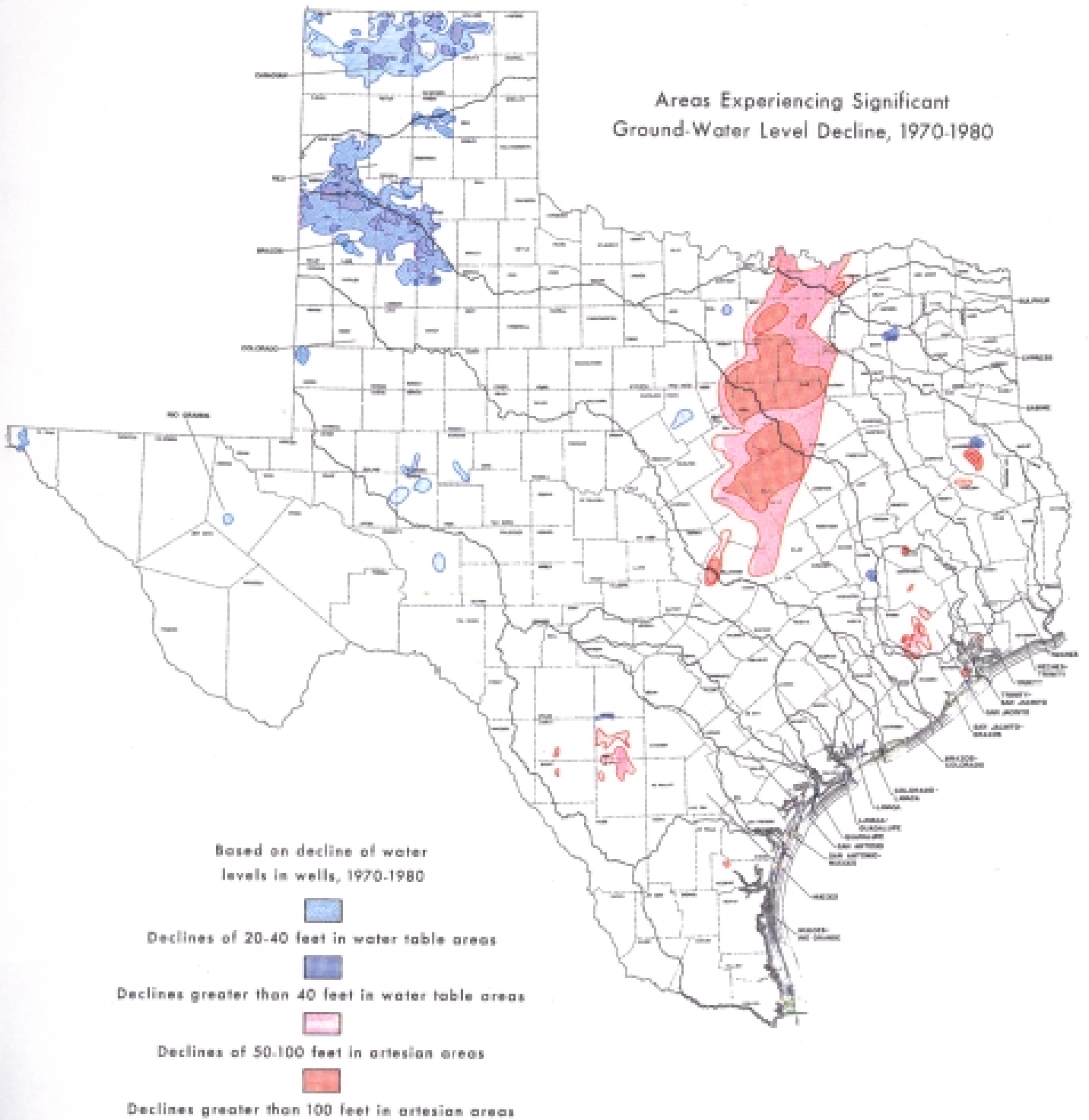
Northeast Texas - From 1980 to 1990, three areas of water-table decline in excess of 20 feet covered a total of 220 square miles in Van Zandt, Henderson, and Freestone Counties in the Wilcox outcrop belt. A fourth cone of depression in the Simsboro Sand Member of the Wilcox aquifer covered nearly 75 square miles in Robertson and Milam Counties. By contrast, only a small portion in northwestern Van Zandt County (30 square miles) experienced a water-table decline during the 1975-1985 period.

The 300-square-mile area of Carrizo-Wilcox artesian decline in excess of 50 feet depicted on the 1975-1985 map in Smith County increased to 425 square miles from 1980 to 1990, and an additional cone developed along the northern border of the county. With the exception of the decline in excess of 100 feet in the City of Lufkin well field in north Angelina County, the three small cones of depression in the artesian portion of the Carrizo-Wilcox of northeast Texas from 1975 to 1985 were no longer present in the 1980-1990 period.

Greater Houston - The 20-foot water-table decline in the Harris/Fort Bend/Brazoria Counties region covered 800 square miles on the 1975-1985 decline map; decline in this area exhibited a dramatic decrease to 45 square miles in five isolated cones of depression in Fort Bend County and western Harris County during the 1980-1990 period. Moreover, only 2.5 square miles in southwest Harris County experienced a decline of over 40 feet in comparison to the 250 square miles as shown on the 1975-1985 map.

Decline in the artesian portion of the Gulf Coast aquifer exhibited a less dramatic areal reduction - although much of the City of Houston has begun to use surface water, population growth in the northwest suburbs has necessitated continued reliance upon ground water. The 485-square-mile area covered by the 50-foot decline from 1975 to 1985 shifted to northwest Harris County and covered 430 square miles. Declines greater than 100 feet covered only 12 as compared to 200 square miles in the 1975-1985 decade.

Areas Experiencing Significant
Ground-Water Level Decline, 1970-1980



Areas Experiencing Significant Ground-Water Level Decline, 1975-1985

