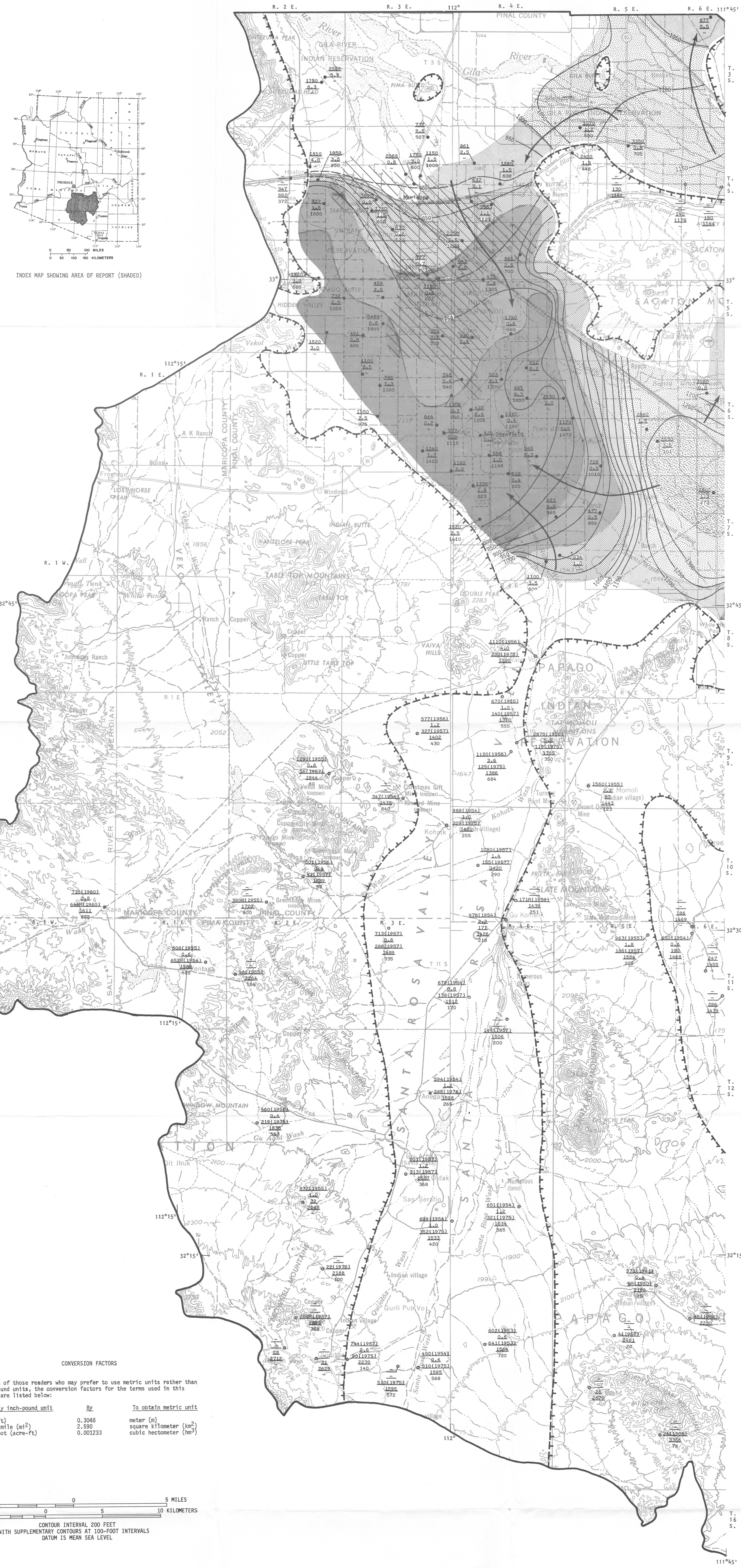
INDEX MAP SHOWING AREA OF REPORT (SHADED)



EXPLANATION

DEPTH TO WATER, IN FEET BELOW LAND SURFACE

- Less than 100
- 100-200
- 200-300
- 300-400
- 400-500
- More than 500
- Insufficient data

750 — WATER-LEVEL CONTOUR—Shows altitude of the water level, 1976-77. Dashed where approximately located. Contour interval 50 feet. Datum is mean sea level

737 / 9.5 / 507 — WELL FROM WHICH WATER SAMPLE WAS COLLECTED IN 1976-77—First entry, 737, is specific conductance in micromhos per centimeter at 25°C; specific conductance is an indication of the dissolved-solids concentration in water. Second entry, 9.5, is fluoride concentration in milligrams per liter. Third entry, 507, is depth of well in feet

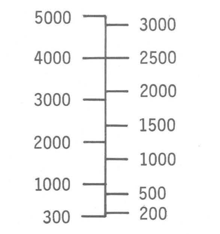
670(1955) / 1.0 / 140(1957) / 1370 / 555 — WELL FROM WHICH MISCELLANEOUS DATA HAVE BEEN COLLECTED—First entry, 670, is specific conductance in micromhos per centimeter at 25°C [(1955), year in which sample was collected if other than 1976-77]; specific conductance is an indication of the dissolved-solids concentration in water. Second entry, 1.0, is fluoride concentration in milligrams per liter. Third entry, 140, is depth to water in feet below land surface [R, depth to water reported; (1957), year in which depth to water was reported or measured if other than 1976-77]. Fourth entry, 1370, is altitude of the water level in feet above mean sea level. Fifth entry, 555, is depth of well in feet

AREA IN WHICH SOME WATER LEVELS ARE ANOMALOUSLY HIGH

GENERALIZED DIRECTION OF GROUND-WATER FLOW

APPROXIMATE BOUNDARY OF THE MAIN WATER-BEARING UNIT—The main water-bearing unit consists principally of unconsolidated alluvial deposits. The upper and the lower sand and gravel units are the main sources of ground water. Outside the boundary of the main water-bearing unit, small amounts of water may be obtained from alluvial deposits in narrow valleys or from faulted or fractured consolidated sedimentary rocks

ARBITRARY BOUNDARY OF GROUND-WATER AREA



APPROXIMATE RELATION OF SPECIFIC CONDUCTANCE TO DISSOLVED SOLIDS

The lower Santa Cruz area includes about 5,400 mi^2 in south-central Arizona and is the second largest agricultural area in the State. The area depends mainly on ground water for irrigation use, and in 1976 about 966,000 acre-ft of ground water was pumped from the area. The main water-bearing unit consists principally of unconsolidated alluvial deposits. In the extensively developed part of the area the alluvial deposits have been divided into four units—the upper sand and gravel unit, the silt and clay unit, the lower sand and gravel unit, and the local gravel unit, which is present only in the Maricopa-Stanfield area (Hardt and Cattany, 1965, p. 21). The upper and the lower sand and gravel units are the main sources of ground water. The upper sand and gravel unit is at the land surface in most of the area and is from less than 50 to about 600 ft thick. The silt and clay unit is from 100 to about 600 ft below the land surface and is from 0 to about 2,000 ft thick. The lower sand and gravel unit is a mixture of sand, gravel, and clay, which is usually more cemented than that in the upper unit. The unit is from 300 to 1,100 ft below the land surface in the western part of the area and from 300 to nearly 2,000 ft below the land surface in the eastern part and is from 0 to about 500 ft thick. Ground water may occur under confined conditions in the lower unit where overlain by the silt and clay unit. Where the silt and clay unit is not present, it is difficult to differentiate between the upper and the lower sand and gravel units. The local gravel unit is from 0 to nearly 1,000 ft thick. (See Hardt and Cattany, 1965, p. 21-25.) Outside the boundary of the main water-bearing unit, small amounts of water may be obtained from alluvial deposits in narrow valleys or from faulted or fractured consolidated sedimentary rocks.

Prior to major agricultural development, ground-water flow in the southeastern part of the area was from the southeast toward the northwest. In the northeastern part ground water flowed westward, and in the western part ground water flowed northwestward. As a result of the large-scale long-term withdrawal of ground water, the direction of ground-water flow has changed. In the southeastern and south-central parts of the area ground-water flow now is toward a large cone of depression near Eloy (sheet 2), and in the western part ground-water flow is toward a large cone of depression in the Maricopa-Stanfield area (sheet 1).

The long-term withdrawal of ground water has resulted in a general decline in water levels in the lower Santa Cruz area. Since 1923, declines of nearly 500 ft have occurred near Stanfield (sheet 3). The water level in a well in sec. 1, T. 6 S., R. 2 E., has declined 459 ft since 1950. Between 1923 and 1977, declines of less than 50 ft occurred near Casa Grande and in the northeastern part of the area along the Gila River (sheet 4). The rate of decline in water levels in wells west of Casa Grande and north of Eloy generally has decreased in the last few years, and small rises in water level occurred in some wells (see hydrograph D, sheet 3, and hydrograph B, sheet 4). The water level in a well in sec. 34, T. 6 S., R. 5 E., has risen 14 ft since 1940. In this area several large tracts of land are no longer farmed, and some tracts are subdivided for housing developments but remain sparsely populated. The local decrease in agricultural land use greatly reduced pumping in the area, which probably accounts for the decrease in the rate of decline and local rises in the water levels. In the northwestern part of the area the water level in a few wells in the main water-bearing unit is anomalously higher than the water level in most wells. The wells may be open to a shallow water-bearing zone that in other places is either drained of water or is absent.

In the lower Santa Cruz area the dissolved-solids concentrations in ground water range from less than 300 to more than 3,000 mg/L (milligrams per liter). The proposed secondary maximum contaminant level for dissolved solids in public water supplies is 500 mg/L (U.S. Environmental Protection Agency, 1977, p. 17146). The following recommended guidelines for dissolved solids in irrigation water are from the National Academy of Sciences and National Academy of Engineering (1973, p. 335).

Classification	Dissolved solids (milligrams per liter)
Water for which no detrimental effects are usually noticed...	500
Water that can have detrimental effects on sensitive crops...	500-1,000
Water that can have adverse effects on many crops; requires careful management practices......................	1,000-2,000
Water that can be used for tolerant plants on permeable soils with careful management practices....................	2,000-5,000

The maximum contaminant level for fluoride in public water supplies differs according to the annual average maximum daily air temperature (Bureau of Water Quality Control, 1978, p. 6). In the lower Santa Cruz area the annual average maximum daily air temperature is about 87°F, and the maximum contaminant level for fluoride is 1.4 mg/L. The fluoride concentration in much of the ground water exceeds 1.4 mg/L.

The hydrologic data on which these maps are based are available, for the most part, in computer-printout form for consultation at the Arizona Water Commission, 222 North Central Avenue, Suite 800, Phoenix, and at U.S. Geological Survey offices in: Federal Building, 301 West Congress Street, Tucson, and Valley Center, Suite 1880, Phoenix. Material from which copies can be made at private expense is available at the Tucson and Phoenix offices of the U.S. Geological Survey.

SELECTED REFERENCES

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CONVERSION FACTORS

For use of those readers who may prefer to use metric units rather than inch-pound units, the conversion factors for the terms used in this report are listed below:

Multiply inch-pound unit	By	To obtain metric unit
foot (ft)	0.3048	meter (m)
square mile (mi^2)	2.590	square kilometer (km^2)
acre-foot (acre-ft)	0.001233	cubic hectometer (hm^3)

5 0 5 MILES
5 0 5 10 KILOMETERS

CONTOUR INTERVAL 200 FEET
WITH SUPPLEMENTARY CONTOURS AT 100-FOOT INTERVALS
DATUM IS MEAN SEA LEVEL

BASE FROM U.S. GEOLOGICAL SURVEY
AJO 1:250,000, 1953,
MESA 1:250,000, 1954,
PHOENIX 1:250,000, 1954, AND
TUCSON 1:250,000, 1956

DEPTH TO WATER, ALTITUDE OF THE WATER LEVEL, SPECIFIC CONDUCTANCE, AND FLUORIDE CONCENTRATION IN THE WESTERN PART OF THE LOWER SANTA CRUZ AREA

MAPS SHOWING GROUND-WATER CONDITIONS IN THE LOWER SANTA CRUZ AREA, PINAL, PIMA, AND MARICOPA COUNTIES, ARIZONA—1977

By

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