

APPROXIMATE GROUND-WATER-LEVEL CONTOURS, APRIL 1981, FOR
THE SOQUEL-APTOS AREA, SANTA CRUZ COUNTY, CALIFORNIA

By R. M. Bloyd

U.S. GEOLOGICAL SURVEY

Open-File Report 81-680

4018-08



Menlo Park, California
June 1981

UNITED STATES DEPARTMENT OF THE INTERIOR

JAMES G. WATT, Secretary

GEOLOGICAL SURVEY

Doyle G. Frederick, Acting Director

For additional information write to:

District Chief
Water Resources Division
U.S. Geological Survey
345 Middlefield Road
Menlo Park, Calif. 94025

CONTENTS

Abstract-----	Page
Background information-----	1
Findings-----	2
References cited-----	3

ILLUSTRATION

Figure 1. Map showing approximate ground-water-level contours, April 1981, for the Soquel-Aptos area, Santa Cruz County, California-----	Page In pocket
--	-------------------

CONVERSION FACTORS

The inch-pound system of units is used in this report. For readers who prefer metric units, the conversion factors for the terms used in this report are listed below:

<u>Multiply</u>	<u>By</u>	<u>To obtain</u>
ft (feet)	0.3048	m (meters)
mi (miles)	1.609	km (kilometers)

National Geodetic Vertical Datum of 1929 (NGVD of 1929): A geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called mean sea level. NGVD of 1929 is referred to as sea level in this report.

APPROXIMATE GROUND-WATER-LEVEL CONTOURS, APRIL 1981, FOR
THE SOQUEL-APTOS AREA, SANTA CRUZ COUNTY, CALIFORNIA

By R. M. Bloyd

ABSTRACT

Ground-water levels in selected wells were measured in the Soquel-Aptos area in April 1981. On the basis of these measurements approximate ground-water-level contours were constructed.

The general direction of ground-water movement in the Soquel-Aptos area is from the ridges in the northern part of the area toward the adjacent canyons, and then southward toward the ocean. Ground-water pumping has caused ground-water levels to decline below sea level in the Capitola area, in the area just to the west and northwest of Aptos, and in isolated local areas southwest of Rio Del Mar. Ground-water levels in the northern part of the area away from the seacoast have not declined much over time.

BACKGROUND INFORMATION

K. S. Muir (1980) determined that ground-water pumping in the Soquel-Aptos area, Santa Cruz County, Calif., has caused water levels in wells along the coast to decline below sea level. Furthermore, Muir concluded that such water-level declines are favorable for migration of seawater landward and that seawater intrusion has occurred in the area in which water levels are below sea level in the vicinity of Capitola.

On January 6, 1981, the Santa Cruz County Board of Supervisors adopted in concept an ordinance establishing a moratorium on the drilling of wells within the Soquel Creek County Water District boundaries. At that time the supervisors also expressed interest in expanding the moratorium throughout the ground-water basin in the area. Public hearings were held with regard to the proposed expansion. Much discussion, both pro and con, was expressed at the hearings. U.S. Geological Survey representatives participated in the hearings; Muir's findings were a principal basis for the well-drilling moratorium.

During the hearings concern was expressed about the adequacy of available geohydrologic data for the Purisima Formation and Aromas Sand. These two geologic formations are the principal aquifers in the Soquel-Aptos area. The direction of ground-water movement had not been defined. The definition of ground-water movement in an aquifer is basic to any attempt to understand how an aquifer will respond to stress. The only available information on ground-water movement in the area is a postulation by Hickey (1968, fig. 6) of the direction of ground-water movement in the Purisima Formation on the basis of limited water-level measurements. To assist the Santa Cruz County Board of Supervisors, the U.S. Geological Survey has prepared a water-level-contour map to complement Muir's findings. That map is presented in this report.

Water-level measurements in wells are the basic data needed to construct a water-level-contour map. There are probably as many as 1,000 wells in the local area. Time and available resources did not permit measuring water levels in all the wells. Selected wells were measured in an attempt to obtain a reasonably uniform areal coverage of data. The locations of wells in which water-level measurements were made are shown on the water-level-contour map (fig. 1).

Ground-water level is determined by taking the difference between land-surface altitude and depth to water below land surface. Ground-water levels at well sites are accurate to within 40 ft in the northern part of the area and to within 20 ft in the southern part of the area. Land-surface altitudes were determined by locating well sites on the available topographic maps and then estimating site altitudes from the maps. Land-surface contour interval is 40 ft in the northern part of the area and 20 ft in the southern part. Determination of altitudes is more accurate in the urban areas of lower relief near the sea-coast and less accurate in the areas of high relief. No attempt was made to draw water-level contours in the high relief terrain in the northern part of the area.

FINDINGS

1. The general direction of ground-water movement in the Soquel-Aptos area is from the ridges in the northern part of the area toward the adjacent canyons, and then southward toward the ocean.
2. Ground-water pumping has caused ground-water levels to decline below sea level in the Capitola area, in the area just to the west and northwest of Aptos, and in isolated local areas southwest of Rio Del Mar.
3. Ground-water levels in the northern part of the area away from the seacoast probably have not declined much over time.

The general direction of flow in the Soquel-Aptos area can be determined from the water-level-contour map; the ground-water movement is generally perpendicular to water-level contours. To assist the reader in this determination, arrows indicating flow direction were inserted on the map (fig. 1).

Significant ground-water-level declines have occurred in parts of the area. Comparison of the April 1981 water levels with the measurements presented by Hickey (1968, fig. 6) shows a maximum decline of approximately 40 ft in the pumping depression northeast of Capitola. In the pumping depressions northeast and east of Aptos water levels appear to have declined more than 50 ft. Near the conference grounds, north of Capitola, declines of approximately 15 to 20 ft have occurred.

Ground-water levels in the northern part of the area probably have not declined much over time. In the northern area few, if any, large production wells exist; the majority of the wells are low yield domestic wells. This suggests that relatively small amounts of ground water are being pumped from the aquifer in this area. Streams such as Soquel, Aptos, and Branciforte Creeks seem to be perennial, which suggests that the pumpage has not been significant enough to cause water-level declines of sufficient magnitude to dry up the streams during the dry season. Further, ground-water levels in wells are, for the most part, close to land surface, suggesting minimal declines.

REFERENCES CITED

- Muir, K. S., 1980, Seawater intrusion and potential yield of aquifers in the Soquel-Aptos area, Santa Cruz County, California: Menlo Park, Calif., U.S. Geological Survey Water-Resources Investigations 80-84, 29 p.
- Hickey, J. J., 1968, Hydrologic study of the Soquel-Aptos area, Santa Cruz County, California: U.S. Geological Survey open-file report, 48 p.