

Report of the activities of the U. S. Geological Survey
during the fiscal year 1950 in cooperation
with Santa Barbara County, CA

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INTRODUCTION

During the past year, the ground-water investigations by the Geological Survey were continued in accordance with the cooperative agreement with the Santa Barbara County Water Agency effective July 1, 1948. The program has called for the collection of basic data needed in the continuing study of the water resources of Santa Barbara County. These basic data have largely consisted of well data, water level measurements, pumpage estimates, stream-flow records, rainfall records, and water analyses. As more data are collected, studies should be made to revise estimates of the safe yield in the various ground-water basins and to make studies for the best utilization of all available water resources. The work accomplished during the past fiscal year is discussed briefly in the following pages.

WATER LEVEL MEASUREMENTS

Extent of observation well program

During the fiscal year 1949-1950 periodic measurements have been continued on the established network of about 170 observation wells. All observation wells were visited 11 or more times during the year for the purpose of obtaining water level measurements at approximately monthly intervals. The number of observation wells in the various ground-water basins of the county are given in the following

Number of observation wells as of June 30, 1950

Carpinteria	19
Goleta	23
Upper Santa Ynez Valley	19
Lower Santa Ynez Valley	60
San Antonio Valley	4
Santa Maria Valley	34
Cuyama Valley	11
City of Santa Barbara	1
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Automatic water-stage recorders were maintained on two wells for the entire year, and on four other wells for a portion of the year. Three of the recorders are in the area northeast of the Lompoc Plain, one near Buellton, one on the Juan and Lolita Ranch near Santa Ynez and another at the Rancheria Street pumping station of the city of Santa Barbara.

For the purpose of preparing water level contour maps showing the recovery of water levels between irrigating seasons, water levels were measured in all wells possible along the Santa Ynez River and on the Lompoc Plain as far west as 13th Road in October - November 1949 and again in March 1950.

WATER LEVEL FLUCTUATION

General discussion

Figure 1 shows the fluctuation of water levels since 1941 for representative wells in each of the six ground-water areas. In general the decline that started in 1945 is still in progress and average water levels during 1950 will be lower than those during previous years. Even during the winter recovery period water levels in a large portion of the Carpinteria and Goleta Basins were 20 to 30 feet below sea level.

Santa Maria Valley

In the central and eastern parts of the Santa Maria Valley, the ground water is unconfined while in the western 8 miles of the valley the permeable sand and gravel deposits are overlain by relatively impermeable clays. In the area of confined ground water, water levels have declined on the average about 10 feet since 1941. In the area of unconfined water, for the same period, water levels have dropped about 35 feet.

For well 10/34 - 1423 near the center of the Santa Maria Basin, the water level at the end of June 1950 was 3 feet below the previous record low of 1936. For the Santa Maria Valley as a whole, the water levels during 1948 and 1949 were lower than those during the dry period of the mid-thirties. The average water level during 1950 for the Santa Maria Valley will probably be about 6 feet below that of 1949 as the average decline during the three previous years has been about this amount.

Santa Ynez Valley

Alluvial deposits along the river. In the Santa Ynez Valley water levels in wells along the river were about the same as during the previous 5 or 4 years. From Robinson Bridge to San Lucas Bridge, the ground water levels have declined about 3 or 4 feet since 1945 and about 5 feet during the period 1941 to 1949. Most of the decline can be attributed to the 6 consecutive years of below normal rainfall.

Lompoc Plain: In the Lompoc Plain there has been a general decline of water levels averaging about 1 foot per year for the period 1945 to 1949. For the eastern part of the plain between H Street and Robinsons Bridge the decline has averaged about $1\frac{1}{2}$ to 2 feet per year. At the western end of the plain, near Surf, little or no decline has been observed.

Santa Ynez Upland: Declining water levels have been observed in the Santa Ynez Upland since 1941. Over this period the greatest decline of about 15 to 20 feet was observed near Los Olivos. Lesser declines were recorded in the southern portion of the area.

Cuyama Valley

Pumpage in the Cuyama Valley has increased progressively since 1945 and, as a result, the water table has fallen about 5 feet. A continued lowering of the water table may be expected as the Cuyama Valley is undergoing a phase of rapid development.

South Coast Basins

During the years 1941 to 1944 there was little change in ground-water levels in the Goleta and Carpinteria Basins. Since 1945, however, the declines observed have been on the average about 25 feet in the Goleta Basin and about 40 feet in the Carpinteria Basin.

WELL INVENTORY

During the past year, several man months have been devoted to canvassing of new wells in the Santa Ynez and Santa Maria Valleys, but

many additional man months of canvassing still remains. Included in the areas to be canvassed are the Goleta and Cuyana Valleys, the Santa Ynez Upland, the Santa Rita Hills and the Lompoc Plain west of 13th Street.

PUMPAGE OF GROUND WATER

General discussion

Pumpage of ground water in most of the ground-water basins of the county has been estimated on the basis of electric energy consumed and factors derived from pumping tests as to the amount of energy required to pump 1 acre-foot of water. Additional estimates have been made of the ground-water withdrawals made by pumping plants that are powered by diesel fuel, gas and gasoline.

Santa Maria Valley

Under natural conditions the perennial yield of the water-bearing deposits in the Santa Maria Valley is estimated to be about 55,000 acre-feet a year. During the late forties, the total estimated annual pumpage has been about 110,000 acre-feet per year, but not all of this quantity is permanently removed from storage. A part of the total quantity pumped and distributed over the land for irrigation seeps below the root zone and returns to storage. Accordingly, an estimated 80 percent of the total, designated the total net pumpage, is removed permanently from storage. The total net pumpage, therefore, is nearly twice the estimated perennial yield.

Santa Ynez Valley

Lompoc Plain: Pumpage in the San Ynez Valley has increased

*Is the pumpage
or covering the use?*

steadily over the years as more and more land was brought under irrigation. In the Lompoc Plain pumpage has increased from about 10,000 acre-feet in the early forties to 18,000 acre-feet during the years 1947, 1948 and 1949.

Alluvial deposits along the river: Upstream from the Lompoc Plain increased demands for irrigation water have also been recorded. From Robinson Bridge to San Lucas Bridge, the annual pumpage from alluvial deposits along the river has risen from about 5,500 acre-feet during the early forties to a present withdrawal of about 15,000 acre-feet. Pumping in the alluvial deposits near the river unwaters many areas locally, but they are refilled by seepage from the river during the winter months when there is substantial runoff.

Cuyama Valley

Starting in 1939 the growth of irrigated acreage in the Cuyama Valley has been very rapid. More and more wells have been constructed to meet the increased demands of irrigation. As a result pumpage has increased from an estimated 1800 acre-feet in 1939 to about 35,000 acre-feet in 1949. Continued over-draft would eventually lower water levels throughout the entire valley.

South Coast Basins

Pumpage in the South Coast Basins has not increased as rapidly as in the other basins of the county, but the present rates of withdrawal are considerably above the estimated perennial yields of the basins. In the Goleta Basin pumpage has increased from 5,000 acre-feet in the early thirties to about 10,000 acre-feet in 1949. For the same period in the Carpinteria Basin the rise has been 3,000 acre-feet to about 5,500 acre-feet.

STREAM FLOW MEASUREMENTS

Most of the stream discharge measurements in Santa Barbara County are made by the Surface Water Branch of the U. S. Geological Survey in financial cooperation with the State of California, Water Resources Division. This work is done under the direction of D. R. Woodward, Hydraulic Engineer in charge of the Los Angeles office.

Many of the permanent and low-flow stream-gaging stations where continuous records of discharge are obtained were selected because of their importance to the continuing appraisal of the ground-water resources particularly with regard to the proposed plans of the U. S. Bureau of Reclamation for the most efficient utilization of water resources of the Santa Ynez River Valley. The following table summarizes the program of stream-flow measurements in Santa Barbara County as carried out by the Surface Water Branch. This table does not include the sites where stream flow measurements are made in connection with the examination of spring and stream-flows in the Santa Ynez Mountains.

Stream-flow measuring stations and sites in Santa Barbara
County, California, in operation as of June 30, 1950

[Program carried on by the Surface Water Branch]

Drainage Basin and Stream	Continuous gaging stations		Sites of miscellaneous measurements of discharge
	Perennial	Low-flow only	
South-coast drainage:			
Carpinteria Creek	1		
Atascadero Creek	1		
San Jose Creek	1		
Santa Ynez River Basin:			
Santa Ynez River	6	2	5
Hot Springs Canyon Creek			1
Santa Cruz Creek	1	1	
Santa Aguada Creek	1		
Sanja Cota Creek			1
La Zaca Creek	1		
Santa Rosa Creek			1
Salsipuedes Creek	1		1
San Antonio Creek	1		
Santa Maria River Basin:			
Santa Maria River	1		1
Cuyama River	2		2
Alamo Creek	1		
Huasna River	1		
Sisquoc River:	2	1	
LaBrea Creek	1		1
Tepuauquet Creek	1		

The program of spring measurements in the vicinity of Tecolote Tunnel was started in June 1948, and expanded during the fall and winter of 1948-1949 to include all springs and small streams in the Santa Ynez Mountains between San Marcos Pass and Refugio Pass Road. Discharge measurements in these springs and small streams during the 1950 fiscal year were made by the Surface Water Branch of the Geological Survey under the direction of the Los Angeles office. The work is financed by a cooperative agreement between the Santa Barbara County Water Agency and the Geological Survey. Two progress reports on this work have been released by the Los Angeles office.

WATER ANALYSIS TO DETECT SALT-WATER INTRUSION

For the purpose of checking possible ocean-water encroachment into fresh ground-water bodies, 21 samples of well water for partial analysis were taken in the Carpinteria area and 21 samples in the Goleta Basin. A few samples were also taken in Santa Barbara, Montecito, Lompoc and the Santa Maria areas. To date, no definite encroachment of sea water has been shown by the sampling in any of the basins of the county. The average chloride content of the well waters sampled in the Goleta basin was about 160 ppm, and in the Carpinteria area it was about 260 ppm. A few wells showed more than 1,000 ppm, but not enough samples have been collected in these wells to establish any definite trends. During the fiscal year 1951 the frequency and extent of the well water analysis program will be greatly expanded in those areas in which ocean-water encroachment might be suspected.

REPORTS

During the 1950 fiscal year a report entitled "Water levels in observation wells in Santa Barbara County, California in 1947" was duplicated and released to interested agencies. A similar report for 1948 was also prepared, duplicated, and distributed and work has been started on the 1949 water level report.

A report entitled "Wells and water levels in principal ground-water basins in Santa Barbara County, California" previously released in duplicated form was published as Geological Survey Water-Supply Paper 1068 by the U. S. Government Printing Office. "Ground-water in the Cuyama Valley, California" by J. E. Upsen and G. F. Worts, Jr. was duplicated and released to interested agencies.

During the latter part of the 1950 fiscal year, work was directed towards the preparation of a preliminary report for the County and the Bureau of Reclamation with regard to water available in the alluvial deposits bordering the Santa Ynez River from the Narrows to San Lucas Bridge. All available well logs and well data for this reach of the river have been collected. Several weeks have been spent preparing graphs of water-level fluctuations in wells, and graphs showing the variation of stream flow. A report giving estimates of useable storage capacity is in preparation.

Harry D. Wilson, Jr.,
Engineer in Charge

September 22, 1950