2005
Santa Barbara County
Groundwater Report

Santa Barbara County Public Works
Water Resources Department
Water Agency Division

123 East Anapamu Street
Santa Barbara, CA 93101
(805) 568-3440

March 28, 2006

A report on the conditions of groundwater and the status of groundwater basins throughout Santa Barbara County during the calendar year 2005

On the Cover:

Young vineyards in the Santa Ynez Uplands Basin with the San Rafael Mountains in the background

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Forward

This report satisfies requirements of the Santa Barbara County Comprehensive Plan, Conservation Element, Groundwater Resources Section that was adopted May 24, 1994, and amended November 8, 1994.

Specifically, Conservation Element Goal 4, Policy 4.1, Action 4.1.1 states that:

The County Water Agency shall continue to monitor water levels from existing monitoring wells and, in coordination with the U.C. Cooperative Extension/Farm Advisor, shall request, on a voluntary basis, private and public water purveyors and major private groundwater users, including agricultural users, to provide periodic records of groundwater production. Unless deemed unnecessary by the Water Agency's Board of Directors for any year, the Agency shall compile an annual report on the status of pumping amounts, water levels, overdraft conditions, and other relevant data, and shall submit this report to the Board of Supervisors for its acceptance and possible further action. The annual report to the Board shall include a review of the results of all groundwater quality monitoring conducted in the County.

Upon completion of this report, the Water Agency will forward it to the County's Planning and Development Department to aid in land use decisions. According to Conservation Element Policy 3.2, "The County shall conduct its land use planning and permitting activities in a manner which promotes and encourages the cooperative management of groundwater resources by local agencies and other affected parties, consistent with the Groundwater Management Act and other applicable law." The annual report is part of that effort but is not to be the sole basis for any land use decisions.

In addition, as other local agencies complete groundwater management plans, the Water Agency will review these plans and both forward salient information from those plans to the Planning and Development Department and reflect that information in the next groundwater report update. Conservation Element Policy 3.3 States, "The County shall use groundwater management plans, as accepted by the Board of Supervisors, in its land use planning and permitting decisions and other relevant activities."

The information and conclusions contained in this report reflect data developed by the Water Agency and data contained in documents and reports listed in the "References". The Water Agency recognizes that other individuals/agencies might reach different conclusions based on different sources of data or interpretations.

As Conservation Element Action 4.1.3 states, "The County recognizes the need for more accurate data on all groundwater basins within the County and shall continue to support relevant technical studies, as feasible". As a result, the Agency continues to gather water resources data through cooperative programs, and its own collection of data. Finally, as stated in the Conservation Element, "The County recognizes that it has no authority to regulate or manage the use of groundwater except as provided for in the Groundwater Management Act (*Water Code ss 10750. Et seq*.) and other applicable law. Further, the County does not assume any authority under this section to make a determination of the water rights of any person or entity".

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Executive Summary

Climate

1. Rainfall during the 2004-2005 Winter Season was 188% of average countywide and as such produced significant recharge to groundwater basins and inflow to reservoirs. This is the first significant recharge to groundwater basins and runoff to reservoirs since the winter of 2000-2001. A detailed description of rainfall from late 2004 through 2005 can be found on page 18.

Status of Groundwater Basins

2. The Cuyama Groundwater Basin is in a state of overdraft of 28,525 Acre-Feet per year based on a 1992 study. This overdraft pertains to safe yield and not perennial yield. Water levels have fallen significantly but no regional economic or water quality problem has yet been documented. For more information on this basin please see page 71. For definitions of safe yield and perennial yield see page 4.

3. The Santa Maria Groundwater Basin within Santa Barbara County and also that area within San Luis Obispo County known as the *Oso Flaco* unit are in overdraft of 2,368 Acre-Feet per year based on a 2001 study. This overdraft pertains to safe yield and not perennial yield. Water levels have declined since agricultural development of the basin began but no regional economic or water quality problem has yet been documented. In the recent litigation *Santa Maria Valley Water Conservation District versus the City of Santa Maria et al.* the court ruled that based on a preponderance of evidence the groundwater basin is not currently in a state of overdraft. No "safe yield" number for groundwater extraction has been decided upon and thus it is Water Agency opinion that no further Santa Barbara County study is warranted at this time based on this "tentative" decision. For more information on this basin please see page 55.

4. The San Antonio Groundwater Basin is in a state of overdraft of 9,540 Acre-Feet per year based on a 2003 study. This overdraft pertains to safe yield and not perennial yield. Water levels have fallen significantly but no regional economic or water quality problem has yet materialized. For more information on this basin please see page 49.

5. The Lompoc Plain Groundwater Basin is basically in equilibrium under State of California Water Resources Control Board decision WR 89-18 and management by the Santa Ynez River Water Conservation District as natural recharge is augmented with periodical water releases that are

made from Cachuma Reservoir to maintain ground water levels in the basin. For more information on this basin please see page 44.

6. The Lompoc Uplands Groundwater Basin has apparently reached equilibrium as over time water levels have been lowered to approach the elevation of the Lompoc Plain and Santa Ynez River, which now regulate the water levels in the Uplands Basin. For more information on this basin please see page 46.

7. The Santa Rita sub-area of the Lompoc Basin is in a state of overdraft of 799 Acre-Feet per year based on a 2001 study. This overdraft pertains to safe yield and not perennial yield. However, water levels in some parts of this area have declined significantly in the past few years and thus in the future some economic effects may be realized as the balance between energy costs and commodity prices fluctuate. For more information on this basin please see pages 44 through 48.

8. The Buellton Uplands Groundwater Basin is in a state of surplus of 800 Acre-Feet per year based on a 1995 study. For more information on this basin please see page 42.

9. The Santa Ynez Uplands Groundwater Basin is in a state of overdraft of 2,028 Acre-Feet per year based on a 2001 study. This overdraft pertains to safe yield and not perennial yield, thus water levels have declined in many areas but no regional economic or water quality problem has yet materialized. For more information on this basin please see page 34.

10. The South Coast Basins are in equilibrium or surplus through management by local water districts and the Wright Settlement. For more information on these basins please see pages 22-31.

Considerations

11. Santa Barbara County is situated at latitude 34º-35º north in a *semi-arid* climate belt and as such is susceptible to prolonged wet and dry periods such as the wet period 1991-2001 and the droughts of 1945-1951 and 1987-1990. Thus, analysis of groundwater basins must occur over long-term climate and cannot be made year by year. For more information please see the "cumulative departure from mean" chart on page 16.

12. Recharge or precipitation is the dominant parameter in the calculation of the status of a groundwater basin (surplus, equilibrium, or overdraft). Selection of "base period" of climate (recharge) can substantially alter the outcome of such a calculation.

13. Santa Barbara County's cooperative water resources monitoring program through contract with the United States Geological Survey, and involving Water Resources Division staff is an essential task and should be

continued in order to adequately assess changing groundwater basin and watershed conditions.

Introduction

Groundwater supplies about 77% percent of Santa Barbara County's domestic, commercial, industrial and agricultural water. It is also the last line of defense against the periodic droughts that occur in the County. Historic records, combined with tree ring analysis indicate that local drought periods of several years or longer have occurred 2 to four times per century over the last 460 years (Turner, 1992).

To better understand the supply and limitations of each groundwater basin and aquifer, local, state and federal agencies regularly monitor water quantity and quality. This information about our groundwater resources is essential for a thorough understanding of the condition of the aquifers and thereby can help avoid overuse of aquifers which can lead to depletion, seawater intrusion, diminished storage capacity, lower water quality, or land subsidence within a basin. These potential consequences depend on the characteristics of the aquifer. In areas with low recharge rates, excessive pumping might render portions of an aquifer unusable indefinitely. The lowering of water tables might increase pumping "lifts" which could make pumping economically infeasible for some existing uses. In contrast, with proper management the lowering of groundwater basins can sometimes make them more effective by reducing rejected recharge. Since the consequence of long-term groundwater overuse can include permanent impairment of aquifers, careful evaluation of long-term records of use and groundwater response is essential to successful management of groundwater supplies.

In Santa Barbara County significant changes in groundwater basins generally occur over a period of years, or in some cases decades. In larger basins, trends in groundwater level and groundwater quality are recognizable only by examining data the length of one or more hydrologic (rainfall) cycles. Some factors likely to affect the condition of the basins, such as the importation of supplemental water supplies, the implementation of basin management plans, and climatic influences, may change from year to year.

Because of these concerns and various studies indicating slight to moderate levels of overdraft in several groundwater basins within the County and substantial overdraft in one basin, the County developed a set of goals and policies to protect local groundwater. These goals and policies are contained in the Santa Barbara County Comprehensive Plan, Conservation Element, Groundwater Resources Section, which was formally adopted on November 8, 1994. The effects of County permitted projects which may involve new extractions of water resources are evaluated under the California Environmental Quality Act pursuant to the adopted Environmental Thresholds and Guidelines Manual, 1995, and assessed for consistency with County Land Use Plan policy.

Included in this **ninth** annual report are updated water level data and hydrographs for selected wells, a general discussion of basin characteristics, a discussion of climate through late 2005 with its likely effect on groundwater basin conditions and developments in supplemental supplies and basin management plans, if significant.

Groundwater Terms

There are several terms used in this section that warrant definition. **Safe Yield** is defined as the maximum amount of water which can be withdrawn from a basin (or aquifer) on an average annual basis without inducing a long-term progressive drop in water level. **Perennial Yield** is defined as the amount of water that can be withdrawn from a basin (or aquifer) on an average annual basis without inducing economic or water quality consequences (Muir, 1964). **Net yield** is the Safe Yield value with the return flows subtracted. The Net Yield value refers to consumptive use of water that can be removed (without accounting for return flows) on an average annual basis without causing severe adverse affects. The Perennial yield value is always greater than the Net yield value. **Return flows** consist of water that has been rejected from evapotranspiration and thus is returned to the groundwater basin.

Overdraft is defined as the level by which long-term average annual demand exceeds the estimated Safe Yield of the basin and thus, in the long term, may result in significant negative impacts on environmental, social or economic conditions. A basin in which Safe Yield is greater than estimated average annual pumpage is defined as being in a state of **Surplus**. The term Overdraft does not apply to a single year or series of a few years, but to a long-term trend extending over a period of many years that are representative of long-term average rainfall conditions. Thus, the estimated overdraft accounts for both drought periods and periods of heavy rainfall.

Available Storage is the volume of water in a particular basin that can be withdrawn economically without substantial environmental effects. This storage value reflects the amount of water in the basin on a long-term basis (a point on a long-term trend line of water levels), not the current storage level in the basin. This volume of water is also referred to as the **Usable Storage** or **Working Storage** of a basin.

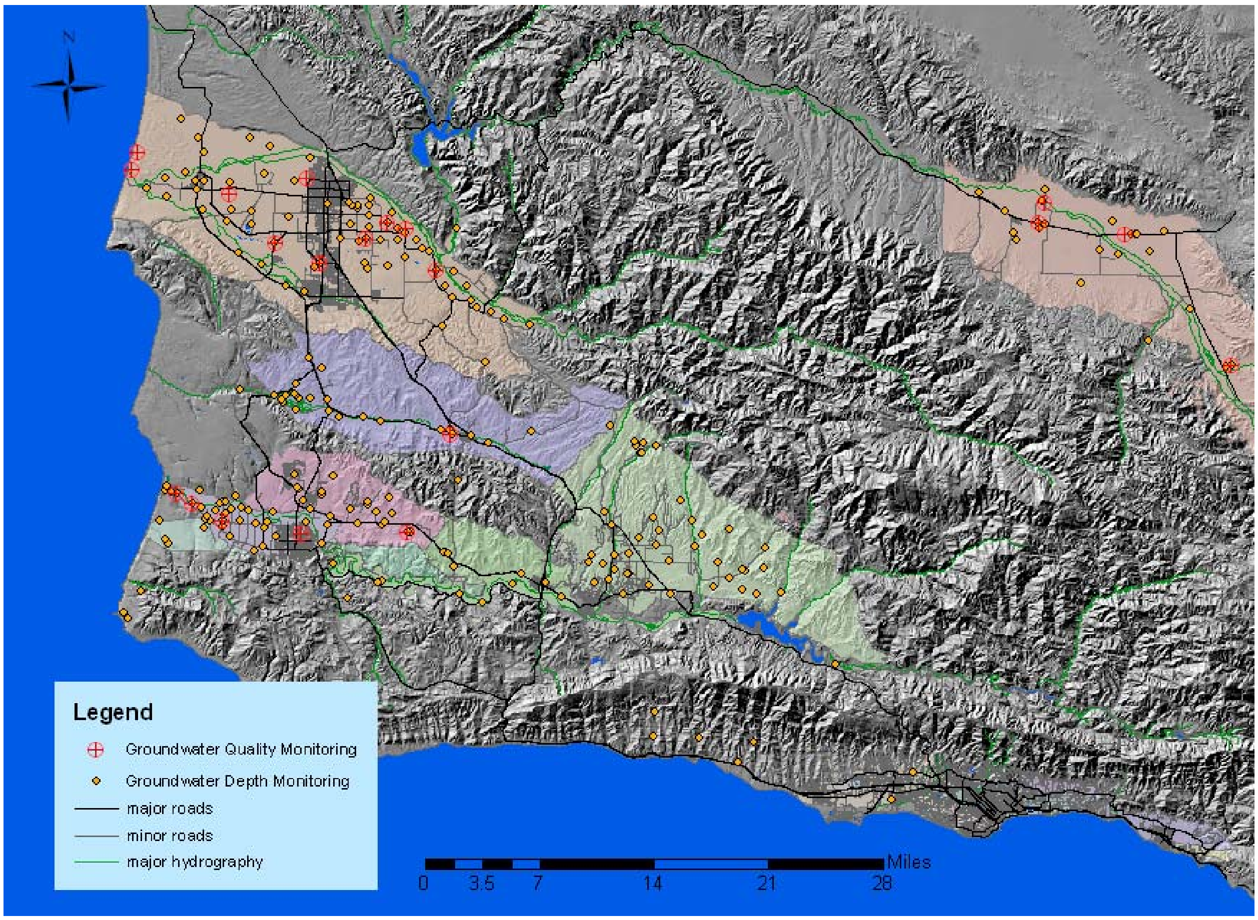
The term **Confined** is used to describe an aquifer, the upper surface of which is overlain by an impermeable layer that prevents any significant upward flow when the aquifer is totally saturated (filled) with water. When this type of aquifer is penetrated by a well the water in the well may rise above ground surface, due to the pressure head exerted on the aquifer, and if so may be described as **Artesian**.

Recharge is the sum of water entering the aquifer from direct deep **percolation** of rainfall, **seepage** from streams and rivers and return flows from irrigation. It is rainfall less losses of evaporation, evapotranspiration, diversion and outflow of the basin. It is the dominant parameter in the calculation of the status of a groundwater basin (surplus, equilibrium or overdraft). Data on actual net recharge by stream seepage and deep percolation of rainfall is very limited and thus is usually estimated or prorated from adjacent areas or historical studies. By utilizing differing “base periods” of climate (recharge) one can easily alter the outcome of the calculation of the status of a particular groundwater basin.

Well Monitoring and Data Collection

The Santa Barbara County Water Agency (SBCWA) currently monitors 283 wells for depth to groundwater throughout the County in cooperation with the United States Geological Survey (USGS). 27 sites include water quality. Individual water districts monitor many more wells. The illustration below shows the groundwater basins and indicates the locations of SBCWA observation wells.

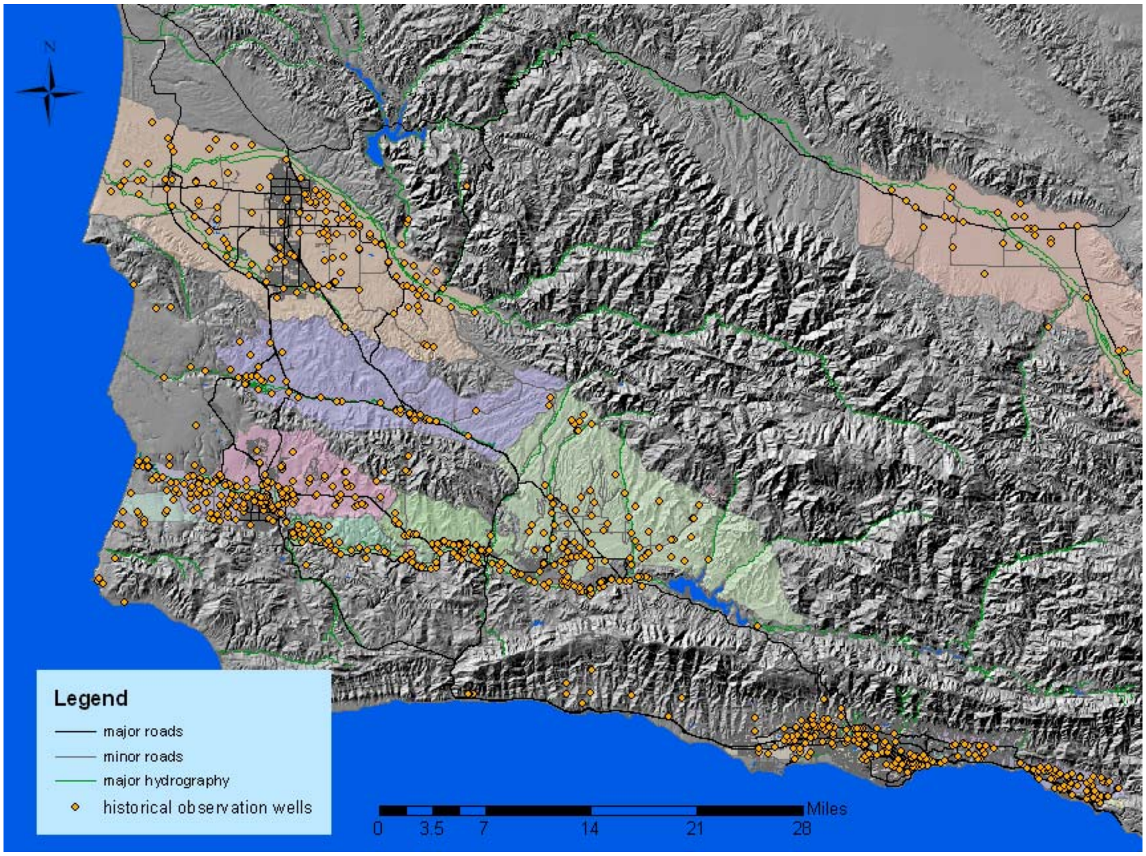
Current SBCWA groundwater quantity and quality observation sites



The County and local water districts cooperate with the United States Geological Survey (USGS) to collect and publish groundwater data. Because it is not feasible to include a discussion of each of these wells in this document, specific wells have been selected because each represents some hydrologic influence or portion of the basins in which they are located. Considerations include long-term record, lack of use or consistent water use over the period of record and centralized location with respect to the aquifers. Selected hydrographs for the entire period of record for representative wells are included in Appendix A.

There are historical records on many more sites than are currently being measured. These records were developed for a number of purposes including USGS investigations, prior inclusion in the County monitoring network, or measurements to address specific issues. The current monitoring network is sufficient to accurately reflect groundwater conditions throughout the County while being measured with a reasonable amount of resources. The graphic below describes the locations of these historical records.

Historical Groundwater Observation Sites



Note that most monitoring well records are from the low lying groundwater basins and Santa Ynez River Riparian Corridor.

Local water districts and municipalities currently monitor or fund monitoring of many sites in addition to those measured by Santa Barbara County. Agencies that currently have cooperative agreements with the USGS for *groundwater monitoring* besides the County Water Agency are the Carpinteria Valley Water District, City of Santa Barbara, Goleta Water District, Santa Ynez River Water Conservation District, United States Bureau of Reclamation (USBR), City of Lompoc and the Santa Maria Valley Water Conservation District. Agencies that provide information for this report but are not participants in the USGS program are Montecito Water District, the City of Santa Maria and California Cities Water Company. Monitoring frequencies vary among agencies and wells and reflect the data needs of the individual agency.

Carpinteria Valley Water District

The Carpinteria Valley Water District has an extensive network of monitoring wells in and near the Carpinteria Basin to track water level, quality and storage changes within the basin. Measurements are made bi-monthly or quarterly. A list of current monitoring sites by the Carpinteria Valley Water District is included in Appendix E.

Montecito Water District

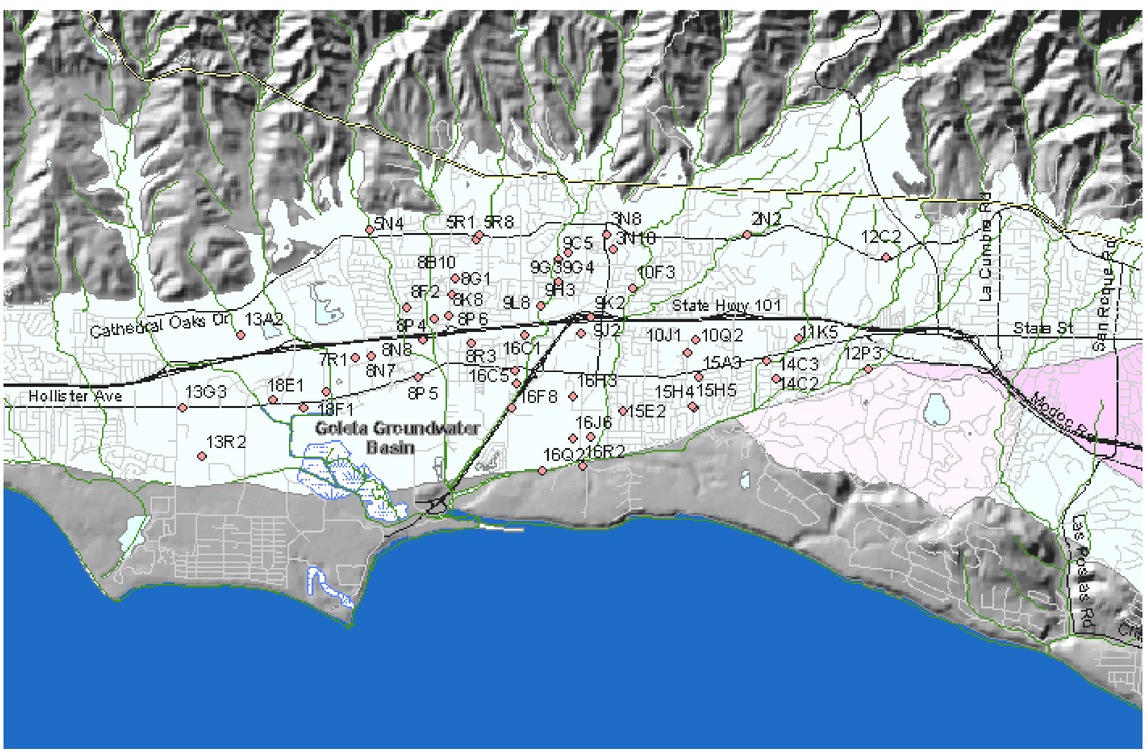
The Montecito Water District monitors 69 wells in and near the Montecito Basin to track water level, quality and storage changes within the basin. Most of the sites do not have an official State Well ID but the water districts own internal numbering system. For more information in this area please contact the Montecito Water District directly at 805-969-2271.

City of Santa Barbara

The City of Santa Barbara collects groundwater information in cooperation with the USGS on the sites listed in Appendix E. Data for these observation wells can be found on the City water website at http://www.santabarbaraca.gov/Government/Departments/PW/WaterData.htm Storage unit I pertains to the eastside and downtown parts of the City of Santa Barbara, Storage unit III pertains to the hidden valley and westside areas of the City, and the Foothill area pertains to the San Roque and La Cumbre areas of the City.

Goleta Water District

The Goleta Water District has an extensive network of monitoring wells in and near the Goleta Basin to track water level, quality and storage changes within the basin. The map below illustrates the spatial location of these sites.



United States Bureau of Reclamation

The USBR currently measures around 28 wells monthly listed in Appendix E in the Santa Ynez River Riparian Corridor to assess downstream groundwater conditions per California Water Resources Control Board Decision 89-18.

Water Quality Data Collection

Although partially funded through SBCWA programs, groundwater quality data is not collected directly by the SBCWA. Much of the data used in this report comes from the USGS, the Regional Water Quality Control Board, or local water agencies. This report discusses total dissolved solids (TDS) as an indication of general water quality, nitrates as an indication of possible return flow contamination and chlorides as an indication of possible seawater intrusion.

Data Collection Methodology

The majority of the representative wells used to create the hydrographs displayed in this report are currently measured by the County Water Agency. For these wells, groundwater depth is measured directly, one or two times per year, using a graduated steel tape. If conditions in a well preclude the use of the steel tape (such as if the well casing leaks), an electric sounder is used. Under ideal conditions, it has been the experience of Water Agency personnel that the steel tape is accurate to within two or three one hundredths of a foot. The accuracy of the electric sounder used by the Water Agency has been found to be somewhat less, typically five one hundredths of a foot.

Other methods for acquiring well measurements might include water stage (float) recorders that record water depths on graphs or punched tape. Stage recorders most often consist of a float and pulley device inserted into a well. Similarly, airline systems measure the pressure required to bubble gas out of a tube, the bottom of which is inserted below water in the well. If the precise elevation of the lower end of the tube is known, it is possible to determine the water depth. However, this method might only have an accuracy of plus or minus a foot (or more) depending on the accuracy of the pressure gage.

Geographic Information System

SBCWA has developed a GIS (geographic information system) to track and record groundwater data, and for analyzing and displaying historical groundwater data. Groundwater data may also be obtained from USGS at the website waterdata.usgs.gov, local water districts as well as SBCWA publications and files.

Drinking Water Standards

The following standards are provided for comparison purposes: the California Department of Health Services (DHS) secondary standard for total dissolved solids (TDS) in drinking water is 1,000 milligrams per liter (mg/l), maximum contaminant level. Secondary standards are applied at the point of delivery to the consumer. The DHS primary standard for nitrates (as NO3) in public drinking water systems is 45 mg/l and the DHS secondary standard for chloride in drinking water is 250 mg/l. DHS is in charge of "Source Water Assessments" and they are required of all "public water supplies" (with over 200 connections). For more information on the Drinking Water Source Assessment and Protection (DWSAP) Program please see the website at www.dhs.ca.gov/ps/ddwem/dwsap/guidance/index.htm.

Conclusions

The period 1991-2001 brought abundant precipitation to the local area and thus groundwater basins recovered after the drought of 1987-1990. Most basins peaked in 1999 after the historical wet year of 1998 however some down basin areas such as Guadalupe peaked as late as 2003. 2002-2004 were not recharge years. Even though 2003 was slightly above average in terms of precipitation the storms were so spread out that moisture never really exceeded soil capacity. Now after the extremely wet winter of 2004-2005 shallow wells have shown dramatic increases while the deeper wells were still falling as of early summer.

The County Public Works Department and the United States Geological Survey will continue the cooperative water resources monitoring program providing groundwater depth and quality (as well as surface water flow and quality) to evaluate water resources throughout the County. Groundwater observations of the last year revealed little change to significant conclusions reached in previous annual reports. Observations well measurements indicate that in the Cuyama Valley the downward groundwater level trend continues, in the Eastern Santa Maria Basin levels have dropped off dramatically, while in the Western Santa Maria Basin near Guadalupe levels appear to have just peaked in the past two years from water moving through the basin from the extremely wet 1990's and 2001 and now are beginning to decline. In the San Antonio Valley most well levels are declining. In the Santa Ynez and Lompoc Basins water levels have remained stable or only slightly declined.

Work on Groundwater management plans continue. Plans have been adopted for the Carpinteria, Montecito and Buellton Uplands Basins. A court action in 1989 set limits on pumping in the Goleta Basin and protects it from overdraft. Litigation continues on the Santa Maria Basin. Planning has been initiated for the Lompoc Plain Basin. State Water Project deliveries began in 1997 and most likely will have a beneficial impact on groundwater supply and quality with time.

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