WATER REPLENISHMENT DISTRICT OF SOUTHERN CALIFORNIA

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PRECIPITATION AND ITS EFFECT ON GROUNDWATER SUPPLY IN WRD'S REGION

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Introduction

Southern California is currently experiencing one of the driest years on record. Los Angeles area precipitation is less than 4 inches entering the summer months. This technical bulletin discusses historical precipitation in the Los Angeles area, how and where it is measured, and its relationships to groundwater replenishment and to local water supply.

How Precipitation Is Measured

Precipitation is typically measured with a rain gauge. Two types of rain gauges are commonly used. The standard device is a cylinder with a funnel opening at the top. Tipping bucket rain gauges are also used.

Figure 1 shows a photograph of a precipitation station at Signal Hill City Hall. The Los Angeles County Department of Public Works (LACDPW) maintains and operates many automated stations throughout the County with data updated continuously to a website (Ref. #1).

Figure 1—Automated tipping bucket precipitation station Signal Hill City Hall. Tipping mechanism shown in expanded photo at right.

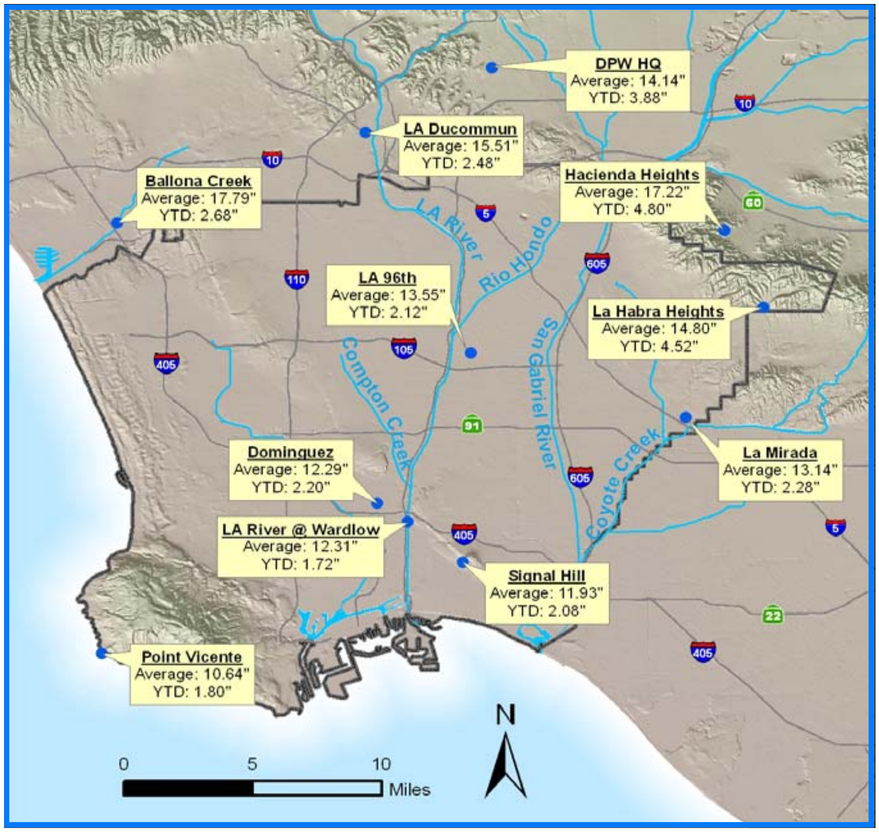

Figure 2—Automated LACDPW precipitation stations — Ref. #1.

Precipitation varies spatially across WRD's boundaries, as it does in any geographic area. Figure 2 shows official LACDPW continuous precipitation stations in and near WRD's service area. Average annual precipitation and the current year-to-date precipitation for each station are shown. Based on this map, Los Angeles area historical averages range from 10.64 inches to 17.79 inches, while current (water) year-to-date totals range from only 1.72 inches to 4.80 inches. Additional precipitation stations are operated in and around WRD's service area by the LACDPW, the National Oceanic and Atmospheric Administration (NOAA) and others.

Historic Los Angeles Precipitation

Precipitation has been recorded at the Los Angeles Civic Center for over 130 years (since 1876). This data is often referenced to represent Southern California rainfall and is convenient due to the length of record. Figure 3 is a graph of the rainfall data and shows the annual total (water year) precipitation in relation to the long-term average of 15 inches per year. This graph also indicates the running 10-year average. The running 10-year average helps to show extended wet and dry periods when it falls above or below the historic average. The graph shows that the Los Angeles area may have experienced four significant below average periods since 1876 with intervening above average periods. These periods appear to be cyclic and somewhat prolonged.

The far right side of the chart indicates the current water year total at about 3 inches, one of the lowest rainfall years on record. This low rainfall also draws the 10-year running average below the historic average. If low rainfall persists in the coming years, Southern California may experience another period (cycle) of below average precipitation.

and limit the actual amount of precipitation reaching the groundwater including urbanization, evapotranspiration, topography, soil types, and flood control facilities.

Groundwater underflow is a replenishment component that relies, in part, on the amount of precipitation falling in the adjacent groundwater basins.

Imported water is purchased from the Metropolitan Water District (MWD) for spreading at the Rio Hondo and San Gabriel spreading grounds. Availability of im-

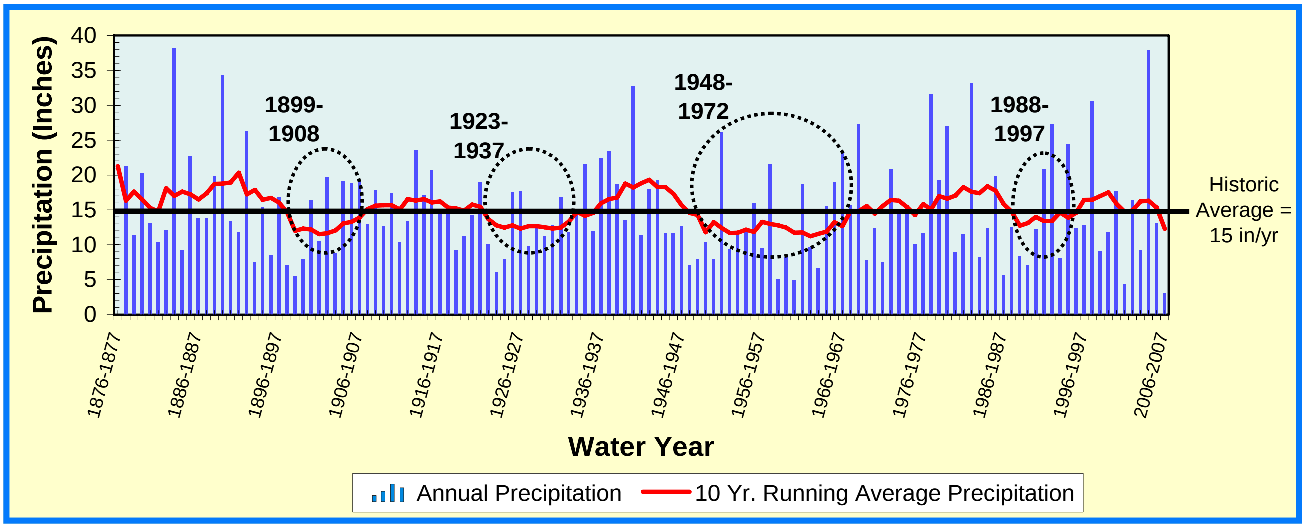

Figure 3—Historic precipitation at the Los Angeles Civic Center,1876 through present —Ref. #2.

Precipitation Effects On Replenishment Sources

Natural replenishment includes captured storm water, aerial recharge, and underflow. Artificial replenishment includes spreading and injection of imported and recycled water. Natural and artificial groundwater recharge and groundwater levels are intuitively related to precipitation, however the amount and timing of responses are not always simple and direct. The following are the sources of replenishment water for WRD.

Storm water is captured and spread primarily in the Rio Hondo and San Gabriel spreading grounds and is very effective at replenishing groundwater. When annual precipitation is limited to a few intense storms, less storm water is captured due to rapid filling of the spreading grounds causing the remaining water to be lost to the ocean.

Aerial recharge, primarily precipitation falling directly on the Central and West Coast Basins (CWCB), should have a direct effect on recharge. Many factors control

ported water is controlled by the State of California Department of Water Resources (DWR) and MWD and is related to river, reservoir, and snow pack levels based on precipitation in the Sierras and Colorado Basin.

Recycled water for recharge is the least dependent on precipitation. However, recharge facilities at Rio Hondo and San Gabriel spreading grounds must have capacity to take the permitted quantities of recycled water.

Challenges to CWCB groundwater management are present during both wet and dry precipitation periods and cycles. During dry periods, the challenge is to acquire sufficient artificial recharge water from Met and to maximize use of recycled water sources. Wet periods provide an opportunity to conserve and store plentiful storm water but take away capacity at spreading facilities for available imported water and recycled water. WRD manages these challenges through its projects and programs to fulfill its mission to provide, protect, and preserve high quality groundwater to the residents and businesses of the CWCB.

Reference Information Used for This Technical Bulletin: 1) http://ladpw.org/wrd/Precip/index.cfm 2) http://www.nwsla.noaa.gov/

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