II - WATERSHED CHARACTERISTICS

2-01 General Characteristics. Prado Dam is the primary flood control facility within the Santa Ana River watershed. The Santa Ana River watershed has an area of approximately 2,450 square miles, excluding a closed area of 32 square miles tributary to Baldwin Lake. During flood events, Prado Dam is operated as a component of the Santa Ana River flood control system. Using real-time telemetry and weather and runoff forecasts, releases from Prado Dam are coordinated with releases from other related Corps projects, such as San Antonio and Carbon Canyon Dams, to attain maximum flood protection for areas below these facilities. Of the total watershed, 2,255 square miles (or about 92 percent) are above Prado Dam. This includes approximately 177 square miles of the watershed above Seven Oaks Dam, which is another flood control project located on the upper Santa Ana River. While Seven Oaks Dam has an impact on inflow into Prado Dam, it is not yet operated for flood control purposes. Seven Oaks Dam will be operated for flood control prior to the start of water year 2003/2004, after the completion and acceptance of its final Water Control Manual in summer 2003. The Santa River basin and the existing flood control structures are shown on Plate 2-01.

Approximately 23 % of the watershed is within the rugged San Gabriel and San Bernardino Mountains, about 9 % is in the San Jacinto Mountains, and 5% is within the Santa Ana Mountains. Most of the remaining area is in valleys formed by broad alluvial fans along the base of these mountains and by the alluvial flood plains further downstream. The numerous low hills in the alluvial valley areas include a few low hills north of San Bernardino; the Crafton Hills east of Redlands; the Jurupa Mountains north and west of Riverside; the Box Springs Mountains and the Badlands located east of Riverside; the Chino Hills and the Peralta Hills northeast of Anaheim. In general, the mountain ranges are steep and sharply dissected. The maximum elevation at San Antonio Peak in the San Gabriel Mountains is 10,064 feet; at San Gorgonio Mountain in

the San Bernardino Mountains, the maximum elevation is 11,499 feet; and at Mount San Jacinto in the San Jacinto Mountains, the maximum elevation is 10,834 feet.

2-02 Topography. The San Bernardino Mountains are the source of the Santa Ana River and of two of its principal tributaries, Bear and Mill Creeks. Lytle Creek, the largest tributary originating in the San Gabriel Mountains, is in the northwest part of the drainage area. The San Jacinto River has its origin in the San Jacinto Mountains southeast of Beaumont. The main tributary in the lower part of the watershed (i.e., below Prado Dam) is Santiago Creek, which originates in the Santa Ana Mountains. The Santa Ana River has an average gradient of about 240 feet/mile in the mountains, about 20 feet/mile near Prado Dam, and about 15 feet/mile below the dam. The average gradient of the tributaries is about 700 feet/mile in the mountains and 30 feet/mile in the valleys.

Well developed growths of white fir, ponderosa pine, sugar pine, and Jeffrey pine occur above elevations of about 5,000 feet. Sparse growths of conifers and brush, including chaparral and manzanita, are common on the steep, rocky slopes of the higher mountains. Large areas on the higher slopes are covered by brush that has replaced timber removed by small-scale lumbering or that has been destroyed by forest fires. Oak and other deciduous trees, brush, and native grasses are the principal vegetal cover on the slopes below an elevation of about 5,000 feet. Large areas on the plateaus and hills are covered with grass and brush. Because of extensive urbanization, large segments of the valley areas have been cleared of most native vegetation. The remaining valley areas are covered mainly with orchards and crops.

2-03 Structures Affecting Runoff. There are currently five dams within the Santa Ana River watershed, which provide some degree of flood control. Three of the five dams are owned and operated by the U.S. Army Corps of Engineers, Los Angeles District; Prado, San Antonio, and Carbon Canyon Dams. Seven Oaks Dam was also constructed by the Corps of Engineers and has been turned over to the local sponsors for

regulation and operation and maintenance, effective October 1, 2003. Virtually all of the storage in the three Corps owned and operated projects are allocated for flood control and closely related purposes such as debris pools. At Prado Dam, the debris pool and an additional buffer pool are also operated for water conservation when they are not needed for flood control. The Corps cooperates with the Orange County Water District in achieving this purpose. Storage space at Seven Oaks Dam will also be dedicated to flood control, starting water year 2003/2004. Flood control operation of Seven Oaks Dam has been allowed as a result of the completion of the Section 7 consultation with the U.S. Fish and Wildlife Service for the evaluation of the original design document's prescribed water control plan to minimize impacts to endangered species. The final water control manual includes the design document's water control plan with built-in flexibilities to allow operation for endangered species, and scheduled to be completed in the summer of 2003. Until the approval of this manual, the approved Seven Oaks Dam Interim Water Control Plan (dated January 2000) will be followed.

The fifth dam is Villa Park Dam, which is owned and operated by the Orange County Public Facilities and Roads Department. The storage at this facility has been allocated for both flood control and water conservation purposes. The pertinent data sheet for Prado Dam is shown on the inside cover of this manual, and Exhibit A contains the Pertinent Data Sheets for San Antonio, Carbon Canyon, Seven Oaks, and Villa Park Dams.

In addition to these four dams, there are over 100 other water storage facilities within the Santa Ana River watershed having storage capacities ranging from 5 acre-feet, to 182,000 acre-feet. These other facilities can affect the flow of the Santa Ana River, but they do not provide any control of flood flows. Table 2-1 is a summary of the major water storage facilities within the Santa Ana River Watershed. Plate 2-02 is a schematic of the Santa Ana River Watershed showing the relative locations of the listed facilities.

Table 2-1
Major Water Storage Facilities
Within the Santa Ana River Watershed

Location	Drainage Area (sq-mi)	Storage (acre-feet)	Flood Control Capability
Prado Dam	2,255.0	196,235	Yes
Seven Oaks Dam	177	113,600	Yes**
San Antonio Dam	27.0	7,703	Yes
Carbon Canyon Dam	19.3	6,614	Yes
Villa Park Dam	20.4	16,044	Yes
Big Bear Lake	38.0	63,381	No
Railroad Canyon Reservoir	641.0	11,459	No
Lake Elsinore	52.0	122,500	Overflow/ Pumped*
Miller Basin	14.2	23	No
Santiago Dam	63.2	25,000	No
Santiago Creek Gravel Pits	9.1	13,299	No
Lake Mathews	40.0	182,804	No
Lake Hemet	67.0	14,000	No
Lake Perris	10.0	100,000	No

*Lake Elsinore acts as a natural sump for the San Jacinto River sub-basin. Flows from Lake Elsinore only occur during major flood events, when the lake is either pumped or actually overflows into Temescal Creek.

**Dam has been recently completed. Its operation for flood control is pending completion of the final Water Control Manual in the summer of 2003.