TESTIMONY OF GEORGE R. "ROY" LEIDY

16 APRIL 2007

Summary of Testimony

1. I was retained in 2005 by the San Bernardino Valley Municipal Water District (Muni) and the Western Municipal Water District (Western) to prepare an assessment of how the proposed Santa Ana River (SAR) Supplemental Water Supply Project (Project) would affect obligate[1] aquatic and semi-aquatic[2] public trust resources potentially impacted by the construction and operation of the Project.

2. In brief, my assessment shows that currently, viable,[3] persistent,[4] aquatic and riparian habitats and aquatic species are restricted to three specific reaches[5] of the SAR where perennial streamflows occur between Seven Oaks Dam and the Prado Flood Control Basin (i.e., the reach of the SAR potentially impacted by operation of the Project). The three reaches are as follows: 1) 0.16 mile of aquatic and riparian habitats 0.3 mile downstream of the Seven Oaks Dam plunge pool; 2) 2 miles of aquatic and riparian habitats downstream of the South Tippecanoe Avenue Bridge; and 3) 18 miles of aquatic and riparian habitats downstream from the RIX-Rialto[6] outfalls to the head of the Prado Flood Control Basin. These three reaches are separated from one another by miles of river channel where water flows intermittently. These intermittent river reaches do not currently support viable, obligate aquatic resources that can persist over time. Special-status native fishes are restricted to the SAR downstream of the RIX-Rialto outfalls. These native fish are unable to migrate upstream to the other two reaches with perennial

[1] Obligate = unable to exist without water.
[2] Semi-aquatic = partly aquatic.
[3] Viable = having the capacity to live, grow, germinate or develop.
[4] Persistent = capable of surviving over time at the population level.
[5] Reach = a length of river between two points.
[6] RIX = Rapid Infiltration/Extraction Wastewater Treatment Plant; Rialto = Rialto Wastewater Treatment Plant.

water due to: 1) intervening river reaches that are frequently dry; and 2) physical barriers to upstream fish passage. I found that the implementation of the proposed Project, with the incorporation of specific mitigation measures described in the Draft Environmental Impact Report (DEIR) for the Project, would not have any significant direct, indirect, or cumulative impacts on the long-term viability of obligate aquatic and semi-aquatic resources of the SAR. I also found that the proposed Project would be protective of the designated beneficial uses for the various SAR reaches as articulated by the California Regional Water Quality Control Board, Santa Ana Region (Regional Board) in the Water Quality Control Plan for the Santa Ana River Basin (Basin Plan).

Background and Qualifications

3. I have over 37 years of experience as an aquatic ecologist evaluating the impacts of water resource projects. I have directed numerous investigations relating to the effects of water projects on water quality, hydrology, fish, aquatic benthic macroinvertebrates[7], aquatic reptiles and amphibians, and riparian habitats. I have published technical documents addressing reservoir dynamics as they relate to aquatic resources. I also have provided expert witness testimony in proceedings related to water use and aquatic resources. I have testified before the State Water Resources Control Board and before judicial bodies. A more detailed description of my qualifications is contained in my resume, which is attached to this testimony as Muni/Western Ex. 9-1.

4. I am currently a principal technical professional and senior aquatic ecologist at EIP Associates, a division of PBS&J, for projects relating to biological resources. My specific activities are related to regional water planning, hydroelectric project licensing and post-licensing compliance, threatened and endangered species impact assessment, and the management of EIP's natural resources program.

[7] Aquatic benthic macroinvertebrates = invertebrates (e.g., insects, mollusks, crustaceans) that are visible to the unaided eye that live associated with the substrate in aquatic habitats.

5. My testimony is focused on aquatic biological resources that have the potential to be affected by the construction and/or operation of the proposed Project. These resources include aquatic benthic macroinvertebrates, fish, aquatic reptiles and amphibians, and riparian habitats. In order to make observations of the SAR under varying hydrological conditions and to observe the aquatic resources of the SAR, I have personally walked, at various times, the SAR from its confluence with Bear Creek downstream to the crossing of State Highway 60, a total distance of approximately 30 miles. I have conducted field studies and assessments at various locations along the SAR on numerous occasions over the past 15 years.

Impacts of Seven Oaks Dam Operation for Flood Control on Aquatic Resources *(Existing Conditions)*

Summary of Existing Flood Control Operations

6. Seven Oaks Dam (Muni/Western Ex. 9-2) was completed in December 1999 and is operated for flood control purposes. Starting October 1 of each year, releases at Seven Oaks Dam are reduced to a maximum of 3 cubic feet per second (cfs) in order to create a debris pool[8] behind Seven Oaks Dam of 2,948 acre-feet (af) at an elevation of 2,200 feet National Geodetic Vertical Datum[9] (NGVD). Muni/Western Ex. 9-3 is a storage allocation diagram for Seven Oaks Dam that illustrates the various reservoir pool relationships (U.S. Army Corps of Engineers, Los Angeles District. September 2003. *Water Control Manual. Seven Oaks Dam & Reservoir, Santa Ana River, San Bernardino County, California*, Plate 7-01A). The Seven Oaks Dam debris pool contains the equivalent amount of water from a two-year flood event (U.S. Army Corps of Engineers, Los Angeles District. 1988. *Santa Ana River Design Memorandum No. 1. Phase II GDM on the Santa Ana River Mainstem including Santiago Creek*. Volume 7. Hydrology. Plate 7-28) and

[8] Debris pool = A body of water behind a dam that functions to capture any material, including floating or submerged trash, suspended sediment, or bed load, moved by a flowing stream. The debris pool protects the upstream face of the dam from physical damage during flood events.

[9] All elevations given in my testimony are referenced to this datum.

functions to protect the upstream dam face from the force of inflowing water. The appearance of the debris pool, once established, is illustrated by Muni/Western Ex. 9-4. Once the debris pool target elevation is reached all inflow is released. The debris pool is held until the end of the flood season on March 1 and then drained to the SAR downstream of the dam during July and August. During July and August all water inflow to the debris pool, plus an additional increment of water necessary to empty the debris pool is released. During flood events, Seven Oaks Dam will store water destined for Prado Dam as long as the reservoir pool behind Prado Dam is rising and the pool at Seven Oaks Dam is not approaching the spillway elevation of 2,580 feet (147,969 af). When the reservoir pool at Prado Dam is rising, releases at Seven Oaks Dam are generally limited to 500 cfs. Once the water surface elevation at Prado Dam peaks and starts to recede, Seven Oaks Dam releases will be made, ranging from 2,000 cfs or less, depending on the water level in the reservoir, to a maximum rate of 7,000 cfs.

7. Flood control operations can, thus, result in the storage of water behind Seven Oaks Dam. These operations vary from year-to-year depending on the intensity, timing, and frequency of storms and runoff characteristics within the upper SAR watershed. In some dry water years, stormwater may not be stored behind Seven Oaks Dam. In other wetter water years, such as water year 2004-2005, substantial quantities of water can be stored for variable periods of time and with variable areas of inundation. Typically, larger runoff events will result in more reservoir area being inundated and a longer water retention time.

8. Seven Oaks Dam has substantially altered the natural hydrology of the SAR, with the largest changes occurring during and after periods of high stream flow (i.e., flood flows). Overall, the completion of Seven Oaks Dam has altered the discharge rate, depth, velocity, and volume of flow in the SAR downstream of the dam.

The Existing Aquatic Environment Upstream of Seven Oaks Dam

9. For purposes of this testimony the Project-related impacts associated with operations are evaluated for seven segments of the SAR for cross-referencing to the Project EIR. Each segment of the river is delineated using criteria that have important implications for the analysis of Project-related impacts. These segments are illustrated in Muni/Western Ex. 9-5 and Ex. 9-125. The segments are defined as follows:

- Segment A – Seven Oaks Dam plunge pool upstream to the confluence of the SAR with Bear Creek (River Mile (RM) 70.93 to Bear Creek (about RM 78.0), or 7.07 miles);

- Segment B – Seven Oaks Dam plunge pool downstream to the Cuttle Weir (RM 70.93 to RM 70.46, or 0.47 mile);

- Segment C – Cuttle Weir downstream to just upstream of the confluence with Mill Creek (RM 70.46 to RM 68.59, or 1.87 miles);

- Segment D – Mill Creek confluence downstream to just upstream of "E" Street (RM 68.59 to RM 57.69, or 10.9 miles);

- Segment E – "E" Street downstream to just upstream of the RIX and Rialto outfalls (RM 57.69 to RM 53.49, or 4.2 miles);

- Segment F – RIX and Rialto Drain outfalls downstream to just upstream of the Riverside Narrows (RM 53.49 to RM 45.2, or 8.29 miles); and

- Segment G – Riverside Narrows downstream to the Prado Flood Control Basin (RM 45.2 to RM 35.5, or 9.7 miles).

Segment A

Segment A extends from the Seven Oaks Dam plunge pool upstream to the confluence with Bear Creek (i.e., from RM 70.93 upstream to approximately RM 78.0). Muni/Western Ex. 9-6 is an aerial view of the relevant portion of Segment A from Seven Oaks Dam upstream to the Southern California Edison (SCE) Powerhouse No. 1. Key geographic locations in Segment A cited in my testimony are identified on Muni/Western Ex. 9-6.

10. Segment A of the SAR is identical to Reach 6 of the Basin Plan as defined by the Regional Board. The current beneficial use designations for this segment that are related to aquatic biological resources are: 1) Cold Freshwater Habitat; 2) Wildlife Habitat; and 3) Spawning, Reproduction, and Development. The key characteristics of Segment A are:

- Perennial streamflow providing year-round Cold Freshwater Habitat upstream of the SCE Powerhouse No. 1 only (Leidy, personal observations, 1996-2007);

- Intermittent streamflow with intermittent Cold Freshwater Habitat and intermittent Warm Freshwater Habitat only downstream of SCE Powerhouse No. 1 to Seven Oaks Dam (Leidy, personal observations, 1996-2007);

- Both rainbow trout (*Oncorhynchus mykiss*) and brown trout (*Salmo trutta*) are resident fish in the Alder Creek and Warm Springs Creek ceinegas, as well as the debris pool, but nowhere else downstream of the SCE Powerhouse No. 1. These fish are not known to spawn in these ceinegas, but rather are believed to be individuals passively washed downstream to the ceinegas from upstream of the SCE Powerhouse No. 1 during high runoff events. Both trout species are known to occur and reproduce

upstream of the SCE Powerhouse No. 1 (Leidy, personal observations, 1996-2007);

- Obligate riparian vegetation downstream of SCE Powerhouse No. 1 that provides Wildlife Habitat is found only at the Alder Creek Cienega and the Warm Springs Cienega (Leidy, personal observations, 1996-2007);

- The Alder Creek Cienega is subject to the impacts of high flow events, but is not affected by partial inundation during flood control operations except during floods with a 100-year or greater return frequency;

- Most (69 percent) of the Warm Springs Cienega is currently impacted annually by flood control operations when the debris pool is created each fall (Muni/Western Ex. 9-4). All of this cienega is subject to inundation and sedimentation during flood events with a return frequency of 10 years or less; and

- Most of the SAR channel between Seven Oaks Dam and the SCE Powerhouse No. 1 is comprised of alluvial sand, rock, and boulder. The channel is subject to routine braiding. The primary vegetation types along the alluvial channel are early seral[10] plant species that colonize rapidly following runoff events that disturb the channel (Leidy, personal observations, 1996-2007).

11. In evaluating the biological impacts from flood control operations at Seven Oaks Dam, the U.S. Army Corps of Engineers (Corps) recognized that the impacts would be variable over time, depending on the runoff characteristics in any given year. With respect to aquatic resources upstream of Seven Oaks Dam, the Corps concluded that because of expected sedimentation conditions, all of the floodplain, including riparian vegetation, from the dam to the 50-year flood pool

[10] Early seral = early developmental stage of a plant community.

elevation (258 acres) would be lost (i.e., up to an elevation of 2,425 feet) (Muni/Western Ex. 9-7 and 9-8). Muni/Western Ex. 9-9 illustrates the upstream limit of 50-year flood pool in the SAR Canyon relative to the upstream debris pool limit on an aerial photograph for perspective. Similarly, the Corps concluded that 50 percent of the floodplain vegetation between the 50-year flood pool elevation and the maximum flood pool elevation of 2,580 feet (an additional 163 acres) would be lost (U.S. Army Corps of Engineers, August 1988. *Final Supplemental Environmental Impact Statement, Santa Ana River Mainstem Including Santiago Creek, Phase II General Design Memorandum. Counties of Orange, Riverside and San Bernardino*).

12. The Corps' *Final Supplemental EIS* (FSEIS) identified these losses as a significant impact. The FSEIS included 100 percent mitigation for sensitive biological resources up to the 50-year flood pool elevation, and further mitigation to reduce all of the biological impacts above the 50-year elevation to a less than significant level. The FSEIS specifically recognized the loss of herpetofauna[11] due to: 1) drowning and habitat alteration; 2) loss of riparian habitat; and 3) the loss of trout spawning habitat upstream of the dam. Biological surveys upstream of Seven Oaks Dam did not reveal the presence of the federally listed as endangered arroyo toad (*Bufo californicus*), the federally listed as threatened California red-legged frog (*Rana aurora draytonii*), or the federally listed as threatened Santa Ana sucker (*Catostomus santaanae*). Also, the southwestern willow flycatcher (*Empidonax traillii extimus*), a federally listed as endangered bird that depends upon riparian habitats for breeding, was not found within the area potentially affected by flood control operations.

13. During the 2004-2005 flood season, the Corps' predictions of impacts from flooding to aquatic resources were tested when a significant volume of water was captured over time that increased the flood pool by 8 March 2005 to an maximum elevation of 2,392.4 feet, nearly 200 feet higher in elevation than the debris pool

[11] Herptofauna = amphibians and reptiles.

(Muni/Western Ex. 9-10). This elevation equates to 42,936 af of water and an inundation area of 348 acres. This level of inundation was 32.6 feet less than the 50-year one-day flood pool elevation of 2,425 feet. (Muni/Western Ex. 9-4) provides a view of the extent of flooding in March 2005. Muni/Western Ex. 9-9 also provides a different view of the upstream limit of this flood pool which is the maximum pool that has occurred to date since Seven Oaks Dam became operational in 1999. The 50-year flood event would inundate an additional 3,075 feet of the SAR in comparison to the 8 March 2005 maximum flood pool to date.

14. A series of photographic exhibits greatly aid in understanding the impact of the 2004-2005 runoff events on the aquatic and riparian (as well as terrestrial) resources of Segment A. Muni/Western Ex. 9-11 and 9-12 illustrate the appearance of the SAR Canyon looking upstream (north) from the confluence of SAR and Warm Springs Creek before and after the flood control operations. Muni/Western Ex. 9-13 illustrates the appearance of the flood pool from the dam at near the maximum elevation reached in March 2005. Muni/Western Ex. 9-14 illustrates the flood pool from the dam one month later after some of the flood storage had been discharged. Muni/Western Ex. 9-15 provides an aerial view of the Seven Oaks Dam flood pool as it was rising. The highly turbid water and floating debris is readily visible. Muni/Western Ex. 9-16 illustrates a similar view up the SAR Canyon as the flood pool was increasing in elevation in March 2005.

15. Within this inundation zone, the channel of the SAR was substantially disrupted and vast quantities of sand, rock, boulders, and organic debris were deposited as illustrated by Muni/Western Ex. 9-17 and 9-18. The area within the reservoir pool known as the Warm Springs Cienega was inundated and buried beneath sediment for a prolong period of time (Muni/Western Ex. 9-19) which resulted in the elimination of all riparian plant species except the yellow willow (*Salix lutea*) and Lemmon's willow (*Salix lemmonii*). These willow species, while substantially damaged, did resprout along the SAR channel after the reservoir was dewatered (Leidy, personal observation, 2005). Other important riparian species,

for example, the white alder (*Alnus rhombifolia*), were killed (Muni/Western Ex. 9-20). Within the zone of inundation, it is probable that most other aquatic biological resources were eliminated or severely reduced in abundance (Muni/Western Ex. 9-21).

16. Upstream of the area inundated during the 2004-2005 flood season, there was substantial damage to the bed, banks, and river terraces of the SAR due to the force of the water and moving debris during flooding. Large quantities of sand and rock were moved and redeposited. Alder Creek changed its channel location at its confluence with the SAR. Most of the riparian vegetation that occurred at the Alder Creek Cienega was removed or damaged. Instead of the formerly dense canopy of riparian vegetation along this cienega (Leidy, personal observations, 1996-2004), there remained a sparse, open canopy of larger trees, particularly white alder. The SAR channel was scoured to bedrock (Leidy, personal observation, 2005).

17. In the 2005-2006 flood control season, the Warm Springs Cienega was again substantially altered due to at least two or more flood events. Muni/Western Ex. 9-22 through 9-27 show the appearance of the Warm Springs Cienega following the 2005-2006 floods. The first substantial flood event sheared off the tops of the dead white alders killed in the 2004-2005 flood season, as is seen in Muni/Western Ex. 9-23. The even shear-line seen in the exhibit represents the original alluvial surface prior to the flood event. Next, a second flood event substantially eroded the original surface by approximately 15 feet, as can be seen in Muni/Western Ex. 9-25 and 9-26. The eroded sediment was carried downstream to the debris pool (Muni/Western Ex. 9-27).

18. The effect of the floods of 2005-2006 was to substantially destroy the Warm Springs Cienega as a functioning riparian habitat for wildlife. While a few yellow and Lemmon's willows survived the floods and were resprouting in 2007, many

of the plants found in the cienega in 2007 were terrestrial and exotic. The exotic tree tobacco (*Nicotiana glauca*) was abundant.

19. In contrast to the severe impact the floods had on the Warm Springs Cienega, the Seven Oaks Dam debris pool, following the flood events, provided excellent aquatic habitat (Muni/Western Ex. 9-28). In early 2007, I observed adult Pacific chorus frog (*Pseudacris regilla*), Canyon treefrog (= California treefrog) (*Pseudacris cadaverina*), and larval western toad (*Bufo boreas*) at the debris pool. Aquatic invertebrates, for example, sideswimmers (*Gammarus* sp.), were abundant in the water. Several species of waterfowl were using the pool. Several people were fishing for trout (Leidy and Thompson, personal observations, 2007).

20. Subsequent to the completion of Seven Oaks Dam and subsequent to the 2004-2005 flood season, the U.S. Fish and Wildlife Service (USFWS) designated critical habitat for the federally listed as endangered southwestern willow flycatcher, including 25.3 miles of the upper SAR extending from the face of Seven Oaks Dam upstream to the headwaters of the SAR (Muni/Western Ex. 9-29). There is currently no suitable breeding habitat for this species within the maximum high waterline of the flood pool due to the absence of dense riparian vegetation. Consequently, while the southwestern willow flycatcher may move through the Project area, the hydrological regime of the SAR and the flood operations of the dam will prevent any suitable breeding habitat for this bird from developing. It is assumed that the Corps will meet the necessary obligations related to southwestern willow flycatcher (avoidance of impacts or mitigation as necessary) as part of its on-going Endangered Species Act (ESA) obligations for operations at Seven Oaks Dam.

21. In general, water quality is temporarily degraded during flood events due to increased sediment transport, soil erosion, and inputs of organic debris. This has already occurred in the flood pool at Seven Oaks Dam following the 2004-2005 and 2005-2006 runoff events. Water quality measurements were attempted by

Muni/Western during early 2005 when the flood pool was substantial; however, all access roads were destroyed and access was not possible.

22. Extended water impoundment occurred in 2004-2005. During the summer period higher water temperatures can cause water column stratification and lower concentrations of dissolved oxygen which can lead to anaerobic conditions near the reservoir bottom. Anaerobic conditions can also cause several other water quality parameters to degrade. Examples include:

- Hydrogen sulfide can be generated in quantities harmful to aquatic life when materials containing sulfur, for example, organic detritus and mineral sulfides, are available;

- Ammonia can be generated from nitrogen-containing material and un-ionized ammonia, in particular, can be toxic to many aquatic organisms, including trout;

- Anaerobic conditions can lower the pH, which can result in the release of trace metals found in bottom sediments; and

- Local nuisance conditions, for example, algal blooms resulting from high nitrogen and phosphorus levels, and mosquito breeding, are more likely to occur.

23. Anaerobic conditions may have already occurred in the water of the debris pool behind Seven Oaks Dam following the 2004-2005 flood season. The degree to which such conditions may occur in the future depends on the frequency, magnitude, and duration of flood events.

24. Surface water quality data were collected for selected parameters during the release of water from the Seven Oaks Dam from June 2005 through July 2006

(the 2005-2006 flood season). Muni/Western Ex. 9-30 summarizes the water quality data reflective of the flood pool. Water quality data were collected at the outlet of the Bear Valley Bypass. Water discharged at this location is water that has been directly released from the flood pool of Seven Oaks Dam. I do not know from what water depth in the flood pool the discharged water was drawn; however, all of the parameter values are within current water quality standards. The dissolved oxygen concentration measured may be greater than the flood pool water concentration because it is immediately aerated upon discharge. To the degree that the data in Muni/Western Ex. 9-30 are representative of water stored behind Seven Oaks Dam (once flooding has ceased and sediment settled), there are no indications of any chronic water quality problems that would affect aquatic resources.

25. The two-striped garter snake (*Thamnophis hammondii*), a California Department of Fish and Game (CDFG) Species of Special Concern, has been reported to occur in both the Warm Springs Cienega and the Alder Creek Cienega by the California Natural Diversity Data Base (CNDDB) and by Leidy (Leidy, personal observations, 2001 and 2005). No other special-status aquatic amphibians or reptiles are known from Segment A;

26. In summary, upstream of Seven Oaks Dam, flood control operations have resulted in a substantial impact on aquatic and riparian resources, particularly in the Warm Springs Cienega, just as predicted by the Corps in its FSEIS. Today, the existing conditions show the virtual elimination of the Warm Springs Cienega as a functioning riparian habitat for wildlife and a slow recovery of the riparian plant community at the Alder Creek Cienega. While the 2004-2005 and 2005-2006 flood events likely eliminated or severely depressed aquatic invertebrates, fish, and aquatic reptiles and amphibians within the inundation area, these resources are capable of recolonization over time and will do so, as noted by my observations at the debris pool in April 2007. The degree to which these

resources recover is directly related to sedimentation and habitat loss from future flood events.

The Existing Aquatic Environment Downstream of Seven Oaks Dam

27. Currently, diversions from the SAR downstream of Seven Oaks Dam are made by senior water rights claimants and the San Bernardino Valley Water Conservation District. Releases of water from the dam are made in accordance with the *Water Control Plan* issued by the Corps and the guidelines contained in the 2002 Biological Opinion (BO) issued by the USWFS.

Overview of Existing Aquatic Resources Occurring Between
Seven Oaks Dam and the Prado Flood Control Basin

28. As stated in my initial testimony, viable, persistent, obligate aquatic habitats and aquatic species are restricted to three specific reaches of the SAR where perennial streamflows occur between Seven Oaks Dam and the Prado Flood Control Basin: 1) 0.16 mile of aquatic habitat 0.3 mile downstream of the Seven Oaks Dam plunge pool (Segment B); 2) 2 miles of aquatic habitat downstream of the South Tippecanoe Avenue Bridge (Segment D); and 3) 18 miles of aquatic habitat downstream from the RIX-Rialto outfalls (Segments F and G) (Muni/Western Ex. 9-31). These three reaches are separated from one another by miles of river channel where water flows intermittently. These intermittent river reaches do not currently support viable, obligate aquatic resources that can persist over time. Muni/Western Ex. 9-32 illustrates the known occurrences of special-status public trust aquatic and riparian resources along the SAR in relationship to the river reaches with perennial streamflow. It is clear that all of these special-status species are only associated with those perennial stream reaches and not those reaches where streamflow is intermittent.

29. The obligate riparian vegetation between Seven Oaks Dam and the Riverside Narrows varies from non-existent to dense, depending on the frequency, magnitude, and duration of water available to the plants. Where persistent, riparian vegetation is typically a mixture of southern willow scrub and southern cottonwood-willow riparian forest (Muni/Western Ex. 9-33). In wetter areas (hydro-mesic) not regularly disturbed by flooding, the riparian vegetation is predominately mature black willow (*Salix goodingii*), red willow (*Salix laevigata*), arroyo willow (*Salix* lasiolepis), Frémont cottonwood (*Populus frémontii*), western sycamore (*Platanus racemosa*), and the exotic giant reed (*Arundo donax*). Other species associates include Mexican elderberry (*Sambucus mexicana*), wild grape (*Vitus girdiana*), Emory baccharis (*Baccharis emoryi*), umbrella sedge (*Cyperus eragrostis*), and Olney bulrush (*Scirpus olneyi*) (Leidy and Thompson, personal observations, 2005 and 2007). Large patches of this community type occur discontinuously downstream along many segments of the SAR beginning downstream from the confluence with San Timoteo Creek. A small patch occurs upstream of the Cuttle Weir. In areas regularly disturbed by flooding, the plants are not able to mature into a forest and the young plants form riparian scrub (Muni/Western Ex. 9-34).

30. In drier areas, with variable surface and groundwater, the vegetation types are predominately sand/wash communities, such as alluvial scrub (Muni/Western Ex. 9-35). Dominate species include mulefat (*Baccharis salicifolia*), sand bar willow (*Salix hindsiana*), the invasive, exotic salt cedar (*Tamarix* sp.), various weedy herbaceous species, and non-native grasses (Leidy and Thompson, personal observations, 2005 and 2007).

31. Aquatic and riparian habitats downstream of Seven Oaks Dam are restricted to the presence of perennial water or saturated soil conditions. In addition to occurrences of species found in hydro-mesic communities, other species associated with this these habitat types include bur marigold (*Bidens laevis*), yellow water weed (*Ludwigia peploides*), willow weed (*Polygonum*

lapathifolium), cattail (*Typha* sp.), water speedwell (*Veronica anagaliis-aquatica*), green flatsedge (*Cyperus virens*), water cress (*Rorippa* sp.), and knot grass (*Paspalum distichum*) (Leidy and Thompson, personal observations, 2005 and 2007).

32. Knowledge of aquatic benthic macroinvertebrates (BMIs) downstream of Seven Oaks Dam along the SAR is limited by a lack of site-specific data. Well-developed BMI communities are only found where permanent water is present because most species, primarily aquatic insects, require at least one year to mature. The diversity and abundance of BMIs depends on numerous factors, for example, substrate, water depth, water velocity, and water quality. The BMI community directly downstream of the Seven Oaks Dam plunge pool (Segment B) was examined by me in 2005. The substrate was entirely large coble and boulder (Muni/Western Ex. 9-36). Here, the BMI community was found to be predominately limited to the exotic aquarium snail *Radix* sp. and to numerous leaches (Class Hirudinea). The presence of these taxa indicates generally poor water quality at this location. Alternatively, directly downstream of the confluence of the SAR with San Timoteo Creek (Segment D), the substrate is primarily sand with some gravel (Muni/Western Ex. 9-37). Here, dragonfly naiads[12] of the family Gomphidae were abundant (Leidy, personal observation, 2006). These large predators indicated an abundant food supply and higher quality water. As a general observation, the BMI communities along the SAR were most diverse where the habitat types, particularly substrates, were also diverse. Locations subject to intermittent streamflow had substantially less species diversity and total BMI numeric abundance, if BMIs were present at all (Leidy, personal observations, 2005-2007).

33. Native amphibian populations are limited to common species along the SAR. These taxa include the Pacific chorus frog, the Canyon treefrog, western toad, and the western spadefoot (*Scaphiopus hammondii*). The non-native bullfrog (*Rana*

[12] Naiad = the aquatic nymph or juvenile life-stage.

catesbeiana) has been observed downstream of the confluence of SAR with San Timoteo Creek (Segment D) (Swift and Leidy, personal observations, 2006), and upstream of the La Cadena Drive Bridge (Segment E) (Leidy and Thompson, personal observations, 2005). Also, the non-native African clawed frog (*Xenopus laevis*) was collected in San Timoteo Creek at its confluence with the SAR (Swift and Leidy, personal observations, 2006). Despite field surveys, the native arroyo toad, California red-legged frog, and mountain yellow-legged frog (*Rana muscosa*) have not been reported between the Seven Oaks Dam and the Prado Flood Control Basin located 35.4 miles downstream.

34. Many of the aquatic amphibians only utilize available water supplies in the spring and summer breeding season (i.e., semi-aquatic species). Some species, for example the western spadefoot and western toad, aestivate[13] deep underground during the hot summer period. Others, for example the non-native bullfrog and African clawed frog, are present year around in suitable habitats where perennial water exists. The bullfrog is considered to have significantly adversely impacted native amphibian species through direct competition for resources and by predation.

35. As many as 33 non-native fish species have been reported to occur in the Santa Ana River watershed (EIP Associates January 2003. *Santa Ana Integrated Watershed Plan. Volume 2. Environmental and Wetlands Component.* Prepared for the Santa Ana Watershed Project Authority, Riverside, California). The introduced fish species known to be present or likely to be present between the Prado Flood Control Basin and Seven Oaks Dam include golden shiner (*Notemigonis crysoleucas*), fathead minnow (*Pimephales promelas*), goldfish (*Carassius auratus*), common carp (*Cyprinus carpio*), black bullhead (*Ameiurus melas*), channel catfish (*Ictalurus punctatus*), western mosquitofish (*Gambusia affinis*), bluegill (*Lepomus macrochirus*), green sunfish (*Lepomis cyanellus*), and Mozambique tilapia (*Oreochromus mossambica*). Against this formidable array

[13] Aestivate = pass the summer or dry season in a dormant or torpid state.

of competitors and predators, only three native fish taxa[14] remain (out of eight native fish taxa under pristine conditions) between the Prado Flood Control Basin and Seven Oaks Dam: arroyo chub (*Gila orcutti*); Santa Ana sucker; and the undescribed subspecies of dace known as the Santa Ana speckled dace (*Rhinichthys osculus* ssp.).

36. The Santa Ana sucker, a federally listed as threatened species and a CDFG Species of Special Concern, the arroyo chub, not federally listed but considered a CDFG Species of Special Concern, and the Santa Ana speckled dace, also not federally listed but considered a CDFG Species of Special Concern, are found in limited suitable habitats from the RIX-Rialto outfalls downstream to the Prado Flood Control Basin (Segments F and G) (Muni/Western Ex. 9-5). These fish do not currently occur between the RIX-Rialto outfalls and Seven Oaks Dam, a distance of 17.4 miles. Until recently, the Santa Ana speckled dace was reported to occur in the SAR at the confluence of San Timoteo Creek (RM 58.5) (Swift, personal communication, 2005) (Muni/Western Ex. 9-5). Field sampling at this location in 2006 failed to detect this taxon, nor was it observed by me in 2007. It is believed that this fish is extirpated from the mainstem SAR at this location (Swift and Leidy, personal observations, 2006; Leidy and Thompson, personal observations, 2007).

37. The persistence of the Santa Ana sucker, arroyo chub, and Santa Ana speckled dace downstream of the RIX-Rialto outfalls[15] is primarily due to: 1) tertiary treated wastewater from the Rialto Wastewater Treatment Plant; 2) tertiary treated wastewater from the RIX Wastewater Treatment Plant; 3) tertiary treated wastewater from the City of Riverside Wastewater Treatment Plant; 4) rising groundwater resulting from the geological constriction at Riverside Narrows; and 5) seasonal inflow from several small tributaries to the SAR. While winter and

[14] Taxa = a taxonomic group of any rank.

[15] Until about 1985 most of the surface water downstream of RM 49.0 percolated to the local groundwater leaving the lower part of Segment F dry. Flows are now perennial due to the RIX-Rialto discharges.

spring inflows from Mill Creek and other tributary streams can contribute substantial additional streamflows to the SAR, these water inputs are seasonal and do not ensure the survival of suckers, chubs, and dace during the low-flow season. During this period, only these predominately artificial water inputs maintain perennial streamflow and allow these two native fish species to persist.

38. As noted previously, during the 2004-2005 flood season, Seven Oaks Dam captured a significant volume of flood water that, in turn, was metered out to the SAR over the non-flood season. Mill Creek and other tributaries also provided an additional seasonal inflow to the SAR. Due to the releases from Seven Oaks Dam and the inflow from tributaries, the SAR experienced variable streamflows for most of the 2005 summer, a period during which the river would typically be dry in most years from the Cuttle Weir downstream to San Timoteo Creek. During this period of unusually high flows in the SAR (summer 2005), Rosemary Thompson, Ph.D., and I walked the SAR from Seven Oaks Dam downstream to the State Highway 60 Bridge (RM 70.93 to RM 49.5) in order to observe the distribution of aquatic resources during periods of sustained streamflow (Muni/Western Ex. 9-5). The only fish species observed were mosquitofish at the old E Street stream gage weir (Segment D at RM 57.7) and at the drop structure downstream of the La Cadena Drive Bridge (Segment E at RM 54.5), and arroyo chub and Santa Ana sucker downstream of the RIX Wastewater Treatment Plant outfall (Segment F at RM 53.5). These sites were locations that have perennial streamflow and were known to historically support fish. In 2006, Camm Swift, Ph.D., and I seined for fish from the old "E" Street stream gage (RM 57.7) upstream to the confluence of San Timoteo Creek (RM 58.5) (Muni/Western Ex. 9-5). Our objective was to see if Santa Ana speckled dace were still present in this stream reach. This reach is nearly one mile long and it is perennial due to intermittent inflow from San Timoteo Creek and the upwelling of groundwater caused by the Bunker Hill Dike (San Jacinto Fault). Speckled dace were not found; however, the non-native mosquitofish, non-native green sunfish, non-native African clawed frog, and non-native bullfrog were present.

39. During this same field survey, Dr. Swift and I also observed arroyo chub and Santa Ana sucker downstream of the RIX-Rialto outfalls, a location where these fish have been consistently found.

40. The observations that I made with Dr. Thompson verified that there were a number of barriers to fish movement upstream along the SAR between the RIX-Rialto outfalls and "E" Street in river Segment E. The most significant of these barriers is the concrete drop structure beneath the Interstate 10/Interstate 215 interchange (RM 57.5) (Muni/Western Ex. 9-5). The sloped concrete pad is approximately 160 feet in length creating a drop in elevation of approximately 15 feet. No fish species can pass upstream over this structure at any streamflow discharge. The second barrier is a concrete and rock grouted drop structure immediately downstream of the La Cadena Drive Bridge in Segment E (RM 55.5). This structure is approximately 15 feet in height and is impassible.

Existing Aquatic Resources by River Segment

Segment B

41. River Segment B is a short stream reach, 0.47 mile in length, and it extends from the Seven Oaks Dam plunge pool downstream to the Cuttle Weir (Muni/Western Ex. 9-5). The gradient (slope) of this segment is a moderate 3.51 percent. This reach is within Reach 5 of the Basin Plan. The beneficial uses designated for this reach that could pertain to aquatic resources are: 1) Warm Freshwater Habitat; 2) Wildlife Habitat; and 3) Rare, Threatened or Endangered Species. The Regional Board notes in the Basin Plan that: "Most of this reach [Reach 5, Seven Oaks Dam to the City of San Bernardino] tends to be dry, except as a result of storm flows, and the channel is largely operated as a flood control facility" (Basin Plan 1995, p. 1-6).

42. Muni/Western Ex. 9-38 provides an aerial view of Segment B and Muni/Western Ex. 9-39 provides a view of the segment from the top of Seven Oaks Dam. Key aquatic characteristics of this segment are as follows:

- Permanent southern cottonwood-willow riparian woodland occupies approximately 500 feet (0.09) mile of the segment due to permanent water. This woodland is bordered by a narrow band of mulefat scrub (Muni/Western Ex. 9-40 and 9-41);

- Riparian scrub mixed with mulefat scrub occupies approximately 400 feet (0.07 mile) of the segment, also due to permanent water (Muni/Western Ex. 9-42);

- The plunge pool is essentially devoid of obligate riparian vegetation (Muni/Western Ex. 9-43);

- The 0.3-mile reach immediately downstream of the plunge pool is devoid of riparian vegetation (Muni/Western Ex. 9-44);

- The reach from the USGS Mentone gage to the Cuttle Weir is devoid of obligate riparian vegetation (Muni/Western Ex. 9-45 and 9-46);

- Wetlands and ponded water occupy a small area at the entrance to the Auxiliary River Pickup where there is permanent water. This location is not part of the SAR channel;

- Each of these riparian habitat types is currently subject to scour and potential elimination during flood releases at Seven Oaks Dam;

- With the exception of the southern cottonwood-willow riparian woodland and the wetland and ponded habitats, all other habitat types are currently

subject to dewatering and desiccation due to reservoir operations (Leidy, personal observation, 2005);

- There are no fish in Segment B;

- The Cuttle Weir would be a barrier to the upstream movement of fish were they present in Segment C downstream;

- The two-striped garter snake, a CDFG Species of Special Concern, has been recently reported in the CNDDB to occur just upstream from the Cuttle Weir. There are no other known special-status aquatic species in Segment B;

- Segment B, while having a short reach with perennial water, is isolated from downstream areas with perennial water, such as the SAR at San Timoteo Creek, by over 11 miles of dry stream during typical hydrological conditions during the summer and fall; and

- The overall quality of the aquatic habitat in this segment is poor due to the engineered characteristics of the channel and streamflow fluctuations that routinely disrupt aquatic resources.

Segment C

43. Segment C extends from the Cuttle Weir downstream to just upstream of the confluence of Mill Creek, a distance of 1.87 miles (Muni/Western Ex. 9-5). The gradient of Segment C averages a moderate 2.71 percent. This segment is also part of Basin Plan Reach 5 and has the same designated beneficial uses as Segment B. Muni/Western Ex. 9-47 provides an aerial view of this segment, while Muni/Western Ex. 9-48 through 9-55 provide typical ground-level views of

the SAR channel during wet and dry conditions. Key aquatic characteristics of this segment are:

- The upper reach of the SAR channel in this segment was substantially scoured and incised during releases from Seven Oaks Dam in 2005 (Muni/Western Ex. 9-48 and 9-49). The highest releases approached 1,200 cfs which has steepened the channel slope and coarsened the bed material (Muni/Western Ex. 9-50 and 9-51);

- With the exception of one large willow and one small willow at the Greenspot Road Bridge, Segment C does not support any obligate riparian vegetation or wetlands (Muni/Western Ex. 9-52 and 9-53). Mulefat, an early colonizer of disturbed sites, and not an obligate wetland plant, is scattered along the segment. A few exotic tamarisks are also found (Muni/Western Ex. 9-54 and 9-55);

- The segment is usually completely dry during the summer through fall of most years; therefore, there are no fish, or obligate aquatic amphibians or reptiles present. For the same reason, there are no persistent BMIs present in Segment C. Over the period of record from WY 1967 through WY 2000, the streamflow in Segment C under current conditions is predicted to be zero (0 cfs) on 75.3 percent of the total days of record with Seven Oaks Dam in place. This statistic is consistent with the statement quoted previously from the Basin Plan;

- Seasonal streamflow in the spring and summer may provide limited breeding habitat in rare wet water years for such amphibians as western toad, Pacific chorus frog, and Canyon treefrog; however, these semi-aquatic species are not persistent in this segment under current conditions;

- There are no known special-status aquatic species in Segment C; and

- The overall quality of aquatic habitat in Segment C is extremely poor under existing conditions due to the absence of streamflow most of the time in any given year.

Segment D

44. Segment D extends from the confluence of Mill Creek with the SAR downstream to just upstream of "E" Street, a distance of 10.9 miles (Muni/Western Ex. 9-5). This segment is also part of Basin Plan Reach 5 and has the same beneficial uses as Segment B. Muni/Western Ex. 9-56 is an aerial photograph of Segment D. This segment is best understood as two distinct reaches due to different hydrological characteristics. The upstream reach has water intermittently while the downstream reach has semi-perennial to perennial water sufficient to maintain obligate riparian vegetation and obligate aquatic species. Key aquatic characteristics of the upstream intermittent reach are:

- Muni/Western Ex. 9-57 provides an aerial view of this subreach, while Muni/Western Ex. 9-58 and 9-59 provide typical ground-level views of the SAR channel during periods of streamflow and no flow. This reach comprises the majority of Segment D (8.2 miles or 75 percent of the segment), and extends from the confluence of Mill Creek (RM 68.59) downstream to the South Tippecanoe Avenue Bridge over the SAR (RM 59.7). The gradient of this reach of Segment D is 1.39 percent. The reach has intermittent flow during the low flow season despite having substantial seasonal tributary inflow from Mill Creek, City Creek, Plunge Creek, and minor other tributaries. Over the period from WY 1967 through WY 1999, with Seven Oaks Dam in operation, it is estimated that 58.3 percent of the total days of record had zero (0 cfs) flow in this reach at the upstream reach boundary;

- What little riparian vegetation that exists in this reach is comprised predominately of small, shrubby willows and mulefat;

- There are no fish in this intermittent reach.

- There are no persistent BMIs in this intermittent reach;

- There are no known special-status aquatic species in this intermittent reach; and

- The overall quality of aquatic habitat in the intermittent reach of Segment D is extremely poor due to the absence of perennial water.

45. Muni/Western Ex. 9-60 is an aerial photograph of the semi-perennial to perennial reach of Segment D. Key aquatic characteristics of the downstream perennial reach of Segment D are:

- From the South Tippecanoe Avenue Bridge downstream to "E " Street, a distance of about two miles, more surface water accumulates due primarily to the Bunker Hill Dike (San Jacinto Fault) and seasonal inflow from San Timoteo Creek (Muni/Western Ex. 9-61), making this reach more likely to have perennial water. The gradient of this reach of Segment D is a low 0.65 percent;

- The reach from South Tippecanoe Avenue Bridge downstream to the confluence of San Timoteo Creek, about one mile in length, is occasionally intermittent in dry water years; nevertheless the groundwater table is immediately beneath the surface and it maintains obligate wetland plants and a well-developed riparian forest even with the seasonal absence of surface streamflow (Muni/Western Ex. 9-62);

- Riparian vegetation also becomes more abundant and dense along the margins of the SAR channel in a downstream direction from the South Tippecanoe Avenue Bridge (Muni/Western Ex. 9-63 through 9-65). The riparian vegetation is primarily southern cottonwood-willow riparian woodland with limited areas of marsh habitat. This riparian habitat is known to support breeding by the southwestern willow flycatcher and least Bell's vireo (*Vireo bellii pusillus*). As more groundwater up-wells to the surface, the riparian community becomes well developed (Muni/Western Ex. 9-66);

- Until recently, the Santa Ana speckled dace was reported to occur in the SAR at the confluence of San Timoteo Creek (RM 58.5) (Swift, personal communication, 2005). Field sampling at this location in 2006 failed to detect this fish, nor did field observations in 2007. It is presumed that this fish is extirpated from the mainstem SAR at this location (Swift and Leidy, personal observations, 2006; Leidy and Thompson, personal observations, 2007);

- The only known fish to currently occur in the perennial reach of Segment D are the non-native mosquitofish and the non-native green sunfish (Swift and Leidy, personal observations, 2006). These fish are known to prey on the larvae of native amphibians;

- The only known amphibians to occur in this perennial reach are the non-native bullfrog and the non-native African clawed frog (Swift and Leidy, personal observations, 2006);

- The aquatic benthic macroinvertebrate communities of the perennial reach are limited to those communities that are adapted to a soft bottom of primarily sand and fines, with scattered gravel patches;

- Overall, the quality of the aquatic habitat of the lower reach of Segment D is only fair to moderate. While the reach typically has perennial water, there is a limited diversity of aquatic habitat types due to the generally sandy nature of the channel. The wide, shallow channel is subject to routine channel braiding and is not stable. Also, importantly, the only fish and amphibians documented to occur in this reach recently are all non-native exotics that pose a threat to native aquatic species; and

- The obligate riparian vegetation in the perennial reach of Segment D is excellent habitat for numerous wildlife species, including the endangered southwestern willow flycatcher and least Bell's vireo.

Segment E

46. Segment E of the SAR extends from "E" Street downstream to just upstream of the RIX-Rialto outfalls, a distance of 4.2 miles (Muni/Western Ex. 9-5). The segment has a low gradient of 0.43 percent. Only the upstream 0.02 mile of this segment is included in Basin Plan Reach 5, the remainder being in Reach 4. The beneficial uses of Reach 4 that may pertain to aquatic resources are: 1) Warm Freshwater Habitat; and 2) Wildlife Habitat. Muni/Western Ex. 9-67 provides an aerial view of this segment, while Muni/Western Ex. 9-68 through 9-71 provide typical ground-level views of the SAR channel during wet and dry water years. Key aquatic characteristics of this segment are:

- Segment E receives seasonal tributary inflows from Lytle and Warm creeks which join the SAR just downstream of the Interstate 10/Insterstate 215 interchange. From November to April, this segment generally has flow along its entire length; however, from May to October the SAR streambed typically dries out from approximately RM 54.5 downstream to the RIX-Rialto outfalls at RM 53.49. In 2007, Segment E was dry on 6 April upstream of the USGS gage which is only 0.4 mile downstream

from "E" Street. The stream only had surface water on this date from "E" Street downstream 0.25 mile. Modeling the influence of Seven Oaks Dam under existing conditions indicates that 54.0 percent of the total days of record had zero (0 cfs) flow in this segment at the upstream segment boundary;

- Most of the SAR channel in this segment is broad, sandy, and highly permeable, reflecting the slight gradient and substrate composition (Muni/Western Ex. 9-68 and 9-70). The stream channel frequently changes location, often leaving riparian vegetation to perish without water. The limited riparian vegetation present is primarily riparian scrub and mulefat;

- The limited riparian habitat that is present is not suitable for use by breeding southwestern willow flycatchers or the least Bell's vireo because it is too small in aerial extent and has too low of a tree density;

- There are two barriers to the upstream movement of fish and other aquatic species in this segment. The upstream barrier is the concrete drop structure beneath the interchange of Interstates 10/ 215 (Muni/Western Ex. 9-72). The elevation change is approximately 15 feet. The downstream barrier is a concrete and rock-grouted drop structure at the South La Cadena Drive Bridge crossing of the SAR (Muni/Western Ex. 9-73). The elevation change at this structure is also about 15 feet;

- No viable populations of fish are in Segment E due to its intermittent hydrology. Dr. Rosemary Thompson and I observed mosquitofish, a non-native fish, in small rock pools at the base of the South La Cadena Drive Bridge drop structure during our 2005 reconnaissance of the SAR. These fish would soon perish as the water evaporated or percolated into the channel substrate;

- Similarly, there are probably no long-term viable populations of water-obligate amphibians or BMIs in Segment E due to intermittent hydrology. During the field reconnaissance that Dr. Thompson and I conducted in 2005, we found numerous desiccated carcasses of juvenile bullfrogs in the reach of Segment E upstream of the South La Cadena Drive Bridge (Muni/Western Ex. 9-68). Surface water had percolated into the sandy streambed leaving these non-native frogs to perish;

- There are no known special-status aquatic resources in Segment E; and

- Overall, the quality of aquatic habitat in Segment E was poor due to intermittent hydrology, the absence of well-developed riparian vegetation, barriers to aquatic resource movement, and the wide, sandy, unstable character of the SAR channel.

Segment F

47. SAR Segment F extends from the RIX-Rialto outfalls (RM 53.49) downstream 9.29 miles to just upstream of the Riverside Narrows (RM 45.2) (Muni/Western Ex. 9-5). The channel gradient is 0.43 percent, the same as Segment E. About two-thirds of Segment F is in Basin Plan Reach 4 and one-third in Reach 3. The beneficial uses that may apply to aquatic resources in Reach 3 are identical to Reach 4 with the addition of Rare, Threatened or Endangered Species. Muni/Western Ex. 9-74 provides an aerial view of this segment. Muni/Western Ex. 9-75 provides a typical ground-level view of the SAR channel in Segment F for any water year type. Key aquatic characteristics of this segment are:

- River Segment F receives inflow from wastewater discharges from the RIX and Rialto wastewater treatment plants (WWTPs). In WY 2001 these two facilities discharged 57,750 af (or 80 cfs on a mean annual basis) of

tertiary treated water, and this volume could increase in the future to 59,000 af/year (or 82 cfs);

- Segment F and locations downstream flow year-round due to the effluent discharges, rising groundwater, and urban and agricultural runoff. Modeling the influence of Seven Oaks Dam on streamflows in Segment F confirms that there are no days of zero (0 cfs) flow in this segment;

- Typically, Segment F has well-developed riparian habitat that is primarily southern cottonwood-willow riparian forest or woodland. The channel moves in response to flood events and some reaches are highly braided;

- Mature riparian vegetation provides breeding habitat for the southwestern willow flycatcher, least Bell's vireo, and yellow-billed cuckoo;

- The federally listed as threatened Santa Ana sucker, the arroyo chub, a CDFG Species of Special Concern, and the Santa Ana speckled dace, also a CDFG Species of Special Concern, occur in this reach with other non-native fishes. The sucker, chub, and dace are closely associated with the RIX-Rialto discharges and one of the few known spawning locations for the sucker is in the Rialto outfall (*aka* Rialto Channel or Rialto Drain) (Muni/Western Ex. 9-76 and 9-77);

- There are no known special-status aquatic reptiles and amphibians in this segment; and

- Due to the perennial streamflows in this segment of the SAR, the overall quality of aquatic habitat is moderate to good, depending on location. Habitat for the sucker, chub, and dace is not ideal; nevertheless, this segment and Segment G are the primary remaining habitats for these native fish on the SAR valley floor. The continued survival of these three

fish on the valley floor in Segment F depends, at this time, substantially on the treated wastewater from the RIX and Rialto WWTPs.

Segment G

48. SAR Segment G extends from the Riverside Narrows (RM 45.2) downstream to Prado Flood Control Basin (RM 35.5), a distance of 9.7 miles (Muni/Western Ex. 9-5). The stream gradient is very slight at 0.19 percent. This segment is entirely within Basin Plan Reach 3. Streamflow is perennial throughout the segment due to inflow from WWTPs and groundwater up-welling. Muni/Western Ex. 9-78 provides an aerial view of this segment. Key aquatic characteristics of Segment G are:

- Segment G represents a continuum from Segment F. Typically, Segment G has well-developed riparian habitat that is primarily southern cottonwood-willow riparian forest or woodland;

- The developed riparian vegetation provides breeding habitat for numerous riparian-dependent songbirds, such as the yellow warbler (*Dendroica petechia brewsteri*) and yellow-breasted chat (*Icteria virens*);

- The Santa Ana sucker, arroyo chub, and Santa Ana speckled dace are known from this segment;

- There are historical records in the CNDDB for the southwestern pond turtle (*Emys marmorata pallida*), a CDFG Species of Special Concern, in this river segment. There are no other known occurrences of special-status aquatic reptiles and amphibians;

- In this segment of the SAR, the overall habitat quality is good due primarily to perennial streamflow, habitat diversity, riparian vegetation

that provides habitat for many species, and a more stable river channel. The primary limitation of aquatic resources is the impact of non-native aquatic species and their collective adverse affect on native aquatic species.

49. In summary, the aquatic resources of the SAR from Seven Oaks Dam downstream to the beginning of river Segment F are substantially restricted by periods with no surface water under existing conditions. Segments F and G have perennial streamflows and, as expected, aquatic resources are more abundant and diverse. There are no native fish upstream of Segment F. Native aquatic amphibians and reptiles may be present in Segments F and G where water is present. These species may occur elsewhere upstream of Segment F in suitable habitats; however, the abundance and distribution of these species in the SAR is currently limited by the seasonal availability of water. I have prepared a summary table (Muni/Western Ex. 9-79) as an aid in understanding the occurrence of special-status aquatic species in the Project area under existing conditions and to what extent current operations of Seven Oaks Dam impact special-status aquatic resources.

Impacts of Seven Oaks Dam Operated for Seasonal Water Conservation on Aquatic Resources

(Project Conditions including Operation and Construction)

50. The details of how the different seasonal water storage alternatives were evaluated are presented in the testimony of Robert Beeby, P.E.. Rather than repeat his detailed testimony, I have focused on the impacts of seasonal water storage under the so-called "worst-case" scenario, i.e., the Corps' Alternative 3. This alternative would result in a maximum seasonal storage of 50,000 af. Muni/Western incorporated the Corps' Alternative 3 into their seasonal storage Scenarios A and B. Under Project Scenarios A and B, up to 50,000 af (elevation 2,418 feet) could be seasonally impounded at Seven Oaks Dam in wet water years

when water was available. Such storage would have a water surface elevation almost 200 feet above that of the existing debris pool, but below the 100 percent mitigated area associated with flood operations during a 50-year flood event. Operation of the dam for seasonal conservation storage as specified under the Project would involve normal flood control operations in the typical winter flood months of October through February. At the beginning of March each year, the seasonal conservation pool would be expanded to a target conservation storage of 50,000 af in those years of sufficient inflow. From March through May, inflow would be released from the dam after the target storage elevation was reached. From June through September, all inflow plus an additional increment of release would be made to ensure that both the conservation pool and debris pool would be drained by the end of September. The target storage levels by month are presented in the Project FEIR in Table 2.2-2 (page 2-26).

Upstream of Seven Oaks Dam

Segment A

51. Assuming a statistical repeat of the hydrological conditions that occurred over the period from WY 1962 through WY 2000, the manner in which daily storage at Seven Oaks Dam under the Project would differ from No Project (i.e., Existing Conditions) is summarized in Muni/Western Ex. 9-80. To create this exhibit, the water storage values for No Project and for Project (Scenario A) were compared one-to-one by water year for all 14,245 days of record. The following statistics were calculated: 1) number of days that water storage in the reservoir under Scenario A was greater than or equal to the debris pool elevation of 2,200 feet and also exceeded water storage under No Project; 2) the number of days that water storage under Scenario A and No Project was both greater than or equal to the debris pool elevation of 2,200 feet and the storage values were identical; and 3) the number of days that water storage under No Project exceeded water storage

under Scenario A when the Scenario A pool was greater than or equal to the debris pool elevation of 2,200 feet.

52. Under Project Scenario A, which includes a seasonal storage element and a diversion rate of 1,500 cfs, daily storage is anticipated to exceed the daily storage that would occur under the No Project alternative on approximately 683 days or 4.8 percent of the total days in the comparison (Muni/Western Ex. 9-80). Similarly, both scenarios had 203 days when their respective water storage values were identical, or 1.4 percent of the total days evaluated. Interestingly, the No Project alternative exceeded the water storage of Scenario A on 144 days, or 1 percent of the total days. Project storage would never exceed the highest volume of storage that would occur under No Project when the flood pool exceeded 50,000 af. Of the 14,245 days used in this analysis, water storage under Scenario A was less than the debris pool elevation of 2,200 feet on 13,562 days, or 95.2 percent of days. Since the debris pool is created each year during the flood control operations season, this statistic demonstrates how few days out of the total number of days that Scenario A even exceeded the debris pool, much less exceeded the No Project flood pool.

53. While the Project would result in a total of 683 days of additional storage above the debris pool behind Seven Oaks Dam, the additional storage would occur in only 7 of the 39 years of record, or 18 percent of the years (Muni/Western Ex. 9-80). During the remaining 82 percent of years, there would be no difference between the Project and No Project as measured by days of reservoir water storage greater than or equal to the debris pool. In WY 1978, water storage under Scenario A exceeded water storage under No Project on only two days, an insignificant difference. During 6 years, however, the water storage under Scenario A exceeded storage under the No Project on 39 to 217 days. The impact on aquatic resources of the Project during these 6 years when the conservation pool would exceed the reservoir pool under No Project is actually beneficial to aquatic resources because a greater volume of water is available, albeit

temporarily, for fish and other aquatic species to utilize, assuming no water quality problems arise. The impact of additional storage time due to the conservation pool can be evaluated further by examining both the difference in water depth (additional inundation time and inundation depth) and storage volume (additional aquatic habitat availability) between the two operating alternatives.

54. Muni/Western Ex. 9-81 through 9-86 illustrate the reservoir water storage elevations and differences in water depth for those 6 years when Scenario A results in a substantial difference in the number of days of water storage compared to the No Project alternative. The analysis focuses on the potential impacts to the Warm Springs Cienega which currently is defined to extend from the debris pool elevation of 2,200 feet up to a maximum elevation at the upstream head of the cienega of 2,229 feet. Muni/Western Ex. 9-81 indicates that in WY 1969, a very wet water year, that the Warm Springs Cienega would have been flooded by late January and would have remained flooded under both Scenario A and No Project until mid-March, a period of about 45 days. Water surface elevation (and water depths) would have risen to a maximum of more than 100 feet greater than the debris pool elevation. All but the most resilient, flood-tolerant aquatic plants, for example, willow species, would have been eliminated in the Warm Springs Cienega under both Scenario A and No Project. During WY 1969, the water storage elevations of Scenario A remained substantially greater than the No Project storage elevations from mid-March through late September. While most, if not all, of the aquatic and riparian vegetation in the Warm Springs Cienega would have been destroyed during the initial flooding and inundation under both operational alternatives, any residual vegetation would have been eliminated by the extended period of inundation due to Scenario A.

55. During WY 1980 (Muni/Western Ex. 9-82), both Scenario A and No Project would have resulted in sustained inundation of the Warm Springs Cienega from at least mid-February through late August. The result would have been the total loss of vegetation in the cienega due to flooding impacts and prolonged inundation.

56. In WY 1983, (Muni/Western Ex. 9-83), the Warm Springs Cienega would have been inundated partially to totally for short periods of time of less than one month under both Scenario A and No Project until late May. Non-aquatic and riparian vegetation would have been eliminated due to flood impacts and inundation under both alternatives. Scenario A inundated all or part of the Warm Springs Cienega from late May until early August. All but the most resilient riparian plants would have died during this period due to inundation, assuming that the scouring action of flood events had not destroyed this vegetation.

57. Muni/Western Ex. 9-84 demonstrates that during WY 1993, both Scenario A and No Project would have eliminated any aquatic or riparian vegetation in the Warm Springs Cienega due to prolonged inundation from early January through mid-May, assuming that the scouring action of flood events did not destroy this vegetation, as noted for WY 1983.

58. In WY 1995 (Muni/Western Ex. 9-85), the Warm Springs Cienega was again inundated from early March through mid-April, a period of about 45 days. All non-resilient riparian vegetation would have been killed due to prolonged inundation and/or flood scour under both Scenario A and No Project. Scenario A continued to inundate the cienega until early May, but the additional inundation time would not have made any substantial difference in vegetation mortality.

59. Finally, in WY 1998 (Muni/Western Ex. 9-86), only Scenario A inundates all or part of the Warm Springs Cienega from late May through early August. This period of inundation would be expected to eliminate most, if not all, of the aquatic and riparian vegetation in the cienega.

60. The forgoing analysis does not account for the independent impact of substantial sediment deposition that probably has more of an impact on aquatic resources, particularly vegetation, than inundation by itself. Over the period of analysis, many feet of sediment would have been deposited and eroded from Warm Springs

Cienega, as noted previously in my testimony for the 2004-2005 and 2005-2006 flood seasons. It is questionable whether the Warm Springs Cienega would remain as a functioning aquatic and riparian habitat under such conditions. In any event, the available data demonstrate that Scenario A does not have a substantially greater impact on the Warm Springs Cienega and its associated aquatic resources than does the No Project alternative based on the impacts of water storage as it relates to inundation frequency, magnitude, and duration.

61. The storage elevation data for the 6 water years when Scenario A maintained a substantially greater number of days of water storage than did the No Project alternative can be converted to the storage volume in acre-feet and used to analyze impacts to aquatic resources. These results are presented in Muni/Western Ex. 9-87 through 9-92. While the two water volume metrics are often similar during portions of the 6 water years analyzed, Scenario A provided substantially more volume, and consequently more aquatic habitat, than did the No Project alternative in WYs 1969, 1980, 1983, and 1998 (Muni/Western Ex. 9-87, 9-88, 9-89, and 9-92). Only in 1993 and 1995 were the two operational scenarios similar; however, even then Scenario A provided slightly more aquatic habitat than did the No Project alternative (Muni/Western Ex. 9-90 and 9-91). These data indicate that the Project (Scenario A) has a beneficial impact, although temporary, on the availability of aquatic habitat for obligate aquatic species, for example trout, and semi-aquatic species, for example amphibians, to the degree that the flood events that create the reservoir storage do not substantially adversely effect these species. The additional water availability following flood events may assist some aquatic species in recovering from the floods themselves by providing an aquatic environment of sufficient duration for breeding in some water years.

62. The foregoing exhibits indicate that under Project Scenario A, water would be held longer in the Seven Oaks Reservoir flood pool above the debris pool elevation of 2,200 feet on about 4.8 percent of total days more than would

otherwise be the case without the Project. This simply means that in some flood years, specific locations within the inundation zone would be underwater longer with the Project than with No Project. As noted previously, however, the impacts to aquatic and riparian habitats at the Warm Springs Cienega are not substantially different than the No Project alternative based on the impacts of water storage as it relates to inundation frequency, magnitude, and duration. Some benefit may accrue to aquatic resources from the additional time that the reservoir pool is present in some water years.

63. Currently, the riverbed upstream of Seven Oaks Dam up to the 50-year flood elevation of 2,425 feet is predominately mulefat which is recolonizing along the braided channels from the 2004-2005 and 2005-2006 flood events. Two willow species are also developing again at the substantially disrupted Warm Springs Cienega. Riparian habitats along the SAR that were not destroyed by scour or sedimentation during the 2004-2005 and 2005-2006 floods were severely damaged by the flood discharge itself. With the operation of Seven Oaks Dam as primarily a flood control facility, the repeated cycle of flooding and biological recovery will continue into the future. Statistically, flood events will be frequent and severe enough to keep the riparian plant community along the SAR in a continuous state of disruption/recolonization/recovery as illustrated in Muni/Western Ex. 9-17 and 9-22, previously presented.

64. Mature riparian habitats will not develop within the reservoir's flood control pool at elevations less than the 50-year flood event. To illustrate this statement, I return to Muni/Western Ex. 9-7 which shows the relationship of flood frequency relative to the location of the Warm Springs Cienega, the only obligate riparian vegetation between the dam and the 50-year flood elevation. Quite clearly, any recovering riparian vegetation at the Warm Springs Cienega (for example, yellow and Lemmon's willows), would be impacted again at a frequency of 10 years or less. As stated previously, the debris pool, once full, contains the same volume of water as the two-year flood event. The annual creation of the debris pool for

flood control operations inundates most (69 percent of the original pre-dam cienega) of the Warm Springs Cienega as shown previously in Muni/Western Ex. 9-4 and 9-9. Furthermore, Muni/Western Ex. 9-8 demonstrates that over the 100-year operational horizon for Seven Oaks Dam, about 100 feet of sediment would be deposited over portions of the cienega in response to cycles of deposition and scour. The Alder Creek Cienega is almost entirely upstream of the 100-year flood event and it has the potential to mature more fully, depending on the severity of flood scour on the cienega.

65. It is noted that the USFWS designated habitat from Seven Oaks Dam upstream to the headwaters of the SAR as critical habitat for the southwestern willow flycatcher. As stated previously, due to the natural hydrology of the upper SAR and operation of Seven Oaks Dam for flood control, the effects of flooding will prevent the riparian community at the Warm Springs Cienega from developing into the dense riparian habitat required for flycatcher breeding. The flood events of 2004-2005 and 2005-2006 support this conclusion. The flycatcher may migrate through the Project area to more suitable habitats elsewhere.

66. As a further observation, I note that the flood events of 2004-2005 and 2005-2006 have provided excellent examples of flood impacts related to inundation under existing conditions. During March 2005 the reservoir pool reached 2,392.4 feet, 32.6 feet lower than the 50-year flood pool elevation of 2,425, and only 19.2 feet lower than the maximum water storage elevation of 2,411.6 feet that would occur if the proposed Project were implemented. The upstream extent of these flood pools was previously illustrated in Muni/Western Ex. 9-4 and 9-9. This flood event alone illustrates the impacts of capturing and storing only incrementally less water than the maximum volume of water proposed to be stored by the Project (i.e., 50,000 af). The storage of 50,000 af of water under the proposed Project operation would have inundated an additional 1,811 feet of stream channel than inundated by the March 2005 flood pool. We can observe the impacts without speculating.

67. It is clear that operation of the Project for water conservation will have a less than significant impact on the obligate riparian community within the 50-year floodline. This community, located in the Warms Springs Cienega, will be subject to routine flooding with or without the Project when the debris pool is created annually. The remainder of the cienega will be inundated at a less than 10 year frequency. Over time, sediment may eliminate the cienega entirely, as the floods of 2005-2006 nearly did. This impact was recognized by the Corps in their FSEIS and, accordingly, the Corps provided 100 percent mitigation for the loss of aquatic and riparian habitats.

68. The only fish species known to occur within the 50-year flood elevation are the exotic brown trout and introduced strains of the once native rainbow trout. These fish were known to occur in the SAR within the Warm Springs Cienega. No genetically pure strains of native fish currently occur in the SAR watershed upstream of Seven Oaks Dam (Baldwin Lake basin excluded). It is unknown to me whether or not the two trout species still occupy Warm Springs Cienega; however, they apparently occur in the debris pool based on my observations of anglers fishing there. If trout currently occur in the cienega or debris pool, the impact of an additional incremental duration of conservation storage would be indistinguishable from the No Project alternative. In any event, the Corps has previously mitigated 100 percent of the resource losses within the 50-year flood elevation.

69. The foregoing conclusion also is true for aquatic reptiles and amphibians. These aquatic resources would be impacted by flood control operations, as recognized in the Corps' FSEIS. Within the 50-year flood elevation, the Corps concluded that all biological resources would be lost. Consequently, the Corps mitigated for 100 percent of these losses. I know from my own observations at the debris pool in 2007 that at least three frog and toad species still occur in the flood-impact zone following flood events. Incremental water conservation storage at elevations less than the 50-year flood elevation have already been mitigated and there is no

additional significant impact to these resources requiring mitigation. In fact, the additional water storage may be beneficial to these species.

70. Surface water quality data were collected for selected parameters during the release of water from Seven Oaks Dam during 2005 and 2006. Muni/Western Ex. 9-30, previously presented, summarizes the water quality data reflective of the flood pool. All of the water quality parameters measured have values that are within current water quality standards. To the degree that the data in Muni/Western Ex. 9-30 are generally representative of the quality of water that would be stored behind Seven Oaks Dam (once flooding has ceased and the sediment has settled), then there are no current indications of any future chronic water quality problems associated with conservation storage that would affect aquatic resources.

71. Notwithstanding the forgoing data, as noted under the existing conditions for Seven Oaks Dam, the length of time a flood pool is retained in the reservoir has the potential to result in water quality degradation. Also as noted, daily Project storage is anticipated to exceed the daily storage that would occur under the No Project alternative on approximately 4.8 percent of days and storage would never exceed the highest volume of storage that would occur under No Project. While an increase of 4.8 percent of days may or may not result in an additional increment of time during which water quality could be degraded due to anaerobic conditions during the summer period, the Project DEIR recognized this possibility and identified it as a potentially significant impact. The following mitigation measure was identified to reduce the impact to a less-than-significant level:

> **MM SW-1** (DEIR, page 3.1-35)
>
> Because anaerobic conditions are a problem associated with current operations at Seven Oaks Dam, it is anticipated that the operators of the dam (San Bernardino, Riverside, and Orange county flood control

districts, known as the 'Local Sponsors'), will implement a program (such as water quality monitoring and aeration) to avoid and reverse anaerobic conditions so that water quality objectives are not exceeded. In those years when the Project results in seasonal water conservation storage behind Seven Oaks Dam, Muni/Western will participate in such a preventative program and provide funding, proportional to the volume of seasonal water conservation storage behind Seven Oaks Dam.

72. As noted previously, Segment A corresponds to Basin Plan Reach 6. The current beneficial use designations for this segment that are related to aquatic biological resources are: 1) Cold Freshwater Habitat; 2) Wildlife Habitat; and 3) Spawning, Reproduction, and Development. Cold Freshwater Habitat under existing conditions within the maximum reservoir pool elevation is only found perennially at Warm Springs and Alder Creek cienegas and in the debris pool (depending on water volume). A more realistic designation of Segment A, downstream of Southern California Edison Powerhouse No. 1, that reflects current thermal conditions would be "Intermittent Warm/Cold Freshwater Habitat," given that Segment A in this reach has intermittent streamflow and as streamflow declines in the spring, water temperatures gradually rise to levels that are not optimum for coldwater aquatic resources such as trout. Nevertheless, the two cienegas that currently support Cold Freshwater Habitat will remain with the Project. These cienegas will continue to be subject to flood events of varying magnitude that will temporally disrupt habitat. Similarly, Wildlife Habitat and Spawning, Reproduction, and Development beneficial uses will continue to be met, subject to disruptive flood events which occur under existing conditions. As stated previously, with the Project the daily storage is anticipated to exceed the daily storage that would occur under the No Project alternative on approximately 4.8 percent of days and storage would never exceed the highest volume of storage that would occur under No Project. This incremental increase in retention time is not expected to significantly impact any of the designated beneficial uses for Segment A, given implementation of mitigation measure MM SW-1.

Impairments to beneficial uses are the result of: 1) flood events that are non-controllable events; 2) the physical impact of the initial flooding on aquatic resources and their habitats; and 3) the prolonged inundation of aquatic habitat not adversely impacted by 2) above. The Corps has already mitigated 100 percent of these impacts to beneficial uses within the reservoir elevation that would be impacted by the proposed Project.

73. No adverse impacts to aquatic resources are anticipated upstream of Seven Oaks Dam during Project construction. All construction activities that would take place on the upstream side of Seven Oaks Dam would occur in areas that are already heavily disturbed and do not currently support aquatic habitats. Under flood control operations, the construction areas are anticipated to be disturbed regularly by inundation during the winter storm season. These construction sites do not support habitats for any special-status aquatic species.

Downstream of Seven Oaks Dam

Overview of Project Impacts to Aquatic Resources Between
Seven Oaks Dam and the Prado Flood Control Basin

74. Persistent aquatic and riparian habitats and aquatic species are located at only a few locations downstream of Seven Oaks Dam. These are: 1) approximately 0.16 mile of Segment B; 2) approximately 2.0 miles of Segment D; 3) all of Segment F (8.3 miles); and 4) all of Segment G (9.7 miles). Muni/Western Ex. 9-31, previously presented, shows the locations of these aquatic resources. Aquatic and riparian habitats are patchy in distribution due to the intermittent presence of water in segments of the SAR. The distance along the SAR channel from Seven Oaks Dam downstream to Prado Flood Control Basin is approximately 35.4 miles. Of this total distance, approximately 20.16 miles, or 43.5 percent of the total, supports persistent aquatic and obligate riparian habitats of varying types and qualities, along with their associated floras and faunas. The remaining 56.5

percent of the SAR in this area does not support such aquatic and riparian habitats due primarily to the absence of perennial streamflow. Over one half of the SAR is an intermittent stream.

75. The implementation of the proposed Project will change the hydrology of the SAR downstream of Seven Oaks Dam. It is these hydrological changes that have effects on the physical, chemical, and biological environments occupied by obligate aquatic resources. The significance criteria from the Project DEIR that were applied to the SAR downstream of Seven Oaks Dam (as well as construction areas) to determine if the proposed Project would have a significant effect on aquatic habitats and aquatic species and their long-term viability were:

- Result in a measurable change, i.e., a change greater than ±15 percent, in the mean daily non-storm flow;

- Change in fluvial processes such that, in a 100-year flood event, channel velocity is decreased below that necessary to transport sand and/or gravel and cobble;

- Violate any water quality standards or waste discharge requirements;

- Substantially degrade water quality, including increasing erosion or siltation on- or off-site;

- Have a substantial adverse effect, either through habitat modifications on any species identified as a candidate, sensitive, or special-status in local or regional plans, policies, or regulations, or by the CDFG or the USFWS;

- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the CDFG or the USFWS;

- Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act through direct removal by filling, hydrological interruption, or other means;

- Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;

- Conflict with any local policies or ordinance protecting biological resources, such as a tree preservation policy or ordinance; or

- Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

76. From the significance criteria Project-specific impact thresholds were identified for key aquatic resources. The thresholds were developed to be measurable yet conservative, so that impacts falling below the threshold would be unlikely to be significant.

77. For impacts to riparian and wetland habitats, whether from construction or operation of the Project the thresholds were:

- Removal of any riparian or wetland habitat involving excavation or earthmoving; and

- Predicted observable reduction in density, height, or vigor of riparian vegetation or wetted habitat in an area exceeding 1 acre.

78. Any removal involving excavation or earthmoving would be observable and measurable. The low threshold is in recognition of the scarcity of the habitat, high value per unit area, and its ecological importance. The 1-acre threshold is conservative, reflecting the importance and scarcity of riparian and wetland habitat.

79. For impacts to the Santa Ana sucker, whether from construction or operation of the Project, the thresholds were:

- Loss of 1 or more acres of occupied habitat or suitable habitat in close proximity with occupied habitat measured based on dewatering of suitable habitat within areas known to support the Santa Ana sucker;

- Impacts that substantially reduce the potential for occupation of 1 or more acres in areas of habitat; and

- Substantial decrease in frequency of gravel and cobble transport during flood events between Mill Creek and the "E" Street gage. A substantial decrease is one that is sufficiently large to be measurable at the upstream end of occupied habitat.

80. The 1-acre habitat threshold is conservative, reflecting the limited distribution of this species and small amount of suitable habitat available. Sediment transport is a principal constituent element in habitat maintenance for the Santa Ana sucker.

81. Each SAR river segment is next evaluated for Project impacts, given the significance criteria and impact thresholds previously presented.

Analysis Approach for each Segment

82. To evaluate the potential impact of the Project (Scenario A) in relationship to the No Project alternative (existing conditions) on aquatic resources the following topics were analyzed for each SAR segment:

- Hydrological conditions with the No Project and the Project operations;

- Effect of hydrological conditions under the No Project and the Project operations on: 1) BMIs; 2) amphibian breeding using the Canyon treefrog as an indicator species; 3) native fish species; 3) obligate riparian habitats; and 4) special-status species associated with aquatic and riparian habitats;

- Water quality as it relates to aquatic resources; and

- Basin Plan beneficial use designations related to aquatic resources.

83. The methodological approaches to the analysis of the foregoing topics are explained in the discussion of Segment B.

Segment B

84. Segment B extends from Seven Oaks Dam plunge pool downstream to the Cuttle Weir (see previously referenced Muni/Western Ex. 9-38 through 9-46). Segment B currently receives at a minimum a release from Seven Oaks Dam of at least 3 cfs to meet established water rights downstream. This 3 cfs may or may not flow through the entire segment along the SAR channel (i.e., from the plunge pool to the San Bernardino Valley Water Conservation District (SBVWCD) diversion immediately upstream of the Cuttle Weir via the SAR channel), depending on the release point, before being diverted at either the Auxiliary River Pickup or the SBVWCD diversion facilities upstream of the Cuttle Weir. The reach of the

segment from the plunge pool outlet downstream approximately 0.3 mile can be (and historically has been) dewatered by delivering water to the above facilities via the Bear Valley Bypass. Currently, the median daily flow (i.e., discharge from Seven Oaks Dam) in Segment B (all days included) for the No Project alternative is 4.7 cfs (Muni/Western Ex. 9-93). With the Project the median daily flow would be reduced to the required 3 cfs minimum release. The mean daily flow under No Project operations would decline from 51.2 cfs to 11.6 cfs under Project operations (Muni/Western Ex. 9-93). The frequency of mean daily flows in Segment B under No Project and Project operations are summarized in the flow exceedance curves in Muni/Western Ex. 9-94. As seen in the exhibit, flows in Segment B are typically low.

85. Segment B currently would also receive varying flood flow releases (i.e., flows greater than 50 cfs) from Seven Oaks Dam in those years when flood control operations retained water behind the dam (Muni/Western Ex. 9-94). The principal difference between the No Project and proposed Project operations would be that up to 1,500 cfs would be diverted to the Plunge Pool Pipeline from the water conservation pool if the Project was fully implemented. This operation would result in reducing the frequency of high flood releases that the flood control agencies would make from Seven Oaks Dam in the absence of the Project. In other words, the frequency of potentially high releases that could injure or destroy aquatic resources in Segment B would be reduced by the Project by as much as 12 percent at 50 cfs (Muni/Western Ex. 9-94).

86. Simulation modeling of flood control operations at Seven Oaks Dam indicates that there would be no days with zero (0 cfs) flow in Segment B with or without the Project. To illustrate this conclusion, I prepared hydrological charts of the daily simulation modeling results showing the temporal sequence of releases from Seven Oaks Dam under the No Project alternative and under the Project (Scenario A) to illustrate the timing and variability of releases for 39 water years (WY) (i.e., WY 1962-WY 2000) (Muni/Western Ex. 9-95 and 9-96). As seen by comparing

these two exhibits, the aquatic resources of Segment B would receive the same guaranteed minimum streamflow that they currently receive, but would be subject to a reduced frequency of high flood flow releases with the Project (Muni/Western Ex. 9-94). At no time would the reach of Segment B that is currently perennial be dewatered, nor would the aquatic resources associated with this perennial reach receive less water than the 3 cfs that they currently receive.

87. The proposed Project would actually enhance the survival of aquatic resources in Segment B by reducing the frequency of potentially damaging high flow releases (i.e., those release greater than 50 cfs shown in blue in the two exhibits). High flow releases begin to reduce the quality of aquatic habitats for most aquatic species by: 1) increasing water velocities and water depths to less than preferred levels for life history activities; 2) reducing the aerial extent of habitat that may provide refuge during high flow events (i.e., shallow eddies and shallow backwater areas); and 3) by disrupting or scouring habitat at high flows that are of sufficient magnitude to mobilize stream substrates or damage riparian vegetation.

88. To determine what level of flow in Segment B begins to degrade aquatic habitat, I selected water velocity as an index of habitat quality. Most aquatic species are sensitive to water velocities because an organism requires more energy to maintain itself in a physical location with increased water velocities. For example, it is well established that many aquatic insects are dislodged and enter the water column as "drift" as flows and water velocities increase. In addition, breeding and rearing activities can be disrupted when velocities are greater than preferred for these life cycle activities. Because most BMIs have univoltine[16] life cycles, any disruption of the life cycle during development may substantially impact the specific species or the entire BMI community.

89. The microhabitat preferences (i.e., optimum depth, velocity, and substrate) of BMIs have been studied for a range of species. Depth, velocity, and substrate are

[16] Univoltine = one-year life cycle from egg deposition to adult emergence.

the best predictors of BMI distribution within a stream. Substrate stability and fine sediment deposition also influence BMI abundance, with reduced abundance where substrates are routine disrupted or where fine sediment (i.e., sand, silt, and fine organic material) accumulates. Substrate stability and fine sediment deposition provide hydraulic constraints on habitat suitability. Most aquatic invertebrates have mean water column velocity preferences (based on highest diversity and abundance measurements) in the range from 0.5 to 2.5 feet per second (fps). Similarly, most BMIs prefer relatively shallow water, typically less than about 1.5 feet in depth.

90. The Canyon treefrog is a common amphibian along the upper SAR where the channel is rocky and often water velocities are swift. This frog is more strictly aquatic than other members in the genus and it is seldom found far from water. Adult frogs are 1.75 to 2.25 inches long. When breeding in the spring, this treefrog typically deposits eggs singly and attached to rocks or vegetation near or on the bottom of the quieter rocky pools. Larvae (tadpoles) typically metamorphose after 40 to 75 days, depending primarily on water temperature. The larvae of the frog and toad species found in the SAR region are poor swimmers and also require quiet, shallow eddies or shallow, backwater areas to rear. Such quiet habitat types are uncommon along the SAR in Segments B through the upper reach of Segment D due to substrate sizes, channel incision, and gradients that range in these reaches from 3.51 percent (Segment B) to 1.39 percent (intermittent reach of Segment D). The Canyon treefrog would select sites to deposit eggs at water velocities of about 1.0 fps or less.

91. While there are no fish, native or exotic, in Segment B, I also considered water velocity preferences for juvenile Santa Ana suckers in determining the water velocity threshold to select. Adults of this species are typically found in shallow water with flows ranging from slight to swift. Recently hatched juvenile fish, however, are found in shallow, quiet water along stream margins and other locations where the water velocity is less than about 0.5 fps.

92. The scientific data for aquatic species taken collectively indicate that the BMIs have a greater range of water velocity preferences than do other aquatic groups due to the diversity of species in this group. Consequently, I selected a conservative mean water column value of 3.0 fps as a threshold value which, if exceeded, would indicate deteriorating physical habitat quality due to excessive water velocities for aquatic species, as a community, in the SAR. While most aquatic species can move around and select microhabitats that provide the preferred water velocities they like, the higher the flows, suitable microhabitats with acceptable water velocities also decline, and may even be eliminated if the flow is great enough (as when bed load movement begins to occur). The use of mean water column velocity is a reasonable index of the general velocity conditions faced by BMIs and other aquatic species.

93. Based on the results of the simulation modeling, I determined that for Segments B through D, water velocities begin to exceed 3.0 fps at about 42 cfs based on a typical cross-section and gradient (approximate range 30 to 80 cfs). In Segment E, 3.0 fps was exceeded at about 250 cfs due to the much lower stream gradient (0.43 percent) and wide stream channel.

94. Next, I overlaid the hydrological charts with the general life history periodicity of the Canyon treefrog. From Muni/Western Ex. 9-95 and 9-96, I selected three of the water years (only to limit the number of exhibits) as typical indicators of the whether the flows released from Seven Oaks Dam with and without the Project were suitable for BMIs in general, and specifically for Canyon treefrog breeding, egg incubation, and larval rearing to metamorphosis. For Segment B, the water years selected for further evaluation were WY 1967, 1971, and 1980 (Muni/Western Ex. 9-97, 9-98 and 9-99).

95. A horizontal line was placed on Muni/Western Ex. 9-97, 9-98 and 9-99 at 42 cfs to indicate that flows greater than 42 cfs exceeded the 3.0 fps mean water column water velocity threshold preferred by most BMIs, breeding amphibians, and fish.

96. While Muni/Western Ex. 9-97 appears complicated at initial glance, it can be easily interpreted as follows:

- The Canyon treefrog breeding season is a red, solid-line box that extends from March 1967 through July 1967. The egg incubation period is a black, dashed-line box that extends from March 1967 through mid-August. The larval rearing stage is a yellow, solid-line box that extends from mid-March 1967 through October;

- A thin, horizontal, red solid line extends across the exhibit at 42 cfs;

- The No Project flow releases are depicted by the thick, solid, red curve;

- The Project (Scenario A) line is a thin, sold, blue line;

- Where both the No Project and Project are identical the solid line color is purple; and

- By viewing only the flow levels of the No Project and the Project flows within the Canyon treefrog breeding, egg incubation, and larval rearing boxes, the relative impacts of both operations can be determined.

97. As can be seen in Muni/Western Ex. 9-97, No Project flows are well above the 42 cfs threshold for most of the Canyon treefrog breeding season in WY 1967. The No Project flows decline to less than 42 cfs during June, but do not remain less than 42 cfs for long. In contrast, the Project flows are a constant 3 cfs during the treefrog breeding, incubation, and larval rearing periods. For WY 1967, these data strongly indicate that the Project operation is substantially more favorable for successful treefrog breeding than the highly variable flow regime that would occur under No Project operations. The Project operation reduces flood flow

releases and highly variable water velocities and provides a stable flow environment for treefrog breeding. Project operations would also favor the breeding success of other native amphibian species. These same conclusions also apply to BMIs.

98. For WY 1971, Muni/Western Ex. 9-98 illustrates that both the No Project and Project flow releases remain less than 42 cfs during the Canyon treefrog breeding, incubation, and larval rearing periods, except for a brief exceedance during mid-March under both operations. The purple solid line indicates that both alternative operations are identical in early May. While both operating scenarios may allow successful treefrog breeding, the Project operation provides a more stable hydrological environment. These same conclusions also apply to BMIs.

99. WY 1980 would have been a very volatile hydrological year under both No Project and Project operations (Muni/Western Ex. 9-99). During the early part of the Canyon treefrog breeding, egg incubation, and larval rearing periods the flows under both alternatives fluctuated substantially. These flows, up to 500 cfs, are flood flows that would have disrupted treefrog breeding and BMI development until at least May with Project operations, and for the entire treefrog breeding period with No Project operations. Project operations would have allowed successful treefrog breeding, incubation, and rearing after May. No Project operations would have precluded a successful treefrog breeding cycle in WY 1980. The BMI community would have been similarly disrupted until May under Project operations, and substantially disrupted during the spring through fall growing season under No Project operations. These results demonstrate that, based on hydrology, the Project operation has less of an impact than the No Project operation on aquatic resources during WY 1980.

100. The data analyzed indicate that obligate riparian habitats will be disrupted during high flow releases such as occurred in WY 1980. Such high flow releases are more frequent under the No Project operation than under the Project operation.

Consequently, it can be concluded that the No Project operation will have a greater impact on riparian vegetation than the Project operation. Such impacts may damage the riparian vegetation and limit riparian growth at a greater frequency than would occur under Project operations.

101. The two-striped garter snake, a Species of Special Concern, has been reported from Segment B. This species would be benefited under Project operations by the reduced frequency of high releases that could eliminate habitat or possibly the species itself. No other special-status species are known from Segment B.

102. Water quality data are available for 2005 and 2006 at two locations in Segment B: 1) the plunge pool; and 2) upstream of the Cuttle Weir (Muni/Western Ex. 9-100 and 9-101). These data do not indicate any water quality problems related to aquatic resources under current No Project conditions. There is no evidence to indicate that the water quality parameters would be significantly different under Project conditions. Therefore, there should be no substantial differences in water quality between the two operating scenarios.

103. Recall that the beneficial uses designated for this segment (Basin Plan Reach 5) that could pertain to aquatic resources are: 1) Warm Freshwater Habitat; 2) Wildlife Habitat; and 3) Rare, Threatened or Endangered Species. Warm Freshwater Habitat will continue to persist and support aquatic resources under both the No Project and Project operations. Wildlife Habitat (riparian habitats) will also continue to persist under both operations, although the higher No Project flows are likely to impact Wildlife Habitat functions to a greater degree than will Project flows. There are no Rare, Threatened or Endangered Species known to occur in Segment B at this time.

104. If the proposed Project is implemented through Phase III, then impacts to aquatic resources will occur downstream of Seven Oaks Dam in Segment B during construction of the Plunge Pool Pipeline. This impact was recognized in the

Project DEIR as Impact BIO-2 (DEIR, page 3.3-42) and it is considered a significant impact. The construction of the Phase III Plunge Pool Pipeline would result in the temporary removal of most, if not all, riparian and wetland vegetation immediately downstream of the plunge pool to the Cuttle Weir. This impact would remove more than one acre of aquatic habitat. No known state or federally listed aquatic species occur in this segment of the Plunge Pool Pipeline alignment; however, the two-striped garter snake, a CDFG Species of Special Concern, is reported from SAR Segment B and could be impacted by construction. To reduce this construction impact to less than significant two mitigation measures were identified in the DEIR. These are MM BIO-1 (DEIR, pages 3.3-37 through 3.3.39) and MM BIO-2 (DEIR, pages 3.3-39 and 3.3-40). In addition to the identified mitigation measures, both the Corps and the CDFG have regulatory authority over construction in the SAR channel. The Corps regulates the placement of fill material into "waters of the United States" pursuant to Section 404 of the federal Clean Water Act. The CDFG regulates activities that substantially disturb the bed and banks of any stream pursuant to Section 1602 of the Fish and Game Code of California. Once the Plunge Pool Pipeline has been completed and the required mitigation measures implemented, aquatic habitat functions and values will recover over a period of a few years, thereby eventually reducing the initial impact to less than significant.

105. With the exception of the above recognized construction impact, no identified biological significance criteria or impact thresholds included in the Project DEIR related to aquatic resources would be exceeded in Segment B with the Project in operation. The impact from constructing the Plunge Pool Pipeline on aquatic resources would be reduced to less than significant based on MM BIO-1 and MM BIO-2.

106. Collectively, the data analyzed indicate that the implementation of the proposed Project would not have a significant impact on obligate aquatic or semi-aquatic resources or riparian habitats in Segment B. The proposed Project would reduce

the frequency of potentially destructive high flows to the long-term benefit of existing aquatic resources in this segment of the SAR. All construction impacts would be reduced to less than significant following mitigation.

Segment C

107. Segment C extends downstream from the Cuttle Weir to just upstream of the Mill Creek confluence with the SAR (see previously presented Muni/Western Ex. 9-47 to 9-55). Segment C is currently intermittent with 74.5 percent of the total days of record having zero (0 cfs) flow in this segment. With the proposed Project in operation, the number of total days with zero flow would increase to 81.5 percent (Muni/Western Ex. 9-93). The frequency of mean daily flows in Segment B under No Project operations are summarized in the flow exceedance curve in Muni/Western Ex. 9-102. There is no flow exceedance curve for Project operations because flows are virtually eliminated.

108. The hydrological charts for Segment C are presented in Muni/Western Ex. 9-103 and 9-104. While Muni/Western Ex. 9-104 is in stark contrast to Muni/Western Ex. 9-103, the critical observation relevant to aquatic resources is that Segment C becomes intermittent in *every* water year of record with or without the Project. Segment C does not have any large, deep pools to serve as refugia for aquatic resources along its entire 1.87-mile length. Consequently, there are under current conditions no obligate aquatic or semi-aquatic animal species resident anywhere in this segment. This conclusion is true under both No Project operations and under Project operations.

109. The mere presence of water flowing down a stream channel does not constitute usable aquatic habitat of and by itself, no more than urban runoff down a street gutter is aquatic habitat. Water must be of a sufficient frequency, duration, and magnitude to begin to provide suitable habitat for aquatic organisms. Obviously, fish do not occur in Segment C because the segment dries up sooner or later every

year (by November) - or there are no annual flows at all in Segment C (Muni/Western Ex. 9-103).

110. Under current conditions Segment C is dry 75 percent of the time. While we call Segment C intermittent, it approaches ephemeral in character. What happens to aquatic resources when there is at least 1 cfs the other 25 percent of the time? We know from hydrological studies that it takes at least a 4 cfs release from the Cuttle Weir (the upstream boundary of Segment C) to get any surface flow at all at the confluence with Mill Creek (the downstream boundary of Segment C). This means that if the streamflow at the Cuttle Weir is less than 5 cfs, some length of Segment C will be dry even when a flow is recorded at the Cuttle Weir. Muni/Western Ex. 9-103 shows these periods of time when the flow is between 1 and 5 cfs. Can the Canyon treefrog and BMIs use Segment C opportunistically to successfully breed, rear, and mature in the face of intermittent flows under current conditions?

111. Using the Canyon treefrog life cycle (a three-month period from breeding to larval metamorphosis), Muni/Western Ex. 9-103 reveals that if this treefrog began breeding early (March 1) and eggs were deposited immediately after early breeding (March 1), then there were only five water years out of the 39-year period of record (12.8 percent of years), when the treefrog even had the opportunity to attempt to successfully breed in Segment C of the SAR. These water years were: 1967, 1969, 1971, 1980, and 1983. More realistically, if the Canyon treefrog did not initiate breeding and egg laying early due to cold air temperature and/or lack of rainfall (air temperature and rainfall are breeding cues for this species), but started breeding later in the season, then there were only three years (7.7 percent of years) that this amphibian even had an opportunity to successfully breed: 1967, 1969, and 1971. In WY 1971, flows may not have even reached the confluence of Mill Creek during June (Muni/Western Ex. 9-103).

112. As for Segment B, I selected three water years that had flow in Segment C long enough for the Canyon treefrog to have the opportunity to breed successfully, assuming breeding began early. These water years were: 1967, 1971, and 1980 (Muni/Western Ex. 9-105, Ex. 9-106 and 9-107). The interpretation of these exhibits follows the process described for similar exhibits presented for Segment B.

113. For WY 1967 (Muni/Western Ex. 9-105), the hydrological conditions in Segment C (based on the exceedance of 3.0 fps at 42 cfs) are unsuitable for successful treefrog breeding due to extended periods of high water and high water velocities, and an insufficient period for larval development at suitable water velocities. Because this treefrog prefers water velocities for egg laying less than 1.0 fps, my exhibit is conservative and overestimates the potential breeding days when the flow is less than 42 cfs. Remember, Segment C does not provide an abundance of shallow eddies or backwaters due to the channel shape and gradient.

114. As I stated previously, most BMIs have a univoltine life cycle and, consequently, these species would be precluded from successfully using Segment C because it always dries up prior to the completion of a full-year life cycle. For BMIs with bivoltine[17] life cycles (a limited number of species), if even established in the segment, would find physical habitat conditions less than suitable under No Project operations due to the variable flow releases and associated changes in water velocity.

115. WY 1971 provides breeding conditions for the Canyon treefrog that might allow successful reproduction (Muni/Western Ex. 9-106). After mid-March, streamflows remain less than 42 cfs. While these flows are variable and nearly reach zero flow in late June, treefrogs would have had the opportunity to successfully reproduce. This would not have been the case for most BMIs that have one-year life cycles.

[17] Bivoltine = two reproductive cycles per year.

116. In WY 1980 there is virtually no opportunity for successful Canyon treefrog reproduction (Muni/Western Ex. 9-107). Flood-level flows occur during the treefrog breeding season and discharges and water velocities vary substantially and rapidly. BMIs would have been adversely impacted by these No Project operations; however, they would have perished in any case when the segment dried out later in the year.

117. The hydrological data in Muni/Western Ex. 9-103 demonstrates that over a 39-year period, the Canyon treefrog may have been able to use Segment C of the SAR for opportunistic breeding in one year, WY 1971 (2.5 percent of years). Segment C does not, even under current conditions, provide usable aquatic habitat for obligate or semi-aquatic species, except under rare circumstances. While the proposed Project would eliminate the "rare" event, this impact is less than significant to the aquatic resources of the area.

118. It is logical to ask how the semi-aquatic amphibian population persists in the Project area if the SAR does not provide suitable breeding habitat on a routine basis, given that the Canyon treefrog reaches reproductive maturity in two years and probably only lives about four years in the wild. The answer is that this aquatic treefrog occurs in more suitable habitats near Segment C. Examples of these habitats are: 1) the overflow channel from the SCE Powerhouse No. 3; 2) perennial reaches of Segment B upstream; 3) the Auxiliary River Pickup; and 4) the numerous ponds in the SBVWCD water spreading grounds just to the north of Segment C. There may be additional locations as well. The Canyon treefrog and other amphibians persist, not because of Segment C of the SAR which is dry 75 percent of the time, but because these other aquatic sites provide water of sufficient duration to allow treefrog breeding, incubation, and larval rearing. Individual frogs from the local population may opportunistically use the SAR in those rare years when water is available in sufficient duration and magnitude; however, the persistence of the treefrog population is not dependent on such rare

events. This explains why in Muni/Western Ex. 9-103, the Canyon treefrog, and other semi-aquatic amphibian species, can persist when the SAR is dry for years on end, for example, between WY 1987 and WY 1992, a period longer than the probable treefrog life expectancy in the wild.

119. As I stated previously, the current hydrological conditions associated with No Project operations do not provide persistent habitats for BMI communities or individual species. Consequently, the vast majority of BMIs cannot become established in Segment C sufficiently long enough to complete their respective life cycles.

120. In the 1.87-mile length of Segment C there are a few willows immediately downstream of the Cuttle Weir that are supported by leakage from the weir and other water structures. Aside from these artificially maintained plants, there are two willows immediately downstream of the Greenspot Road Bridge. These plants have persisted at this location over the years, even in the absence of surface streamflow. Other than these few individual plants, there is no obligate riparian vegetation anywhere along Segment C. Project operations would not affect these few plants or result in impacts to riparian vegetation elsewhere.

121. No known special-status aquatic species or special-status riparian-associated species are present in Segment C. There would be no impact of the Project on these resources.

122. Muni/Western Ex. 9-108 provides water quality data for Segment C of the SAR immediately downstream of the Greenspot Road Bridge for 2005 an 2006. When water was present there were no water quality concerns related to aquatic resources under current conditions. There would be virtually no water in the SAR channel in Segment C with the Project and, therefore, no water quality concerns as well.

123. The beneficial uses designated for this segment (Basin Plan Reach 5) that could pertain to aquatic resources are: 1) Warm Freshwater Habitat; 2) Wildlife Habitat; and 3) Rare, Threatened or Endangered Species. Warm Freshwater Habitat does not occur in Segment C, except on rare occasions and for a limited duration due to the intermittent flow characteristics of the segment. Those species that Warm Freshwater Habitat was designated to benefit, for example, the Santa Ana sucker, arroyo chub, Santa Ana speckled dace, arroyo toad, and mountain yellow-legged frog, are all currently absent from Segment C (and Basin Plan Reach 5 to which the designations apply). Water must be consistently available for aquatic species to establish viable populations in Segment C. The data indicate that this has not occurred in recent times (for example, the Santa Ana sucker was last recorded from SAR Segment C in 1940). Wildlife Habitat, in the form of riparian habitat, does not occur in Segment C of the SAR. Isolated riparian plant specimens in this reach are inconsequential to wildlife resources since the riparian resources do not occur on a sustained basis. There are no Rare, Threatened or Endangered Species in Segment C.

124. There are no Project construction impacts to aquatic resources in Segment C.

125. No identified biological significance criteria or impact thresholds included in the Project DEIR related to aquatic resources would be exceeded in Segment C with the Project in operation.

126. While the hydrological data indicate that the number of days with zero flow would increase with the Project, there is no nexus (i.e., cause and effect) to a biological impact to aquatic resources in this river segment because there are no aquatic resources consistently present to sustain with the difference in zero flow frequencies between the No Project and Project. If obligate aquatic habitats and species are not now present due to the absence of perennial streamflows, they can not be adversely impacted by reducing the frequency of days with flow further. For example, it is a fact that fish require water to survive and complete their life

cycle. Fish do not occur in Segment C because there is currently insufficient water for their survival. Reducing the frequency of flows further will have no additional incremental impact on fish because they are already extirpated from the segment. Similar logic applies to BMIs, amphibians, and obligate riparian vegetation.

127. The data analyzed indicate that the implementation of the proposed Project would not have a significant impact on obligate aquatic and semi-aquatic resources in Segment C primarily because those aquatic resources do not persist in Segment C under existing conditions (No Project). There are no sustainable aquatic resources to impact.

Segment D

128. Segment D, which extends from Mill Creek downstream to "E" Street, was previously separated by me into two reaches primarily because of the distinct differences in hydrology between the two reaches (see previously presented Muni/Western Ex. 9-56 through 9-66). The impacts of the proposed Project are also best discussed for each of these reaches. The upper, intermittent reach is 8.2 miles in length and extends from Mill Creek downstream to the South Tippecanoe Avenue Bridge (see previously presented Muni/Western Ex. 9-57 through 9-59). It is estimated that under No Project operations, 56.3 percent of the total days of record would have no flow in this intermittent reach, even with significant seasonal inflow from Mill Creek, City Creek, Plunge Creek, and other minor tributaries (Muni/Western Ex. 9-93).

129. With the proposed Project the total number of days with zero flow would increase from 56.3 percent to 63.1 percent, or by 6.8 percent (Muni/Western Ex. 9-93); however, the median mean daily flow would remain unchanged at 0 cfs (Muni/Western Ex. 9-93). The flow exceedance curves for the intermittent reach of Segment D are presented in Muni/Western Ex. 9-109).

130. The hydrological charts for Segment D are presented in Muni/Western Ex. 9-110 and 9-111. The primary difference between the two exhibits is that the operation of the Project eliminates the releases from Seven Oaks Dam related to the draining of the debris pool during July and August which largely accounts for the 6.8 percent increase in the number of zero flow days. The hydrological charts are substantially the same otherwise.

131. Because the upper reach of Segment D is dry 56.3 percent of the days under No Project, this reach, while not supporting permanent resident aquatic resources, could be used opportunistically by BMIs and amphibians for breeding and rearing at a greater frequency than Segment C, due primarily to the influence of seasonal inflow from Mill Creek. Again I used the Canyon treefrog life cycle to evaluate the likely success of using this reach of Segment D for treefrog breeding. From Muni/Western Ex. 9-110, I selected water years 1967, 1969, and 1980 for further evaluation (Muni/Western Ex. 9-112, 9-113, and 9-114). The interpretation of these exhibits follows the process described for similar exhibits presented for Segments B and C.

132. During WY 1967 (Muni/Western Ex. 9-112), Canyon treefrog breeding, incubation, and larval rearing habitat is very poor through most of the season due to highly fluctuating streamflows and associated high water velocities from March through late May. Both the No Project and Project operations decline to less than 42 cfs in late May and early June, respectively, but flows under No Project operations again increase by mid-July and fluctuate substantially thereafter. No Project operations would not provide for successful treefrog breeding in WY 1967. Project operations also fail to provide successful treefrog breeding in this water year because, while the flows are more suitable, the reach dries up for the first time in early July (Muni/Western Ex. 9-112). Neither operating alternative would be beneficial to treefrogs.

133. Again, most BMIs have a univoltine life cycle and, consequently, these species would be precluded from successfully using this reach of Segment D because it always dries up for some period of time in every water year prior to the completion of a full-year life cycle. BMIs with bivoltine life cycles would find physical habitat conditions less than suitable under both No Project and Project operations due to the variable flow releases and associated changes in water velocities.

134. At no time during the treefrog breeding cycle in WY 1969 is the habitat suitable for incubation and rearing under either operating scenario (Muni/Western Ex. 9-113). The streamflows are extreme and there is little doubt that streambed scouring and bed load movement of some substrate would occur during this water year. All aquatic resources would be substantially impacted and possibly eliminated from the reach if they were present.

135. WY 1980 is similar in its impact on aquatic resources as described for WY 1969 (Muni/Western Ex. 9-114). Neither the No Project operations nor the Project operations would provide suitable physical aquatic habitat for any aquatic resource.

136. The collective data indicate that neither the No Project alternative nor the Project alternative (Scenario A) provide suitable aquatic habitats for aquatic resources in the upper, intermittent reach of Segment D when streamflows are available (Muni/Western Ex. 9-112, 9-113, and 9-114). In fact, this reach of Segment D is even more volatile in flow fluctuations than Segment C due to the seasonal influence of Mill Creek. Under such conditions, the Project would have no significant impact on aquatic resources for all of the reasons described for Segment C. There is simply no aquatic resource to impact in this upper, intermittent reach. There are no persistent BMIs. There are no known resident amphibians. There are no fish. The overall aquatic habitat quality is extremely

poor due to the absence of perennial flows and the extreme flow events that do occur when water is present.

137. Obligate riparian vegetation is virtually non-existent over the 8.2-mile intermittent reach of Segment D.

138. There are no known special-status aquatic species in this reach of Segment D.

139. Muni/Western Ex. 9-115 provides water quality data for the intermittent reach of Segment D of the SAR immediately downstream of the Orange Street Bridge for 2005 and 2006. When water was present there were no water quality concerns related to aquatic resources under current conditions. The data indicate that there would be no reason to suspect water quality issues related to aquatic resources with the Project.

140. The beneficial uses designated for this upper reach of Segment D (Basin Plan Reach 5) that could pertain to aquatic resources are: 1) Warm Freshwater Habitat; 2) Wildlife Habitat; and 3) Rare, Threatened or Endangered Species. Warm Freshwater Habitat does not occur on a sustained basis in this reach of Segment D; however the intermittent flows would continue to occur if the Project is implemented, but would increase by 6.8 percent of days. Wildlife Habitat in the form of riparian vegetation is virtually non-existent in the reach. There are no Rare, Threatened or Endangered aquatic species in this reach of Segment D.

141. There are no Project construction impacts to aquatic resources in Segment D.

142. No identified biological significance criteria or impact thresholds included in the Project DEIR related to aquatic resources would be exceeded in the intermittent reach of Segment D with the Project in operation.

143. The data analyzed indicate that the implementation of the proposed Project would not have a significant impact on obligate aquatic or semi-aquatic resources or their habitats in the intermittent reach of Segment D primarily because those aquatic resources do not persist in this reach under No Project. There are no sustainable aquatic resources to impact. Increasing the number of days of zero flow by 6.8 percent, primarily in July and August, would have a less-than-significant impact on aquatic resources that are not present in any case.

144. The downstream, perennial reach of Segment D begins at the South Tippecanoe Avenue Bridge and extends about two miles downstream to "E" Street (see previously present Muni/Western Ex. 9-60 through 9-66). Over this distance there is a gradual increase in surface flows primarily due to the Bunker Hill Dike (San Jacinto Fault), but also due to inflow from San Timoteo Creek (see previously presented Muni/Western Ex. 9-61). As surface flows increase so does the extent of riparian vegetation. The overall quality of aquatic habitat in this reach is only fair to moderate; however, a greater diversity of aquatic resources is present due to the permanence of flow, particularly during low flows in the summer and fall. Without the effect of up-welling groundwater and seasonal inflow from San Timoteo Creek this reach of Segment D would be intermittent as well.

145. Because the groundwater up-welling and the inflow from San Timoteo Creek are not gaged, no flow exceedance curves, hydrological charts, or flow fluctuation exhibits relative to the Canyon treefrog and BMIs are available. Such data are unnecessary to the evaluation of this reach of Segment D because streamflow in this reach is perennial and persistent over time.

146. The occurrence of aquatic resources in the perennial reach of Segment D is not dependent on No Project operations or future Project operations but, rather, on up-welling groundwater from the San Jacinto Fault and inflows from San Timoteo Creek and other minor tributaries. Because up-welling groundwater and creek

inflow are hydrologically independent of operations at Seven Oaks Dam, the virtual elimination of flows from Seven Oaks Dam to Segment C and points downstream would not substantially affect aquatic species or riparian habitats in the perennial reach of Segment D. Up-welling groundwater and creek inflow have been observed to persist for years when there were no historical summer releases from Seven Oaks Dam due to a lack of water.

147. There are no water quality data specific to this reach of Segment D; however, the long-term persistence of aquatic species in the reach indicates that there are no chronic water quality problems affecting aquatic resources.

148. As noted for the upstream reach of Segment D, the beneficial uses designated for this perennial reach (Basin Plan Reach 5) that could pertain to aquatic resources are: 1) Warm Freshwater Habitat; 2) Wildlife Habitat; and 3) Rare, Threatened or Endangered Species. Recent fishery surveys and observations indicate that there are no native fish remaining in the perennial reach, although non-native fish species are present. Warm Freshwater Habitat is present in this reach and it supports a number of non-native vertebrates and a range of BMI communities. Wildlife Habitat in the perennial reach of Segment D is abundant and of generally high quality. Two endangered bird species are reported to breed in the riparian habitat found in this reach. There are no known aquatic Rare, Threatened or Endangered Species in the perennial subreach; however, as just noted, the riparian habitat found in this reach does support breeding for Rare, Threatened or Endangered Species of birds.

149. There are no Project construction impacts to aquatic resources in this reach of Segment D.

150. No identified biological significance criteria or impact thresholds included in the Project DEIR related to aquatic resources would be exceeded in the perennial reach of Segment D with the Project in operation.

151. In summary, the implementation of the proposed Project would have no significant impacts to aquatic and semi-aquatic species or aquatic and riparian habitats in this reach of Segment D.

Segment E

152. SAR river Segment E is 4.2 miles in length and it extends from "E" Street downstream to just upstream of the RIX-Rialto outfalls (see previously presented Muni/Western Ex. 9-67 through 9-73). The reach is broad, sandy, low gradient, and intermittent in flow, even with the inflow from Lytle and Warm creeks and other minor tributaries (Muni/Western Ex. 9-93 and 9-116). Implementation of the Project would increase the number of days without flow from 54.0 percent to 56.5 percent (2.5 percent increase) (Muni/Western Ex. 9-93).

153. The hydrological charts for Segment E are presented in Muni/Western Ex. 9-117 and 9-118. The two exhibits are almost indistinguishable from one another. As can be seen in these exhibits, Segment E has become intermittent for various durations in every water year of record over a 39-year period except 1999 when the segment remained perennial. This single perennial water year occurred with and without the Project in operation.

154. The Canyon treefrog life cycle is also illustrated on Muni/Western Ex. 9-117 and 9-118). It should be noted that the Canyon treefrog is unlikely to occur in Segment E because the habitat is unsuitable. This treefrog species prefers rocky, perennial mountain streams with swifter currents. The life cycle of the Pacific chorus frog, a close relative of the Canyon treefrog and a species potentially occurring in this segment, can be substituted without affecting the analysis. As can be seen, there are a number of years that have streamflows of sufficient duration to potentially allow for successful chorus frog breeding, incubation, and rearing. Again, I selected three water years for further evaluation: 1969, 1980, and 1983 (Muni/Western Ex. 9-119, 9-120, and 9-121). Note that the water

velocity threshold of 3.0 fps occurs at about 250 cfs in Segment E due to the wide stream channel and low gradient.

155. During WY 1969, both the No Project and Project operations were similar in pattern, but not magnitude, during the chorus frog breeding cycle (Muni/Western Ex. 9-119). Flows declined to suitable water velocities under No Project operations about mid-June and remained below the 3.0 fps threshold for the remainder of the rearing period. These results suggest that chorus frog breeding may have been successful in WY 1969 under the No Project operation; however, it should be noted that in Segment E, once streamflows drop to low levels of about 50 cfs, the numerous braided channels in this segment may only carry part of the total flow. These channels are typically very shallow and wide which may affect frog survival. Under the Project operations suitable velocities are reached in late May. If it is assumed that frogs began breeding in late May, then they would not be successful in WY 1969 under Project operations because Segment E dries up by early August, probably before the larvae have metamorphosed.

156. During WY 1980, water velocities decline to a suitable range by June under No Project operations (Muni/Western Ex. 9-120). Suitable water velocities occur earlier under Project operations in early May. Both operations, however, appear to provide hydrological conditions that would be suitable for Pacific chorus frog breeding, incubation, and larval rearing.

157. In WY 1983, both high streamflow and high water velocities eliminate most of the chorus frog breeding season from March through mid-June (Muni/Western Ex. 9-121). Following the decline in flows to less than 250 cfs, more suitable physical habitat conditions were available; however, the remaining days in a normal breeding cycle would have been too few to provide for successful reproduction in this water year under both operating scenarios.

158. Collectively, both No Project and Project operating scenarios have similar impacts on the breeding cycle of the Pacific chorus frog and other amphibians in Segment E of the SAR. Some water years appear to provide suitable habitat of a sufficient duration to allow successful reproduction. Other water years do not. There is no distinct difference in impacts to chorus frog breeding between No Project and Project operations in Segment E.

159. While Segment E would appear to provide streamflow longer for use by BMIs, the segment is still intermittent more than half the time, thereby affecting the development and survival of those BMIs with univoltine or longer life cycles. Both No Project operations and Project operations would impact BMIs in a similar manner. The Project operations, if implemented, would have a less than significant impact on the BMI communities of Segment E of the SAR.

160. Segment E supports scattered patches of willow riparian habitat, but this habitat type is not extensive. Near-surface groundwater appears to maintain many of these riparian patches in the absence of surface flow. The small increase in zero-flow days with the Project is not expected to impact these limited riparian resources because they have persisted in the absence of historical releases from Seven Oaks Dam.

161. There are no known special-status aquatic species or special-status riparian-associated species in Segment E. There would be no impact of the Project on these resources.

162. There are no water quality data for Segment E to evaluate in relation to aquatic resources. Because the segment is predominately intermittent, implementation of the Project is not expected to present water quality concerns relative to aquatic resources.

163. Only the upstream 0.02 mile of this segment is included in Basin Plan Reach 5, the remainder being in Reach 4. The beneficial uses of Reach 4 that may pertain to aquatic resources are: 1) Warm Freshwater Habitat; and 2) Wildlife Habitat. As noted previously in my testimony, there are no fish or other special-status aquatic resources known to persist in this segment. Seasonal use by aquatic benthic macroinvertebrates adapted to shifting sand substrates may occur temporally in this river reach, but there are no permanent, resident BMI communities in the segment due to the absence of permanent water. The riparian habitat present is unsuitable for breeding by special-status bird species and none have been reported from the segment. Implementation of the proposed Project would not adversely impact the Basin Plan beneficial use designations.

164. There are no Project construction impacts to aquatic resources in Segment E.

165. No identified biological significance criteria or impact thresholds included in the Project DEIR related to aquatic resources would be exceeded in Segment E with the Project in operation.

166. In summary, implementation of the Project would have a less than significant impact on aquatic and semi-aquatic species and aquatic and riparian habitats in Segment E when compared to the No Project alternative.

Segment F

167. Segment F extends downstream 8.3 miles from the RIX-Rialto outfalls to just upstream of the Riverside Narrows (see previously presented Muni/Western Ex. 9-74 through 9-77). As noted previously, a substantial volume of treated wastewater enters the SAR at the RIX-Rialto outfalls. Downstream from this location flow surface water is perennial under current conditions, i.e., there are no days with zero (0 cfs) flow (Muni/Western Ex. 9-93). While the frequency of days with and without flow does not change with or without the Project, the

implementation of the Project would reduce the median mean daily flow from 74 to 68 cfs, or by 7 percent (Muni/Western Ex. 9-93 and 9-122).

168. While the Project would result in a small reduction in the magnitude of mean daily flows, this reduction is not expected to result in any significant impact to aquatic resources or aquatic or riparian habitats in Segment F, particularly listed species of birds and fish and species identified as of Species of Special Concern by the CDFG. As groundwater up-welling increases in a downstream direction from the upstream boundary of Segment F, the potential influences of the Project gradually decline, and eventually become indistinguishable from the No Project condition.

169. Water quality in Segment F is controlled by the National Pollutant Discharge Elimination System permits issued to the RIX and Rialto WWTPs. Water quality in this segment would not be affected by Project operations in any measurable way.

170. About two-thirds of Segment F is in Basin Plan Reach 4 and one-third in Reach 3. The beneficial uses that may apply to aquatic resources in Reach 3 are identical to Reach 4 with the addition of Rare, Threatened or Endangered Species. Currently, Segment F provides Warm Freshwater Habitat to a variety of aquatic resources, most notably the Santa Ana sucker, arroyo chub, and Santa Ana speckled dace. Wildlife Habitat is provided by extensive stands of riparian vegetation. This habitat is known to be used by special-status birds for breeding (Muni/Western Ex. 9-32). Further, several of these birds and the Santa Ana sucker fall under the Rare, Threatened or Endangered Species beneficial use designation. The proposed Project would be protective of these designations.

171. The Santa Ana sucker may use the SAR in Segment F for spawning. Spawning substrate for this fish is small- to medium-sized gravel. The Project DEIR presents evidence in Section 3.1 (Impact SW-9) that Project operations would

have a less than significant impact on sediment transport in Segments D through G of the SAR. Consequently, the Project is not expected to reduce the availability of spawning gravels for the Santa Ana sucker or other aquatic species that use this substrate type for reproduction, including BMIs.

172. There are no Project construction impacts to aquatic resources in Segment F.

173. No identified biological significance criteria or impact thresholds included in the Project DEIR related to aquatic resources would be exceeded in Segment F with the Project in operation.

174. In summary, implementation of the Project would have a less-than-significant impact on aquatic and semi-aquatic species and aquatic and riparian habitats in Segment F when compared to the No Project alternative.

Segment G

175. SAR Segment G begins at the Riverside Narrows and extends downstream 9.7 miles to the Prado Flood Control Basin (see previously presented Muni/Western Ex. 9-78). The Project's effects on the hydrology of the SAR are virtually indistinguishable from No Project in this segment (Muni/Western Ex. 9-93 and Ex. 9-123). There are no days without flow with or without the Project. The median mean daily flow is 106.9 cfs under No Project operations and 106.8 cfs under Project operations. The monthly variations in median mean daily flow with and without the Project is 2 cfs or less.

176. All of Segment G is in Basin Plan Reach 3. The beneficial uses of Reach 3 that may pertain to aquatic resources are: 1) Warm Freshwater Habitat; 2) Wildlife Habitat; and 3) Rare, Threatened or Endangered Species. Currently, Segment G provides Warm Freshwater Habitat to a variety of aquatic resources, including the Santa Ana sucker, arroyo chub, and Santa Ana specked dace. Segment G

supports good aquatic and riparian habitat over most of its length. The riparian vegetation (Wildlife Habitat) of this segment is known to be used by special-status birds for breeding (Muni/Western Ex. 9-32). Further, several of these birds and the Santa Ana sucker fall under the Rare, Threatened or Endangered Species beneficial use designation. The proposed Project would be protective of these designations.

177. There are no Project construction impacts to aquatic resources in Segment G.

178. No identified biological significance criteria or impact thresholds included in the Project DEIR related to aquatic resources would be exceeded in Segment G with the Project in operation.

179. In summary, implementation of the Project would have a less-than-significant impact on aquatic and semi-aquatic species and aquatic and riparian habitats in Segment G when compared to the No Project alternative.

Segment Summary

180. In order to assist in understanding whether the Project DEIR biological significance criteria and thresholds related to aquatic and semi-aquatic resources or aquatic and riparian habitats were exceeded in any specific river segment I have prepared Muni/Western Ex. 9-124. This exhibit demonstrates that with the mitigation measures identified in the Project DEIR, no significance criteria or thresholds were exceeded. Implementation of the Project would not significantly impact aquatic and semi-aquatic species or aquatic and riparian habitats between Seven Oaks Dam and the Prado Flood Control Basin.

Non-SAR Aquatic Resources Impacts of the Project

181. The Project DEIR states that construction of the Devil Canyon By-Pass Pipeline would disturb wetland and riparian vegetation and that this impact, identified as Impact BIO-11 would be significant (Project DEIR, pages 3.3-52 and 3.3-53). The Project DEIR states that approximately 1.9 to 3.2 acres of habitat would be removed, including riparian and wetland habitat at the pipeline crossing of Devil Canyon Creek. Both of the two pipeline alignment options cross this creek. Immature southern willow scrub vegetation would be impacted. No known special-status aquatic species are reported from the pipeline alignments at this location. Implementation of mitigation measures MM BIO-1 and MM BIO-2 would, over time, reduce the impact of the Project to less than significant. Both the Corps and the CDFG have regulatory authority over construction in the Devil Canyon Creek channel. The Corps regulates the discharge of fill material into "waters of the United States" under Section 401 of the federal Clean Water Act. The CDFG regulates activities that alter the bed and banks of streams under Section 1602 of the Fish and Game Code of California.

182. The following elements of the Project would not impact aquatic resources during construction:

- Within the Santa Ana River Construction Area: Lower Flow Connector and Morton Canyon Connector II pipelines; and

- Within the Lytle Creek Construction Area: Lower Lytle Creek and Cactus Basin pipelines.

Impacts of Cumulative Projects on Aquatic Resources

Upstream of Seven Oaks Dam

Segment A

183. The use of Seven Oaks Reservoir for seasonal water conservation storage under the Project and temporary water storage per the USFWS 2002 BO could substantially degrade water quality as a result of impoundment of flows, thereby impacting aquatic resources. The impoundment of flows increases the risk of anaerobic conditions in Seven Oaks Reservoir. The Project DEIR concluded that this would be a significant impact (Project DEIR, Cumulative Impact SW-4, pages 6-20 and 6-21). Mitigation measure MM SW-1 was identified in the Project DEIR to reduce Cumulative Impact SW-4 to less than significant. MM SW-1 requires Muni/Western to participate in a program to avoid and reverse anaerobic conditions in the reservoir should they occur.

184. The overall effect of the Project and operation of the dam under the BO would be to hold a greater volume of water in the reservoir more frequently. However, historically both Southern California Edison (SCE) (since 1898) and the Corps (since 1999) have impacted aquatic resources upstream of Seven Oaks Dam by substantially eliminating streamflows (SCE) and by flood control operations (Corps). The impacts of Seven Oaks Dam have been mitigated by the Corps. The Project would not contribute substantially to the impact of Seven Oaks Dam and would not result in a significant cumulative impact to aquatic resources in Segment A.

185. Construction of the Project is the only project identified that could affect surface water and water quality upstream of Seven Oaks Dam, therefore cumulative impacts to aquatic resources in the construction area are not anticipated.

Downstream of Seven Oaks Dam

Segments B through G

186. Aquatic resources in the SAR would be affected by Project operations, Seven Oaks Dam operation under the BO, the San Bernardino Valley Water Conservation District Water Right Application, City of Riverside Water Right Application, Chino Basin Watermaster Water Right Application, Orange County Water District Water Right Application, and the RIX Facility Recycled Water Use Project. The Project and related projects would have less-than-significant cumulative effects on riparian habitat, aquatic habitat, and aquatic species downstream of Seven Oaks Dam.

187. The effect of the Project and other related projects is to decrease flow in the SAR downstream of Seven Oaks Dam. Reductions in SAR flow would occur throughout the year due to the Project, with the greatest effects in February and during July and August.

- Upstream of the Cuttle Weir (Segment B), riparian habitat is present but would not be significantly impacted by the Project given the required 3 cfs minimum flow requirement following diversions by the Project and/or San Bernardino Valley Water Conservation District application.

- Between the Cuttle Weir and RIX-Rialto outfalls (Segments C, D, and E), riparian resources are much more limited due to the intermittent character of the river, with the exception of the two-mile perennial reach in Segment D. The cumulative reduction in flow is not expected to significantly impact aquatic and semi-aquatic resources or their habitats in those segments that do not currently support viable aquatic species or aquatic and riparian habitats.

- Because the perennial reach in Segment D is supported by up-welling groundwater and inflows from San Timoteo Creek, it will remain unaffected by reduced releases from Seven Oaks Dam. Consequently, there would be no cumulative impact to this reach.

- Downstream from the RIX-Rialto outfalls (Segments F and G), the RIX Facility Recycled Water Use Project would reduce flows by approximately 30 to 35 cfs out of a current mean annual discharge of approximately 80 cfs. However, the impact analysis for that project did not identify significant impacts on aquatic resources because sufficient streamflows would remain in the SAR which would provide suitable habitat for the native fish occurring there. The Project would add an increment to the reduction (approximately 1-2 cfs) caused by the RIX project, but cumulative impacts in this reach downstream to the Prado Flood Control Basin would remain less than significant because streamflows would continue to remain of sufficient magnitude to protect aquatic resources, particularly the Santa Ana sucker, arroyo chub, and Santa Ana speckled dace.

188. For the foregoing reasons, cumulative impacts on aquatic and semi-aquatic species and aquatic and riparian habitats in the SAR downstream of Project diversions are expected to be less than significant.

189. The Project and related projects would cumulatively affect, directly or through habitat modification aquatic resources, including riparian habitats, at both the construction areas for the Plunge Pool Pipeline within SAR Segment B, and at the Devil Canyon By-Pass Pipeline at Devil Canyon Creek. These cumulative impacts are less than significant with the implementation of Project DEIR mitigation measures MM BIO-1 and MM BIO-2.

Conclusions

190. I would like to summarize my key conclusions as follows:

- First, the periodic seasonal storage of up to 50,000 af of water in Seven Oaks Reservoir would not impact aquatic resources or their habitats to a degree greater than the impacts identified by the Corps in its FSEIS. Mitigation has been provided by the Corps for all impacts to biological resources, and no additional mitigation is required. The Project impacts to aquatic species and habitats would be less than significant. To the extent that the increased detention time of stored water in Seven Oaks Reservoir creates anaerobic conditions and degrades water quality, Muni/Western has incorporated MM SW-1 into the Project to reduce this potential impact to less than significant.

- Second, of the 35.4 miles between Seven Oaks Dam and the Prado Flood Control Basin, 15.2 miles (or 43.1 percent of this river reach) have intermittent surface water and do not support viable aquatic resources under existing conditions. The only locations supporting viable aquatic species and habitats over the long-term are: 1) approximately 0.16 mile of Segment B downstream of Seven Oaks Dam; 2) approximately 2 miles of Segment D in San Bernardino; and 3) approximately 18 miles of Segments F and G from the RIX-Rialto outfalls to the Prado Flood Control Basin. The reach of Segment B supporting aquatic resources is supported by a required minimum release of 3 cfs from Seven Oaks Dam that would not be affected by the Project should it be built. Therefore, the Project would have no significant long-term impacts on the aquatic resources of Segment B. Aquatic resources in the two-mile reach of Segment D are maintained primarily by up-welling groundwater from the San Jacinto Fault and by seasonal inflow from San Timoteo Creek. The persistence of these aquatic resources does not depend on releases from Seven Oaks Dam.

Consequently, these habitats and species would not be significantly affected by the Project should it be built. Finally, perennial flows in SAR Segments F and G, located downstream from the RIX-Rialto outfalls, are maintained primarily by treated wastewater discharges and up-welling groundwater. The hydrological influence of the Project on Segment F is minor, and on Segment G, negligible. The Project would have a less-than-significant impact on aquatic resources in these two river segments;

- Third, the only occurrences in the mainstem SAR of the federally listed as threatened Santa Ana sucker and the two CDFG Species of Special Concern (arroyo chub and the Santa Ana speckled dace), are a minimum of 17.4 miles downstream of Seven Oaks Dam in river Segments F and G. The Project has a minor and insignificant effect on the hydrology of these two segments and, consequently, the Project would have a less-than-significant effect on the these special-status fish species;

- Fourth, with the exception of the two-striped garter snake that may occur in river Segment B, there are no special-status aquatic amphibians or reptiles are known to be present that would be impacted by the Project. The Project has incorporated mitigation measures MM BIO-1 and MM BIO-2 to reduce the long-term impacts to aquatic resources in Segment B to less than significant;

- Fifth, all riparian habitats known to support breeding for special-status birds are in locations supported by perennial water. These areas are the perennial reach of Segment D and Segments F and G. The Project, if built, would have less than significant impacts on the riparian habitats of these segments because the perennial flows of these segments do not depend on releases from Seven Oaks Dam;

- Sixth, Project construction impacts to aquatic resources would be reduced to less than significant with the implementation of mitigation measures MM BIO-1 and MM BIO-2, and by consultations with the Corps, CDFG, and USFWS;

- Seventh, the cumulative impacts of the Project with mitigation and other relevant projects on aquatic resources is demonstrated to be less than significant; and

- Eighth, the Project would be protective of the established designated beneficial uses of SAR as articulated in the Basin Plan for Reaches 3 through 6.

Exhibit #	Exhibit Title
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9-2	Seven Oaks Dam
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