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SANITATION DISTRICTS OF LOS ANGELES COUNTY

SANTA CLARITA VALLEY SANITATION DISTRICT

UPPER SANTA CLARA RIVER CHLORIDE TMDL

White Paper No. 1
Boundary Re-designation
Considerations
Santa Clara River – Reaches 4 and 5

July 2007

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1.0 Introduction and Purpose

This white paper identifies potential options for the redefinition of reach boundaries for Reaches 4 and 5 of the Santa Clara River, as currently identified in the 1994 Water Quality Control Plan – Los Angeles Region (Basin Plan), see Figure 1. A redefinition of reach boundaries for Reaches 4 and 5 may better represent the unique hydrogeologic conditions that exist within the currently defined reaches, while simultaneously dividing these surface water reaches based on political jurisdictional boundaries between Los Angeles and Ventura County. A redefinition of reach boundaries for Reaches 4 and 5 would also better facilitate discussions on site-specific objective considerations for the Upper Santa Clara River (Reaches 5 and 6) as well as other potential compliance options to meet final wasteload allocations determined in TMDL Task 10. No changes to water quality objectives are considered in this report.

Support for redefining the reaches consists of four parts:

1. Changes to the reach definitions for the Santa Clara River have occurred during each Basin Plan revision. The basis for the reach redefinitions currently being proposed are similar to the reasons for previous revisions.

2. Recent studies have defined hydrogeologic conditions that provide appropriate reach boundaries.

3. Recent water quality data analyses have defined water quality differences that define reach boundaries.

4. Previous reach boundary designations (Blue Cut gaging station) no longer exist and consideration of political boundaries provide a basis for reach redefinition.

The first section of this paper summarizes the reach redefinitions that have occurred for the Santa Clara River in the 1978 and 1994 Basin Plans and provides available information on the basis for those redefinitions. This background information is then used to support the hydrogeologic, water quality, and political boundary information developed to define the reach redefinition alternatives.

2.0 Background on Basin Plan Reach Boundary Designations

In the Basin Plan, the California Regional Water Quality Control Board – Los Angeles Region (Regional Board) assigns reach boundaries for the Santa Clara River and its tributaries. The reaches discussed in this white paper that are being considered for redefinition include:

- Reach 5 – Between West Pier Highway 99 and Blue Cut gaging station.

- Reach 4 – Between Blue Cut gaging station and A Street, Fillmore.

Based on review of historical Basin Planning documents from 1975, 1978 and 1994, revisions to reach boundaries for the Santa Clara River are discussed in Sections 2.1, 2.2, and 2.3, respectively.

2.1. 1975 Basin Plan

In March 1975, the Regional Board adopted the Water Quality Control Plan for the Santa Clara River Basin – 4A (1975 Basin Plan). The 1975 Basin Plan established mineral water quality objectives at specific surface water monitoring stations[i] within the Santa Clara River where water quality and flow data were available. As seen in Attachment 1, these stations included the following:

- At West Pier Highway 99
- At Los Angeles – Ventura County Line
- At A Street, Fillmore
- At Santa Paula Bridge
- At Saticoy Diversion
- At United States Highway 101

Attachment 1 also includes water quality data that were collected at the Los Angeles/Ventura County line (Reach 5) as well as at Highway 99 (Reach 6). These stations correspond approximately to the downstream end of the existing boundaries for the Santa Clara River reaches identified in the 1994 Basin Plan.

2.2. 1978 Amendments to the Basin Plan

In March 1978, The Regional Board amended the 1975 Basin Plan to revise certain mineral objectives and to add or revise reach designations of the Santa Clara River. Whereas the 1975 Basin Plan established water quality objectives at specific stations within the Santa Clara River, the 1978 Amendments to the Basin Plan modified the description to identify the upstream and downstream boundaries for reach segments of the Santa Clara River where water quality objectives were to apply. One additional station was added at Lang to reflect presumably newly available sampling water quality data from Lang station. Another station (at United States Highway 101) was also deleted. As seen in Attachment 2, the bounded reach descriptions for the Santa Clara River, included the following:

- Above Lang
- Reach bounded by Lang and West Pier Highway 99
- Reach bounded by West Pier Highway 99 and Los Angeles-Ventura County Line
- Reach bounded by Los Angeles-Ventura County Line and A Street, Fillmore
- Reach bounded by A Street, Fillmore and Santa Paula Bridge
- Reach bounded by Santa Paula Bridge and Saticoy Diversion

[i] As a weighted annual average, based on footnote (a), which stated: "*The objective at each station* is of the weighted annual average. Samples shall be collected at monthly intervals preferably but at least at quarterly intervals. Flow rate shall be determined at the time of sampling."

Attachment 2 also includes water quality data that were used to revise some surface water objectives for the Upper Santa Clara River reaches.

2.3. 1994 Amendments to the Basin Plan

In June 1994, the Regional Board amended the Basin Plan once more as the *Water Quality Control Plan – Los Angeles Region; Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties* (1994 Basin Plan). The 1994 Basin Plan formally numbered the reach designations revised in the 1978 Amendments to the Basin Plan (See Figure 2-3 of Attachment 3). The 1994 Basin Plan contained the most significant revisions to the reach boundary designations for the Santa Clara River. First the Regional Board formally numbered these reaches. Secondly, the Regional Board split the "Reach bounded by Lang and West Pier Highway 99" into two distinct reaches: (1) "Between West Pier Highway 99 and Blue Cut Gaging Station"; and (2) "Between Lang Gaging Station and Bouquet Canyon Road Bridge." Thirdly, the Regional Board combined the reaches bound by "A Street, Fillmore and Santa Paula Bridge" and "Santa Paula Bridge and Saticoy Diversion" into one single reach known as "Between A Street Fillmore and Freeman Diversion 'Dam' Near Saticoy." Fourthly, the Regional Board revised the reach description for the Los Angeles – Ventura County Line, with "Blue Cut Gaging Station[ii]." Finally the Regional Board added two additional reaches: (1) "Between Freeman Diversion 'Dam' Near Saticoy and Highway 101 Bridge" and (2) "Between Highway 101 Bridge and Santa Clara River Estuary." As seen in Attachment 3, the numbered reach descriptions of the Santa Clara River, include the following in the 1994 Basin Plan:

- Reach 1. Between Highway 101 Bridge and Santa Clara River Estuary
- Reach 2. Between Freeman Diversion 'Dam' Near Saticoy and Highway 101 Bridge
- Reach 3. Between A Street Fillmore and Freeman Diversion 'Dam' Near Saticoy
- Reach 4. Between Blue Cut Gaging Station and A Street Fillmore
- Reach 5. Between West Pier Highway 99 and Blue Cut Gaging Station
- Reach 6. Between Bouquet Canyon Road Bridge and West Pier Highway 99
- Reach 7. Between Lang Gaging Station and Bouquet Canyon Road Bridge
- Reach 8. Above Lang Gaging Station

Figure 1 provides a graphical depiction of the revised reach boundary designations as a result of the 1994 Basin Plan Amendments.

2.3.1 Rationale for 1994 Amendments to Basin Plan Reach Boundary Designations

Three reach boundary revisions occurred for the Santa Clara River in 1994 that provide support for the redefinitions being proposed: (1) the splitting of the "Reach bounded by Lang and West Pier Highway 99" as described in the 1978 Basin Plan, into two distinct reaches; (2) the combining of two reaches (A Street Fillmore to Santa Paula Bridge, and Santa Paula Bridge to Saticoy Diversion) into one reach (A Street Fillmore to Saticoy Diversion); and (3) the revision of the reach description for the Los Angeles – Ventura County line with the descriptor, "Blue Cut Gaging Station." These three revisions are

[ii] "Blue Cut" is the common name used to refer to the U.S. Geological Survey (USGS) river gaging station number 11108500, *SANTA CLARA RIVER AT L.A.-VENTURA CO. LINE CA*, established in 1952.

similar to actions currently being considered as reach boundary re-designation options for Reaches 4 and 5 of the Santa Clara River, as addressed in Section 3.0 of this white paper. The Regional Board contracted with the California Department of Water Resources (DWR) for two studies to provide information to update the 1994 Basin Plan. These studies include: (1) 1989 DWR Study entitled, *Update of Basin Plan for Piru, Sespe, and Santa Paula Hydrologic Areas;* and (2) 1993 DWR Study entitled, *Investigation of Water Quality and Beneficial Uses – Upper Santa Clara River Hydrologic Area.* Based on review of these particular studies, the rationale for these specific reach boundary re-designations as approved in the 1994 Basin Plan are further discussed in sub-sections 2.3.1.a, 2.3.1.b, and 2.3.1.c.

2.3.1.a Rationale for Splitting Lang-West Pier Highway 99 into Two Subreaches

The 1993 DWR report describes the original reach of the Santa Clara River from Lang to the Old Highway Bridge (as designated in the 1978 Basin Plan) as "a long reach with many factors that influence the surface water quality, as well as the ground water quality, because of the hydraulic interconnection between the two waters." In their analysis, DWR found the existing reach to be too long to be fully protective of water quality, citing the many factors that influence the water quality along the reach. Specifically, the DWR found that "The hydraulic regime along this entire reach is different in terms of channel morphology, loss in transit, inflows from tributaries, and other factors." The DWR recommended the reach be divided into two separate reaches, each with its own water quality objectives, further indicating that this division would bring the reach into correlation with the underlying groundwater basin. The 1994 Basin Plan incorporated this recommendation and created two new reaches, one between Lang and the confluence of Bouquet Canyon and another between Bouquet Canyon and West Pier Highway 99. The mineral objectives for chloride, TDS, Boron, Sulfate, SAR, and Nitrate+Nitrite for groundwater and surface water were established for these split reaches as summarized in Tables 2-1 and 2-2:

Table 2-1 Water Quality Objectives for Selected Constituents in Inland Surface Waters

Watershed/Reach	TDS (mg/L)	Sulfate (mg/L)	Chloride (mg/L)	Boron (mg/L)	Nitrogen (mg/L)	SAR (mg/L)
Santa Clara River Watershed:						
Above Lang gaging station	500	100	50	0.5	5	5
Between Lang gaging station and Bouquet Canyon Road Bridge	800	150	100	1.0	5	5
Between Bouquet Canyon Road Bridge and West Pier Highway 99	1000	300	100	1.5	10	5
Between West Pier Highway 99 and Blue Cut gaging station	1000	400	100	1.5	5	10
Between Blue Cut gaging station and A Street, Fillmore	1300	600	100	1.5	5	5

Watershed/Reach	TDS (mg/L)	Sulfate (mg/L)	Chloride (mg/L)	Boron (mg/L)	Nitrogen (mg/L)	SAR (mg/L)
Between A Street, Fillmore and Freeman Diversion "Dam" near Saticoy	1300	650	80	1.5	5	5
Between Freeman Diversion "Dam" near Saticoy and Highway 101 Bridge	1200	600	150	1.5	-	-

Table 2-2 Water Quality Objectives for Selected Constituents in Regional Ground Waters

Basin	TDS (mg/L)	Sulfate (mg/L)	Chloride (mg/L)	Boron (mg/L)
Upper Santa Clara				
Acton Valley	550	150	100	1.0
Eastern Santa Clara				
Santa Clara – Mint Canyon	800	150	150	1.0
Santa Clara – Bouquet & San Francisquito Canyon	700	250	100	1.0
Castaic Valley	1000	350	150	1.0
Ventura Central				
Santa Clara – Piru Creek Area				
Lower area east of Piru Creek	2500	1200	200	1.5
Lower area west of Piru Creek	1200	600	100	1.5
Santa Clara – Sespe Creek area				
Fillmore area				
Pole Creek Fan area	2000	800	100	1.0
South Side of Santa Clara River	1500	800	100	1.1
Remaining Fillmore area	1000	400	50	0.7
Santa Clara – Santa Paula area				
East of Peck Road	1200	600	100	1.0
West of Peck Road	2000	800	110	1.0

In their 1993 report, DWR noted that the new reaches better coincide with the underlying groundwater basin. DWR also identified the reach above Bouquet Canyon as having a steeper bed slope and higher infiltration rates than below Bouquet Canyon.

Additionally, the report identified that tributary inflows above Bouquet Canyon were probably of low mineral content and are significantly smaller than flows from Bouquet Canyon and other tributaries below Bouquet Canyon, specifically finding that the chemical character of the surface water changes below Bouquet Canyon because of

influence of these tributary flows as well as discharge from the Saugus Water Reclamation Plant. The Basin Plan reflects the water quality differences in that the surface water TDS and sulfate objectives are higher in the reach between Bouquet Canyon Bridge and West Pier Highway 99 as compared to the Reach between Lang and Bouquet Canyon Bridge, while the objective for chloride is the same for both reaches. As shown in Table 2-2, water quality objectives for chloride and TDS in regional ground waters below Bouquet Canyon (Santa Clara – Bouquet and San Francisquito Canyon) are higher than above Bouquet Canyon (Santa Clara – Mint Canyon). However, for sulfate, regional ground waters below Bouquet Canyon (Santa Clara – Bouquet and San Francisquito Canyon) have a lower objective than above Bouquet Canyon (Santa Clara – Mint Canyon), reflecting the variability in water quality conditions for groundwater underlying the new split reaches.

2.3.1.b Rationale for Combining Intermediate Reaches into a Single Reach (A Street Fillmore to Freeman Diversion)

The 1989 DWR report recommended combining two reaches included in the 1978 Basin Plan, (1) the reach bounded by A Street, Fillmore, and Santa Paula Bridge, and (2) the reach bounded by Santa Paula Bridge and Saticoy Diversion Dam, into one new reach, identified as "Reach bounded by A Street, Fillmore and United Water Conservation District's diversion dam near Saticoy (included in the 1994 Basin Plan as Reach 3: Between A Street, Fillmore and Freeman Diversion "Dam" near Saticoy). The rationale for this change as described in 1989 DWR report was that the "number of stations sampled on the Santa Clara River has been greatly reduced since the early 1970s and current available data no longer support two separate reaches."

2.3.1.c Rationale for Revising Reach descriptor "Los Angeles-Ventura County Line" to "Blue Cut Gaging Station"

The 1975 Basin Plan established surface water quality objectives at specific surface water stations for which data were available, including the objectives at the location identified as the "station at Los Angeles and Ventura County Line." The station referred to was the U.S. Geological Survey's river station No. 11108500 Santa Clara River at LA-Ventura Co. Line CA, commonly referred to as Blue Cut, which was removed from service in October 1996.[iii] Water quality objectives were based in part on historical water quality and flow data from this gaging station, and the 1994 Basin Plan renamed the reach descriptor "Los Angeles – Ventura County Line" (for the eastern end of Reach 4 and Western end of Reach 5) to "Blue Cut Gaging Station" to reflect this historic location.

3.0 Reach Boundary Re-designation Options

Considering the reach boundary re-designations that already have been implemented in the 1994 Basin Plan by the Regional Board, and recognizing the unique hydrogeologic conditions existing within the Reaches 4 & 5 of the Santa Clara River, this white paper will evaluate options to potentially re-designate the boundaries of Reaches 4 and 5 of

[iii] See USGS website: http://waterdata.usgs.gov/nwis/inventory/?site_no=11108500&

the Santa Clara River to better reflect the present understanding of the hydrogeologic conditions within these reaches, as well as county jurisdictional boundaries. Three potential reach boundary re-designations have been identified in this white paper and are discussed in subsections 3.1, 3.2 and 3.3:

- Divide Reach 4 into two separate reaches, 4A and 4B.
- Revise Reach 4 & 5 boundary to Los Angeles/Ventura County Line.
- No changes to the existing reach boundaries.

3.1 Divide Reach 4 Into Two Separate Reaches, 4A and 4B

This reach boundary re-designation would split Reach 4 of the Santa Clara River into two separate reaches; Reach 4A: Between Confluence of Piru Creek and A Street, Fillmore and Reach 4B: Between Los Angeles and Ventura County Line (or Blue Cut should Regional Board determine revising boundary between Reaches 4 & 5 of the Santa Clara River to the Los Angeles and Ventura County Line is not warranted) and Confluence of Piru Creek. Figure 2 provides a graphical depiction of this potential reach boundary re-designation option. Specific justification for this reach boundary re-designation is discussed in sub-sections 3.1.1, 3.1.2 and 3.1.3.

3.1.1 Re-designation of the Reach 4 Boundary Would Better Reflect Hydrogeologic Conditions

Reach 4 of the Santa Clara River contains unique hydrogeologic conditions that support the separation of the reach into two separate reaches. The DWR 1989 report describes the condition of the river within the reach as containing an unsaturated zone separating the surface stream channel from the underlying water table.[iv] This condition exists from approximately one mile east of the Las Brisas Bridge (east of the confluence with Piru Creek) and extends about 6 miles west (about 2 miles east of the Fillmore Fish Hatchery) where rising groundwater occurs, due to the pinching of the aquifer at the interface between the Piru and Fillmore Subbasins. This stretch of the Santa Clara River is known as the "Dry Gap," as identified in Attachment 4, which is a project map of important Groundwater-Surface Water Interaction Model (GSWIM) study area features, as well as in Figure 1.

Additionally, the revised reaches would better coincide with the underlying groundwater basins. The 1975 Basin Plan established water quality objectives for the groundwater in the Santa Clara – Piru Creek area separately for the lower area east of Piru Creek and the lower area west of Piru Creek.[v] Currently, the surface water quality objective in Reach 4 for TDS is 1300 mg/L while the water quality objective for underlying groundwater in the lower area west of Piru Creek is 1200 mg/L. Water quality objectives for underlying groundwater in the lower area east of Piru Creek are considerably higher for TDS and chloride, 2500 mg/L and 200 mg/L respectively, reflecting the presence of

[iv] See Section V. Hydraulic Interconnection of Surface and Ground Waters for Santa Felicia Subarea (pages 89-90 of 1989 DWR report, *Update of Basin Plan for Piru, Sespe, and Santa Paula Hydrologic Areas).*

[v] See Table 4-2 of the 1975 Basin Plan, *Water Quality Objectives for Groundwater Basins* and Table 3-10 of the 1994 Basin Plan, *Water Quality Objectives for Selected Constituents in Regional Ground Waters.*

marine sediment deposits in the East Piru area, downstream of the Los Angeles and Ventura County Line, which has historically been cited as one of the reasons why elevated chloride and TDS concentrations exist in the surface water near Blue Cut.[vi] Re-designation of the existing reach boundary into two separate reaches (4A and 4B) would bring the reach into better correlation with respect to the underlying groundwater basins.

Additionally, the reach redefinition would better represent the unique hydraulic regime between Reaches 4A and 4B. Reach 4B is different in terms of channel morphology, loss in transit, and inflows from tributaries as compared to Reach 4A. As seen in Figure 2, all flow in Reach 4B infiltrates to groundwater, creating the beginning of the "Dry Gap", while in Reach 4A, rising groundwater re-surfaces due to unique geologic conditions that cause the aquifer to pinch and narrow. Also, similar to the rationale used for splitting the reach between Lang and West Pier Highway 99 to two reaches in the 1994 Basin Plan, influence from small tributary inflows to the Santa Clara River east of Piru Creek are significantly smaller than influence from significantly larger flows from Piru Creek, Hopper Creek and other tributaries to the Santa Clara River west of Piru Creek. The Task 2A Report for the Groundwater-Surface Water Interaction Model (GSWIM) by CH2M Hill (CH2M Hill report) conducted a thorough review of inflows to the GSWIM study area, and confirmed that inflows from Piru Creek were one of the predominant inflows to the study area, approximately 52,000 acre-feet per year on average (see Table 7-1 of CH2M Hill report). A breakdown of inflows to the GSWIM area is summarized in Figure3.

3.1.2 Re-designation Would Better Reflect Water Quality Differences Between East and West Piru

Historically, groundwater has been very limited in the area east of Piru Creek. As seen in Figures 6 –9 of the 1989 DWR report, there were limited water quality data for groundwater east of Piru Creek compared to west of Piru Creek. This gap in available water quality data likely precluded establishing a separate reach west of Piru Creek. However, more recent data collection from various agencies has been compiled for the GSWIM study and review of this data has begun to fill some of those data gaps. Historical water quality data are presented in Figures 4 & 5, and generally show the water quality differences between East and West Piru in groundwater. Similarly, surface water quality varies in the Santa Clara River east of Piru Creek compared to surface water quality in the Santa Clara River west of Piru Creek. Figure 6 present historic surface water quality at several locations for the Santa Clara River, east and west of Piru Creek.

The Regional Board has historically recognized these differences between water quality in groundwater in the areas east and west of Piru Creek by setting water quality objectives for groundwater in the lower Piru Creek area east of Piru Creek significantly higher than objectives for the area west of Piru Creek. It appears that the groundwater objectives were established to reflect not only unique hydrogeologic conditions as discussed previously in subsection 3.1.1, but also due to the influence of Piru Creek tributary flows. The influence of Piru Creek tributary flows is described in the 1975 Basin

[vi] The 1989 DWR Report describes the existence of Pico Formation, a Pliocene marine sandstone and shale, underlying the thin alluvium east of Piru Creek. The poorest quality waters are those from wells extracting water from this Pico Formation.

Plan explaining that, "…the quality of Piru Creek water predominates, showing great effect on mineral quality of the groundwater in Piru Basin west of the confluence."[vii]

As discussed previously, Piru Creek tributary flows appear to significantly influence groundwater and surface water quality west of Piru Creek. Figure 7 illustrates that such influence continues to exist under current conditions, and groundwater West of the confluence of Piru Creek (Reach 4A) correlates well with Piru Creek water quality conditions. As seen in Figure 8, surface water quality for chloride has also remained relatively constant as compared to water quality conditions East of Piru Creek, most likely attributable to the influence of Piru Creek recharge flows.

Hence, the Re-designation of Reach 4 boundary into two subreaches, 4A and 4B, would bring these subreaches into correlation with the difference between groundwater and surface water quality west and east of Piru Creek, respectively.

3.2 Re-designate the Shared Reach Boundary for Reaches 4 & 5 as the Los Angeles - Ventura County Line

This potential action will re-designate the boundary between Reaches 4 & 5 of the Santa Clara River as the Los Angeles and Ventura County Line, restoring the original reach boundary as described in the 1975 and 1978 Amendments to the Basin Plan. Specific justification for this re-designation is included in sub-sections 3.2.1, 3.2.2 and 3.2.3.

3.2.1 Water Quality and Flow Data are No Longer Being Collected at Blue Cut

As discussed in Section 2, the 1994 Basin Plan defines Reach 5 of the Santa Clara River as being bounded by West Pier Highway 99 and Blue Cut Gaging station. Previously, the 1975 Basin Plan and 1978 Amendments identified the western boundary of the reach as being at the Los Angeles – Ventura County Line. As indicated previously, the USGS gaging station at Blue Cut was discontinued in 1996[viii], and has since been abandoned and destroyed, with flow and water quality data now collected further downstream at the Las Brisas Bridge. Given that the gaging station originally used to set the boundary of this reach is no longer in existence, since 1996 there is no longer any more water quality or flow data that is being collected to specifically characterize this shared reach boundary for Reaches 4 and 5 of the Santa Clara River. For similar reasons, it should be noted that the Regional Board revised the 1978 Basin Plan to combine two sub-reaches into what is now Reach 3 of the Santa Clara River between A Street Fillmore and Freeman Diversion "Dam" near Saticoy because of the lack of available data to properly characterize the reach boundary at the Santa Paula Bridge.

[vii] 1975 Basin Plan, Part II Chapter 14 Water Quality and Quantity Problems, on page II-14-67. Statement was in the context of describing groundwater quality with respect to TDS concentration showing an abrupt improvement west of the confluence of Piru Creek.

[viii] See USGS website: http://ca.water.usgs.gov/waterdata/discontinued.html

3.2.2 Re-designation of Blue Cut Boundary to the Los Angeles – Ventura County Line Would Better Reflect Political Jurisdictions

By naming the location specifically as "at Los Angeles and Ventura County Line", it could be inferred that the intent of the 1975 Basin Plan was to establish the boundary between these reaches to coincide with the political boundary of the Los Angeles and Ventura County Line, rather than the specific sampling location at Blue Cut. Similarly, the USGS name designation for the Blue Cut gaging station is labeled as "Santa Clara River at LA-Ventura Co. Line CA" indicating the intent to represent water quality at the political boundary. Re-designating the reach boundary to the Los Angeles and Ventura County Line would be consistent with language in the 1975 Basin Plan, 1978 Amendments and would better reflect the political jurisdictions between Los Angeles and Ventura Counties. As indicated below, the California DWR has similarly defined groundwater basin boundaries based in part on "political considerations."

3.2.3 Re-designation of Blue Cut Boundary to the Los Angeles – Ventura County Line Would Better Reflect Hydrogeologic Conditions

In addition, this re-designation of the boundary would better reflect current hydrogeologic conditions in the area. As shown in Figure 1, the Los Angeles and Ventura County Line coincides generally with the boundary between the Santa Clara River Valley Basin, Piru and Santa Clara River Valley East Subbasins as defined by the California Department of Water Resources in DWR Bulletin 118 – California's Groundwater originally released in 1975. Revisions to the DWR Bulletin 118 in 1980 included changes to basin boundaries as the result of "combining several basins based on geologic or political considerations, and dividing the San Joaquin Valley groundwater basin into many smaller subbasins, based primarily on political boundaries." [ix] As shown in Figure 1, the existing 1994 Basin Plan boundary at Blue Cut lies approximately one mile west of the Los Angeles Ventura County Line and the boundary between the groundwater basins.

Additionally, the DWR 1978 report characterizes the entire stretch of the Santa Clara River from about 1 mile east of Camulos diversion to upstream of the Los Angeles and Ventura County Line as consisting of shallow alluvium overlying more consolidated Pico Formation resulting in an area of rising groundwater. This condition is consistent with geophysics data collected as part of the GSWIM study, which indicates that the saturated alluvium in vicinity of Blue Cut area is very shallow (<20' depth).[x] Given that the constricted alluvium occurs over the entire area as described by DWR, locating the boundary between Reaches 4 & 5 of the Santa Clara River to the Los Angeles and Ventura County Line would bring these reaches into correlation with the underlying groundwater basins, similar to the rationale the Regional Board utilized for splitting the reach between Lang and West Pier Highway 99 (discussed in Subsection 2.3.1.a) in the 1994 Basin Plan.

3.3 No Changes to the Existing Reach Boundaries

This potential action will maintain the reach definitions and boundaries as defined in the 1994 Basin Plan if the Regional Board finds that there is insufficient justification to

[ix] See DWR website: http://www.groundwater.water.ca.gov/bulletin118/prev_b118_rpts/index.cfm#b11875
[x] See Memorandums, titled *Surface Geophysics Program in the Vicinity of Blue Cut* and *Proposed Monitoring Wells in the Vicinity of Blue Cut*, prepared by Geomatrix Consultants as part of the USCR chloride TMDL GSWIM Study.

neither separate Reach 4 into two separate reaches, nor re-designate the boundary between Reaches 4 & 5 to the Los Angeles and Ventura County Line.

4.0 Summary

This white paper looked at several potential reach boundary re-designation options for Reaches 4 and 5 of the Santa Clara River, which include: (1) dividing Reach 4 into two separate reaches, 4A and 4B; (2) revising the Reach 4 & 5 boundary to Los Angeles/Ventura County Line; and (3) making no changes to the existing reach boundaries. Given these options, there are three potential alternatives the Regional Board may consider to take action on.

Alternative 1 would revise the existing reach boundary designations for Reaches 4 and 5 of Santa Clara River by: (1) re-designating the common boundary between Reach 4 and Reach 5 from the current location at the Blue Cut gaging station to the Los Angeles and Ventura County Line; and (2) separating Reach 4 into two separate reaches, Reach 4A between the confluence of Piru Creek and the A Street Bridge in the city of Fillmore and Reach 4B between the Los Angeles and Ventura County Line and the confluence of Piru Creek.

Alternative 2 would revise Reach 4 of the Santa Clara River by dividing Reach 4 into two separate reaches, Reach 4A between the confluence of Piru Creek and the A Street Bridge in the City of Fillmore and Reach 4B between the Blue Cut gaging station and the confluence of Piru Creek.

Alternative 3 maintains the existing reach definitions and boundaries in the 1994 Basin Plan. Table 4-1 summarizes the potential reach boundary re-designation alternatives available.

Table 4-1 Summary of Alternatives for Boundary Re-designation Options for Reaches 4 and 5 of the Santa Clara River

Alternative 1	Reach 4A	Between Confluence Piru Creek and A Street Fillmore
	Reach 4B	Between Los Angeles and Ventura County Line and Confluence Piru Creek
	Reach 5	Between West Pier Highway 99 and Los Angeles and Ventura County Line
Alternative 2	Reach 4A	Between Confluence Piru Creek to A Street Fillmore
	Reach 4B	Between Blue Cut gaging station and Confluence Piru Creek
	Reach 5	Between West Pier Highway 99 and Blue Cut gaging station
Alternative 3	Reach 4	Between Blue Cut gaging station and A Street Fillmore
	Reach 5	Between West Pier Highway 99 and Blue Cut gaging station

5.0 References

California Department of Water Resources, 1989. *Update of Basin Plan for Piru, Sespe, and Santa Paula Hydrologic Areas*. June 1989.

California Regional Water Quality Control Board, 1975, *Water Quality Control Plan: Santa Clara River Basin (4A)*, March 1975.

California Regional Water Quality Control Board, 1978, *Revisions to Water Quality Control Plan for Santa Clara River Basin (4A)*, Resolution No. 78-02, March 1978.

California Regional Water Quality Control Board, 1994, *Water Quality Control Plan: Los Angeles Region*, June 1994.

CH2M Hill, 2006. *Final Report. Task 2A – Conceptual Model Development East and Piru Subbasins, Upper Santa Clara River Chloride TMDL Collaborative Process.* October 2006.

California Department of Water Resources, 1993. *Investigation of Water Quality and Beneficial Uses: Upper Santa Clara River Hydrologic Area*, June 1993.

Geomatrix, 2007 (a), Memorandum - *Surface Geophysics Program in the Vicinity of Blue Cut*, June 2007.

Geomatrix, 2007 (b), Memorandum – *Proposed Monitoring Wells in the Vicinity of Blue Cut*, June 2007.

Figure 1: Existing Santa Clara River Reaches 4 and 5

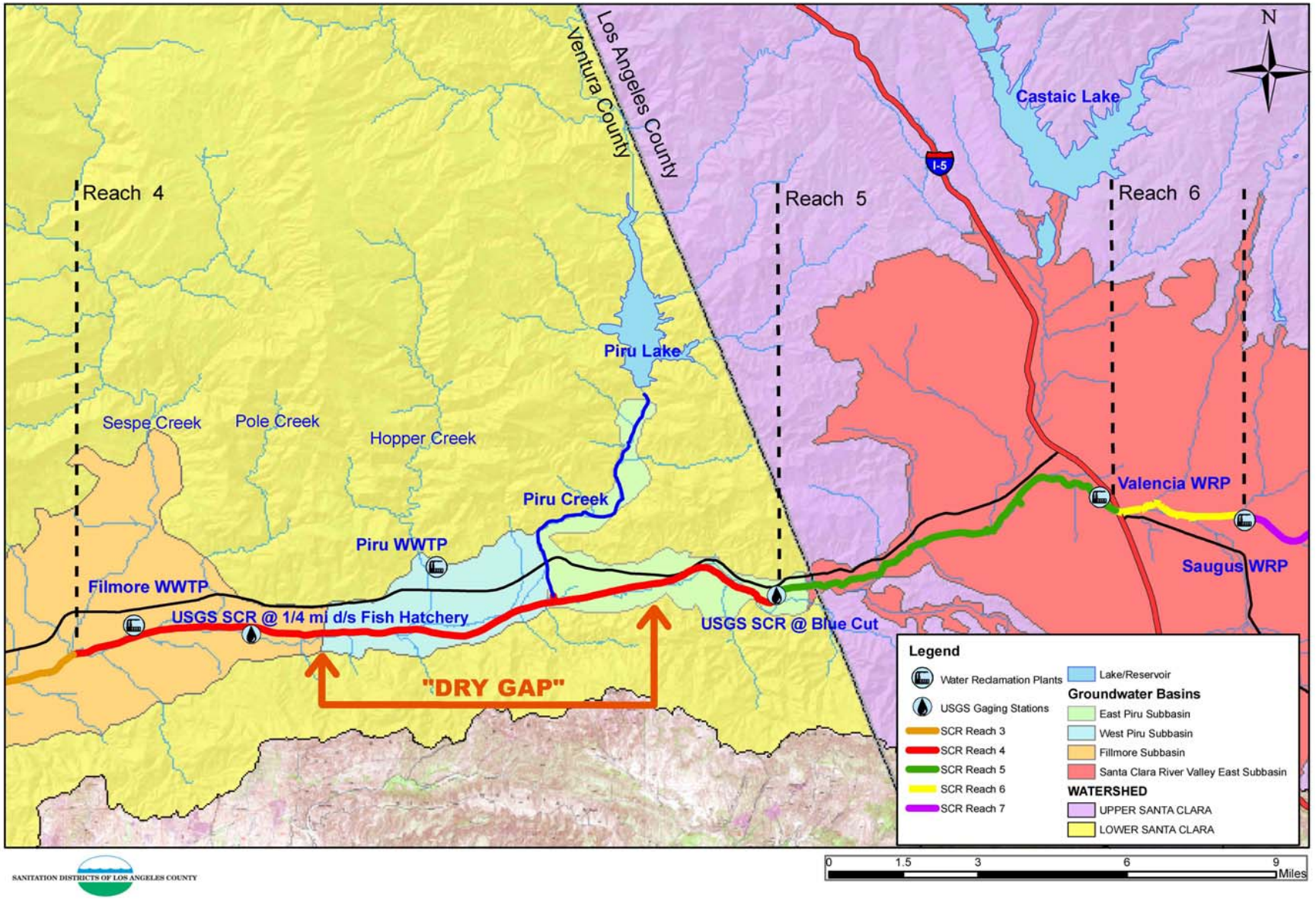


Figure 2: Proposed Santa Clara River Reaches 4A, 4B, and 5

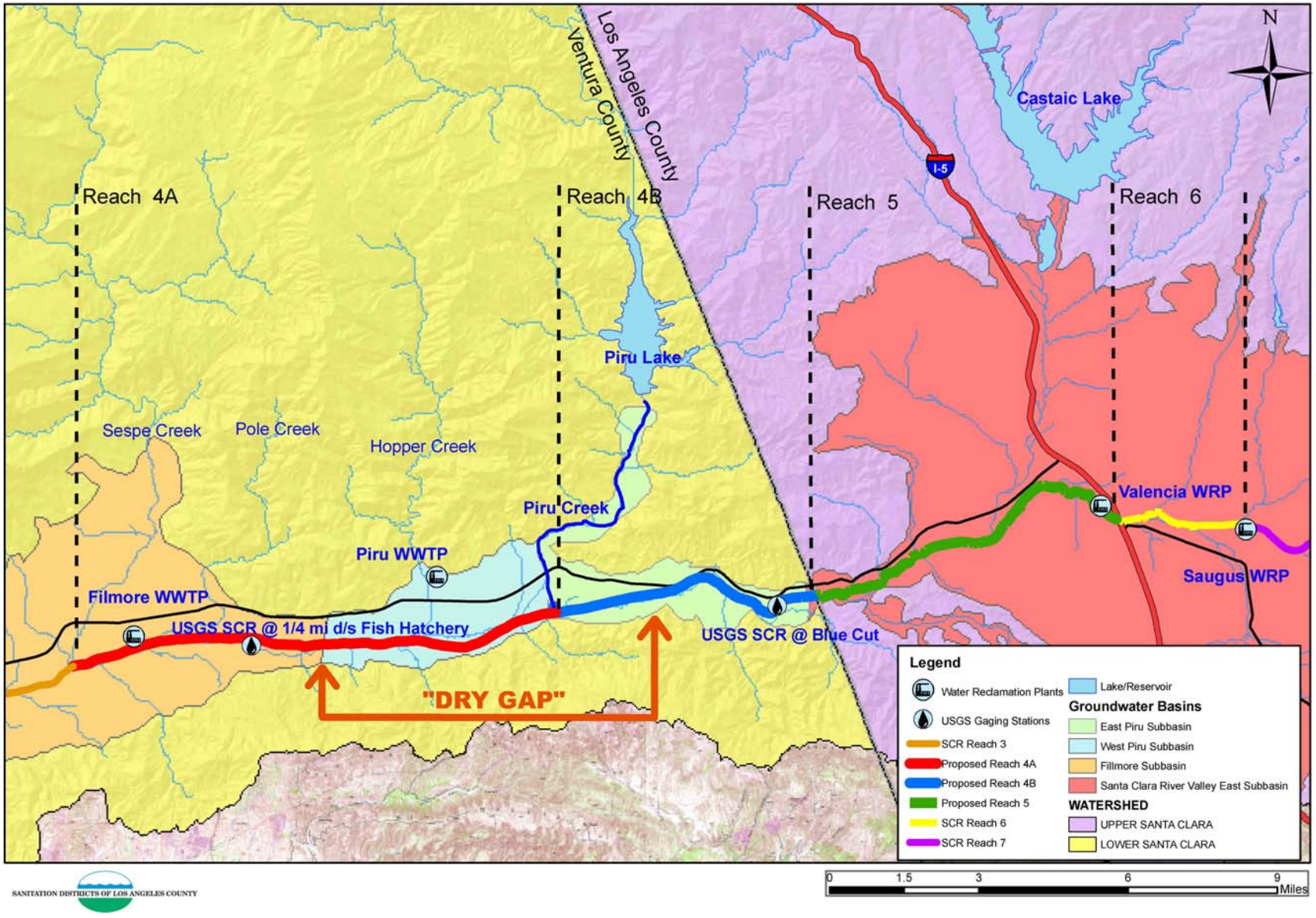


Figure 3: Estimated Water Budget for Upper Santa Clara River GSWI Model Boundary: Lang Gaging Station to A Street Bridge, Fillmore

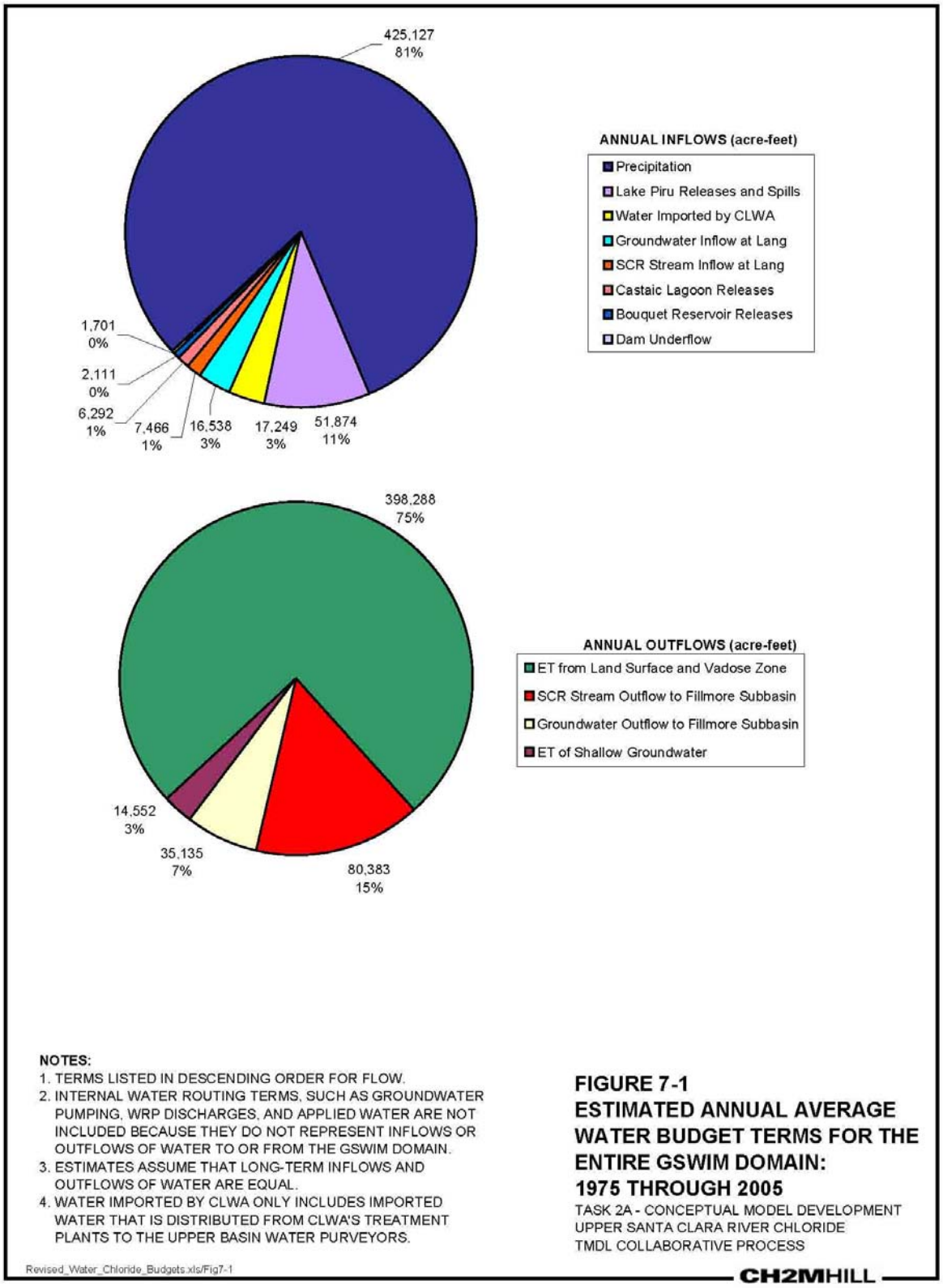
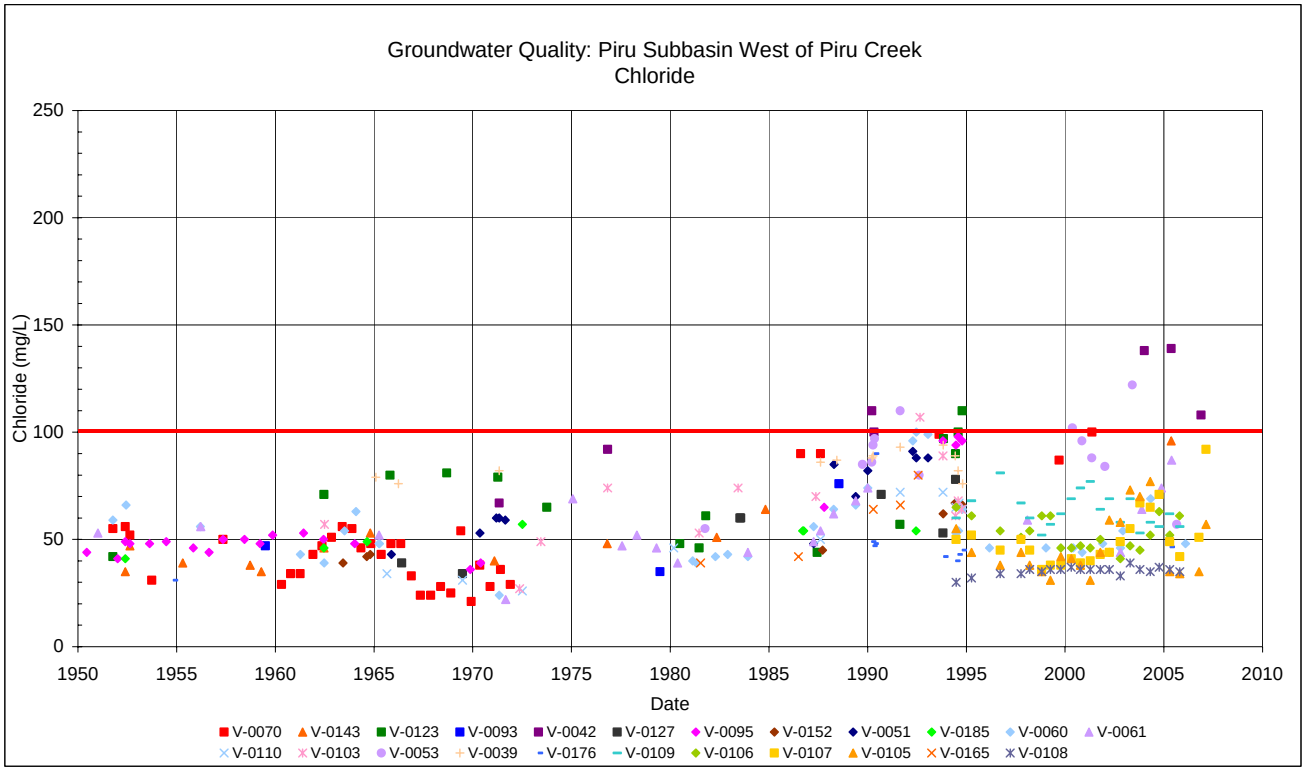


Figure 4: Water Quality Data of Groundwater East and West of Piru Creek - Cl



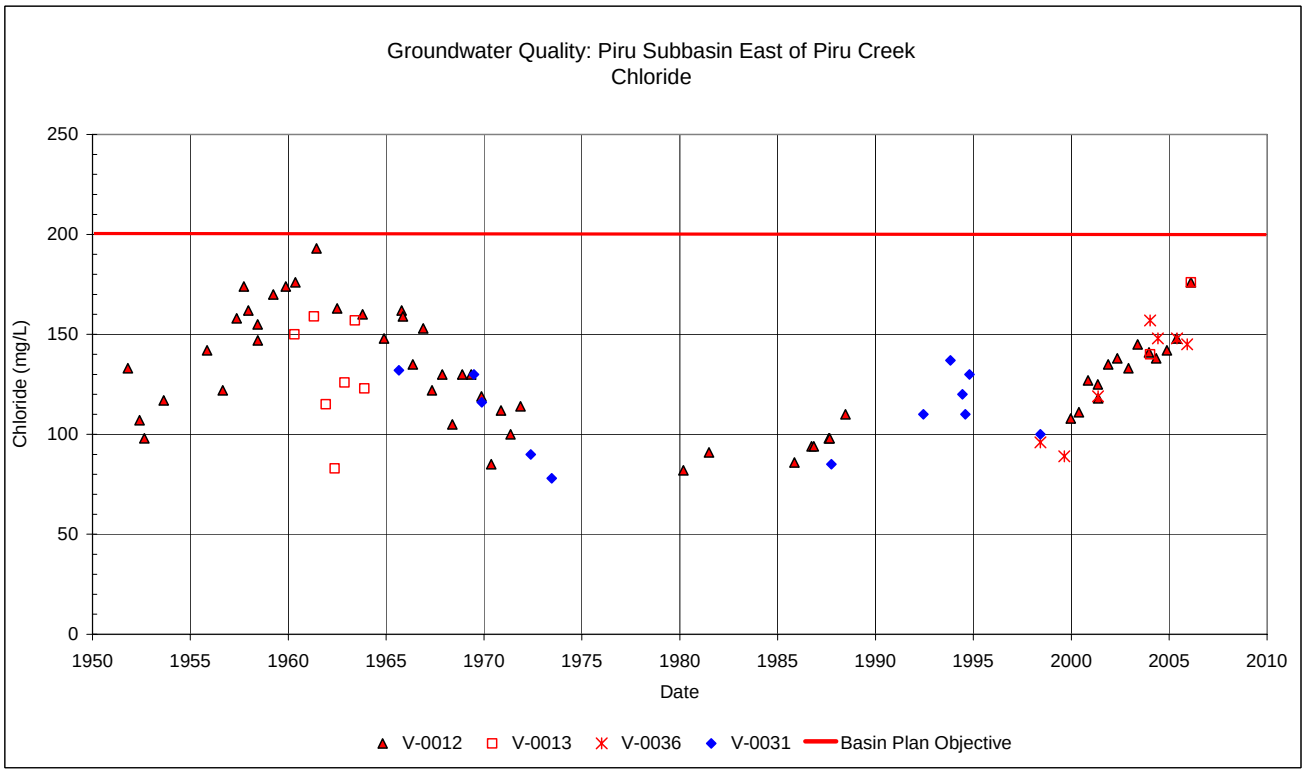
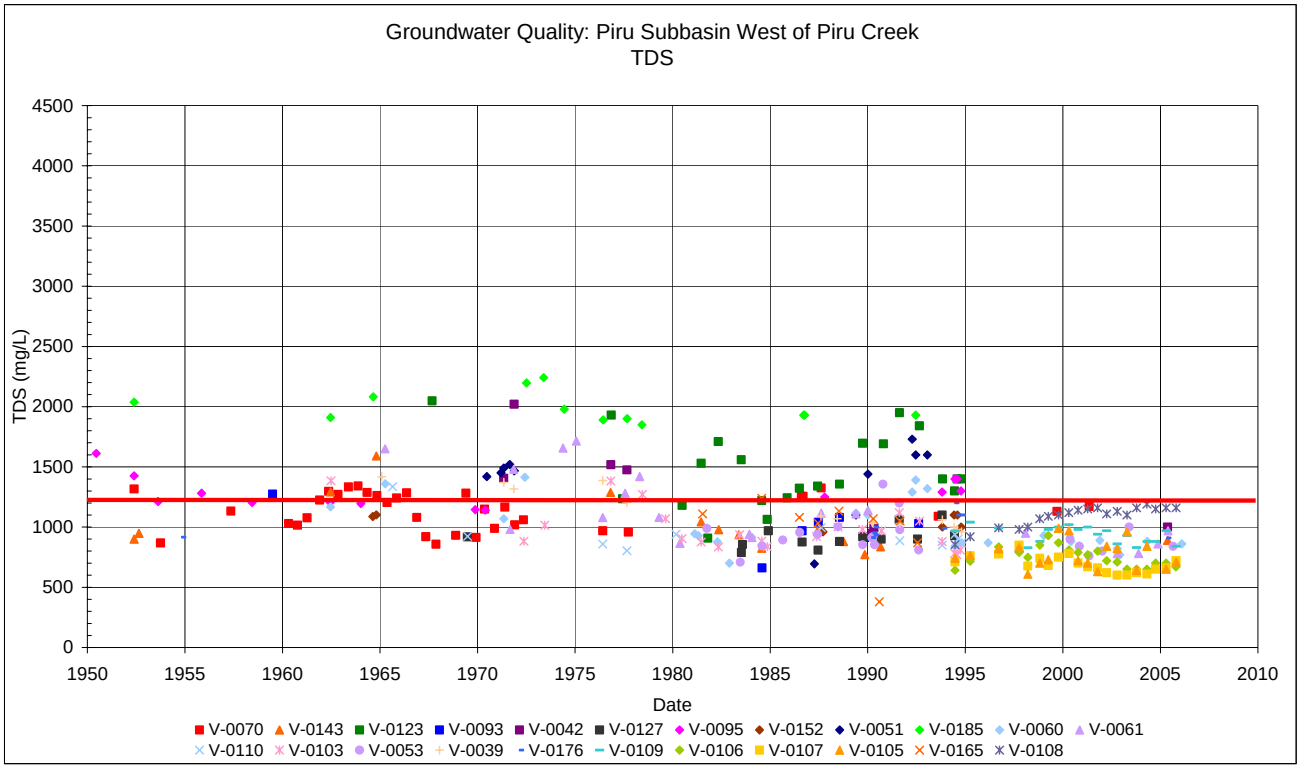


Figure 5: Water Quality Data of Groundwater East and West of Piru Creek - TDS



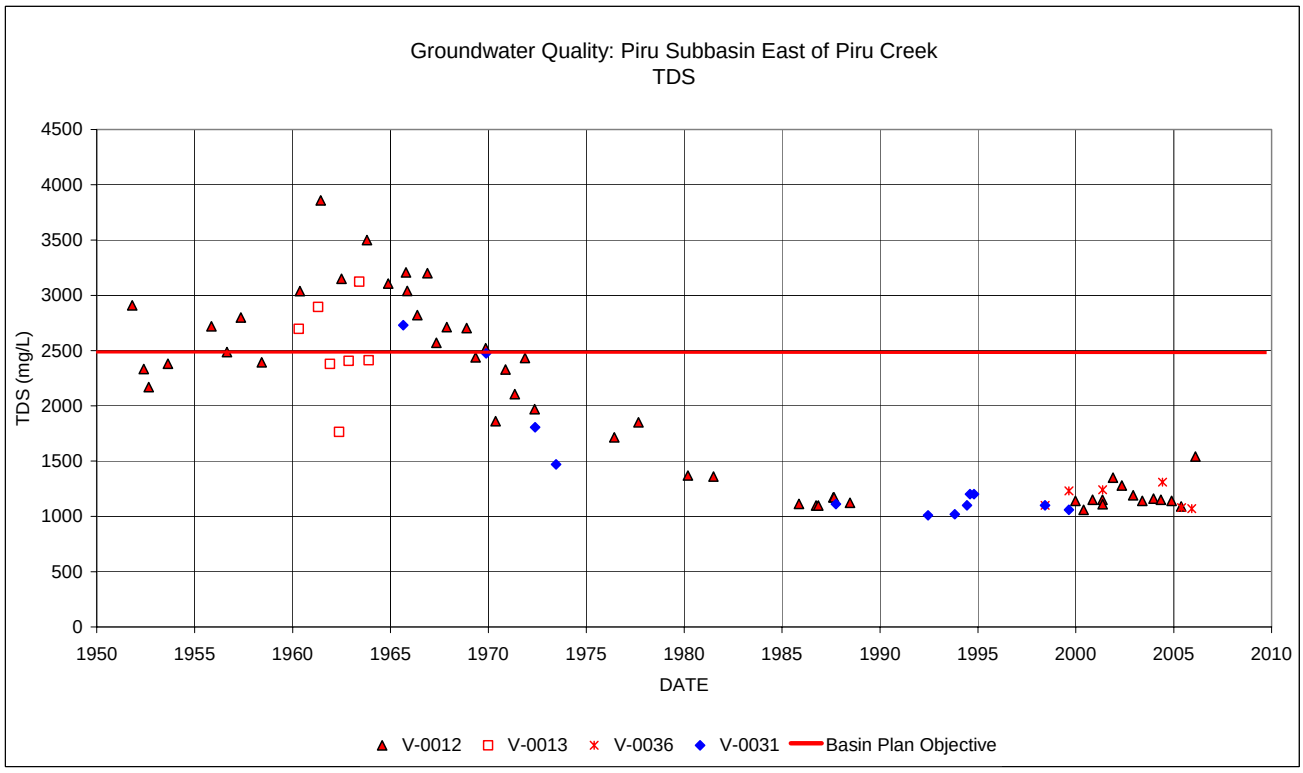
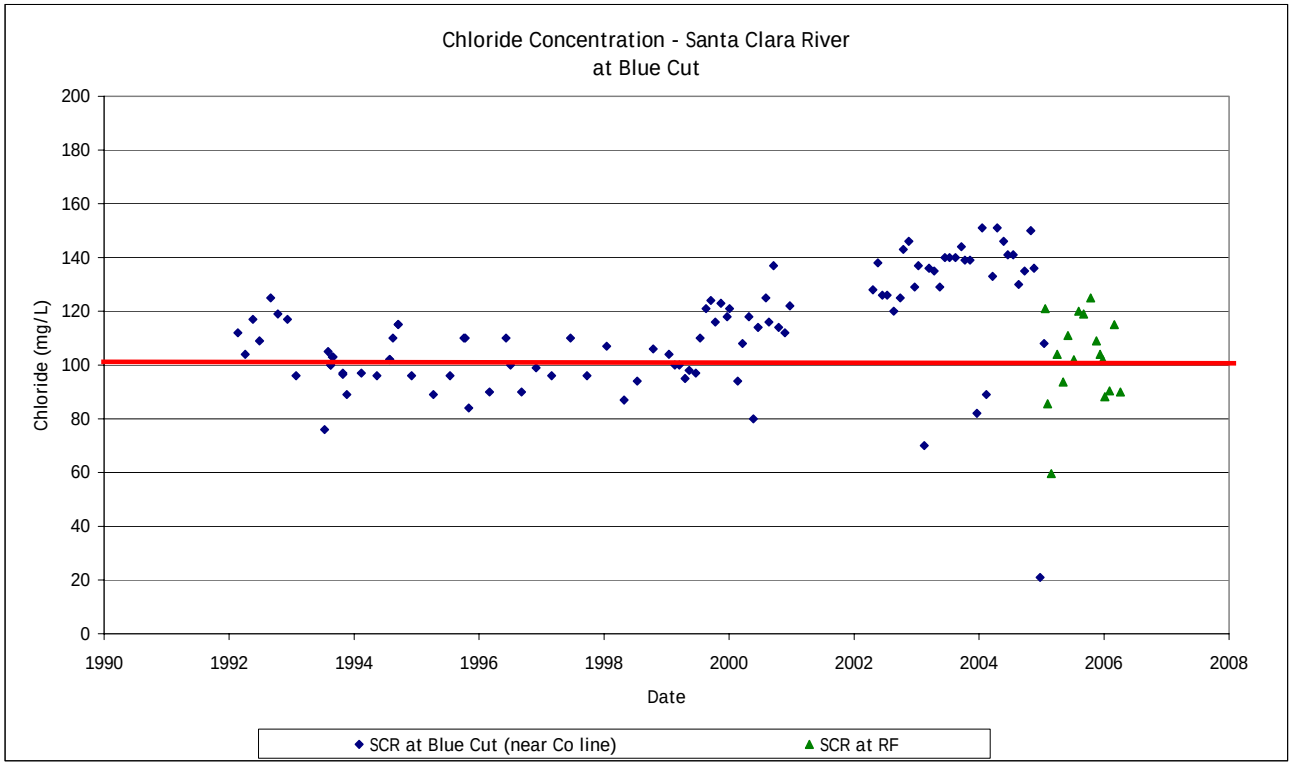


Figure 6: Surface Water Quality SCR East and West of Piru Creek



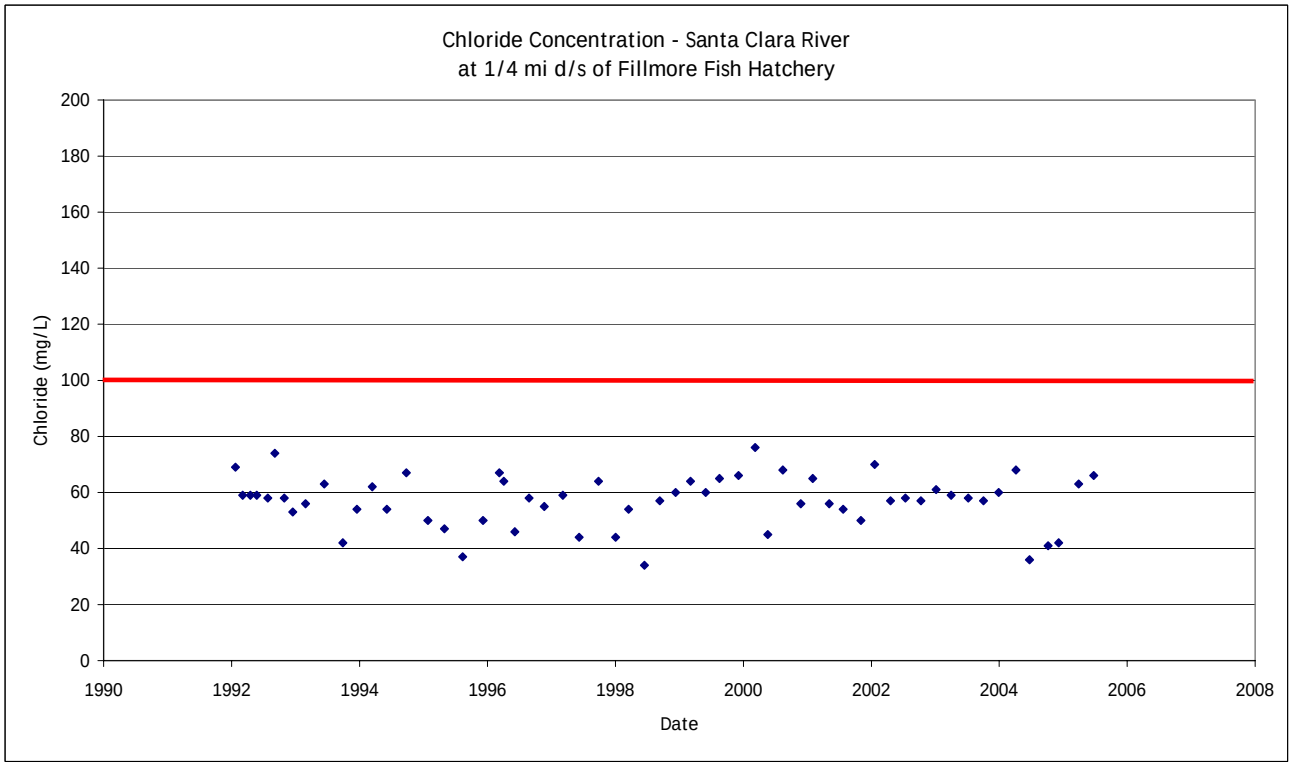
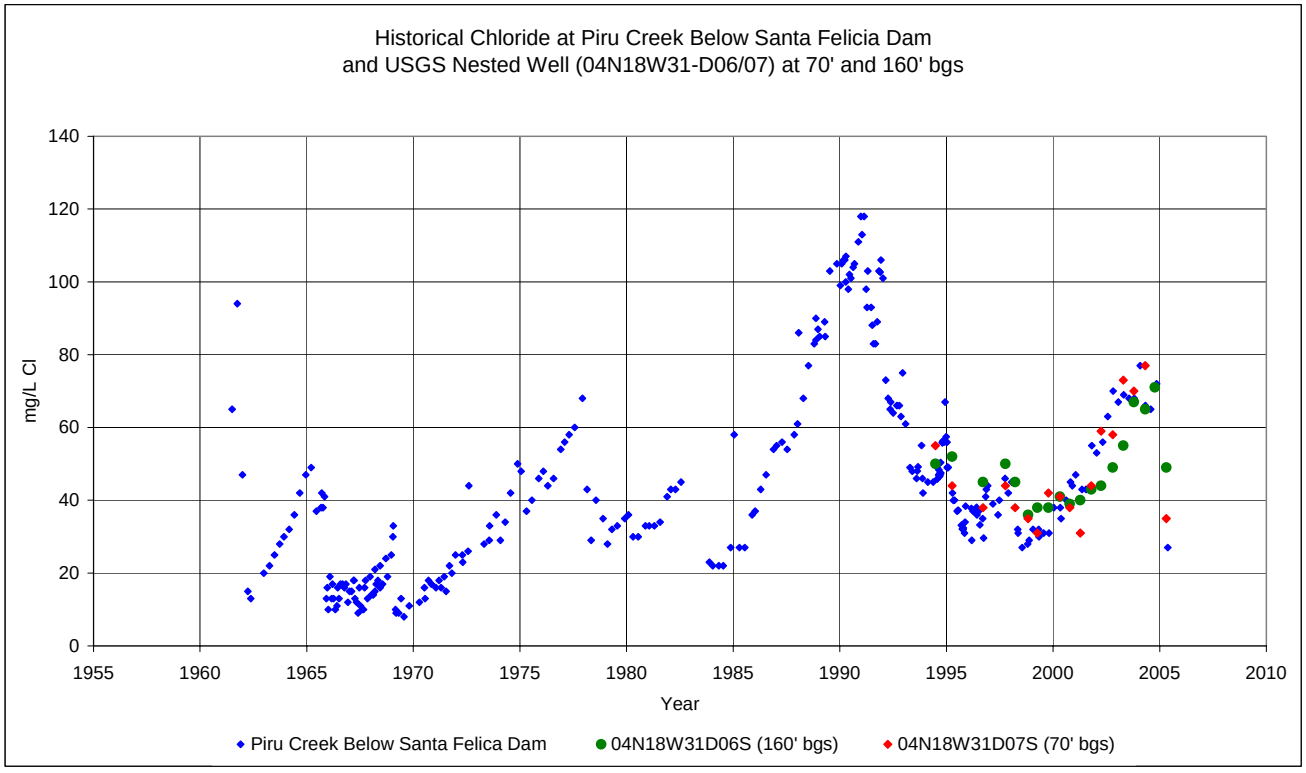


Figure 7: Water Quality Data at Piru Creek and USGS Well (East of Piru)



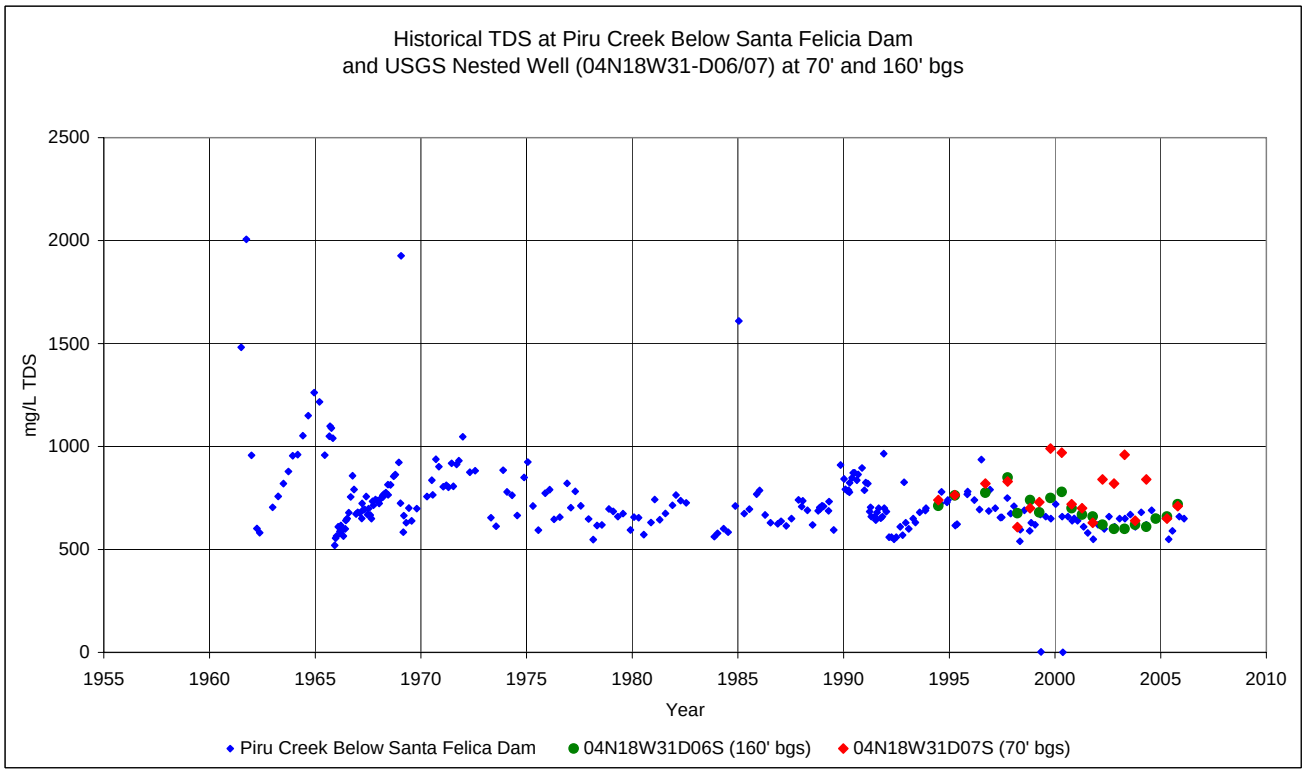
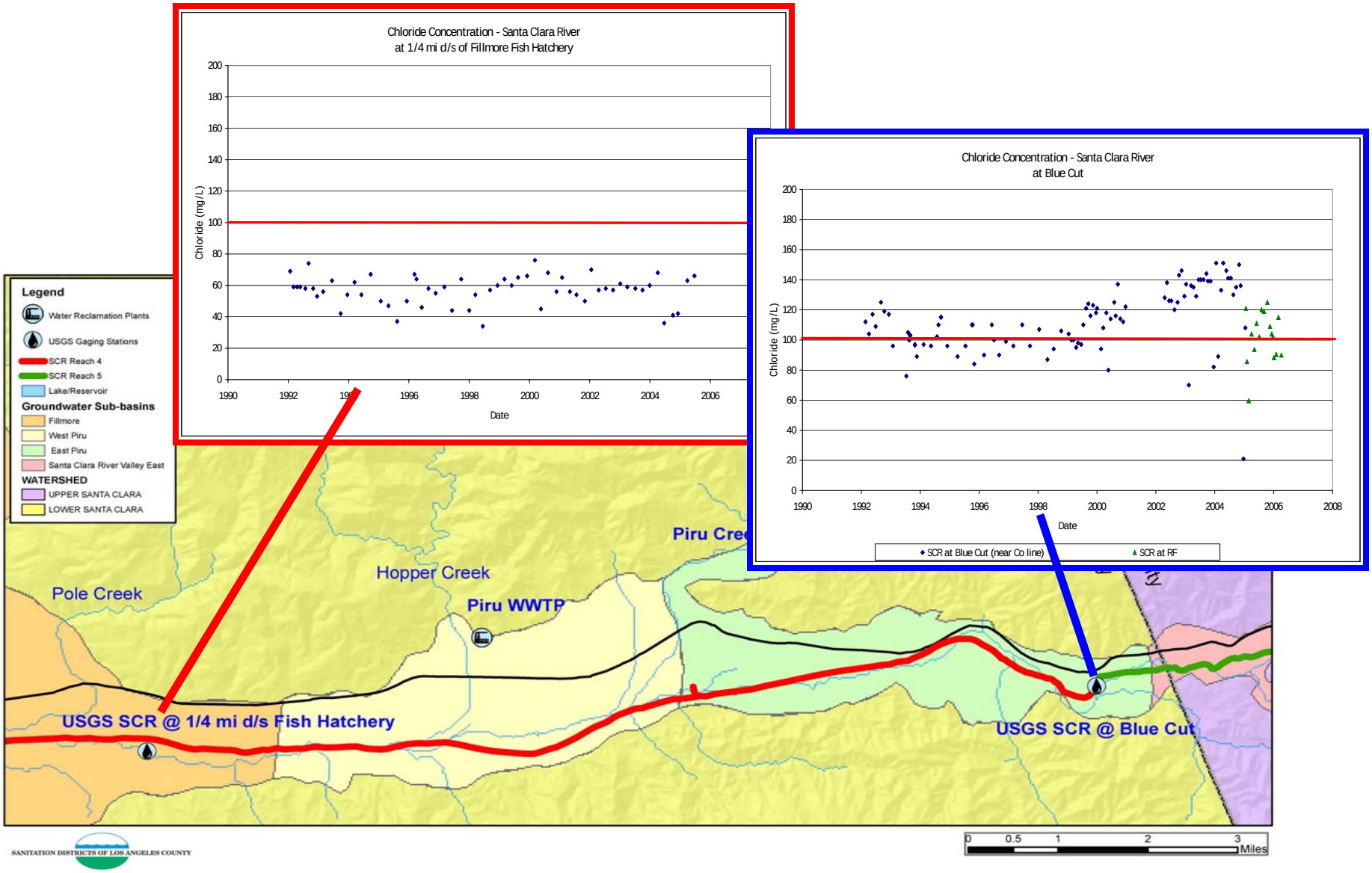


Figure 8: Surface Water Quality SCR East and West of Piru Creek



Attachment 1: Excerpts from 1975 Basin Plan

Attachment 2: Excerpts from 1978 Basin Plan Amendments

Attachment 3: Excerpts from 1994 Basin Plan

Attachment 4: USCR Cl TMDL GSWI Model Study Area Features