Stream Classification for the Coyote Creek Watershed

Coyote Creek Watershed Integrated Pilot Assessment
Technical Memorandum: Task 2.0

Prepared for the
Santa Clara Valley Urban Runoff Pollution Prevention Program

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INTRODUCTION

The primary objective of this task was to develop a reach-scale classification system for the Coyote Creek watershed based on a repeatable method that could be easily applied to other local watersheds in the Santa Clara Basin. The selected classification system was to be based on physical variables that could be readily measured or obtained using information acquired from existing datasets. The resulting classification would be tabulated and developed in digital format using a GIS.

BACKGROUND

The Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) previously developed a stream classification for the mainstem Coyote Creek as part of the Stormwater Environmental Indicators Demonstration Project (SEIDP). The SEIDP stream classification integrated nine physical variables to create eight distinct reaches for the section of Coyote Creek below Anderson Dam. A stream reach was defined as a section of stream that exhibits similar characteristics across the selected variables.

There are several reasons that developing a stream classification system can be useful when conducting watershed assessments and establishing monitoring programs. A classification facilitates an understanding of the variables that affect sensitive or important aquatic resources, and leads to a more meaningful evaluation of the factors affecting Beneficial Uses. Classifying stream reaches also provides a mechanism for extrapolating site-specific data to other stream reaches that have similar characteristics. In addition, classification serves as a tool for predicting future stream responses to perturbations and as a basis for selecting future sampling sites and methodologies for field monitoring.

METHODS

The Coyote Creek watershed consists of approximately 230 square miles of land in eastern Santa Clara County. Developing and implementing a classification system for the entire watershed requires using information at multiple scales that can be combined and analyzed to determine appropriate breaks in stream type. The presence of large reservoirs and urbanization in the lower watershed, and steep, mountainous terrain in the upper watershed precluded applying a single classification system for the entire watershed. . We divided the watershed into a lowland and an upland region based on the break between the alluvial plain and upland areas and applied different classifications in these regions. This division was created using the Santa Clara Valley Water District's GIS layer that depicts groundwater recharge zones for the valley region versus source water zones for the upland region of the Coyote Creek watershed.

Available data sources were compiled and analyzed for their utility to develop a stream classification. Six variables were used in the upland region and four variables were used in the valley regions to define reach breaks of the Coyote Creek watershed:

Upland Region

- Ecological Unit – Section Level: National Hierarchical Framework of Ecological Units classification scheme developed by the USDA Forest Service. Scale of analysis is 1:7,500,000 to 1:3,500,000.
- Valley Gradient – Computed using USGS 10-meter resolution Digital Elevation Models (DEMs) along with a derived stream layer. Gradient was determined using stream segment lengths no greater than 1000 feet.

- Valley Width – Computed using USGS 10-meter resolution DEM along with a derived stream layer. Method used to determine valley width is based on an algorithm that that extends lines across the valley, perpendicular to the average direction of local stream segments (Dvorsky, 2000). Valley width was determined using stream segment lengths no greater than 1000 feet.
- Strahler Stream Order – Computed using a derived stream network based on USGS 10-meter resolutions DEMs. A drainage area of approximately 250 acres (1000 cells) was used for channel initiation.
- Drainage Area – Computed using a USGS 10-meter resolution DEM.
- Landslide Severity – Computed using digital data produced by the USGS entitled, "Summary distribution of slides and earth flows in the San Francisco Bay Region, California" (Wentworth et. al., 1997). A value of 0, 1, 2, or 3 was assigned to polygons classified as water or superficial deposits, few landslides, many landslides, or mostly landslides, respectively. Subwatershed polygons were intersected with the landslide values to compute a weighted area landslide severity.

Lowland Region

- Channel modification – Derived from SCVWD Waterways Management Model database, which describes channel types for the SCVWD Creeks GIS data layer, developed at a scale of 1:5000 feet.
- Stream Flow Regime – Derived from SCVWD Waterways Management Model database, which describes flow regime for SCVWD Creeks GIS data layer.
- Rosgen Channel Type (Level 1) – Geomorphic stream classification system based on channel shape and gradient (Rosgen 1994). Classification was previously done for Upper Penitencia and the Coyote Creek mainstem, below Anderson Dam, as part of the Fisheries Aquatic Habitat Collaborative Effort (FAHCE) project.
- Ecological Unit – See description above.

We created a digital stream-reach GIS coverage, by individually assessing each of the data layers described above and determined reach breaks based on where values for individual variables changed. Since many of the data layers consist of variables representing continuous values, divisions were made based on natural breaks in the data or divisions that were based on previous studies or methods.

Gradient Class	Percent Valley Gradient	Rosgen Classification
1	0% - 1%	C
2	1% - 2%	C
3	2% - 4%	B
4	4% - 10%	A
5	> 10%	Aa+

Description of Variables

Ecological Unit

Three primary ecologic zones pertain to the upland area: the Fremont-Livermore Hills and Valleys, the Western Diablo Range, and the Diablo Range. Three primary ecologic zones also pertain to the valley area: Bay Flats, Santa Clara Valley, and East Bay Terrace and Alluvium. Most stream reaches lay within one of these regions. Those that crossed two regions were split along the boundary into separate reaches.

Valley Gradient

Results from the valley gradient produced a range of values in units of percent slope (rise over run). The following ranges were used to classify all stream gradients into a distinct gradient class. Final gradient classes were then used to estimate Rosgen Level 1 channel types (Rosgen, 1994). Defining Rosgen channel types using this method was assumed to be a reasonable first-order approximation of the true Rosgen channel type. Additional ground-based information regarding channel entrenchment would be required to further define the channel type.

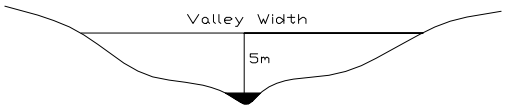
Significant changes in valley gradient are a good indicator of changes in channel and valley form. Not all changes in gradient were considered definite reach breaks (*see Valley Width for more detail*).

Derived Valley Width

A derived valley width was calculated for each stream segment. Derived valley width is a good variable to determine differences between valleys and gorges that often alternate along the stream length in tectonically active mountain ranges (Dvorsky, 2000). Unfortunately the valley width variable is the least accurate of all the derived variables due to inaccuracies in the DEM, presence of tributary valleys that may produce overestimates of valley width, and the difficulties of developing an algorithm to accurately estimate a perpendicular line to the direction of flow. Due to these inaccuracies, general valley width categories were developed to express the relative width

of the valley (e.g. – narrow, wide) rather than reporting actual values. The valley width analysis is also computed five meters (approximately 15 feet) above the valley floor to reduce systematic errors known to occur in DEM's directly along the valley floor.

Valley width characteristics will often dictate substrate conditions, sediment storage potential, and presence of a well-developed floodplain. Not all valley width changes were considered to be locations of reach breaks. The general pattern in valley width over longer distances was considered to determine appropriate locations for reach breaks. Valley width and gradient often covary throughout a landscape and were therefore considered together when considering appropriate reach breaks.



Each reach was classified by valley width using one of the following ranges. For reaches with varying valley width, an average width was determined.

Valley Width Class	Valley Width	Valley Width Category
1	0 m	Very Narrow
2	10 – 50 m	Narrow
3	60 – 10 m	Moderate
4	>100 m	Wide

Stream Order

Stream order ranged from 1st to 5th within the Coyote Creek watershed. Many of the reach breaks occurred at changes in stream order since stream order is often associated with significant changes in the channel conditions due to increases in the amount of contributing area to stream flow.

Drainage Area

The drainage area (in acres) was determined for each reach of stream and classified based on the following ranges.

Drainage Area Class	Drainage Area
1	0 – 250 acres
2	250 – 500 acres
3	500 – 1000 acres
4	1000 – 5000 acres
5	5000 – 10000 acres
6	>10000 acres

Significant changes in drainage area and a concurrent change in stream order will often influence channel factors such as channel width and flow regime. Drainage area was used to determine reach breaks in a similar manner to stream order.

Landslide Severity

Classification with respect to erosion was determined using an average of landslide occurrences weighted by drainage area, producing a landslide severity for each subwatershed. Boundaries to determine landslide severities were based on the SCVURPPP subwatershed layer with additional divisions made based on the resolution required for this analysis. One of the following density classes was assigned to each landslide severity polygon.

Severity Class	Landslide Severity
1	0.00 - 0.50
2	0.50 – 1.52
3	1.52 – 1.89
4	1.89 – 2.27
5	2.27 – 2.57

The results from the landslide severity analysis were fairly coarse (at the subwatershed scale). All changes in the severity class were used to determine reach breaks since the density of landslides occurring along a stream channel has a significant impact on channel and floodplain conditions. Landslide occurrence is also an appropriate proxy to describe changes in local hillslope conditions such as slope, geology, relief and soil conditions. Terminal points for subwatersheds where this variable changed value were considered a break in reach type

Channel Modification

There were15 types of channel modifications described for SCVWD creeks that occur within the Coyote Creek watershed. These types were reclassified into five major channel types based on similar types of modification made to channel bed and banks: concrete or rock-lined, earth levee, natural bed/modified bank, natural modified, and natural unmodified. The reclassified channel type classes represent distinct types of channel response to changes in flow and sediment and ecological conditions for aquatic biota and riparian vegetation. Reaches were broken only when changes in reclassified channel type were greater than or equal to 1000 feet in length.

Channel Type SCVWD_code	Description	Reclassified channel type	Bed	Bank
2	Pipe Culvert	Concrete or Rock-lined	fixed	hard
3	Arch Culvert	Concrete or Rock-lined	fixed	hard
4	Box Culvert	Concrete or Rock-lined	fixed	hard
5	Bridge	Concrete or Rock-lined	fixed	hard
6	U-Frame Concrete	Concrete or Rock-lined	fixed	hard
8	Trapezoidal Concrete	Concrete or Rock-lined	fixed	hard
10	Sack Concrete	Natural Bed, Modified bank	unfixed	mixed
12	Gabion (Sides)	Natural Bed, Modified bank	unfixed	mixed
16	Rock-lined (Sides)	Natural Bed, Modified bank	unfixed	mixed
18	Rock-lined (Sides & Bottom)	Concrete or Rock-lined	fixed	mixed
20	Earth Levee	Earth Levee	unfixed	soft
22	Flood Walls	Natural Bed, Modified bank	unfixed	mixed
24	Excavated Earth	Earth Levee	unfixed	soft
30	Modified Flood Plain	Natural Modified	unfixed	soft
32	Natural Unmodified	Natural Unmodified	unfixed	soft

Flow Regime

The SCVWD creeks database identified two flow regimes– intermittent and perennial – and several sections of creeks with "no data". This flow information is based on SCVWD hydrology and biology staff knowledge of flow patterns for typical years. Stream reaches were defined at each change in flow regime, including those sections of stream identified as "no data".

Rosgen Channel Type

Rosgen Level 1 channel types are based on several factors related to stream form and gradient, including entrenchment and stream width/depth ratio, sinuosity and channel slope (Appendix A). These factors were assessed to identify breaks in channel types using aerial photography, USGS topographic maps and groundtruthing in Upper Penitencia Creek and the Coyote Creek mainstem as part of the FAHCE study (Tom Taylor, ENTRIX, personal communication, 2001). Rosgen channel types were further validated by groundtruthing in the field for this study.

RESULTS

The classification of streams in the upland and lowland regions were kept as separate digital data layers due to the different scales and types of variables used. For the upland region of Coyote Creek, reach breaks were assigned to stream segments in the 1:24,000 scale USGS hydrography layer using a GIS. We used a minimum reach length of approximately 0.5 mile. For the valley region, reach breaks were assigned to stream segments in the 1:5000 scale SCVWD Creeks hydrography layer using a GIS. We identified 510 and 84 reaches within the upland and valley regions, respectively (Figure 1). Each reach was given a unique identification code and assigned class values from each of the variables previously discussed. Rosgen channel type was calculated for each reach in the upland region using the gradient variable. Rosgen channel type for stream reaches in both regions is shown in Figure 2.

SUMMARY

The following summarizes the results of this study:

1. A reach-scale stream classification system for the entire Coyote Creek watershed was developed using available data at multiple scales.
2. The stream classification approach was based on a repeatable method that could be easily applied to other local watersheds in the Santa Clara Basin.
3. The stream classification assists watershed assessment by providing a framework to assess the conditions for stream reaches with existing information to other reaches with similar stream characteristics, with limited or no data.
4. The classification provides a framework to identify future sampling locations and identify methods for field monitoring.

REFERENCES

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Wentworth, C., S. Graham, R. Pike, G. Beukelman, D. Ramsey, and A. Barron. 1997. "Summary distribution of slides and earth flows in the San Francisco Bay Region, California". USGS Open-File Report 97-745 C. Menlo Park, Californ

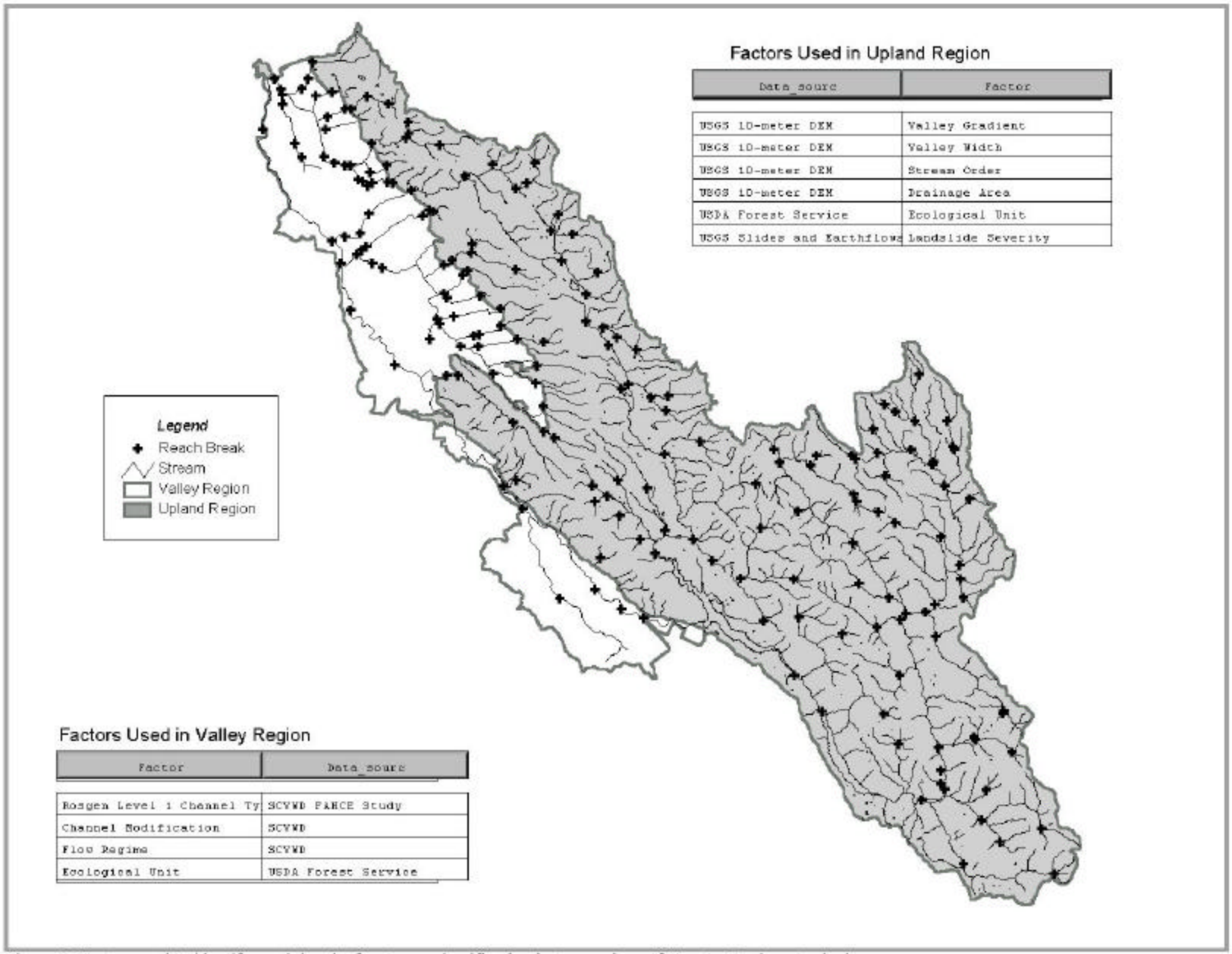

Figure 1. Factors used to identify reach breaks for stream classification in two regions of Coyote Creek watershed.

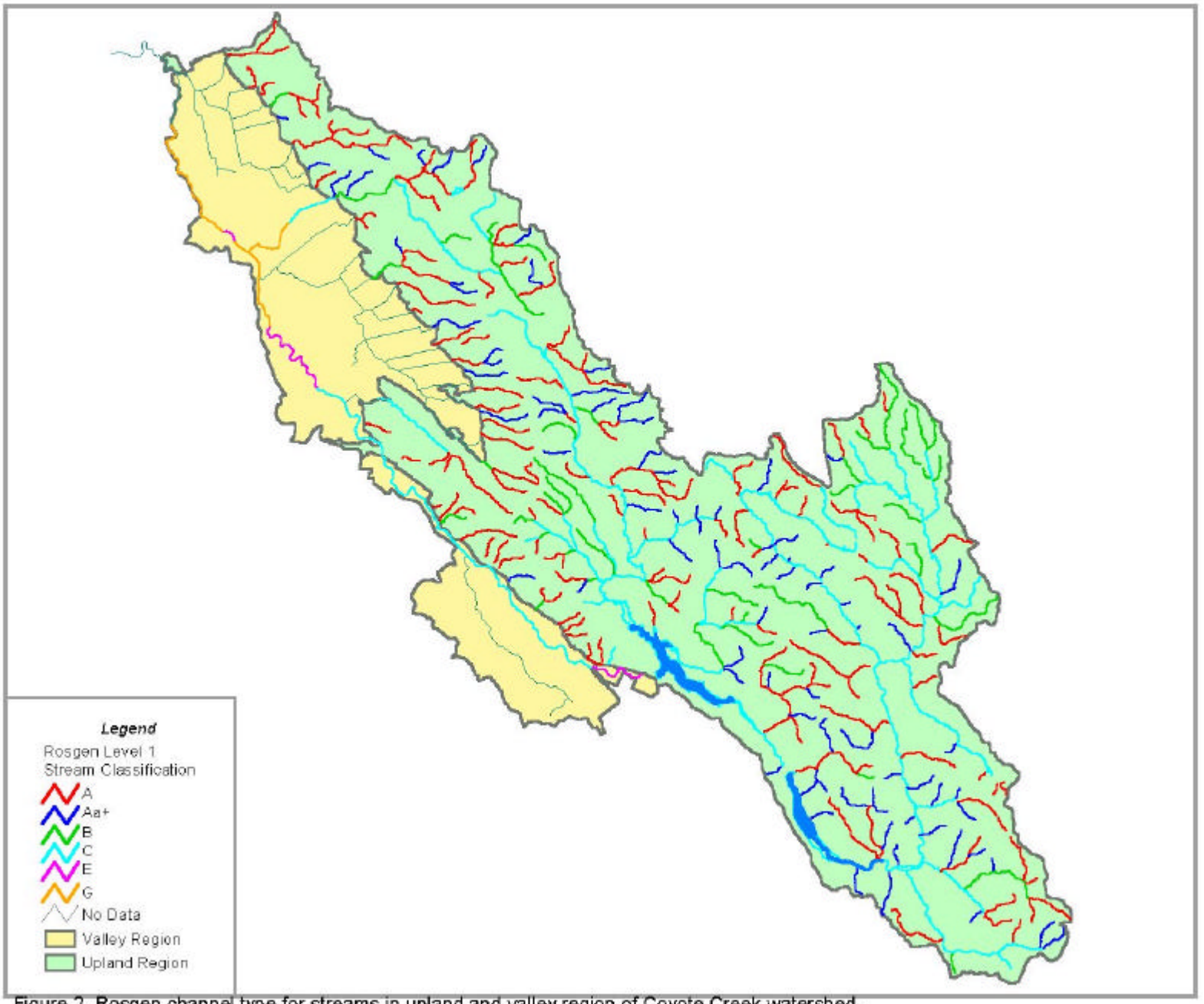

Figure 2. Rosgen channel type for streams in upland and valley region of Coyote Creek watershed.

Appendix B. Species sampled in Coyote Creek between 1858 and 2000. Species listed in approximate chronological order of sampling. The five time periods reflect major structural changes to the creek and/or observed differences in the relative proportion of native and non-native fishes in the community Buchan et al. (1999).

	Upper Coyote					Lower Coyote					Index of Tolerance
Time	1858-1940	1941-1954	1955-1967	1972-1981	1987-2000	1858-1940	1941-1954	1955-1967	1972-1981	1987-2000	
Native Species											
Thicktail chub *Gila crassicauda*	x					x					I
Splittail *Pogonichthys macrolepidotus*	x					x	o	o	o	x	Ie
Sacramento perch *Archoplites interruptus*						x	o	x			S
Western brook lamprey *L. richardsoni*	Unknown status due to taxonomic difficulty					x	Unknown status due to taxonomic difficulty				I*
Pacific lamprey *Lampetra tridentata*	x	o	o	o	o	x	x	o	x	x	**T**
Coho salmon *O. kisutch*	o	x	x								S
Chinook salmon O. *tshawytscha*						o	o	x	o	x	S
Steelhead/rainbow trout *Oncorhynchus mykiss*	x	x	x	x	x	x	x	x	x	x	S
California roach *Lavinia symmetricus*	x	x	x	x	o	x	x	x	x	x	I
Hitch *L. exilicauda*	x	o	o	x	x	x	o	o	x	x	I
Sacramento blackfish *Orthodon microlepidotus*	x	x	o	x	o	x	x	x	x	x	I
Sacramento pikeminnow *Ptychocheilus grandis*	x	x	o	x	o	x	x	o	x	x	I
Speckled dace *Rhinichthys osculus*	x	x	o	x		x	o	o	x		S
Sacramento sucker *Catostomus occidentalis*	x	x	o	x	x	x	x	x	x	x	**T**
Threespine stickleback *Gasterosteus aculeatus*	x	x	o	x	x	x	x	x	x	x	I
Tule perch *Hysterocarpus traskii*	x	o	o	o	x						I
Prickly sculpin *Cottus asper*	x	o	x	x	x	x	x	o	x	x	I
Riffle sculpin *Cottus gulosus*						x	o	o	x	x	I
Staghorn sculpin *Leptocottus armatus*						o	o	o	o	x	Ie

	Upper Coyote					Lower Coyote					Index of Tolerance
Time	1858-1940	1941-1954	1955-1967	1972-1981	1987-2000	1858-1940	1941-1954	1955-1967	1972-1981	1987-2000	
Nonnative Species											
Mosquitofish *Gambusia affinus*				x	x		x		x	x	**T**
Bluegill *Lepomis macrochirus*				x	x			x	x	x	**T**
Green sunfish *L. cyanellus*				x	x			x	x	x	**T**
Largemouth bass *Micropterus salmoides*				x	x			x	x	x	**T**
Brown bullhead *Ictalurus nebulosus*				x				x			**T**
Golden shiner *Notemigonus crysoleucas*								x	x	x	**T**
White crappie *Pomoxis annularis*								x	x	x	**T**
Channel catfish *Ictalurus punctatus*								x		x	**T**
Carp *Cyprinus carpio*				x	x				x	x	**T**
Goldfish *Carassius auratus*				x					x	x	**T**
Fathead minnow *Pimephales promelas*					x				x	x	**T**
Rainwater killifish *Lucania parva*									x	x	Te
Threadfin shad *Dorosoma petenense*									x	x	Ilen
Redear sunfish *L. microlophus*									x		**T**
Black crappie *Pomoxis nigromaculatus*									x	x	**T**
Red shiner *Notropis lutrensis*										x	**T**
Pumpkinseed *Lepomis gibbosus*										x	Ilen
Smallmouth bass *Micropterus dolomieui*										x	Ilen
Yellowfin goby *Acanthogobius flavimanus*										x	Ie

	Upper Coyote					Lower Coyote					Index of
Time	1858-1940	1941-1954	1955-1967	1972-1981	1987-2000	1858-1940	1941-1954	1955-1967	1972-1981	1987-2000	Tolerance
Inland silverside *Menidia beryllina*										x	**T**
Black bullhead *Ameiurus melas*										x	**T**
Yellow bullhead *A. natakis*										x	**T**
Striped bass *Morone saxatilis*										x	Ilen
Number Native Sp	13	8	4	9	6	15	8	7	11	13	
Number Nonnative Sp	0	0	0	7	7	0	1	7	13	21	
Percentage Native Sp	100	100	100	56	46	100	89	50	46	38	
The following values include species presumed present during respective time periods. Values representing the 1955 - 1967 time period were used to represent reference conditions for the purpose of calculating metrics used in the IBI.											
Number Native Sp	14	12	12	11	10	17	15	15	14	13	
Number Nonnative Sp	0	0	0	7	8	0	1	8	15	23	
Percentage Native Sp	100	100	100	61	56	100	94	65	48	36	
Number Tolerant Sp	0	0	0	7	8	0	1	8	14	17	
Total Number Species	14	12	12	18	18	17	16	23	29	36	
Percentage Tolerant Sp	0	0	0	28	31	0	6	26	33	32	

Legend:

x = species sampled; o = species not sampled but presence expected and presumed for our analysis

= extinction

= invasive species appearance

= unsuitable habitat; not expected

Index of Tolerance (species marked "T" included in metric of tolerant species):

T = tolerant

Te = tolerant and euryhaline (not included in metric of tolerant species due to habitat limitation)

I = intermediate

Ie = intermediate and euryhaline

Ilen = intermediate and lentic,

I* = called intermediate, but really not well understood

S = sensitive

Appendix C. Occurrence of Fishes from Historical Sources for the Coyote Creek Watershed: Upper Coyote Segment (above Metcalf Dam). Dates reflect sampling periods unless in parentheses (publication date).

Native Species	Snyder[1] 6/30/98	Gilbert[1] 1897	Snyder[1] 1905	(1936) Fry 1926-1927	(1950) Taft & Murphy 1926-28	Fry 1936	Simpson & Simpson 1945	CDFG 1946	Hendricks SJSU 1950s	Skinner[2] 1962	Follett 1964	(1976) Aceituno *et al.* 1973	(1978) Scoppetone & Smith 1972-77	(1982) Pitt & Bozeman 1977-80	(1984) Leidy 1981	Leidy 1993-1995	SCVU RPPP 1999
Pacific lamprey Lampetra tridentata	X		X														
Rainbow/steelhead trout Oncorhynchus mykiss			X			X	X	X[3]		X		X				X	X
Coho salmon O. kisutch									X[4]	X							
Hitch Lavinia exilacauda		X	X									X	X	X	X	X	X
California roach L. symmetricus	X		X		X	X	X				X		X	X	X		
Sacramento pikeminnow Ptychocheilus grandis			X	X	X		X								X		
Splittail Pogonichthys macrolepidotus	X		X														
Thicktail chub Gila crassicauda			X														
Sacramento blackfish Orthodon microlepidotus			X			X	X					X	X	X	X		
Speckled dace Rhinichthys osculus			X										X[5]				
Sacramento sucker Catostomus occidentalis			X	X	X	X	X					X	X	X		X	X
Threespine stickleback Gasterosteus aculeatus			X			X	X					X	X	X	X		X
Prickly sculpin Cottus asper			X			X					X	X	X	X	X	X	X
Tule perch Hysterocarpus traskii			X														X

[1] Sampling location(s) unknown.
[2] Depicted on maps as "Silver salmon and/or steelhead – probable historical distributions" and "Lightly used streams".
[3] Reference to existing steelhead run in Coyote River downstream from Coyote Dam
[4] Coho salmon observed in Coyote Creek into the 1950s by J. Hendricks, San Jose State University.
[5] Collected by R.L. Hassur, San Jose State University.

Appendix C. Occurrence of Fishes from Historical Sources for the Coyote Creek Watershed: *Upper Coyote Segment (above Metcalf Dam)*.

Non-native Species	Snyder 6/30/98	Gilbert 1897	Snyder 1905	(1936) Fry 1926-27	(1950) Taft & Murphy 1926-28	Fry 1936	Simpson & Simpson 1945	CDFG 1946	Hendricks SJSU 1950s	Skinner 1962	Follett 1964	(1976) Aceituno *et al.* 1973	(1978) Scoppetone &Smith 1972-77	(1982) Pitt & Bozeman 1977-80	(1984) Leidy 1981	Leidy 1993-95	SCVU RPPP 1999
Common carp Cyprinis carpio														X		X	
Goldfish Carassius auratus													X	X			
Mosquitofish Gambusia affinis													X	X		X	
Fathead Minnow *Pimephales promelas*																	X
Brown bullhead Ictalurus nebulosus															X		
Bluegill sunfish Lepomis macrochirus													X	X		X	
Green sunfish L. cyanellus													X			X	
Largemouth bass Micropterus salmoides													X		X	X	X
No. Native/ Non-native Spp.	3 / 0	1 / 0	13 / 0	2 / 0	3 / 0	6 / 0	6 / 0	1 / 0	1 / 0	2 / 0	2 / 0	6 / 0	6 / 5	6 / 4	8 / 2	5 / 5	6 / 2
Percentage Native Spp.	100	100	100	100	100	100	100	100	100	100	100	100	54	60	80	50	75

Appendix D. Occurrence of Fishes from Historical Records for the Coyote Creek Watershed: ***Lower Coyote Segment (below Metcalf Dam).*** *Dates reflect sampling periods unless in parentheses (publication date).*

Native Species	Girard[1] 1858	Gilbert[1] 1897	Heath[1], Abbott 1895	(1905) Snyder[1] 1898	Snyder[1] 1905	(1924) Hubbs 1922-23	Stanford 1925	SJ State 1925	Follett 1932	Follett 1941	Follett 1944	CDFG 1946	Merkel 1953
Pacific lamprey *Lampetra tridentata*					x	x			x	x			
Western brook lamprey *L. richardsoni*						x[2]							
Steelhead/rainbow trout *Oncorhynchus mykiss*				x	x							x[3]	x
Chinook salmon O. *tshawytscha*													
Coho salmon *O. kisutch*													
Thicktail chub *Gila crassicauda*					x								
California roach *Lavinia symmetricus*				x	x	x	x			x	x		x
Hitch *L. exilicauda*		x			x								
Sacramento blackfish *Orthodon microlepidotus*					x	x			x				x
Splittail *Pogonichthys macrolepidotus*		x		x	x								
Sacramento squawfish *Ptychocheilus grandis*					x	x					x		x
Speckled dace *Rhinichthys osculus*					x								
Sacramento sucker *Catostomus occidentalis*					x	x	x				x		x
Threespine stickleback *Gasterosteus aculeatus*	x				x	x			x	x	x		x

[1] Sampling locations unknown.

[2] Recorded as Lampetra richardsoni in 1922, and as Lampetra pacifica in 1923, reflecting historical, taxonomic debate.

[3] Reference to existing steelhead run, then in Coyote River (Creek) downstream from Coyote Dam.

Native Species	Girard[1] 1858	Gilbert[1] 1897[2]	Heath[1], Abbott 1895	(1905) Snyder[1] 1898	Snyder[1] 1905	(1924) Hubbs 1922-23	Stanford 1925	SJ State 1925	Follett 1932	Follett 1941	Follett 1944	CDFG 1946	Merkel 1953
Sacramento perch *Archoplites interruptus*						x			x				
Tule perch *Hysterocarpus traskii*			x		x	x		x					
Prickly sculpin *Cottus asper*					x	x			x				x
Riffle sculpin *C. gulosus*						x							
Staghorn sculpin *Leptocottus armatus*													
Nonnative Species													
Carp *Cyprinus carpio*													
Goldfish *Carassius auratus*													
Mosquitofish *Gambusia affinus*										x			
Bluegill *Lepomis macrochirus*													
Redear sunfish *L. microlophus*													
Green sunfish *L. cyanellus*													
Black crappie *Pomoxis nigromaculatus*													
Pumpkinseed *L. gibbosus*													
Largemouth bass *Micropterus salmoides*													
Smallmouth bass *M. dolomieui*													

Nonnative Species	Girard[1] 1858	Gilbert[1] 1897[2]	Heath[1], Abbott 1895	(1905) Snyder[1] 1898	Snyder[1] 1905	(1924) Hubbs 1922-23	Stanford 1925	SJ State 1925	Follett 1932	Follett 1941	Follett 1944	CDFG 1946	Merkel 1953
Brown bullhead *Ameiurus nebulosus*													
Rainwater killifish *Lucania parva*													
Yellowfin goby *Acanthogobius flavimanus*													
Inland silverside *Menidia beryllina*													
Threadfin shad *Dorosoma petenense*													
Golden shiner *Notemigonus crysoleucas*													
Red shiner *Notropis lutrensis*													
Fathead minnow *Pimephales promelas*													
White crappie *Pomoxis annularis*													
Black crappie *P. nigromaculatus*													
Black bullhead *Ameiurus melas*													
Yellow bullhead *A. natakis*													
Channel catfish *Ictalurus punctatus*													
Striped bass *Morone saxatilis*													
No. Native/Nonnative Spp.	1/0	2/0	1/0	3/0	13/0	11/0	2/0	1/0	5/0	3/1	4/0	1/0	7/0
Percentage Native Spp.	100	100	100	100	100	100	100	100	100	75	100	100	100

Native Species	SJ State 1953-56	CAS 1956	SJ State 1959	CDFG 1961	Skinner[5] 1962	SJ State 1964	Hassur[4] 1966-67	Hassur[4] 1972-73	(1976) Aceituno et al., 1973	Guzzetta 1974	(1978) Scoppettone & Smith 1972-77
Pacific lamprey *Lampetra tridentata*											x
Western brook lamprey *L. richardsoni*											
Steelhead/rainbow trout *Oncorhynchus mykiss*				x	x						
Chinook salmon O. *tshawytscha*					x						
Coho salmon *O. kisutch*											
Thicktail chub *Gila crassicauda*											
California roach *Lavinia symmetricus*	x	x						x		x	x
Hitch *L. exilicauda*								x			x
Sacramento blackfish *Orthodon microlepidotus*						x		x			
Splittail *Pogonichthys macrolepidotus*											
Sacramento squawfish *Ptychocheilus grandis*	x									x	
Speckled dace *Rhinichthys osculus*											x
Sacramento sucker *Catostomus occidentalis*						x		x		x	x
Threespine stickleback *Gasterosteus aculeatus*	x					x		x			x

[4] Collected by R.L. Hassur, San Jose State University.

[5] Depicted on maps as "Silver salmon and/or steelhead - probable historical distribution" and "Lightly used streams".

Native Species	SJ State 1953-56	CAS 1956	SJ State 1959	CDFG 1961	Skinner[5] 1962	SJ State 1964	Hassur 1966-67	Hassur 1972-73	(1976) Aceituno et al., 1973	Guzzetta 1974	(1978) Scoppettone & Smith 1972-77
Sacramento perch *Archoplites interruptus*			x								
Tule perch *Hysterocarpus traskii*											
Prickly sculpin *Cottus asper*											
Riffle sculpin *C. gulosus*								x		x	
Staghorn sculpin *Leptocottus armatus*											
Nonnative Species											
Carp *Cyprinus carpio*											
Goldfish *Carassius auratus*									x		x
Mosquitofish *Gambusia affinus*								x	x		x
Bluegill *Lepomis macrochirus*						x				x	x
Redear sunfish *L. microlophus*											
Green sunfish *L. cyanellus*						x		x			x
Black crappie *Pomoxis nigromaculatus*											x
Pumpkinseed *L. gibbosus*											
Largemouth bass *Micropterus salmoides*	x					x		x			
Smallmouth bass *M. dolomieui*											

Nonnative Species	SJ State 1953-56	CAS 1956	SJ State 1959	CDFG 1961	Skinner[5] 1962	SJ State 1964	Hassur 1966-67	Hassur 1972-73	(1976) Aceituno et al., 1973	Guzzetta 1974	(1978) Scoppettone & Smith 1972-77
Brown bullhead *Ameiurus nebulosus*	x										
Rainwater killifish *Lucania parva*											
Yellowfin goby *Acanthogobius flavimanus*											
Inland silverside *Menidia beryllina*											
Threadfin shad *Dorosoma petenense*											
Golden shiner *Notemigonus crysoleucas*						x					
Red shiner *Notropis lutrensis*											
Fathead minnows *Pimephales promelas*											
White crappie *Pomoxis annularis*						x					
Black crappie *P. nigromaculatus*											
Black bullhead *Ameiurus melas*											
Yellow bullhead *A. natakis*											
Channel catfish *Ictalurus punctatus*							x				
Striped bass *Morone saxatilis*											
No. Native/Nonnative Spp.	3/2	1/0	1/0	1/0	2/0	3/5	0/1	6/3	0/2	4/1	6/5
Percentage Native Spp.	60	100	100	100	100	60	0	67	0	80	55

Native Species	CDFG 1975	SJ State 1977	Smith 1978	(1982) Pitt & Bozeman 1978-1979	(1984) Leidy 1981	CDFG 1987	HRG 1990	Leidy 1993-1995	JSA, Inc. 1996	SCVWD 1997	Cressey 1998	SCVWD 1998	SCVURPP 1999
Pacific lamprey *Lampetra tridentata*			x					x		x	x	x	x
Western brook lamprey *L. richardsoni*													
Steelhead/rainbow trout *Oncorhynchus mykiss*			x			x	x			x		x	x
Chinook salmon O. *tshawytscha*						x					x		
Coho salmon *O. kisutch*													
Thicktail chub *Gila crassicauda*													
California roach *Lavinia symmetricus*	x			x	x		x	x		x	x	x	x
Hitch *L. exilicauda*	x			x	x		x		x	x	x	x	x
Sacramento blackfish *Orthodon microlepidotus*				x			x						
Splittail *Pogonichthys macrolepidotus*													
Sacramento squawfish *Ptychocheilus grandis*					x		x						
Speckled dace *Rhinichthys osculus*													
Sacramento sucker *Catostomus occidentalis*	x			x			x	x	x	x	x	x	x
Threespine stickleback *Gasterosteus aculeatus*	x			x	x					x		x	

Native Species	CDFG 1975	SJ State 1977	Smith 1978	(1982) Pitt & Bozeman 1978-1979	(1984) Leidy 1981	CDFG 1987	HRG 1990	Leidy 1993-1995	JSA, Inc. 1996	SCVWD 1997	Cressey 1998	SCVWD 1998	SCVURPP 1999
Sacramento perch *Archoplites interruptus*													
Tule perch *Hysterocarpus traskii*													
Prickly sculpin *Cottus asper*				x			x	x			x	x	x
Riffle sculpin *C. gulosus*													
Staghorn sculpin *Leptocottus armatus*										x			
Nonnative Species													
Carp *Cyprinus carpio*				x	x		x		x	x	x		x
Goldfish *Carassius auratus*	x			x	x		x		x	x		x	x
Mosquitofish *Gambusia affinus*	x			x	x			x		x	x	x	
Bluegill *Lepomis macrochirus*				x	x		x		x	x	x	x	
Redear sunfish *L. microlophus*					x								
Green sunfish *L. cyanellus*	x			x							x		x
Black crappie *Pomoxis nigromaculatus*													
Pumpkinseed *L. gibbosus*							x			x		x	
Largemouth bass *Micropterus salmoides*	x			x	x		x		x	x	x	x	x
Smallmouth bass *M. dolomieui*											x		

Nonnative Species	CDFG 1975	SJ State 1977	Smith 1978	(1982) Pitt & Bozeman 1978-1979	(1984) Leidy 1981	CDFG 1987	HRG 1990	Leidy 1993-1995	JSA, Inc. 1996	SCVWD 1997	Cressey 1998	SCVWD 1998	SCVURPP 1999
Brown bullhead *Ameiurus nebulosus*													
Rainwater killifish *Lucania parva*					x			x					
Yellowfin goby *Acanthogobius flavimanus*								x	x		x	x	
Inland silverside *Menidia beryllina*							x	x		x			
Threadfin shad *Dorosoma petenense*				x			x		x	x		x	
Golden shiner *Notemigonus crysoleucas*				x						x			
Red shiner *Notropis lutrensis*										x	x	x	x
Fathead minnows *Pimephales promelas*		x		x	x					x		x	x
White crappie *Pomoxis annularis*				x							x		
Black crappie *P. nigromaculatus*							x		x	x			
Black bullhead *Ameiurus melas*									x				
Yellow bullhead *A. natakis*												x	
Channel catfish *Ictalurus punctatus*							x						
Striped bass *Morone saxatilis*							x						
No. Native/Nonnative Spp.	4/4	0/1	2/0	6/10	4/8	2/0	10/17	4/4	2/8	7/12	6/9	7/10	6/6
Percentage Native Spp.	50	0	100	38	33	100	37	50	20	37	67	41	50

Appendix E: Summary of Existing Projects Negatively Impacting the Coyote and Upper Penitencia Creek Watersheds.

STRESSOR PROJECT INVENTORY	UPPER PENITENCIA						COYOTE CREEK											OTHER TRIBUTARIES	
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**Lower Penitencia**	**Lower Silver**
Permanent Dams & Water Storage Reservoirs																			
Anderson Dam/Reservoir																	X		
Coyote Percolation Dam/Pond													X						
Cherry Flat Dam/Reservoir						X													
Seasonal Dams																			
Coyote Diversion Dam																	X		
Ford Spreader Dams (Potential)												X							
Standish Dam							X												
Mabury Diversion Dam		X																	
Noble Diversion Dam				X															
Other Artificial Barriers (From SCVWD database)	X	X	X	X	X	X	X	X		X	X	X	X	X	X		X		
Flood Control Projects																			
Upper Penitencia Creek FCP	X	X	X	X															
Coyote at Rock Springs Dr											X								
Stream Maintenance Projects	X	X	X				X												
Instream Percolation and Diversion																			
Ford Ponds												X							
Metcalf Ponds													X						
Osier Ponds															X				
Upper Penitencia Ponds				X															
Historic Near-Stream Gravel Mining																			
Granite Rock Quarry																	X		
Cattle Grazing																			
Below Cherry Flat Res.						X													
Urbanization/Development																			
Homeless encampments									X	X									
Golf Course												X							
The Ranch at Siver Creek Development												X							
Burnett Ave Bridge																	X		
Bailey Ave Bridge														X					
Cisco Systems Campus														X					

STRESSOR PROJECT INVENTORY	UPPER PENITENCIA						COYOTE CREEK											OTHER TRIBUTARIES	
	1	2	3	4	5	6	1	2	3	4	5	6	7	8	9	10	11	Lower Penitencia	Lower Silver
Metcalf Energy Center														X					
Evergreen Tech Park																			X
Silver Ridge																			X
Ponderosa Homes																			X
Streambank Stablization																			
Sediment Removal (SCVWD)	X	X	X				X												
Near Model Airplane Park (SCCPD)																X			
Fish Stocking & Sport Fishing																			
Hatchery trout in Parkway Lakes (CDFG)													X						
Agriculture																			
Field Crop Production							X												X

Appendix F: Summary of Existing Projects Positively Impacting the Coyote and Upper Penitencia Creek Watersheds.

CONSERVATION PROJECT INVENTORY	UPPER PENITENCIA						COYOTE CREEK											OTHER TRIBUTARIES	
	1	2	3	4	5	6	1	2	3	4	5	6	7	8	9	10	11	Lower Penitencia	Lower Silver
Restoration Projects																			
RRAP Pilot Project										X									
Caltrans Coyote-Bernal Mitigation Project												X							
Arundo donax Removal and Revegetation Project												X							
Coyote Dam Fish Ladder													X						
Mabury Diversion Dam Fish Ladder		X																	
Noble Diversion Dam Fish Ladder				X															
Alum Rock Park Riparian Study					X	X													
Salmon Steelhead Restoration Group	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
Management Changes Assessment																			
Coyote Stream Stewardship Plan	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FAHCE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
WMI	X	X	X	X	X	X													
SCVURPPP	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SCC Weed Management Program	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SCVWD HCP	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SCCPD Rangeland Management												X	X	X	X	X	X	X	
SCCPD Mitigation Policy												X	X	X	X	X	X	X	
SCCPD Natural Resource Plan												X	X	X	X	X	X	X	
Monitoring																			
Lotic Macroinvertebrate Study	X		X	X	X	X		X	X			X		X			X		
Streamflow Augmentation Project	X						X	X	X	X	X	X							X
SEIDP								X		X	X	X		X	X		X		
Steelhead Genetic Survey					X	X													
SCCPD Vegetation & Wildlife Inventory												X	X	X	X	X	X	X	
SCCPD Stream & Lake Stewardship												X	X	X	X	X	X	X	

APPENDIX G

DESCRIPTIONS OF ACTIVITIES THAT MAY NEGATIVELY IMPACT STREAM ECOSYSTEM FUNCTIONS

TABLE OF CONTENTS

INTRODUCTION

The purpose of this appendix is to provide more detailed descriptions, than included in the body of this report, of sources of stress affecting fisheries and/or aquatic/riparian habitat in the Coyote and Upper Penitencia watersheds. Sources were categorized as follows:

1. *Permanent Dams and Water Storage Reservoirs*: dams which are currently installed and operated year-round
2. *Seasonal Dams* : dams which are currently installed and operated on a seasonal basis.
3. *Other Artificial Barriers*: inactive dams or other existing obstructions such as road crossings, culverts, and large rubble.
4. *Flood Control Channels*: channel modifications and/or maintenance activities for the purpose of flood control.
5. *Instream Percolation and Diversion*: management operations for water supply needs.
6. *Near-Stream Gravel Mining*: gravel mining operations which exist within or near the riparian corridor and may influence stream hydraulics.
7. *Cattle Grazing*: livestock grazing on public or private lands within the watershed draining to focus area streams.
8. *Urbanization/Development*: large development projects that will likely influence the riparian corridor, and/or bank stabilization projects that have been promulgated by associated infrastructure and riparian corridor recreational management.
9. *Fish Stocking & Sportfishing*: stocking of hatchery bred fish and associated recreational fishing activity.
10. *Agriculture*: non-grazing agricultural activities, including field crop and orchard productions, and/or flower growing.

Information pertaining to sources of stress is presented first by the above categories and subsequently by watershed and then by reach. However, if a project spans the entire focus watershed area, it is listed as "All Reaches".

Coyote Creek: *Reaches 1 – 11*

All Reaches in Coyote Watershed

Upper Penitencia Creek: *Reaches 1 - 6*

Other Tributaries to Coyote

Information provided for each stressor includes the associated project/activity name, lead agency/organization, specific location within reach, brief description of the activity/project/program, including potential or known impacts to fisheries, and information regarding the timeframe of the activity. Blanks indicate where information was not available. Reaches have been omitted from the list if no activities were identified for respective stressors.

COYOTE CREEK

- ***Reach 7***

  Source: Coyote Percolation Dam
  Location: Below Metcalf Road Crossing and Parkway Lakes
  Description: Concrete dam with an 8 – 10 foot drop. This permanent dam is a barrier to fish passage, but a fish ladder was constructed below the dam during summer, 1999 (Jae Abel and Joe Aguilera, SCVWD, personal communication, 1999).
  Timeline: Dam installed 1934; Fish ladder was completed 10/15/99.

- ***Reach 11***

  Source: Anderson Dam/Anderson Reservoir (SCVWD)
  Location: Approximately 2 miles east of Interstate 101 and the City of Morgan Hill
  Description: Streamflow is regulated by SCVWD from April 15 through October 15. Water is released into Coyote Creek, and diverted (< 1 mile downstream) into Coyote Canal, which joins Coyote Creek at Coyote Station (just upstream of Metcalf Road), and flows into a percolation pond. Consequently most of this section of Coyote Creek that is bypassed by the Canal is dry during summer months (Joe Aguilera, SCVWD, personal communication, 1999).
  Timeline: Constructed 1950; Operated annually, April 15 – October 15.

  Source: Coyote Reservoir (SCVWD)
  Location: Approximately 1.5 miles upstream of Anderson Reservoir
  Description: Streamflow is regulated by SCVWD from April 15 through October 15. Water is released into Coyote Creek and flows into Anderson Reservoir (Joe Aguilera, SCVWD, personal communication, 1999). Reservoir level is maintained at half-capacity due to geologic and seismic concerns.
  Timeline: Constructed 1936.

UPPER PENITENCIA CREEK

- ***Reach 6***

  Source: Cherry Flat Reservoir/Dam (City of San Jose)
  Location: About two miles upstream of Alum Rock Park on Upper Penitencia Creek.
  Description: Reservoir/Dam was originally constructed to supply water to Alum Rock Park and several local ranches, and was also used for flood control. In the late 1970's, the Park switched to the municipal water supply and has managed the reservoir for flood control only. Several ranchers above the Park, however, still derive their water supply from stream flows (one example is withdrawal from the pool created by the dam above Miller Bridge). Flows are not released from the dam unless early or high rains are predicted and storage capacity needs to be increased. Two pipes at the dam's base can release cold water to the Creek.

  The City of San Jose is regulated under a California Department of Fish and Game (CDFG) 1600 permit to maintain a "wet/active" channel below the dam. Most years, the flows from the natural springs on which the dam is built, supply adequate flows to maintain a "wet" streambed, and no releases are made from the dam. These natural spring flows provide cool temperatures in reaches between the dam and the Park that are suitable for steelhead. However, it is important to note that streamflow in the section of Upper Penitencia Creek between the downstream boundary of Alum Rock Park and the point where streamflow is augmented at Noble Avenue, is often very low, and

could potentially cause problems for outmigrating smolts, especially during drier years. When the creek was used for water supply, a bypass pipeline delivered water from the dam to the natural streambed at the Park's upper picnic area. This system, however, is now defunct (Mike Will, City of San Jose, personal communication, 1999).

Timeline: Completed in 1936. Managed in winter for flood control. In summer, releases are not normally made; flows derive from natural springs at base of dam.

SOURCE: SEASONAL DAMS

COYOTE CREEK

- ***Reach 1***

  Source: Standish Dam (SCVWD)
  Location: Coyote Creek mainstem several hundred yards upstream of the confluence with Calera Creek and Dixon Landing Road.
  Description: Standish Dam (Dam) was designed to replace a seasonal structure (earthen dam) that had been installed by local farms to provide a freshwater source for irrigation during the summer. The earthen dam failed several times and thus was replaced. The Dam now limits tidal influence in Lower Coyote Creek reaches, providing for agricultural crop irrigation. It was also designed to provide a freshwater pool for summer rearing habitat for steelhead. The Dam is constructed of steel plates with a center V-notch and fish chute to allow downstream fish passage.

  The SCVWD has found installation and operation of the dam problematic: water flows have often exceeded the dam capacity, resulting in water overtopping the dam and flowing onto the adjacent road. Under such conditions, safe fish passage has been precluded. Monitoring of the surface water in the rearing pool showed temperatures in July or August 1991 – 1995 to have exceeded the range preferred by salmonids. Fish sampling also indicated that the target species were not found in this habitat.

  The SCVWD has discussed options for managing the dam with the CDFG, National Marine Fisheries Service (NMFS), and USACE. The SCVWD is interested in removing the Dam, however, the CDFG's current position is that the SCVWD must maintain the dam. For the past two years the SCVWD has not installed the Dam but has monitored the fisheries and riparian vegetation to examine the effects of not installing the dam. They will continue this adaptive management experiment and monitoring for at least one more year (Jae Abel, SCVWD, personal communication, 1999). If removed too late in the fall (October), the Dam can act as a barrier to migration. It is also a potential barrier to the later period of smolt downstream migration (after May 15). An alternative being considered is installation and operation of a gravel dam 100 yards upstream of the Dam site, rather than installation of the steel Dam (Jae Abel, SCVWD, personal communication, 1999). The proposed gravel dam structure would include a pipe near the top of the dam to allow streamflows to pass downstream, which could provide passage for smolts during the later out-migration period. However, the location and size of the pipe would not likely appeal to many smolts, and thus not greatly facilitate those migrating later. The Dam was breached during removal on Oct 14, 1997, causing sediment flow and erosion, increased turbidity, etc., (Keith Anderson, Santa Clara County Streams for Tomorrow, personal communication, 1999).
  Timeline: Designed in 1984. First operational year was 1995. Dam is installed seasonally between May 15 and October 15, but was not installed in 1998 through 2001 and may not be installed in the future. (Jae Abel, SCVWD, personal communication, 2001).

- ***Reach 6***

  Source: Ford Road Spreader Dams (SCVWD)
  Location: Upstream of Ford Road by 2500', 1100', and 900'
  Description: Through February 1997 there were three spreader dams located between the Ford Road Ponds that were used for groundwater percolation. Due to dam failures (high flows from Anderson Reservoir before the SCVWD could dissemble the dams) during the past two years, the CDFG has not reissued permits for these dams. There are no current plans to reinstall these dams, however, SCVWD is investigating the potential to install flashboard dams at these sites and all other sites where spreader dams have been installed within their jurisdiction. All three dams had fish ladders. Note: the Great Oaks Water Company is dependent upon the recharge within this

area for the water that they supply to their customers (Joe Aguilera, SCVWD, personal communication, 1999)

Timeline: Flows were historically regulated through the dams from April 15 through October 15. These dams are not installed currently, nor are future installation dates planned. Future installation is pending based on CDFG permit approval.

- ***Reach 11 (Impacts reaches 8-11)***

  Source: Coyote Diversion Dam (SCVWD)

  Location: Coyote mainstem just downstream of the confluence with Coyote Canal, near Cochrane Road.

  Description: Dam diverts water through a concrete bypass channel. Bypassed water is reintroduced to the natural channel at the Coyote Narrows, upstream of Metcalf Road. A consequence of this operation is the drying of section of the bypassed natural channel during the summer months. Through the current negotiation of their 10-year Streambed Alteration (code 1600) Permit from CDFG, the SCVWD may shorten this period of streamflow regulation period to October 1. The SCVWD installed (completed Oct 15, 1999) a fish screen to prevent downstream passage of fish into the Coyote Canal. (Joe Aguilera, SCVWD, personal communication, 1999).

  Timeline: Dam constructed 1936. Typically operational from April 15 through October 15, although water was not diverted 1999 through 2000. Flows were reinitiated in June 2001, stopped briefly in July for repair work to canal levee, and restarted in July 2001.

UPPER PENITENCIA CREEK

- ***Reach 2***

  Source: Maybury Road Diversion Dam (SCVWD)

  Location: Downstream of the intersection with Educational Park Drive, near stream gage #72.

  Description: Three, one-foot drops constructed as concrete wiers with v-notches in metal plates. Dam construction doubles as a fish ladder with pools between the drops.

  Timeline: Typically operative from April 15 – October 15. Last installation July 14, 1999, still in place as of November 1, 1999.

- ***Reach 4***

  Source: Noble Avenue Diversion Dam (SCVWD)

  Location: Intersection with Noble Avenue

  Description: The pool below this dam has silted in since 1993 (HRG 1994), creating a smaller, (approximately one-foot) drop than was perviously present (approximately 3 – 4 feet). Though not a migration barrier, if the diversion dam at this site is operated, this drop would increase to at least 3 feet (size influenced by sediment transport from current position beneath the drop) (Joe Aguilera, SCVWD, personal communication, 1999).

  Timeline: Currently not in use due to the inoperative fish screen; the dam was last operated 1989 (Joe Aguilera, SCVWD, personal communication, 1999).

SOURCE: OTHER ARTIFICIAL BARRIERS

COYOTE CREEK

- ***Reach 1***

  Source: Bridge crossing for contruction.
  Location: Downstream of Highway 237 bridge.
  Description: Construction diversion. Barrier was identified as passable condition, temporary severity and low priority for improving biotic potential (SCVWD 2002).

- ***Reach 2***

  Source: Washington baffles fishway.
  Location: Upstream of Highway 237 bridge.
  Description: Fish ladder/grade control structure. Barrier was identified as passable condition, intermittent severity and low priority for improving biotic potential (SCVWD 2002).

  Source: SCVWD trap station.
  Location: Downstream Trimble Road.
  Description: Recreational weir. Barrier was identified as low flow condition, temporary severity and low priority for improving biotic potential (SCVWD 2002).

  Source: Bridge crossing.
  Location: At Ridder Park Drive.
  Description: Aggraded sediments. Barrier was identified as low flow condition, partial severity and moderately high priority for improving biotic potential (SCVWD 2002).

  Source: SPRR trestle crossing.
  Location: Upstream Ridder Park Drive bridge.
  Description: Drop associated with grade control below bridge. Barrier was identified as low flow condition, partial severity and high priority for improving biotic potential (SCVWD 2002).

- ***Reach 4***

  Source: Critical riffle.
  Location: At San Jose Municipal Gold Course.
  Description: Barrier was identified as low flow, partial and moderately low priority for improving biotic potential (SCVWD 2002).

- ***Reach 5***

  Source: Bridge crossing
  Location: At Highway 280 crossing.
  Description: Aggraded sediments. Barrier was identified as low flow, partial and moderate priority for improving biotic potential (SCVWD 2002).

  Source: WPRR trestle crossing.
  Location: Downstream Story Road crossing.
  Description: Aggraded sediments. Barrier was identified as low flow, partial and moderate priority for improving biotic potential (SCVWD 2002).

  Source: Construction rubble.

Location: Downstream Story Road crossing.
Description: Barrier was identified as passable, temporary and low priority for improving biotic potential (SCVWD 2002).

Source: Bridge crossing
Location: At Story Road bridge.
Description: Aggraded sediments. Barrier was identified as low flow, partial and moderate priority for improving biotic potential (SCVWD 2002).

Source: Construction rubble.
Location: Approximately 1 mile upstream Kelley Park.
Description: Barrier was identified as intermittent and moderately low priority for improving biotic potential (SCVWD 2002).

Source: Low flow vehicle crossing.
Location: Carroll's Hay and Grain road crossing, approximately 1 mile downstream of Tully Road bridge crossing.
Description: Low-flow vehicle crossing has culverts that may impede fish passage under high flow conditions; water running through these culverts during high flows can reach extreme velocities (Campbell and Cannon, 1998). Barrier was identified as intermittent and moderate priority for improving biotic potential (SCVWD 2002).

Source: Construction rubble.
Location: Approximately ¼ mile downstream Tully Road bridge crossing.
Description: Barrier was identified as intermittent and moderately low priority for improving biotic potential (SCVWD 2002).

Source: Construction rubble.
Location: Approximately ¼ mile downstream Tully Road bridge crossing.
Description: Barrier was identified as intermittent and moderately low priority for improving biotic potential (SCVWD 2002).

Source: Bridge crossing.
Location: Just downstream of Tully Road bridge crossing.
Description: Aggraded sediments. Barrier was identified as intermittent and moderate priority for improving biotic potential.

Source: Remnant abutment.
Location: At the end of Umbarger Road.
Description: High gradient riffle. Barrier was identified as intermittent, partial and moderately low priority for improving biotic potential.

- ***Reach 6***

Source: Debris jam.
Location: San Jose Horseshoe Club at the end of Lewis Road.
Description: Abandoned low flow crossing. Barrier was identified as low flow, intermittent and moderately low priority for improving biotic potential (SCVWD 2002).

Source: Weir

Location: Approximately ½ mile downstream Capital Expressway.
Description: Type and degree of barrier is unknown. Identified as low priority for improving biotic potential (SCVWD 2002).

Source: Construction rubble.
Location: Approximately ½ mile downstream Capital Expressway.
Description: Abandoned low flow crossing. Barrier was identified as intermittent and moderately low priority for improving biotic potential. (SCVWD 2002).

Source: Debris jam.
Location: Just downstream of Capital Expressway.
Description:. Barrier was identified as low flow, temporary and low priority for improving biotic potential (SCVWD 2002).

Source: Debris jam.
Location: Just upstream of Capital Expressway.
Description:. Barrier was identified as passable, temporary and low priority for improving biotic potential (SCVWD 2002).

Source: Low flow vehicle crossing.
Location: Singleton road culvert, about 0.2 miles upstream of Capitol Expressway.
Description: Bike path ford. During moderate flows this culvert is 2 feet above a plunge pool. Culvert becomes plugged with debris. Ascent possible during high flows (Anonymous, 1987). Barrier was identified as both low and high flow, partial and high priority for improving biotic potential (SCVWD 2002).

- ***Reach 8***

Source: Low flow vehicle crossing.
Location: At Coyote Ranch Road crossing.
Description: Debris in channel. Barrier was identified as intermittent and moderately high priority for improving biotic potential (SCVWD 2002).

Source: Low flow vehicle crossing.
Location: Riverside Road crossing.
Description: Debris in channel. Barrier was identified as low and high flow condition, partial severity and moderate priority for improving biotic potential (SCVWD 2002).

- ***Reach 9***

Source: Entrainment.
Location: Osier Ponds.
Description: Stream flow diverted into deep water gravel pits. Barrier was identified in all conditions, partial severity and high priority for improving biotic potential (SCVWD 2002).

Source: Culvert
Location: Osier Road crossing at Osier Ponds.
Description: Barrier was identified in passable condition, intermittent severity and moderate priority for improving biotic potential (SCVWD 2002).

- ***Reach 11***

  Source: Low flow vehicle crossing.
  Location: Anderson County Park.
  Description: Barrier was identified in intermittent condition, partial severity and low priority for improving biotic potential (SCVWD 2002).

  Source: Gaging weir
  Location: Stream flow gage Number 9 in Anderson County Park.
  Description: Barrier was identified in passable condition, intermittent severity and low priority for improving biotic potential (SCVWD 2002).

UPPER PENITENCIA CREEK

- ***Reach 1***

  Source: Critical riffle.
  Location: Pedestrian crossing at confluence with Coyote Creek.
  Description: Channel configuration and flow conveyance at crossing impedes sediment transport. Barrier was identified in intermittent condition, partial severity and high priority for improving biotic potential (SCVWD 2002).

  Source: Culvert
  Location: Bridge crossing at Berryessa Industrial Park, upstream of Flea Market.
  Description: No low flow channel. Barrier was identified in high and low flow condition, partial severity and moderate priority for improving biotic potential (SCVWD 2002).

- ***Reach 3***

  Source: Dryback zone.
  Location: Penitencia Creek Park near Pond.
  Description: Barrier was identified in intermittent condition, intermittent severity and moderately low priority for improving biotic potential (SCVWD 2002).

  Source: Culvert
  Location: Penitencia Creek Park diversion.
  Description: Bank revetment impeding sediment transport; diversion lacks fish screen. Barrier was identified in intermittent condition, intermittent severity and moderately high priority for improving biotic potential (SCVWD 2002).

  Source: Critical riffle.
  Location: Highway 680 bridge crossing.
  Description: Barrier was identified in intermittent condition, partial severity and high priority for improving biotic potential (SCVWD 2002).

- ***Reach 4***

  Source: Weir
  Location: SF83 Stream gage station.
  Description: Barrier was identified in passable condition, unknown severity and low priority for improving biotic potential (SCVWD 2002).

SOURCE: OTHER ARTIFICIAL BARRIERS

- ***Reach 5***

  Source: Low flow vehicle crossing
  Location: Ford at Quail Hollow in Alum Rock Park. At end of picnic area located on Upper Penitencia Creek Road just below the intersection with Alum Rock Park Blvd.
  Description: The ford bisects the streamflow providing inadequate flow for migration passage (Dave Johnston, H.T. Harvey and Associates, personal communication, 1999). A steep gradient located on the upstream side of the ford may also be a velocity barrier during high flows (Anonymous 1987). The Park plans to replace the ford with a bridge in the summer, 2002. The new bridge will not block the creek (as the current ford does) and will be constructed from wood and metal materials. Barrier was identified in intermittent condition, partial severity and moderately high priority for improving biotic potential (SCVWD 2002).
  Timeline: Constructed approximately 1920's

  Source: Weir
  Location: Alum Rock Park.
  Description: Grade control weir. Barrier was identified in low flow condition, partial severity and high priority for improving biotic potential (SCVWD 2002).

  Source: Recreational weir
  Location: Alum Rock Park falls.
  Description: Barrier was identified in low flow condition and partial severity. No priority identified for improving biotic potential (SCVWD 2002).

- ***Reach 6***

  Source: Pipe crossing
  Location: Just downstream of Arroyo Aguague confluence.
  Description: Barrier was identified in low flow condition and partial severity. No priority identified for improving biotic potential (SCVWD 2002).

  Source: Debris jam
  Location: Just upstream of Arroyo Aguague confluence.
  Description: Barrier was identified in low flow condition and partial severity. No priority identified for improving biotic potential (SCVWD 2002).

SOURCE: FLOOD CONTROL CHANNELS

COYOTE CREEK

- ***Reach 3***

  Source: Coyote Creek Flood Protection (SCVWD)
  Location: Coyote Creek at South Bay Mobile Home Park, about ½ mile downstream of Berryessa Road.
  Description: This project would construct a floodwall to replace a temporary sandbag wall on Coyote Creek. The wall would provide 1% flood protection to the existing mobile home park. The wall is scheduled for construction in late 2001.

- ***Reach 5***

  Source: Coyote Creek Flood Protection (USACE, SCVWD)
  Location: Coyote Creek at Rock Springs Drive
  Description: This project will provide flood protection to the Rock Spring Neighborhood in the City of San Jose. The preferred project is to purchase right-of-way and construct 1500 feet of levee adjacent to Coyote Creek.
  Timeline: In January 2000, the District and the Army Corps signed a Feasibility Study Cost Sharing Agreement and the study commenced.

UPPER PENITENCIA CREEK

- ***Reaches 1-4***

  Source: Upper Penitencia Creek Flood Control Project (USACE, SCVWD)
  Location: 3.6 miles of Upper Penitencia Creek between confluence with Coyote Creek to Dorel Drive in the City of San Jose
  Description: The project consists of a combination of modified floodplains, floodproofing and bypass channels. The District is designing the Bypass Project, which is flow diversion structure starting approximately 200 feet upstream of King Road. The bypass will divert flows exceeding the natural conveyance capacity into a covered concrete bypass channel approximately 2,500 feet long, and drain into Coyote Creek approximately 1,200 feet upstream from the natural channel confluence. Flood protection on the reaches upstream of the bypass channel will be designed to convey the 1% flood. Creek modifications are expected to include a new percolation pond, mitigation site and fish ladder. The are also plans to relocate an existing 66 inch potable water pipeline near the Coyote Creek confluence to allow for the construction of the new bypass channel.
  Timeline: Project was initiated in 1982 but was halted by Natural Resources Conservation Service (NRCS) in 1991 due to insufficient agricultural-related benefits (coinciding with the passage of the 1990 Farm Bill; NRCS was the initial federal sponsoring agency). In 1991 the SCVWD requested that the USACE act as the federal sponsor and proceed with a reconnaissance study of the project area. October, 1994, USACE initiated a reconnaissance study that was completed in July 1995. February, 1998 USACE began a feasibility study, which is scheduled to be completed by September 2003. By-pass design will be 60% complete by Feb 2002 (Steve Bui, SCVWD, pers. comm.). Project construction is scheduled for 2004 – 2007.

SOURCE: FLOOD CONTROL CHANNELS

ALL REACHES IN COYOTE WATERSHED

Source: Multi-Year Stream Maintenance Program (SCVWD)
Location: All streams and canals under SCVWD jurisdiction.
Description: Three major activities associated with stream maintenance are as follows: (1) sediment removal to restore the flood conveyance capacity of existing channels or associated features (e.g., tide gates); (2) vegetation management in and around streams in the SCVWD jurisdiction, including removal of vegetation for flood capacity, access and fire control; and (3) bank protection activities necessary to protect SCVWD or other facilities. Sediment removal projects identified by the District for the next 10 years include Berryessa, Calera, Fisher, Los Coches, Lower and Upper Silver, Miguelita, Upper and Lower Penitencia, Sierra, Tularcitos, Norwood, and Thompson Creeks. SCVWD will apply for multi-year permits from USACE, RWQCB and CDFG to conduct multi-year stream maintenance program.
Timeline: Final EIR to be completed in September 2001. Permits are expected from regulatory agencies in November 2001 and implementation is expected to begin in 2002.

OTHER TRIBUTARIES TO COYOTE

- ***Lower Penitencia Creek***

Source: Berryessa Creek Flood Control Program (USACE, SCVWD)
Location: 4.5 miles along Berryessa Creek between intersections with Calaveras Blvd and 600' upstream of Old Piedmont Road.
Description: Construct channel improvements including setback levees and floodwalls to preserve sensitive areas and minimizing use of concrete, revegetation mitigation to protect riparian areas, and sediment control structures to limit turbidity and protect water quality as part of overall effort to contain 100-year flood flows (USACE 1988; USACE 1993).
Timeline: USACE completed a feasibility report (1987) and final Environmental Impact Statement (EIS), which recommending construction of trapezoidal channel. The USACE and SCVWD are now preparing a General Reevaluation Report to develop more environmentally sensitive alternatives for flood control. Estimated completion of report is FY2002.

- ***Lower Silver Creek***

Source: Lower Silver Creek Flood Project (SCVWD)
Location: 4.7 mi of Lower Silver Creek between the confluence with Coyote Creek and Lake Cunningham.
Description: 0.74 mi of multistage, vegetated earth channel; 2.15 mi of vegetated, hybrid block wall channel with earth covered riprap bottoms; 0.57 mi of architecturally-treated, trapezoidal concrete channel; and 0.25 mi of architecturally-treated rectangular concrete channel. Fishery mitigation and enhancement projects include low flow channels continuously from Coyote Creek to Lake Cunningham, planted riparian vegetation; two drop structures (2.5' and 2.0' height) both with low flow notches and resting pools; installation of pools and riffles in the channel invert. The Guadalupe-Coyote Resource Conservation District (GCRCD) will initiate the fishery operations and maintenance as well as citizen monitoring programs (NRCS 1998).
Timeline: 1983 final plan and EIS completed; 1986 workplan approved; 1992, Reach 2A designed and built. 1990 – 1998 EIS updated. Watershed plan was reformulated in 1998. April, 1999 the 1994 reformulated watershed plan was updated, and a USACE 404 Permit application was submitted. 2001 – 2002, Construct Reaches 1 and 2. 2002 – 2004 construct Reaches 3 – 6.

SOURCE: FLOOD CONTROL CHANNELS

Source: Calera Creek Flood Protection (SCVWD)
Location: Approximately 1.2 miles between Berryessa Creek and Interstate 680.
Description: Initial planning phase of flood control project. Objectives are to conduct Reconnaissance Study to determine flood capacity, sediment and maintenance issues. Completion of this study may lead to additional detailed study identifying alternatives to reduce flood damages and long-term maintenance problems.
Timeline: Reconnaissance Study completed in September 2001.

Source: Silver-Thompson Flood Project (SCVWD)
Location: Approximately 2 miles along Lower Silver-Thompson Creek between Lake Cunningham and Aborn Road.
Description: Initial planning phase of flood control project. Objectives are to restore channel capacity by removal of accumulated sediments, construct modifications to allow Lake Cunningham to operate as an off-stream storage facility (originally planned under the NRCS/SCVD Lower Silver Flood Project), evaluate instream erosion and upstream sediment sources. Approximately 200,000 cubic yards (cy) of accumulated sediment will be removed.
Timeline: Sediment removal will be accomplished under the SCVWD Stream Maintenance Program. Remaining objectives will be accomplished upon completion and implementation of planning study, which evaluates alternatives to reduce flood damages. Hydraulic study completed in April 2001; sediment study, estimated for completion in September 2001. An annual sediment removal project to remove 50,000 cy of sediment is planned between 2002-2006.

SOURCE: INSTREAM PERCOLATION & DIVERSION

COYOTE CREEK

- ***Reach 6***

  Source: Ford Road percolation ponds created by spreader dams.
  Location: Three instream ponds located upstream of Ford Road by 2500', 1100', and 900' (between Silver Creek Valley Road and Tennant Avenue).
  Description: Instream ponds are created seasonally by installation of gravel spreader dams.
  Timeline: Dams are in place from April 15 to October 15. However, CDFG has withheld permit to install all SCVWD spreader dams, thus they have not been installed since they were eliminated by high flows in February, 1997.

- ***Reach 7***

  Source: Metcalf percolation pond (SCVWD)
  Location: Six miles downstream of Anderson Reservoir, downstream of Metcalf Road, just below Parkway Lakes.
  Description: A flashboard dam supports an on-channel pond (Metcalf) that is fed by a canal paralleling the natural channel below Anderson Reservoir. All water entering Metcalf Pond percolates within the streambed and a series of on- and off-channel percolation ponds upstream of Hellyer County Park. Consequently, during most summers, the streambed immediately downstream of the Park is either dry or intermittent. Flow resumes downstream from perched groundwater (Smith 1998).
  Timeline: Dam first installed 1935. Streamflow is typically regulated April 15 through October 15. Last removal date Nov. 17, 1998, not installed 1999 due to construction of fish ladder. With construction of fish ladder may be able to keep dam in year round (barring Anderson dam spillway flows) (Joe Aguilera, SCVWD, personal communication, 1999).

- ***Reach 9***

  Source: Osier Ponds (SCCPD)
  Location: 3.5 miles downstream of Anderson Reservoir, at the end of Osier Road and downstream of Model Airplane Park.
  Description: Ponds were created as a result of gravel extraction from streambed for the construction of Highway 101. Ponds are not being managed by the SCVWD for groundwater percolation. Coyote Creek breached the levees surrounding the ponds during winter floods of 1997. The creek has abandoned its channel and currently flows through the ponds. Future management of the ponds is being discussed by SCCPD and SCVWD.

UPPER PENITENCIA CREEK

- ***Reach 4***

  Source: Percolation ponds (SCVWD)
  Location: Approximately 0.6 mile downstream from Alum Rock Park.
  Description: Water is imported from the SBA and diverted from the creek to a series of off-channel percolation ponds adjacent to Upper Penitencia Creek. Water is reintroduced from the ponds to Penitencia Creek for instream percolation, and conveyed via the stream to another percolation pond located on the south side of the Creek, near the intersection with Educational Park Drive. Upper Penitencia Creek is classified as intermittent (meaning the creek is normally or

nearly dry during late summer months), however, the imported water augments the natural flow downstream of Noble Avenue, maintaining perrenial flow to Coyote Creek in many years. However, the section between King Road and Coyote Creek often dessicates in late summer/early fall (USACE 1995). Water import operations are also subject to occasional cutoffs which dry the stream and can pose problems for smolt outmigration April - June (Smith 1998).

Timeline: Water import and percolation occurs year-round.

SOURCE: NEAR-STREAM GRAVEL MINING

COYOTE CREEK

- ***Reach 11***

  Source: Granite Rock Quarry Operation at the Polak Site.
  Location: About 500 feet upstream of crossing with Highway 101 on the east side of Coyote Creek.
  Description: Sand and gravel open pit quarry that included both in- and near-stream quarrying. Currently SCCPD is having difficulty negotiating site mitigation (Mohammed Assaf, SCCPD, personal communication, 1999). The site has caused stream degradation typical of gravel extraction, e.g., bank erosion, and changes in stream elevation and morphology, that negatively impact fisheries and their habitats (Ken Reiller, SCVWD, personal communication, 1999).
  Timeline: Operated from mid 1950s (1956 or 1957) to 1994 (Mohammed Assaf, SCCPD, personal communication, 1999).

SOURCE: CATTLE GRAZING

COYOTE CREEK

- ***All Reaches***

  Source: Grazing within Santa Clara County Parks
  Location: Levin, Grant, Anderson, and Coyote Parks
  Description:. Grazing is allowed in many Santa Clara County Parks. Improper grazing practices can lead to increased erosion, sedimentation, and nutrient loads, and decrease in riparian vegetation. (Rangeland Watershed Program 1999). For a description of Rangeland Management Policy established six to seven years ago, and other grassland management strategies, see Appendix F, Management Changes & Assessment section.
  Timeline: Grazing is ongoing, however, Rangeland Management Policy is limiting grazing intensity and seasonal duration.

UPPER PENITENCIA CREEK

- ***Reach 6***

  Source: Private ranch operations above Alum Rock Park
  Location: Lands near or adjacent to Arroyo Aguague and Upper Penitencia above confluence with Arroyo Aguague.
  Description: Grazing cattle on private lands. In some cases (example is about ½ mile below Cherry Flat Reservoir on Upper Penitencia Creek), cattle are allowed access to the creek, resulting in stream bank destabilization and introduction of sediment and nutrient loads.
  Timeline: Ongoing

COYOTE CREEK

- ***Reaches 3 and 4***

  Source: Water Quality Degradation (homeless encampments)
  Location: Interspersed along the Lower Coyote Reach, more densely located nearer to downtown San Jose.
  Description: Homeless encampments have been observed frequently within the stream channel and the riparian corridor (Tom Taylor, ENTRIX, personal communication, 1999). Associated human activities pose threats to water quality.
  Timeline: Ongoing.

- ***Reach 6***

  Source: Golf Course Development on Coyote Creek (City of San Jose)
  Location: On the east and west sides of Coyote Creek, with the southern extent at Capitol Expressway; NW extent at the PG&E substation; NE extent at Stonegate Park; Eastern extent at Tuerst Road; Western extent at Long Bluff Way.
  Description: 90 – 100 acre golf course on 175 acres. Development plan adheres to the City of San Jose's riparian corridor policy (100' setback from riparian vegetation or top of bank, whichever is wider) (Tom McLauchlan and Bill Hallack, City of San Jose, personal communication, 1999). This resulted in a total of 22 acres of buffer on the project site. Project construction required mitigation of 4 acres of riparian habitat within the 100' setback area.. The affected area will be planted with native vegetation.
  Timeline: August, 1999, EIR was screen-checked at the City of San Jose. Mid-late September, 1999 distributed draft EIR. February, 2000, Certification. March, 1999, approval by City Planning Commission, Parks and Recreation Department, and City Council. April, 2000, went to bid and under construction. Advertising a bid for project mitigation Fall, 2001. Expected to open Spring, 2002.

  Source: The Ranch at Silver Creek Development and the Environmental Trust
  Location: East and South of US 101, 1,000' South of Hellyer Avenue
  Description: Presley Homes (project developer) is designing a development to protect the identified significant natural resources on approximately 52% (298 acres; total site area is 575 acres) of the land. Protection is ensured by the establishment of the Environmental Trust. The developer has surveyed the land to identify significant resources, and designed facilities to avoid impacting as many of the resources as possible. Developments will include an 800 square-foot office for the trust, a golf course and clubhouse, and approximately 50 homes (Daniel Holmes, Sycamore Associates, personal communication, 1999).
  Timeline: Rezoning approval pending. Development planned to be phased over 3-5 year period.

- ***Reach 8***

  Source: Construction of Highway 101 Bailey Avenue Interchange
  Location: Bailey Avenue.
  Description: Proposed construction of freeway interchanges at Bailey Avenue and US 101 (east of Coyote Creek) and at Bailey Avenue with Monterey Road (west of Coyote Creek). This construction has been proposed to increase access to proposed development projects in the North Coyote Valley. The interchange project was put on hold in 2001 to allow for the widening of highway 101 from 4 to 6 lanes. (Measures A & B propose the widening of US 101 to 6 lanes (Eric

Morley, Cisco Systems, personal communication; Jeff Roche, City of San Jose, personal communication, 1999; website www.cisco.com).) The widening is planned from 2002 – 2003. Thus, the interchange construction will be delayed at least that long. Funding for the interchange project may be in jeopardy as the State attempts to cover its budget deficit (Craig Breon, Santa Clara Valley Audubon Society, personal communication 2001). Despite Cisco's plans to reduce their campus size, the City of San Jose has expressed interest in constructing and financing the interchange

Timeline: Undetermined

Source: Cisco Systems Campus Development
Location: North Coyote Valley, bounded by the Santa Teresa Hills to the west, Monterey Road to the east, Tulare Hill to the north, and Bailey Avenue to the south.
Description: Cisco has scaled back its original plan to develop a corporate campus in the Coyote Valley. Originally they planned to construct 6.6 million square feet (385 acres) of Research and Development offices and light assembly uses on a 688-acre parcel. Now they maintain the option to develop at most one-half of the original sized campus but have no definate timeline. The decrease in campus size corresponds to at most 3,000 to 9,000 employees. Cisco purchased the land as part of a partnership. Their plan to reduce the campus will result in a larger number of tenants occupying the land. The site has been zoned for industrial use in the City of San Jose's General Plan, and falls within the City's urban growth boundary and urban service area. In their original campus plan, 270 acres were reserved for flood control purposes (detention pond(s) capable of accommodating a 100-year flood event) and open space. Thirty-three acres were to be developed as roadways.

The proposed development site is an old lake-bed which historically had high groundwater levels. Groundwater levels at the development site are being monitored closely and findings may influence site plans, particularly the capacity required of on-site detention ponds, and possibly other site design components (Ken Reiller, SCVWD, personal communication, 1999).
Timeline: Rezoning approval pending

Source: Calpine Metcalf Energy Center (MEC)
Location: 14 acres in the northeast portion of Coyote Valley Campus Industrial Area.
Description: Proposed 600-megawatt natural gas fired, combined-cycle generating facility. MEC needs rezoning from City of San Jose and approval from the California Energy Commission. They intend to use reclaimed water for the processing with groundwater as an emergency backup supply source (SCVWD Coyote/Uva/Llaga Watershed Progress Report, 1st Quarter FY 2002).

- ***Reach 10***

Source: Streambank Stabilization Project (SCCPD)
Location: Stretch of reach near the Model Airplane Park.
Description: The SCCPD has procured $225,000 in FEMA funds to stabilize a downstream section of bank that eroded subsequent to 1997 El Nino floods. The plan will likely include some riprap, however, a site specific engineering plan has not yet been developed.
Timeline: The engineering plan will be developed by a subcontractor in the next 6 months.

- ***Reach 11***

Source: Burnett Avenue Bridge
Location: End of Burnett Avenue at County Park.
Description: The SCCPD and the State of California are proposing to construct a bridge across Coyote Creek to access a future California Conservation Corps facility. The State is asking the

District to provide a cost share of $250,000 to build the bridge. SCVWD is meeting with SCCPD to identify County land along Coyote Creek suitable for environmental mitigation.
Timeline: No timeline identified.

UPPER PENITENCIA CREEK

- ***Reach 5***

  Source: Recreational Activity & Supporting Infrastructure
  Location: Alum Rock Park, particularly near the visitor center, and along highly used trails and picnic areas.
  Description: Design of roads and parking lots, and some trails, precludes natural channel adjustment. In some cases parking lots could be designed differently to accommodate streambank terracing and revegetation. Recreational activity is allowed, and encouraged by trail design in some places, to occur within the riparian corridor and has caused loss of vegetation and streambank structure.
  Timeline: Ongoing

OTHER TRIBUTARIES TO COYOTE

- ***Lower Silver Creek***

  Source: Evergreen Corporate Technology Park (Syntex)
  Location: Murillo Avenue, near Quimby Road. Occurs in Quimby and Norwood Creek drainages, both tributaries to Thompson Creek.
  Description: 52.5 acres of manufacturing and research & design land uses on 164.82 acres (Jodi Clark and Mike Enderby, City of San Jose, personal communication, 1999).
  Timeline: Rezoning approval pending.

  Source: Ryland Silver Ridge Development
  Location: Yerba Buena Road, 1,200' E. of US 101
  Description: 180 single family residential units on a lot zoned for 237 units. The unused unit allotments (169.7 acres) will very likely be turned over to the Environmental Trust for the Ranch on Silver Creek (decision to be made Fall, 1999). Decision to not fully develop all units was made to speed up the approval of the permit. The development will abide by the City of San Jose's riparian corridor setback policy.
  Timeline: Rezoning approved – Planning Department Permit pending

  Source: Ponderosa Homes Silver Ridge Development
  Location: Yerba Buena Road in the Upper Silver Creek Watershed
  Description: 200 lot residential subdivision. Developer intends to dedicate a 3.0 acre parcel adjacent to creek that will allow the future improvement of the creek to convey 100-year flood flows (SCVWD Coyote/Uva/Llaga Watershed Progress Report, 1st Quarter FY 2002).
  Timeline: No timeline identified.

SOURCE: FISH STOCKING & SPORTFISHING

COYOTE CREEK

- ***Reach 7***

  Source: Hatchery rainbow trout (CDFG)
  Location: Six miles downstream of Anderson Reservoir, downstream of Metcalf Road.
  Description: CDFG stocks trout below Metcalf Dam and Parkway Lakes supports sportfishing.
  Timeline: Ongoing

COYOTE CREEK

- ***Reach 1***

  Source: Field Crop Production
  Location: Fields leased from the City of San Jose Water Pollution Control Plant
  Description: Non-orchard crop production. Potential impacts of agriculture include increased non-point source pollutants in runoff (e.g., sediment, pesticides, and fertilizers), increased water temperatures, and introduction of non-native weedy species to riparian communities.
  Timeline: Year-round cropping. Lease was revoked in 1999.

OTHER TRIBUTARIES TO COYOTE

- ***Lower and Upper Silver Creeks***

  Source: Field Crop and Orchard Production
  Location: Within the following subwatersheds: Quimby, Fowler Evergreen, and Upper Silver Creeks.
  Description: Field Crop and Orchard Production. Potential impacts of agriculture include increased non-point source pollutants in runoff (e.g., sediment, pesticides, and fertilizers), increased water temperatures, and introduction of nonnative weedy species to riparian communities.
  Timeline: Undetermined - analyzed from 1995 ABAG land use data (ABAG 1996).

- ***Fisher Creek***

  Source: Field Crop and Orchard Production
  Location: Within Fisher Creek subwatershed and within 2-mile radius on west side of Coyote Creek.
  Description: Field Crop and Orchard Production. Potential impacts of agriculture include increased non-point source pollutants in runoff (e.g., sediment, pesticides, and fertilizers), increased water temperatures, and introduction of non-native weedy species to riparian communities.
  Timeline: Undetermined - analyzed from 1995 ABAG land use data (ABAG 1996)

APPENDIX H

EXISTING AND PLANNED PROJECTS THAT MAY POSITIVELY INFLUENCE STREAM ECOSYSTEM FUNCTIONS

TABLE OF CONTENTS

INTRODUCTION

The purpose of this appendix is to provide more detailed descriptions, than included in the body of this report, of projects/programs which are conservation solutions, e.g., they may solve or contribute to mitigating impacts to fisheries and/or aquatic/riparian habitat occurring within the Coyote and Upper Penitencia Creek watersheds. Conservation solutions were categorized as follows:

1. Restoration: projects that currently or will involve on-the-ground work to improve, enhance, or restore fish populations and/or habitat.
2. Assessment and Management changes: projects or groups which will assess the present condition of fisheries and/or fish habitat, or address management activities that impact the creeks (e.g. management of grazing or road maintenance).
3. Monitoring: projects that are or will monitor fish populations (distribution and abundance) and/or habitat conditions over time.

Information pertaining to conservation solutions is presented first by the above categories and subsequently by watershed and then by reach. However, if a project spans the entire focus watershed area, it is listed as "All Reaches".

Coyote Creek: Reaches 1 – 11

Upper Penitencia Creek: Reaches 1-6

Other Tributaries to Coyote

All Streams in Coyote Watershed

Information provided includes the project name, its location, a brief description of its purpose, project methods and results, a list of collaborating agencies, and information regarding the timeframe of the project/program. Blanks indicate where information was not available. If no projects/programs were identified in a particular reach, that reach has been omitted from the list[1].

[1] Additional restoration projects developed under the CDFG Fisheries Program Grants exist within the focus area watersheds, however, information had not been received from project contacts by the time this draft report was submitted.

I. RESTORATION

COYOTE CREEK

- ***Reach 4 (Pilot project)***

  Project: City of San Jose Riparian Restoration Action Plan (RRAP) and pilot project.
  Location: Action Plan includes entire City. Pilot project was implementated on a quarter acre section of Coyote Creek located along Selma Olinder Park (formerly called William Street Park)..
  Description: The purpose of the RRAP is to provide a comprehensive policy framework for actively restoring degraded portions of the 35 streams located within the City of San Jose. The plan describes current stream conditions, identifies priority areas for riparian restoration, and identifies effective, practical restoration activities to improve riparian corridors for purposes of water quality and wildlife habitat enhancement. The RRAP was developed by Jones and Stokes Associates, under the guidance of a Technical Advisory Committee (RTAC), which is comprised of local, technical experts and representatives of relevant local agencies. Additional input to the plan is being provided by representatives of the Santa Clara Basin Watershed Management Initiative (through the SCBWMI's Riparian Restoration Work Group – RRWG). In conjunction with the development of the RRAP, the City's Environmental Services Department has received a grant from the State Water Resources Control Board (SWRCB) to complete a pilot riparian restoration project to test and refine the RRAP. The grant was submitted in partnership with the SCBWMI and is being guided by the RRWG (contact: City of San Jose).
  Collaborating Organizations: CDFG, Regional Water Quality Control Board (RWQCB), SCVWD, Santa Clara County Parks (SCCPD), Santa Clara County Planning Dept., Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP), GCRCD, Audubon Society, Santa Clara County Streams for Tomorrow, CLEAN South Bay, Salmon and Steelhead Restoration Group.
  Timeline: RRAP slated for completion in September 2001. Pilot project was completed in summer of 2001, with monitoring and maintenance activities planned through 2002. City of San Jose submitted a final report summarizing the pilot project on June 29, 2001.

- ***Reach 5***

  Project: Caltrans Coyote-Bernal Mitigation (CDFG)
  Location: Intersection of Highway 85 and US 101 by Bernal Road (below Parkway Lakes).
  Description: This 24.4-acre project is mitigation for construction of Route 85 in Santa Clara County, California. The construction of Hwy 85 impacted riparian habitat of variable quality on 9 creeks. A hydrological connection to Coyote Creek was established for stream overflows to create riparian habitat. Measurements for Terrestrial vegetation are being utilized, and are currently measured biannually/biennial (every other year). Measurements include transects for line intercept. The artificial channel is monitored annually (9 years total: 1994-2001) for water flow. Problems identified with this project (CERPI website: http://ice.ucdavis.edu/CERPI/) include: very uncooperative and threatening landscape; lack of funds; too detailed of a monitoring program/designed for students and universities. Monitoring program involves transects to determine amount of vegetation cover, (Amy Fowler, CalTrans, personal communication, 2001).
  Timeline: This project is in its ninth year of monitoring.

- ***Reach 6 (Project to date)***

  Project: Giant cane, *Arundo donax,* removal (SCCPD and VTA)

Location: From Tenant Marsh upstream to the Interstate 101 and Highway 85 interchange.
Description: Removal of the invasive giant cane, *Arundo donax,* within Santa Clara County Parks (to date have completed removal along a three-mile stretch in Hellyer County Park). The San Jose Conservation Corps cuts down stalks of Arundo located along creekbanks to one-foot stumps. SCCPD staff then remove as much of the stubble as possible, and spray within 15 minutes using the herbicide "Rodeo". SCCPD has a MOU with CDFG that allows spraying each spring prior to July 15th). Although it is an intensive and expensive method (estimated cost = $25 – 35,000 for each mile of removal), results so far have been positive (Dave Ellis and John Maciel, SCCPD, personal communication, 1999). It is important to note that in addition to invading Park lands, giant cane has invaded many areas in both Upper and Lower Coyote Reaches (Ruth Sundermeyer, ENTRIX/Trihey and Associates, personal communication, 1999) and degraded habitats for native fish species.
Collaborating Organizations: San Jose Conservation Corps
Timeline: Removal occurred from 1996 – Spring 2000. Current activities include monitoring for re-sprouting and maintaining the area. There is no existing plan to expand the project to other areas.

- ***Reach 7***

  Project: Fish Ladder at the Coyote Percolation Dam (SCVWD)
  Location: Below Parkway Lakes
  Description: Concrete structure with metal v-notches and associated pools beneath each. Ladder designed to surmount the 10-foot drop created by this percolation dam.
  Timeline: Construction began summer, 1999; estimated to be completed by 10/15/99.

- ***All Streams in Coyote Watershed***

  Project: Salmon and Steelhead Restoration Group (Roger Castillo – Public Contact)
  Location: Santa Clara County streams
  Description: This group monitors local projects and activities to ensure that they consider and address potential impacts to anadromous fish populations. This group has reviewed and commented on several SCVWD flood control projects, which helped in the eventual adoption of a fish ladder to be installed with new barriers. Roger Castillo has promoted public education about anadromous fishes by developing a mobile exhibit on salmon/steelhead life cycles and ecology for presentation to local schools and interested groups.
  Timeline: Ongoing

UPPER PENITENCIA CREEK

- ***Reach 2***

  Project: Maybury Diversion Dam Fish Ladder (SCVWD)
  Location: Downstream of Educational Park Drive, near the old US Geological Survey (USGS) stream gage 72.
  Description: Concrete wier with v-notches in metal plates constructed as a series of three one-foot drops with pools between the drops.
  Timeline: Construction completed in Summer 1998 (Joe Aguilera, SCVWD, personal communication, 1999).

- ***Reach 4***

  Project: Noble Avenue Diversion Dam Fish Ladder (SCVWD)
  Location: Intersection with Noble Avenue.
  Description: Recently (1998-1999) rebuilt ladder consisting of about five 1-foot drops (constructed in concrete with v-notch metal plates) with pools between (Jae Abel and Joe Aguilera, SCVWD, personal communication, 1999).
  Timeline: Fish ladder construction completed June 1999.

- ***Reach 5***

  Source: Landslides in Alum Rock Park; damage/bank stabilization project (City of San Jose, HT Harvey and Associates is providing oversight)
  Location: Alum Rock Park is located in San Jose, just east of Dorel Avenue, and includes part of Penitencia Creek Road and Alum Rock Falls Road.
  Description: Numerous landslides along Alum Rock Falls Road (adjacent to the creek), caused by heavy rains in 1996-97, contributed a significant amount of erosive material to the streambed and promulgated the current bank stabilization project that will affect the majority of the creek banks within park boundaries. Since only existing structures were stabilized by this project, no new environmental documentation was required. The project plan can be viewed at 801 N. First Street, room 106. The SWRCB/RWQCB mandated that the Park develop a Riparian Corridor Management Plan. SJPW department, the lead agency, hired a consultant to write the technical portion of the plan. The Park supervisor reviewed the plan to ensure implementation feasibility. Examples of additional requirements provisional to CDFG permitting include a 3:1 mitigation for revegetation using native trees (Mike Will, City of San Jose, personal communication, 1999).

  Past Park management practices for handling landslide material included bulldozing it into the creek. The RWQCB banned this activity and in 1999, required the Park to identify emergency holding areas and routines. The Park now has a management plan that specifies acceptable practices and disposal sites for landslide material (the usual practice is to build K-rail corrals, deposit the material to allow moisture to seep out, and then move the remaining dry sediment to appropriate disposal sites) (City of San Jose 1997). The RWQCB also required that road maintenance crews be trained annually to implement these alternative management practices.

  Between the Visitor's Center and the Park Entrance numerous sections of bank recently stabilized using traditional engineering approaches to armor banks, e.g., cemented rock walls, sack concrete walls, rock/gabion walls. In these areas a bioengineering approach incorporating terracing and revegetation could have been, and in some places still could be applied. For example, currently roads exist on both sides of the creek as does a wide parking area on the north side. Such infrastructure could be redesigned to widen the riparian corridor.

  Downstream of the Park entrance and the intersection with Upper Penitencia Creek road existing concrete bank stabilization structures have massively failed but have not been rebuilt yet, and the picnic area adjacent to and in the riparian corridor is heavily trampled. Both conditions could be rehabilitated using bioengineering techniques to both stabilize the streambanks and restore the riparian community and possibly the floodplain.

I. RESTORATION

For areas upstream of the Visitor's center where streambanks have never been hardscaped in the past, but which have failed recently, the SWRCB/RWQCB has made permit approval contingent upon development of a bank stabilization plan using bioengineering techniques.

Beyond the downstream end of the Park boundary a number of private holdings exist along the creek, and erosion and dumping are evident in the riparian corridor. Thus, in addition to working with the Park, potential exists to improve residential land use practices immediately downstream of the Park.

Timeline: Bank stabilization project permitting completed 1999. Stabilization projects anticipated to take two years, with work beginning each summer and ending in October. Riparian Corridor Management Plan was contracted to Swanson Hydrology..

II. MANAGEMENT CHANGES & ASSESSMENT

COYOTE CREEK

- ***All Streams in Coyote Waterhsed***

Project: Hydromodification Management Plan (HMP)
Location: All watersheds in the Santa Clara Basin
Description: The HMP is a requirement in Provision C.3.f. of the SCVURPPP NPDES Permit. The plan will focus on developing guidance to manage the hydrologic effects of new development and significant re-development on stream stability and geomorphology. The HMP workplan includes tasks to characterize existing stream conditions; identify the sensitivity of channels to increased flows due to urban runoff; and develop guidance for selecting, sizing, monitoring and maintaining flow management practices. Current and historical channel information, supplemented with stream surveys, will be compiled and reviewed to characterize stream reaches in terms of hydrologic and geomorphic conditions. The characterization will likely include watershed geology, soil type, and topography; sediment sources, erosional and depositional zones; and stream channel slope, stream type, flow magnitude, and bed material. Impacts to stream channel from natural events (e.g., fires) and anthropogenic activities (e.g., mining and grazing) will be identified to the maximum extent possible.

The guidance for management practices will address requirements and recommendation for Best Management Practices (BMP) selection and design with the objective of protecting stream channel downstream of a development area. BMP selection and design may include site planning, on-site planning, on-site hydrologic (and water quality) controls, in-stream controls, and regional facilities to accommodate the future development conditions. The HMP is schedule for release in March 2003.

Project: Baseline Development for the HMP and the Regional Stormwater Management Program
Location: All watersheds in the Santa Clara Basin. Stream segments determined based on existing or potential for erosion, as developed from data collected through the Stream Maintenance Program and through the HMP analysis.
Description: Project will collect information on storm drain outfalls, determine catchment areas and percent imperviousness of the corresponding catchments serviced by the outralls; use the information to develop baseline information for the HMP and Regional Stormwater Management Program. The project will assist in the future development of design criteria based on the HMP. The design criteria for the HMP will be used to develop on-site and regional alternatives for stormwater management and treatment.

The primary tasks for this project are:

- Establish baseline conditions for stormdrain outfalls, corresponding catchment areas, stream channels, and percent imperviousness within catchments;
- Identify future changes in percent imperviousness based on current plans;
- Identify areas that are not exempt from Hydrograph Modification Management Plan requirements based on absence of hardened channels
- Field verification of data for critical segments

Incorporate information in a format that can become part of a GIS database

Project: Watershed analysis and sediment management practice assessment
Location: Stevens Creek (8-mile stretch from approximately 1 mile upstream of Highway 82 to Stevens Creek Dam) and Coyote Creek (14-mile stretch of Coyote Creek mainstem from Ford Road to Anderson Dam).
Description: The SCVURPP has developed a workplan to conduct a watershed analysis and management practice assessment in Stevens and Coyote Creeks. The goals of this workplan are to identify an approach to conduct watershed analyses and assess sediment management practices for those creeks previously identified by SCVURPPP as high priority for potentially being impaired by sediment production from erosion due to anthropogenic activities. The workplan includes a number of objectives to assess sediment-related impacts to beneficial uses, including:

- Collect available existing data to characterize the watershed and identify issues of concern;
- Develop hypotheses to understand potential impacts of sediment to species that are sensitive to excess sediment;
- Conduct focused studies to test hypotheses;
- Implement a limiting factors analysis to determine to what degree sediment impacts are key factors;
- Conduct rapid evaluation of sediment budget; and
- Assess and evaluate sediment management practices

Upper Penitencia Creek, one of the medium priority watersheds listed in SCVURPPP sediment report, is the next highest priority for future assessment of sediment-related impacts.
Timeline: Assessment of Stevens Creek will occur over 2 years beginning in FY 03-04, with Coyote Creek to follow. Upper Penitencia Creek is listed as next highest priority, although efforts to collect data necessary for assessment may begin earlier as part of the SCVWD Capital Improvement Project.

Project: Fisheries and Aquatic Habitat Collaborative Effort -- FAHCE (SCVWD)
Location: Coyote, Guadalupe, Stevens Creek Watershed; Tributaries Sampled in these watersheds (Upper Penitencia, Guadalupe Creek, Alamitos, Arroyo Calero, Los Gatos Creek).
Description: As part of mitigation required to respond to a lawsuit, the SCVWD, in partnership with CDFG (funding from SCVWD and CALFED) is conducting a comprehensive assessment (in coordination with other stream studies in the above watersheds) in order to 1) Identify the contribution of SCVWD facilities and operations to existing fishery habitat conditions within the context of the variety of factors impacting salmon and steelhead populations; 2) Identify reasonable flow and non-flow measures that will improve habitat conditions for such fish populations within the context of competing water and land use demands (Cressey 1998). The objectives of the project are as follows:
Research Objectives: Provide a technical basis for well-grounded policy decisions; specifically, quantify:

- The diversity, abundance, and condition of existing salmon and steelhead resources;
- Habitat quantity and quality that may limit the above in study area creeks;
- Non-flow measures that could change existing conditions that limit the above in study area creeks);
- Alternative flow regimes that could change the conditions that limit the above in study area creeks.

Management Objectives: Identify and evaluate alternative management actions based in part on the above studies and on the following:

- Improve habitat conditions to maintain fish populations in good condition;
- Protect, maintain, and improve habitat conditions for species listed under the State and Federal Endangered Species Acts or identified as California Species of Special Concern;

- Improve the availability and suitability of stream corridor and channel habitat for a diversity of species of fish and wildlife.

Collaborating Organizations: CDFG, CALFED, City of San Jose, Guadalupe-Coyote Resource Conservation District (GCRCD), National Marine Fisheries Service (NMFS), USFWS, Natural Heritage Institute, SJRA, SWRCB.
Timeline: Field Sampling Period: 7/20/98 – 10/15/00; Projected Study Completion Date: 12/00.

Project: Coyote Watershed Stream Stewardship Plan (SSP)
Location: All streams within SCVWD jurisdiction within the Coyote Creek Watershed
Description: The SCVWD developed the SSP to provide a strategic approach for implementing the District's Ends Policy using a management approach to provide stream stewardship within the Coyote Watershed. The SSP was developed in a collaborative manner between District staff and local stakeholders through the development of a work group within the WMI. The SSP compiled existing regulatory, physical, environmental, and institutional conditions in the Coyote Watershed and summarized projects done by other agencies that are affecting the watershed. District Staff and the workgroup developed a vision, goals, and objectives for the SSP and identified candidate projects and programs, and a priority ranking for those projects that would achieve the established goals and objectives. Sixty-six candidate projects/programs were identified and grouped under five categories, including flood protection, environment/habitat, operations and maintenance, water supply and community participation/recreation. Implementation of the projects identified in the SSP will depend on existing funding and the number of competing District projects. The District is beginning to develop SSP's for other watersheds in the Santa Clara Basin.
Timeline: The Coyote Watershed SSP draft is being reviewed and a final report is expected in mid 2002.

Project: Habitat Conservation Plan (HCP) for SCVWD Jurisdiction
Location: All streams within SCVWD jurisdiction (e.g., those draining areas > 340 acres within Santa Clara County).
Description: The SCVWD is interested in adopting a more coordinated and comprehensive approach to managing sensitive species within their jurisdiction. Therefore they have developed a HCP that will cover approximately 45 species within their jurisdiction. The HCP identifies existing and potential SCVWD activities, their potential impacts, and subsequent conservation measures that could be implemented. The HCP, however, excludes most of the upper Coyote Watershed, including Arroyo Aguague because the SCVWD at this time has no projects scheduled to occur in this area, and the land is mostly publicly owned or located in County Parks. The SCVWD is, however, discussing how they may work cooperatively with other agencies to maintain and restore ecological functions in these areas (Doug Padley, SCVWD, personal communication, 1999).
Timeline: The SCVWD is currently negotiating with Santa Clara County, U.S. Fish and Wildlife Service and City of San Jose to develop a plan, however, no timeline has been identified **(**Doug Padley, SCVWD, personal communication, 2002).

Project: Santa Clara County Weed Management Program
Location: Santa Clara County
Description: A memorandum of understanding has been entered into (see below for participating organizations) to define the terms and conditions under which the aforementioned parties will cooperate and coordinate activities as necessary to prevent the introduction, establishment, and spread of noxious weeds in Santa Clara County. An integrated management

approach will be used to develop a long-range plan to control designated noxious weeds and invasive, exotic plants (Cindy Roessler, SCVWD, personal communication, 1999; Santa Clara County Weed Management Area 1999). Some of the planned projects under this MOU include the SCVWD Giant Reed Control Program, which is part of their Stream Maintenance Program's mitigation projects. The District will be conducting reconnaissance and mapping of *Arundo* in Coyote Creek starting late 2002 (R. Austin, SCVWD, personal communication, 2002). As part of this project, the Santa Clara County Audubon will be mapping four invasive species in Coyote watershed starting spring 2002. The next phase of the project will be to remove *Arundo*, replant with native vegetation and conduct extensive monitoring to determine efficacy of treatments. Removal work will probably start at Anderson Dam and continue downstream.
Collaborating Organizations: Santa Clara County Agricultural Commissioner's Office, Santa Clara County Department of Parks and Recreation, SCVWD, Santa Clara County Farm Bureau, California Department of Food and Agriculture, Santa Clara County Cattlemen's Association, California Native Plant Society, The Nature Conservancy, NRCS, Midpeninsula Regional Open Space District, and California State Parks.
Timeline: Meetings initiated in 1999 to develop a MOU . Giant Reed Control Program will begin in spring 2002.

Project: Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP)
Location: Santa Clara County
Description: The SCVURPPP is an association of co-permittees (see below) that share a common permit (National Pollution Discharge Elimination System; NPDES) to discharge storm water to South San Francisco Bay. NPDES permits are reviewed and issued by the RWQCB at 5-year intervals. The 1995 Permit required the SCVURPPP to develop performance standards for various storm water control measures and incorporate them in a revised management plan (urban runoff management plan; URMP) by September 1, 1997. The URMP (SCVURPPP 1997) includes performance standards for the following: illicit connection and illegal dumping elimination activities; industrial/commercial discharger control program; public streets, roads, and highways operation and maintenance; storm drain system operation and maintenance; water utility operation and maintenance; planning procedures; and construction inspection. Each co-permittee develops a community-specific URMP that is tailored to local characteristics. Co-permittees are also responsible to conduct local pollution information and prevention programs to educate citizens and businesses about best management practices. In addition to these ongoing program components, the SCVURPPP estimated the relative annual contribution to South San Francisco Bay of five pollutant metals of particular concern (copper, nickel, mercury, silver, and selenium) using data from 1988 – 1995 (BASMAA 1996). More recently (1998 – 2000), the SCVURPPP implemented the Stormwater Environmental Indicator Demonstration Project (SEIDP) to evaluate using environmental indicators to measure stormwater program effectiveness (Appendix F, Monitoring).
Collaborating Organizations: Co-permittees included in the NPDES permit and funding the SCVURPPP include the 13 cities and towns in the County, Santa Clara County, and the SCVWD.
Timeline: Ongoing. The RWQCB issued the SCVURPPP its first NPDES permit in 1990, second in 1995 and current permit in 2001.

- ***Reaches 6 through 11 (Areas in County Park Jurisdiction)***

Project: Mitigation Policy (SCCPD)
Location: All SCCPD Parks

Description: As a result of receiving numerous requests from local agencies to implement mitigation projects on SCCPD lands, the SCCPD is drafting (fall, 1999) a mitigation policy (Paul Romero, SCCPD, personal communication, 1999). The policy will likely allow SCCPD to bank mitigation credits and use them when they their own management activities and projects require mitigation. Due to legal restrictions, these are still being handled on a case-by-case basis, until the County deals with the legalities associated with Parklands and Public Charter restrictions.
Timeline: Development of draft policy Winter 2001.

Project: Rangeland Management Policy (SCCPD)
Source: Grazing within Santa Clara County Parks
Location: Levin, Grant, Anderson, and Coyote Parks
Description:. Rangeland Management Policy established 6-7 yrs ago. SCCPD is working through the County's Planning Department to develop guidelines for rangeland management (the policy will apply to their latest acquisition: Bear Property: adjacent to Coyote Lake on east and west side). SCCPD writes the grazing plan for their leasees and maintains the right to provide 48 hour notice to leasees to move cattle from their lands. Fines apply for noncompliance with such notice.

- Grazing Intensity: Reducing AUMs (animal unit months) : Used to allow 14,000 AUMs per grazing season; now allow only 1,400 AUMs (10% of original amount) per grazing season.
- Monitoring: As input to their grazing prescriptions, SCCPD conducts two types of vegetation monitoring: 1) monthly measurement of residual dry matter (RDM) biomass, where vegetation is clipped and weighed, and the pounds of biomass per acre are estimated; 2) biannual estimate of the relative species abundance using the Dobenmeyer method to estimate percent cover for each species.
- Yellow Star Thistle Management: SCCPD is experimenting with methods to control yellow star thistle. To reduce its seedbank they graze areas invaded by this thistle in the spring while it's succulent, halt grazing to allow it to recover (~2 weeks) and then graze it again. They are also tracking the Mid Peninsula Open Space District's efforts to manage this thistle using a combination of goat grazing and controlled burning.(Don Rocha, SCCP, personal communication, 1999)
- Cattle have been brought onto the Mendoza Property (Coyote Lake County Park) under prescriptions written by County Park Natural Resource staff, conforming to the Plan associated with Bear-Mendoza Properties of Coyote Lake County Park.
- Grazing Programs are continuing where natural resource plans exist, addressing cattle grazing as a natural resource management tool.

Timeline: Rangeland Management Policy established 6-7 years ago. South County parks no longer allow winter grazing, and have switched to spring and summer grazing. In Grant Park, grazing has been switched from fall to spring. In Levin Park, cattle are grazed most heavily in the fall, AUMs are greatly reduced in the winter, and increased in the spring and summer. Levin Park has greater flexibility with its grazing leasee who also holds leases in East Bay Regional Parks.

Project: Natural Resource Management Program Plan (SCCPD)
Location: All SCCPD Parks
Description: The Parks Natural Resource Management Program Plan is being put together in 2002. The Program will lend general direction and guidelines to natural resources, including fresh water resources. Guidance for management of site specific areas will come at a later date. (Don Rocha, SCCPD, personal communication, 2001). Their riparian corridor revegetation projects require permit approval from the SCVWD.

Timeline: 2002

UPPER PENITENCIA CREEK

- ***All Reaches***

Descriptions for the following projects/programs influencing Upper-Penitencia Creek reaches are found in the above section for Coyote Creek:

Project: Hydromodification Management Plan (HMP)
Project: Baseline Development for the HMP and the Regional Stormwater Management Program
Project: Habitat Conservation Plan (HCP) for SCVWD Jurisdiction
Project: Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP)
Project: Santa Clara Basin Watershed Management Initiative (SCBWMI)
Project: Santa Clara County Weed Management Area Coordination

Project: Santa Clara Basin Watershed Management Initiative (SCBWMI)
Location: Santa Clara Basin (also referred to by USGS as the Coyote Hydrologic Unit, 18050003)
Description: Collaborative effort of representatives from business and industrial sectors; professional and trade organizations; civic, environmental, resource conservation and agricultural groups; regional and local public agencies; and the general public. This Collaborative's goal is to address all sources of pollution that threaten the waterbodies draining into the San Francisco Bay south of the Dumbarton Bridge. Their objective is to coordinate existing and future watershed activities to ensure that environmental protection efforts are addressed efficiently and cost-effectively (website: www.ci.san-jose.ca.us/esd/wmi.htm). The SCBWMI's approach is to evaluate conditions in at least three watersheds that are representative of others in the Basin, and develop watershed management plans to alleviate stresses that prevent attainment of beneficial uses, as prescribed in the RWQCB's Basin Plan (RWQCB 1995) and improve aquatic community health. The first three watersheds to be evaluated are Upper Penitencia, Guadalupe, and San Francisquito.
Collaborating Organizations: CDFG, Cities of Cupertino, Palo Alto, San Jose, Santa Clara, Sunnyvale, the GCRCD, RWQCB, Santa Clara County, Santa Clara Valley Transportation Authority, SCVURPPP, SCVWD, USACE, US EPA, NRCS, California Restaurant Association, Home Builders Association of Northern California, San Jose Silicon Valley Chamber of Commerce, Santa Clara Cattlemen's Association, Silicon Valley Manufacturing Group, CLEAN South Bay, League of Women Voters, Salmon and Steelhead Restoration Group, San Francisco Bay Bird Observatory, Santa Clara County Streams for Tomorrow, Santa Clara Valley Audubon Society, Silicon Valley Pollution Prevention Center, Silicon Valley Toxics Coalition, and the Western Waters Canoe Club.
Timeline: Project began in 1996. Watershed Assessment Report for the pilot watershed assessments is expected in summer 2002

II. MONITORING

COYOTE CREEK

- ***All Reaches in Coyote Creek***

Project: SCVURPPP Multi-Year Receiving Waters Monitoring Plan
Location: All watersheds in Santa Clara Basin
Description: the SCVURPPP developed a Multi-Year Receiving Waters Monitoring Plan, which identifies monitoring activities in Santa Clara Basin Watersheds over an eight-year period. The Plan contains the following information: watershed location (prioritized based on WMI and SCVURPPP assessment priorities), data type (chemical, biological, physical, and trash), number and frequency of sampling events, FYs (8 years starting with FY02-03 through FY09-10), rationale, and lead agency. The information on data type utilizes a tiered monitoring approach discussed by the RWQCB staff in its RMAS memo (February 8, 2001 Draft Monitoring Design in Regional Board-lead Pilot Watersheds, Spring 2001) that includes the following monitoring categories: screening level, detailed investigation, and status and trends. Implementation of detailed investigations will be determined from the results of screening level monitoring, as well as from the data gaps identified from ongoing watershed assessments.
Timeline: The SCVURPPP will begin monitoring activities in tributaries to Coyote Creek (Upper Penitencia and Lower Silver Creek), as well as Lower Penitencia Creek in FY 02-03. Monitoring for status and trends will occur in a 4-year cycle, with Coyote Creek watershed scheduled in FY 06-07.

Project: The Surface Water Quality Monitoring Program
Location: All watersheds in Santa Clara Basin
Description: The Santa Clara Valley Water District has developed a Surface Water Quality Improvement Program, which provides monitoring and identifies projects that will protect watershed and streams through minimizing or eliminating the impacts of pollutants to human health, fish and wildlife, and the environment. The goal of this program is to 1) develop an understanding of contaminant pollution in District watersheds; 2) coordinate and collaborate with other agencies, stakeholder groups and partnerships; 3) design and implement monitoring and assessment projects to assess the status and trends of target pollutants; and 4) identify potential management measures aimed at protecting our creeks by reducing pollutants. Specific monitoring parameters, design or locations were not identified at the time of this report.
Timeline: To be determined.

Project: Factors Affecting the Distribution of Lotic Macroinvertebrates in an Urban Setting (USGS)
Location: Streams included in the study are 1. San Francisquito Ck., 2. Corte Madera Ck., 3. Los Trancos Ck., 4. Stevens Ck., 5. Saratoga Ck., 6. Guadalupe R., 7. Los Gatos Ck., 8. Ross Ck., 9. Guadalupe Ck., 10. Alamitos Ck., 11. Barret Ck., 12. Arroyo Calero, 13. *Coyote Ck.*, and 14. Penitencia Ck.
Sampling Location: Sites were established at approximately 2 kilometer intervals, starting at the mouth of each stream. On most streams, the upstream most sites are limited to an altitude of 300-400 m. Some locations were inaccessible and/or proved to have insufficient riffle habitat. In total, 85 sites were sampled.
Description: The USGS is conducting research to improve their National Water-Quality Assessment Program, and to establish biomonitoring protocols in the South Bay and other urban centers. They hope to determine the factors that most influence the distribution of stream

macroinvertebrates in an urban environment by relating the distribution of lotic macroinvertebrates to site- and basin-scale physical, chemical, and geomorphological variables, determining how these factors vary within and among sub-basins and determining their rate of longitudinal (downstream) change. The relationships between variables driving the distribution of lotic macroinvertebrates and measures of urbanization, such as: population density, percentage impervious area, etc. will be explored. A database of the distribution and abundance of macroinvertebrates in the Santa Clara Valley will be produced (Jim Carter, USGS, personal communication, 1999)
Collaborating Organizations: SCVWD and the SCVURPPP (funding for lab analysis assistance).
Timeline: Field Sampling Period: Twice per year during May - August 1997, Sept - Oct 1998 and ongoing if funded. Two reports were published by USGS in 2000 describing results of the study. A draft final report will be released in early 2002 (Jim Carter, USGS, personal communication, 2001)

Project: Stormwater Environmental Indicators Demonstration Project (SEIDP) – (SCVURPPP)
Location: 18 sampling locations on Coyote Creek mainstem, including 3 above Anderson and Coyote Reservoirs.
Description: As part of the USEPA's Environmental Indicators/Measures of Success Project, funded under Clean Water Act Section 104(B)(3), the Center for Watershed Protection (CWP) developed 26 "Environmental Indicators to Assess Storm-water Control Programs and Practices." The indicators were accompanied by a suggested methodology for crafting an indicator-based monitoring program. Under a US EPA grant administered by the Water Environment Research Foundation (WERF), and with its own contributed funds, the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) tested 20 of the 26 environmental indicators. The objectives of SEIDP were to evaluate the usefulness, effectiveness, and applicability of the Stormwater Indicator Methodology under semi-arid conditions. This involved selecting, testing, and refining of protocols for monitoring environmental indicators and developing guidance on the selection and use of environmental indicators in western states. Data on fisheries, macroinvertebrates, temperature, sediment, and physical habitat were collected at 18 sampling locations along the mainstem of Coyote Creek. Additionally, existing data on flooding frequency, water quality, industrial/commercial pollution prevention, public involvement and monitoring, illicit discharges, BMP's, permitting and compliance, growth and development, and industrial site compliance were analyzed.
Collaborating Organizations: Woodward-Clyde Consultants, Kinnetic Laboratories, Inc., Program Co-permittees (especially City of San Jose and SCVWD).
Timeline: Project was initiated 7/98. Field collection of data in the Coyote Creek watershed: 4/99-12/99. Final Report: 9/00.

- ***Reaches 1 through 6***

Project: Streamflow Augmentation and Wetland Creation Using Recycled Water (City of San Jose)
Location: 18 miles of Coyote Creek above Standish Dam; three five-mile sampling segments below introduced flow (near crossing of Umbarger Road), and one three-mile segment above point of introduced flow.
Description: As a result of NPDES permit mitigation requirements to enhance the environment and minimize impacts to salt marsh ecosystems from discharge of treated effluent (from the San Jose/Santa Clara Water Pollution Control Plant), the City of San Jose, in partnership with the SCVWD, has contracted Tetra Tech, Inc. and other subconsultants to assess the impacts of using

recycled water to augment dry season streamflow in Coyote Creeks. In order to optimize the environmental benefits of introducing recycled water, the City of San Jose is designing and supporting implementation of two streamflow pilot augmentation projects and conducting feasibility studies for a wetland creation project. The recent energy crisis in California changed the focus of the project to service the Metcalf CalPine power plant that is being built. Recycled water would be distributed to the plant, used for cooling, and then discharged to sanitary sewers. The plan is to extend a pipeline to carry water to the plant at an existing overpass, likely Monterey Highway. Thus, its construction is unlikely to negatively impact the creek.

The City has monitored the creek for this project since 1997. Data collected include water quality, biological and physical habitat assessment (Cressey 1998; contact: Don Arnold, City of San Jose). The changes for the City's 2001 monitoring plan are the following:

Several changes have been made to the monitoring program of the past two years. First, sampling for fish and benthic macro-invertebrates will not be done this season. The data generated to date has been very useful in characterizing the relative quantity and quality of creek biota. Continuation of this survey work will resume once a timeline for project implementation is finalized. Chronic toxicity testing with water fleas (*Ceriodaphnia dubia)* has also been deleted from the work plan since testing last season did not reveal any chronic toxicity in the receiving or recycled waters. The work on algal biomass and nutrient levels, under contract to San Jose State University (SJSU), will continue with a work plan (under separate cover) similar to last season. Lastly, a new and expanded analyte list incorporates the priority pollutant compounds needed to conduct a Reasonable Potential Analysis (RPA) and some added nutrient analyses designed to augment the SJSU algal studies.

Water quality monitoring will be conducted during one week monthly from June through November and includes continuous and discrete instrument measurements of conventional water quality (pH, dissolved oxygen, conductivity, temperature and turbidity) and the determination of the concentration of some 150+ parameters in the recycled and receiving waters through the analysis of "grab" samples. These parameters have been grouped as: 1. General Water Quality; 2. Nutrients & Cations; 3, Metals, Cyanide, & Tributyltin; 4. Microbiology/Pathogens; and 5. Organic Compounds. For a more complete list of monitoring parameters refer to Appendix 1 of their 2001 workplan.

- ***Reaches 6 through 11***

Project: Vegetation and Wildlife Inventory (SCCPD).
Location: All SCCPD Parks.
Description: The SCCPD has planned a two-stage update of their vegetation and wildlife inventories (Don Rocha, SCCPD, personal communication, 1999). Vegetation will be updated by interpreting satellite imagery and aerial photos captured in 1999. In 2000, they will update their wildlife inventory by improving their mapping of wildlife habitats, focusing on those for species of special concern.
Timeline: Project completed by December 31, 2001.

Project: Stream and Lake Stewardship Program (SCCPD).
Location: Almaden-Quicksilver streams (Almaden-Quicksilver and Calero Parks), Anderson Reservoir (Anderson Park), Calero Reservoir (Calero Park), Chesbro Reservoir (Chesbro Park, Coyote Creek (Anderson and Hellyer Parks), Los Gatos Creek (Vasona Park), Stevens Creek

(Stevens Creek Park), Stevens Creek Reservoir (Stevens Creek Park), Uvas Creek (Mt. Madonna Park), Uvas Reservoir (Uvas Park).
Description: SCCPD is interested in establishing a volunteer program to train residents to assist in the protection and enhancement of streams and lakes in Santa Clara County Parks. Volunteers will be expected to provide at least 80 hours per year to: monitor a stream or lake at least four times/year, complete at least one restoration project each year, participate in at least two annual California Coastal Cleanup Events, pick up litter, and report any hazards in their area. The SCCPD has developed a monitoring checklist that includes collecting data for the following categories: hydrology, vegetation, soil erosion and sedimentation, wildlife and water characteristics, and macroinvertebrates (Don Rocha, SCCPD, personal communication, 1999).
Timeline: Program was conceived in 1999 and the SCCPD continuously solicits volunteers. Their intention is to establish ongoing volunteer monitoring. As of December 2001, trained volunteers are working on Los Gatos Creek.

UPPER PENITENCIA CREEK

- ***Reach 1***

  Project: Streamflow Augmentation and Wetland Creation Using Recycled Water (City of San Jose)
  (See description in Coyote Creek)
  Project: SCVURPPP Multi-Year Receiving Waters Monitoring Plan (See description in Coyote Creek)

- ***Reach 5 and 6***

  Project: Steelhead Genetic Diversity Analysis (San Jose State)
  Location: Selected South Bay Creeks, including Upper Penitencia, Smith, Guadalupe River and Creek, Upper Los Gatos Creek, Alamitos Creek, Saratoga Creek, Stevens Creek, San Francisquito Creek.
  Description: San Jose State student's thesis work under Dr. Jerry Smith, Associate Professor of Biology. Used randomly amplified DNA (RAPD) techniques to analyze genetic material from steelhead adults and juveniles collected throughout Santa Clara County in order to identify their origin (e.g., "native" stock, or some influence of introduced rainbow trout stock) and genetic patterns/distribution in Santa Clara County streams. Results using RAPD techniques were inconclusive. Pending funding, they will analyze the same samples again using microsatellite markers which are often more precise. Subsequently they intend to collect new samples 5 years from now. (Jae Abel, SCVWD, personal communication, 1999).
  Timeline: Samples collected approximately 2-3 years ago (Jae Abel, SCVWD, personal communication, 1999). Report may be released in January 2002 (Jerry Smith, SJSU, personal communication). Budget for future sampling and lab analysis pending review.

OTHER TRIBUTARIES TO COYOTE

- ***Lower Silver Creek***

  Project: Streamflow Augmentation and Wetland Creation Using Recycled Water (City of San Jose)
  (See description in Coyote Creek)