Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Watershed Monitoring and Assessment Program

Upper Penitencia Creek Stressor/Source Identification Project

Monitoring and Management Practice Assessment

March 31, 2018

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1.0 INTRODUCTION

The Santa Clara Valley Urban Runoff Pollution Prevention Program (Program) conducted the Upper Penitencia Creek SSID Project (Project) during Water Year (WY) 2016 to meet the requirements of Provision C.8.d.i of the San Francisco Bay Region Municipal Regional Stormwater NPDES Permit ("MRP 1.0"; Order No. R2-2009-0074). This MRP 1.0 provision requires Permittees to conduct monitoring projects to identify and isolate potential stressors and/or sources associated with observed potential water quality impacts. The Project was the third and final SSID project the Program was required to complete during the term of MRP 1.0.

The *Upper Penitencia Creek SSID Project Workplan* (SCVURPPP 2015) was developed in January 2015, but field monitoring for the project was delayed due to dry channel conditions caused by extended period of drought. Subsequent rainfall during the following wet weather season provided wet channel conditions for field monitoring during the spring/summer season 2016. Monitoring data results and interpretation were presented in the *Final Project Report*, which was submitted to the Water Board on March 31, 2017 (SCVURPPP 2017).

Based on findings described in the Final Project Report, the reduced biological integrity in Upper Penitencia Creek that was observed in WY 2016 at the "case site" (COY114), located within the segment of interest, is likely due to the reduction in surface flows from the natural percolation of water through the stream bed into the hyporheic zone. Furthermore, the low biological condition scores at the case site observed during WY 2016, are likely due to the lack of natural and augmented surface water flows caused by the drought that occurred during the preceding four years. These natural seasonal changes in habitat and water flows are likely magnified by anthropogenic activities associated with water operations directly upstream of the case site. The sources of stressors that may reduce the biological condition in the study area, however, do not appear to be linked to stormwater discharges from the municipal separate storm sewer system (MS4).

Although no enhanced or improved municipal stormwater management actions are warranted, SCVURPPP recommended follow-up actions in WY 2017 in an effort to evaluate and inform future monitoring and management actions that may improve biological conditions in Upper Penitencia. These actions include:

- Conduct biological assessments at Project study sites for a second year (WY 2017) to evaluate potential variability in biological conditions during years with different hydrological conditions.

- Conduct a brief evaluation of current management practices associated with water quality and water flows in Upper Penitencia Creek, and provide recommendations on how biological conditions may be improved in the water body.

This report provides summary results for the follow-up actions described above and represents the final report for the Upper Penitencia Creek SSID Project.

2.0 BACKGROUND

The Causal Analysis/Diagnosis Decision Information System (CADDIS) approach was applied to assess potential biological impacts observed in Upper Penitencia Creek. The study approach focused on evaluating the differences in biological, physical, chemical and toxicological indicators between the "case site" (COY114) located within the segment of interest and a "comparator site" (COY121) located directly upstream of the segment. Historical data showed that biological condition, as measured by California Stream Condition Index (CSCI) scores, at the case site was consistently lower than the comparator site. The CADDIS process was focused on identifying indicators of biological condition stress that may indicate the cause of decreased CSCI scores.

Biological assessments and water and sediment sampling was conducted between April and June 2016. An evaluation of the stressor (physical, chemical and toxicological) data did not show a clear linkage to the biological condition observed at the case site. In general, the physical habitat at the case and comparator sites were very similar and not likely the cause of reduced biological condition at the case site. Similarly, water and sediment chemistry at the two sites are very similar, with the exception of temperature and nutrient concentrations, which increased with the increase in water diverted from the percolation ponds into the stream channel during the summer months.

Based on findings from the Project, the reduced biological integrity observed in Upper Penitencia Creek is believed to be associated with intermittent stream flow in the segment associated with the case site. This segment has historically lacked surface water flow during the spring/summer season due to the percolation of surface flow into the underlying groundwater basin. The aquatic biota present at the case site are typically associated with habitat that experiences abrupt, seasonal changes in flow and water quality conditions. The natural seasonal changes in habitat are likely magnified by anthropogenic activities associated with water operations occurring directly upstream of the case site. However, the sources of stressors that may reduce the biological condition in the study area do not appear to be linked to stormwater discharges from the MS4. As a result, the Upper Penitencia Creek SSID Project is considered complete, with the exception of some additional follow-up actions that were identified in the Final Project Report (SCVURPPP 2017) and are summarized below.

3.0 FOLLOW-UP ACTIONS TO SSID PROJECT

3.1 Biological Assessments (WY 2017)

To evaluate the inter-annual variability in biological condition scores, the Program conducted biological assessments at the Project case site (COY114) and control site (COY121) using methods described in SCVURPPP (2017) (Figure 1). Bioassessments were conducted in May 2017 during natural flow conditions at both sites. A second sampling event (during the water releases from percolation ponds) was not conducted in 2017 due to late onset of percolation pond operations (i.e., mid-July), which is well after the sampling index period for bioassessments (i.e., April – June). Biological condition, presented as CSCI and Algae H20 IBI metric scores, at both sites for the three sampling events over the two years of bioassessments are presented in Table 1.

Table 1. CSCI and Algae H20 IBI scores at case and control sites in Upper Penitencia Creek during WYs 2016 and 2017.

Station Code	Station Type	Sampling Date	CSCI Score	Algae "H20" IBI Score
COY114	Case	4/28/2016	0.65	11
		6/9/2016[1]	0.66	19
		5/17/2017	0.84	26
COY121	Control	4/28/2016	0.78	20
		6/9/2016	0.97	32
		5/17/2017	0.73	15

[1] Augmented water from percolation pond influenced habitat conditions prior to and during sampling event.

Figure 1. Bioassessment locations sampled in Upper Penitencia Creek during May 2017.

The CSCI scores were higher at the case site (0.84) compared to control site (0.73) in 2017, which is the opposite trend observed during the previous year. A similar pattern was observed for algae H20 IBI scores. CSCI scores were also higher at the case site for the May 2017 sampling event (0.84) compared to both April and June sampling events in 2016 (0.65 and 0.66, respectively). The CSCI scores at the case site were slightly lower in May 2017 (0.73) compared to April event in 2017 (0.78). A second sampling event was not conducted in 2017, so it is unknown if biological conditions improved a month later at the control site, which was the pattern that was observed in 2016.

The BMI assemblage at the case site during the April 2016 sampling event consisted of primarily short-lived and tolerant taxa that are typically associated with unstable habitat and flow conditions (SCVURPPP 2017). In contrast, the BMI community at the same site in 2017 had a more diverse assemblage, with a greater number of Ephemera/Plecoptera/Tricoptera (EPT) and predator taxa, both indicators of stable habitat and good water quality conditions (Attachment 1).

Water chemistry results were similar at both Project sites during the April 2016 and May 2017 sampling events (Attachment 2). The major differences were higher concentrations of chlorophyll a and AFDM, both indicators of algal biomass, at the case site in 2017. Water temperatures were consistently higher at case site in 2017, which may be associated with combination of groundwater mixing with the surface flows, as well as influences from increased solar radiation and air temperature.

Bioassessment results indicate that habitat and water quality conditions were more supportive of biological indicators at the case site in 2017. The differences in biological conditions at the site across the two years may be associated with differences in precipitation and stream flow patterns. In 2016, the flow conditions were highly variable, with large fluctuation in baseflows occurring during month of February, followed by a series of late spring storms in April, which may have produced scouring flows impacting aquatic biota (Figure 2). In 2017, the stream flows were more consistent during the winter season with smaller magnitude storms in the spring. A plot of the daily surface water flow measured at the nearby

stream gage (Piedmont) for WY 2016 and WY 2017 are shown in Figure 2. Also shown in the figure is the timing and duration of flow augmentation from percolation ponds over the two years. Flow augmentation occurred much earlier in 2016 due to an earlier decline in natural hydrograph.

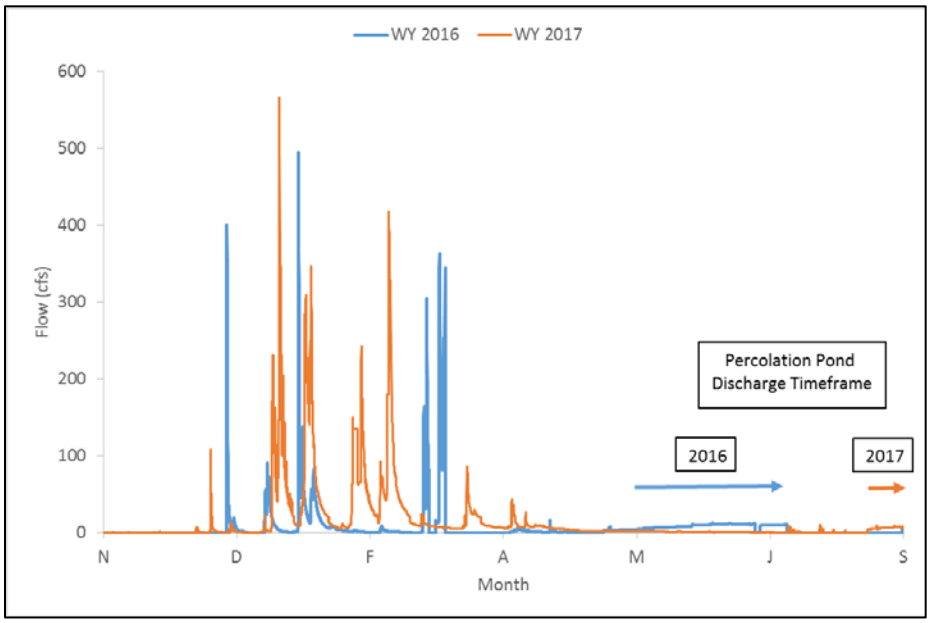

Figure 2. Daily stream flow discharge measured at Piedmont stream gage during WY 2016 and WY 2017.

Monthly average discharges at the Piedmont stream gage for WY 2014 through WY 2017 are shown in Table 2. The spring season of WY 2014 and WY 2015 were extremely dry, with average monthly flows well below 1 cfs. Flows increased during spring WY 2016 following a wetter January, dropped dramatically during the month of February (channel was completely dry for part of the month), increased in March, and then dropped again in April. Starting in May 2016, the stream discharge was entirely derived from percolation pond releases. In contrast, flows in 2017 were more consistent during the winter season and gradually decreased during spring and summer seasons. Percolation pond operations did not begin until late July.

It is not clear why biological condition scores in 2017 were higher at the case site, compared to the comparison site. Water chemistry and physical habitat data collected at both sites in 2017 were very similar and do not appear to be adversely impacting biological conditions at either of the sites.

Table 2. Monthly average stream flow (cfs) measured at Piedmont stream gage over the past four years (WY 2014 through WY 2017). Shaded cells indicate month that stream flow was augmented by percolation pond releases. CSCI scores for the past two years is also shown.

WY Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	CSCI Score
2014	3.6	3.3	2.9	2.6	1.4	.05	.05	0	0	0	0	0	NA
2015	0	.04	10.2	0	0.3	0	< .01	< .01	0	0	0	0	NA
2016	0.0	0.0	5.2	21.4	1.9	21.6	1.5	2.9	9.3	6.1	0.0	7.5	0.65
2017	0.8	0.0	2.0	64.7	62.2	13.0	8.2	2.1	1.3	0.7	2.7	3.3	0.84

Conclusions based on results from bioassessment monitoring in 2017 are provided below:

- Reduced biological conditions observed at the case site in 2016 were likely associated with intermittent flow conditions that occurred prior to sampling events, as well as preceding two years of dry conditions associated with the drought.

- Higher biological conditions observed at the case site in 2017 appear to be associated with consistent storm patterns during the winter season and less variable baseflow conditions during the spring season. In addition, higher groundwater levels likely helped maintain surface flows during the spring and summer seasons in 2017.

3.2 Management Practices Assessment

The Project findings suggest that MS4 discharges are not the probable cause of reduced biological conditions observed at the case site on Upper Penitencia Creek. However, the Program recognizes the importance of freshwater habitat in this creek that currently supports freshwater organisms, including a viable steelhead trout population. To assist in the continued management of this important natural resource, the Program summarized management practices and/or projects that may affect biological conditions within the Project reach. These management practices fall into four categories:

- Water Operations;
- Channel Maintenance; and
- Sediment Control in Upper Watershed, including rural roads, trails and grazing.

For each management practice/project, the following are provided:

- Summary of watershed management activities in the watershed;
- Evaluation of potential impacts that existing and/or planned management practices may have on biological conditions; and
- Recommendations of actions (monitoring or management) that would support the management of the freshwater habitat beneficial use in Upper Penitencia Creek.

3.3.1 Water Operations

The SCVWD conducts water operations in Upper Penitencia Creek to recharge the underlying groundwater basin by diverting water from the South Bay Aqueduct into the Robert Gross percolation ponds, located just upstream of Piedmont Avenue. Water imports are typically initiated when creek flow ceases upstream of the pond turnout. Historically, Upper Penitencia Creek loses surface flow over a segment that spans the groundwater recharge zone, between Dorel Avenue and just downstream of Interstate 680. Imported water is transported to off-channel ponds for percolation. The pond water may then be released to the creek at three potential locations: 1) Pond 1a via pipeline near Toyon Avenue; and 2) Pond 3 via overflow structure, approximately 400 meters upstream of Piedmont Road and 3) overflow structure immediately upstream Piedmont Road (Figure 3). In 2012, a fish screen was installed at the outlet pipe from Pond 1a to prevent fish passage into the ponds during water releases.

The SCVWD water operations for groundwater percolation is dependent on the availability of imported water from the State. During WY 2014 and WY 2015, the State did not allocate imported water to the SCVWD due to an extended period of drought. As a result, both ponds and the reach of Upper Penitencia Creek below Dorel Drive were dry throughout the spring and summer seasons for both years. Although water imports were reinitiated in WY 2016, the augmented water only extended a short distance below the ponds (i.e., down to about Capitol Expressway), presumably due to high percolation rates caused by lower than normal elevation of the groundwater basin following the drought.

Pond water is discharged into the creek for two reasons: 1) groundwater percolation, and 2) to satisfy downstream well users/water rights. Typically, the augmented water extends from the Robert Gross Percolation Ponds downstream to a diversion structure at Jackson Road that conveys water to another off-channel percolation pond at Mabury Road. Approximately 75% of the total volume of imported water that is percolated occurs at the ponds and the remaining 25% occurs in the channel (Aaron Baker, personal communication, SCVWD).

Figure 3. Robert Gross Percolation Ponds in Upper Penitencia Creek, San Jose Ca.

During wetter years, the timing and volume of water that is released from the percolation ponds can be variable. During WY 2016, the natural flows in the creek ceased in early May and water was released from the ponds between May and July 2016 (Table 3). Approximately 90% of these discharges occurred at Pond 1 via pipeline at Toyon Avenue. Pond discharge was stopped for approximately 40 days and reinitiated in September 2016 for about one month. In 2017, natural stream flow continued late into the summer season and water releases did not begin until late July 2017. As a result, the volume of water discharged from the pond during WY 2017 was significantly less, compared to WY 2016 (note period of record for 2017 only extend into early August).

Table 3. Timing and estimated volume of water released from Robert Gross percolation ponds in 2016 and 2017.

Calendar Year	Pond 1 Discharge via Pipeline			Pond 3 Discharge via Overflow		
	Total Volume (Annual)		Timeframe	Total Volume (Annual)		Timeframe
	cfs	Acre-ft		cfs	Acre-ft	
2016	774.6	1536	May 12-July 19; Sept 1-Oct 6 (with some days off)	78.4	156	June 15-July 20; Sept 12-Oct 5 (with some days not overflowing)
2017*	0	0	No discharge between Jan 1 and Aug 5.	6.3	12	July 21-Aug 2 (with some days not overflowing)

*Data only available through August 5, 2017

Percolation pond releases can dramatically effect stream flow discharge in Upper Penitencia Creek. On May 12, 2016, the initial release of water from the percolation ponds increased flow at the Piedmont gage from 0.25 cfs to 2.5 cfs in the span of one hour. Continued releases over the period of one month (May-June 2016) increased stream flow from 2.5 cfs to 12 cfs. In July, the releases were shut off and flows dropped from 11 cfs to 1 cfs in one hour. The channel remained dry for approximately one month, and water releases began again in September 2016 until October 6th.

The City of San Jose owns and operates Cherry Flat Reservoir, which is located about one mile upstream of Alum Rock Park. The reservoir has a capacity of 500 acre-feet and was originally built for flood control and water use in the park. Dam releases are typically made when the reservoir is in danger of exceeding capacity or additional flows are needed to maintain perennial flow in Upper Penitencia Creek mainstem (SCVURPPP 2003). Regular releases are typically not needed during most years due to contribution of natural springs near the dam and perennial flow from Arroyo Aguague.

Evaluation

Based on the Project results, the effects of percolation pond releases to biological conditions, as measured by CSCI and algae IBI scores, were inconclusive. Biological condition scores at the case site were essentially no different between the 2016 sampling events that occurred before and after percolation pond releases. It is unclear to what extent the biological conditions observed at the case site for both sampling events in 2016 were influenced by persistent dry channel conditions caused by the drought (and absence of augmented flow from ponds) during the previous two years.

The percolation pond releases in 2016 resulted in an increase in stream discharge, elevated water temperatures and higher nutrient concentrations at the case site, compared to the upstream comparator site. It is not clear to what degree these stressors may have affected the aquatic biota at the case site, considering the channel at the case site was dry prior to the percolation pond releases and therefore the releases provide a wetted channel where none existed prior to. It is assumed that BMIs and algae present during the June 2016 bioassessment event either recently colonized the stream or were dispersed from the ponds during the releases. The augmented flow may provide connectivity to existing habitat further downstream during wet years (e.g., confluence of Coyote Creek), however in 2016 the augmented flow only extended a short distance downstream before it percolated below the surface at Capitol Expressway.

In general, the additional volume of water from the ponds appears to increase the spatial and temporal extent of water flows in the “dry back” zone downstream of the ponds, which increases the availability of habitat for native warm water fish community and other aquatic organisms (e.g., benthic macroinvertbrates) during spring/summer months. Native fish community of California roach, Sacramento suckers, prickly sculpin and Pacific lamprey larvae are typically found in the reach downstream of the Percolation Ponds (Smith 2013). In addition, the water releases from percolation ponds may benefit juvenile steelhead during their downstream migration (Leicester and Smith, 2013). During dry years, intermittent flows in the percolation zone may result in the stranding of juvenile steelhead during spring migration.

Recommendations

The following recommended management/monitoring actions associated with water operations are provided below.

- Evaluate management scenarios to release water from Robert Gross Percolation Ponds that would enhance aquatic life uses in Upper Penitencia Creek. Management scenarios may include operations to enhance the timing, duration and magnitude of water releases to potentially benefit downstream migration of juvenile steelhead.

3.3.2 Channel Maintenance

The SCVWD performs routine stream and channel maintenance on streams and channels under their jurisdiction as part of the SCVWD Stream Maintenance Program (SMP) (SCVWD 2013). The activities addressed in the SMP include sediment removal projects, vegetation management and bank protection. The SCVWD has flood control jurisdiction for 52% of the Upper Penitencia Creek downstream of Alum Rock Park, including the Project reach.

Sediment removal activities conducted under the SMP typically occur in areas where sediment deposition has reduced flood conveyance capacity, impeded function of facilities and impeded fish passage. Vegetation management activities include removal of vegetation within the riparian zone to maintain flood conveyance capacity, maintain water conveyance for supply purposes, reduce fuel loads on stream banks for fire protection, and control invasive nonnative vegetation (e.g., mowing, hand clearing or herbicide application).

Bank protection activities performed by the SCVWD, where SCVWD has right of way, fee title or easement, include repair of eroding stream banks in areas where erosion could cause property damage, create a public safety concern, and/or negatively affect transportation, beneficial uses, or riparian habitat. Bank protection measures used by the SCVWD may include hard structures (e.g., rock), as well as soft structures (e.g., brush mattresses, root wads, or crib walls).

Evaluation

One of the most pressing issues in Upper Penitencia Creek is the accumulation of sediment at several locations where the channel is constricted, including the Interstate 680 crossing and the confluence of Coyote Creek. In the past four years, the SMP has performed very limited activities in Upper Penitencia Creek (Carole Foster, SCVWD, personal communication, 2017), due to the lack of project approvals by the National Marine Fisheries Service. The District has focused solely on vegetation management, including aquatic herbicide application, vegetation removal and tree pruning, and has not performed sediment removal in Upper Penitencia in over a decade. All vegetation management activities currently occur above and below Noble Avenue road crossing and have very limited effects to biological conditions to the Project reach. The last sediment removal project was proposed in 2015 along a reach at Mabury Road, however it was not approved by the National Marine Fisheries Service. Historically, sediment removal activities are primarily conducted downstream of the Project reach, and thus would not likely impact biological conditions at the Project reach.

The riparian vegetation at the case site contains several mature sycamore trees mixed with younger willows and alders at various locations. A majority of the banks, however, are covered with non-native vegetation, including ivy, blackberries and vinca. The non-native plant species provide little bank protection or stream side shading, which would be beneficial for benthic organisms and native fishes. Qualitative physical habitat (PHAB) assessments conducted as part of the bioassessments support this observation, as the case site had moderately low scores for epifaunal substrate, a measure for potential diversity of habitat available for aquatic organisms. The absence of large woody debris in the channel is one factor contributing to the lower epifaunal substrate score. In general, large woody debris in the channel increases overall habitat diversity for aquatic organisms, and could improve habitat at the case site.

Recommendations

The following recommended management/monitoring actions associated with channel maintenance are provided below.

- Consider removal of non-native plant species (e.g., ivy) and encourage natural recruitment of native riparian vegetation as appropriate at the case site to improve aquatic conditions as part of actions taken by the District's Safe Clean Water and Natural Flood Protection Program, Priority D[1]. Priority D focuses on Restoring Wildlife Habitat and Providing Open Space in Santa Clara County. Funding for this priority pays for control of non-native, invasive plants, revegetation of native species, and maintenance of previously revegetated areas. Other projects include removal of fish barriers, improvement of steelhead habitat and stabilization of eroded creek banks.
- Consider the installation of large woody debris to increase habitat type diversity (e.g., scour pools) to increase the diversity of aquatic biota, leveraging the District's Safe Clean Water and Natural Flood Protection Program, Priority D opportunities when possible. Large woody debris placement should consider habitat benefit versus flood risk. Consider use of SCVWD's gravel placement and large-wood placement site prioritization criteria which aims to integrate geomorphic analysis and aquatic ecology principles to increase in-stream complexity in select urbanized waterways throughout the county[2]. Other sources of information may include SCVWD's Stream Maintenance Program large woody debris guidelines

3.2.3 Sediment Control in Upper Watershed

The Program previously documented management practices associated with controlling anthropogenic sources of sediment in Upper Penitencia Creek (SCVURPPP 2008). A sediment source assessment (Stillwater 2007) determined that active and frequent landslides are common in Upper Penitencia Creek, especially in sensitive geological-land cover areas. The study identified road-related landslide features are a chronic source of sediment and grazing and feral animal as potential sediment source. However, existing information was not sufficient to differentiate the anthropogenic sediment inputs from what is likely a naturally high sediment yield from the watershed (Stillwater 2008).

Although sediment was not identified as an important stressor to the biological condition observed at the case site, compared to control site, sediment impacts from both natural and anthropogenic sources can potentially impact biological conditions in the Upper Penitencia Creek watershed. A summary of sediment management practices potentially impacting Project reach are provided below.

Rural Roads and Trails

The City of San Jose Department of Transportation is primarily responsible for maintaining roads within Alum Rock Park. The City follows standard operating procedures for the maintenance and repair of unpaved roads and trails that are described in the Rural Public Works Maintenance and Support Activities Performance Standards. The goal of these procedures is to ensure that maintenance and/or repairs of unpaved roads and trails/embankments are conducted in a manner that minimizes, to the maximum extent practicable, the impacts on water quality. The City of San Jose Parks and Recreation Department is also responsible for maintaining and protecting facilities in Alum Rock Park. These activities include monthly inspections of Cherry Flat Reservoir and road and trail inspections and maintenance.

Santa Clara County has two departments that are responsible for maintenance of roads within unincorporated areas of Upper Penitencia Creek watershed. The County Roads and Airports Department maintains the majority of Alum Rock Falls Road (i.e., roadway outside of Alum Rock Park boundary). The

[1] https://www.valleywater.org/project-updates/safe-clean-water-and-natural-flood-protection-program/priority-d-restore-wildlife-habitat-and-provide-open-space
[2] Countywide Gravel and Large Wood Augmentation Program (Draft)

Santa Clara County Parks and Recreation Department manages roads, as well as recreational trails, within Joseph D. Grant County Park. Joseph Grant Park covers approximately 24% of the total watershed area of Upper Penitencia Creek, all within the Arroyo Aguague subwatershed.

The Santa Clara Open Space Authority (SCCOSA) manages nearly 10% of the total watershed area in Upper Penitencia Creek watershed above Alum Rock Park. Approximately 70% of total length of roads in land owned or managed by OSA has a dirt surface (i.e., 7.7 miles). Sediment management practices generally consist of repairing roads and culverts that are failing or not functioning properly. The OSA follows guidelines described in "Handbook for Forest and Ranch Roads" and "Road building guide for private roads", developed by the Mendocino Resource.

Grazing

In December 2012, the Santa Clara County Open Space Authority (OSA) purchased three parcels (Kammerer property) surrounding the upper end of Cherry Flat Reservoir in the Upper Penitencia Creek watershed with the intention of partnering with the Santa Clara Valley Water District (SCVWD). Ownership of this property (now referred to as the Upper Penitencia Creek Property) was transferred to SCVWD for the purpose of providing mitigation in perpetuity for impacts associated with the SCVWD's 2002 Multi-Year Stream Maintenance Program (SMP). In December 2015, the SCVWD also purchased the Rancho Cañada de Pala Preserve (Preserve) from The Nature Conservancy (TNC), also for providing mitigation for impacts associated with the SMP.

The Open Space management approach is provided below.

Upper Penitencia Creek Property (Property)

The approach to protecting, managing, and enhancing stream and pond conditions on the Property is to:

1. Monitor and maintain residual dry matter (RDM) at levels sufficient to protect the soils. Ensure sufficient vegetative cover, thus reducing the potential for watershed lands erosion and for increased runoff into streams.

2. Implement a grazing strategy to reduce cattle presence during the hot/dry summer season (once grass forage is dried) when cattle tend to congregate near streams and ponds. This will minimize routine cattle intrusion into the vicinity of ponds and streams. In addition, retain any existing functional watering troughs and install new troughs if they are determined to be needed in the future. Ensure troughs are placed in the Property in sufficient numbers and locations to provide an adequate and preferred water source for cattle, thus deterring cattle utilization of the natural water sources on the Property. Similarly, salt/mineral blocks for cattle will be located well away from sensitive aquatic resources.

3. After implementation of the grazing regime has commenced, conduct annual monitoring of sensitive areas (streams and ponds) that are accessible to cattle to determine that the Property's identified conservation values are being met.

4. Take additional measures (e.g., installation of additional troughs, salt licks, molasses, and temporary or permanent fencing) that may be needed to adapt the grazing plan in a manner that better supports the Property's conservation values.

5. Rehabilitate existing degraded road areas, particularly stream crossings that are currently contributing to minor erosion, and institute an annual road maintenance program to properly configure roads to minimize erosion potential.

Rancho Canada de Pala Preserve (Preserve)

The approach to protecting, managing, and enhancing stream and pond conditions on the Preserve is to:

1. Monitor and maintain residual dry matter (RDM) at levels sufficient to protect the soils. Ensure sufficient vegetative cover, thus reducing the potential for watershed lands erosion and for increased runoff into streams.

2. Implement a grazing strategy to provide relatively low grassland vegetation with appropriate conditions for burrowing mammals and the species that utilize their burrows while minimizing the potentially adverse effects of livestock grazing during the hot/dry summer season (once grass forage is dried) when livestock tend to congregate near water sources. This will minimize routine cattle intrusion into the vicinity of ponds and streams on the Preserve. In addition, maintain the existing watering troughs and install new troughs if they are determined to be needed in the future. Ensure troughs are present in sufficient numbers and locations to provide an adequate and preferred water source for cattle, thus deterring cattle utilization of the natural water sources on the Preserve. Similarly, mineral and protein supplements for cattle will be located well away from sensitive aquatic resources.

3. Conduct annual monitoring of sensitive areas (i.e., streams and ponds) that are accessible to cattle to determine that the identified conservation values of the Preserve are being met.

4. Take additional measures (e.g., installation of additional troughs and mineral and protein supplements) that may be needed to adapt the grazing plan in a manner that better supports the conservation values of the Preserve.

5. Rehabilitate existing degraded road areas and institute a regular road maintenance program to properly configure roads to minimize erosion potential.

Evaluation

The upper basin of Upper Penitencia creek contains highly erosive geology and steep topography, local seismic activity and the intense, episodic winter rainfall, which combine to produce a naturally high sediment load (Stillwater 2007). An extended dry period between WY 2014 and WY 2016, followed by wet winter during WY 2017, resulted in several landslides in Alum Rock Park, causing damages to several buildings in the park (Alex Pearson, City of San Jose, personal communication, 2017). Alum Rock Falls Road (i.e., roadway outside of Alum Rock Park boundary) was shut down due to rockslides and road failures.

City of San Jose and County agency staff are currently addressing these sediment issues with management actions in Alum Rock Park, primarily focused on intercepting erosive soils at roadways to prevent them from entering the creek (Jordan Ciprian, City of San Jose, personal communication, 2017). A subsequent dry winter in WY 2018 has reduced the potential for sediment to get transported to the creek.

Sediment was not identified as an important stressor at the case site during bioassessments conducted in WY 2016 or WY 2017. The case site is located at the downstream end of historical zone for sediment transport (Figure 4). As a result, sediment that is being transported from upstream sources will likely get deposited further downstream of the case site.

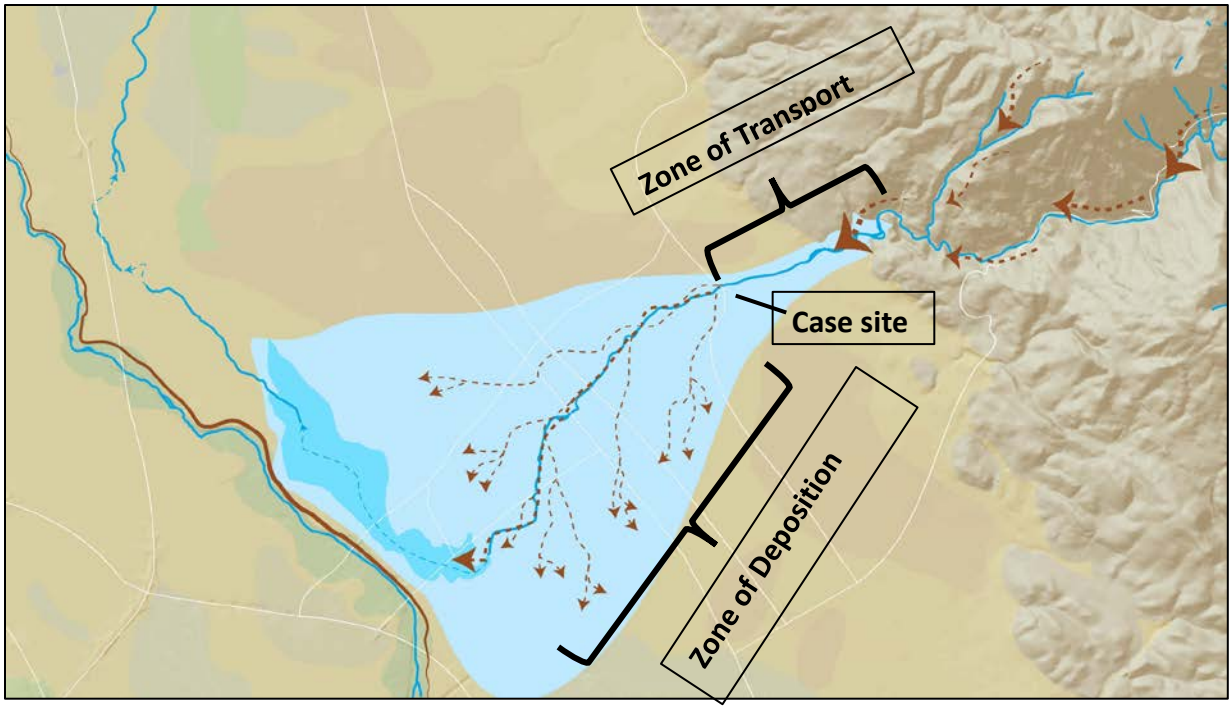

Figure 4. Historical map showing zones of sediment transport and deposition in Upper Penitencia Creek.

Recommendation

There are no recommended management/monitoring action associated sediment control practices.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Conclusions based on results from bioassessment monitoring in WY 2017 are provided below:

- Reduced biological conditions observed at the case site in 2016 were likely associated with intermittent flow conditions that occurred prior to sampling events, as well as preceding two years of dry conditions associated with the drought.

- Higher biological conditions observed at case site in 2017 appear to be associated with consistent storm patterns during the winter season and less variable baseflows during spring season. In addition, higher groundwater levels likely helped to maintain surface flows during the spring and summer season of 2017.

The following recommended management/monitoring actions are provided below.

- Evaluate management scenarios to release water from Robert Gross Percolation Ponds that would enhance aquatic life uses in Upper Penitencia Creek. Management scenarios may include operations to enhance the timing, duration and magnitude of water releases to potentially benefit downstream migration of juvenile steelhead.
- Consider removal of non-native plant species (e.g., ivy) and encourage natural recruitment of native riparian vegetation as appropriate at the case site to improve aquatic conditions as part of actions taken by the District's Safe Clean Water and Natural Flood Protection Program, Priority

D[3]. Priority D focuses on Restoring Wildlife Habitat and Providing Open Space in Santa Clara County. Funding for this priority pays for control of non-native, invasive plants, revegetation of native species, and maintenance of previously revegetated areas. Other projects include removal of fish barriers, improvement of steelhead habitat and stabilization of eroded creek banks.

- Consider the installation of large woody debris to increase habitat type diversity (e.g., scour pools) to increase the diversity of aquatic biota, leveraging the District's Safe Clean Water and Natural Flood Protection Program, Priority D opportunities when possible. Large woody debris placement should consider habitat benefit versus flood risk. Consider use of SCVWD's gravel placement and large-wood placement site prioritization criteria which aims to integrate geomorphic analysis and aquatic ecology principles to increase in-stream complexity in select urbanized waterways throughout the county[4]. Other sources of information may include SCVWD's Stream Maintenance Program large woody debris guidelines.

To support these and future restoration projects the District will create a comprehensive, updated database on stream conditions countywide. The District and other agencies can then use the new information to make informed decisions on where and how to use restoration dollars so they have the greatest value for wildlife.

5.0 REFERENCES

Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP). 2008. Sediment Management Practices Assessment in Upper Penitencia Creek.

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Smith, J. 2013. Northern Santa Clara County Fish Resources. Unpublished. Department of Biological Sciences. San Jose State University. 2013.

Stillwater Sciences Inc. 2007. Upper Penitencia Creek Sediment Source Assessment Technical Memorandum. Prepared for the Santa Clara Valley Urban Runoff Pollution Prevention Program. June, 2007.

[3] https://www.valleywater.org/project-updates/safe-clean-water-and-natural-flood-protection-program/priority-d-restore-wildlife-habitat-and-provide-open-space

[4] Countywide Gravel and Large Wood Augmentation Program (Draft)

ATTACHMENTS

Attachment 1. Metric scores for BMI taxa in samples collected at two Project sites in April 2016 and May 2017.

Metrics	4/28/2016		5/7/2017	
	205COY114	205COY121	205COY114	205COY121
Richness:				
Taxonomic	19	27	31	32
EPT*	6	12	13	11
Ephemeroptera	3	4	7	6
Plecoptera	0	3	2	1
Trichoptera	3	5	4	4
Coleoptera*	0	1	4	0
Predator*	5	9	10	13
Diptera	7	7	7	15
Composition:				
EPT Index (%)	2.8	5.8	24	17
Sensitive EPT Index (%)	0.5	2.6	3.5	3.0
Shannon Diversity	1.33	1.56	2.16	1.91
Dominant Taxon (%)	54	39	23	33
Non-insect Taxa (%)*	26	22	23	19
Tolerance:				
Tolerance Value	5.4	5.5	5.4	5.5
Intolerant Organisms (%)*	0.3	2.3	3.5	2.1
Intolerant Taxa (%)	5.3	22	13	16
Tolerant Organisms (%)	0.6	1.6	3.3	5.7
Tolerant Taxa (%)*	11	22	19	16
Functional Feeding Groups:				
Collector-Gatherers (%)	68	55	70	56
Collector-Filterers (%)	29	40	22	34
Collectors (%)*	98	95	92	90
Scrapers (%)	0.3	1.4	1.3	0.8
Predators (%)	1.6	3.4	6.3	8.2
Shredders (%)	0.3	0.5	0.3	0.9
Other (%)	0.0	0.0	0.3	0.0

Attachment 2. Water chemistry (nutrients) and sonde grab samples collected at two Project sites in April 2016 and May 2017.

Parameter	COY114		COY121	
	4/28/2016	5/17/2017	4/28/2016	5/17/2017
Water Quality				
Temperature	16.2	16.9	11.4	12.3
Dissolved Oxygen	NR	11.15	10.82	8.26
pH	8.62	8.77	8.45	8.39
Specific Conductance	NR	798	757	773
Nutrients and Anions				
Ammonia as N	0.025	0.05	0.043	0.05
Unionized Ammonia (as N)	NR	0.007	0.002	0.002
Chloride	43	38	42	40
AFDM	52	162	61	46
Chlorophyll a	23	150	31	54
Nitrate as N	0.13	0.08	0.24	0.16
Nitrite as N	0.008	0.005	0.011	0.007
Total Kjeldahl	0.57	0.53	0.48	0.57
Total Nitrogen	0.71	0.61	0.73	0.74
Ortho-Phosphate as P	0.02	0.02	0.02	0.03
Phosphorus as P	0.03	0.04	0.03	0.04
Total Phosphorus	0.06	0.06	0.06	0.07
Silica as SiO2	12	15	12	16

NR = Not recorded/measured