Vasona Creek with West Valley College Stream Enhancement Program

Vasona Creek Setting and History

- 0.60 square mile urbanized watershed
- Tributary to San Tomas Aquino Creek
- 4,000 Feet of stream channel within WVC
- Stream incised within old alluvial fans and underlain with clay rich soils
- Flow is “intermittent” (i.e. runs dry in most years) combo of storm runoff in winter and spring flow; urban landscape watering upstream
Vasona Creek with West Valley College Stream Enhancement Program

Vasona Creek Setting and History

History

- Late 1800s to 1960s Agriculture, grazing and orchards, rural residential land use
- Land cover change from original would have increased winter peak runoff and sediment.
- Trees along creek are left intact
Vasona Creek within West Valley College Rare Resource is intact Native Trees forming overstory Canopy is a VERY RARE RESOURCE, Opportunity for rare Showpiece Stream Restoration Program and Research Opportunities

Problems threatening resource:
1) Potential loss of Large Native Trees due to erosion in channel caused by higher floods and bridges on campus;
2) Pollution in Creek due to Urban Stormwater from landscaping, pavement/roofs, turf grass and erosion.
3) Non Native plant invasion in areas that could support native plants – very rare to have shade from trees and native understory.
Upstream Reach – Vasona Creek shallow stable channel predominately native vegetation
Tennis Court Wetland
Slight incision – adobe clay layers exposed
Deep Channel incision/erosion below bridge #3
Culvert outlet and concrete rubble and poured cement for erosion protection
Loss of Oak Trees due to stream erosion
Urban Runoff – storm events and sediment sources
## Biological Resources - Habitat

### Table 1: Vegetation Types and Habitats in the Study Area

<table>
<thead>
<tr>
<th>Vegetation Type or Habitat</th>
<th>Study Area Total (Acres)</th>
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</thead>
<tbody>
<tr>
<td><em>Quercus agrifolia</em> woodland alliance (coast live oak woodland)</td>
<td>9.56</td>
</tr>
<tr>
<td><em>Salix spp.</em> woodland alliance (willow thickets)</td>
<td>2.28</td>
</tr>
<tr>
<td><em>Quercus douglasii</em> woodland alliance (blue oak woodland)</td>
<td>2.02</td>
</tr>
<tr>
<td><em>Quercus lobata</em> woodland alliance (valley oak woodland)</td>
<td>1.56</td>
</tr>
<tr>
<td>Ornamental trees/Non-native annual grassland</td>
<td>1.16</td>
</tr>
<tr>
<td><em>Salix laevigata</em> woodland alliance (red willow thickets)</td>
<td>0.97</td>
</tr>
<tr>
<td>Developed</td>
<td>0.86</td>
</tr>
<tr>
<td><em>Populus fremontii</em> forest alliance (Fremont cottonwood forest)</td>
<td>0.35</td>
</tr>
<tr>
<td><em>Quercus lobata</em> woodland alliance (valley oak woodland)/ Non-native annual grassland</td>
<td>0.33</td>
</tr>
<tr>
<td><em>Phalaris aquatica</em> semi-natural herbaceous stands (Harding grass swaths)</td>
<td>0.23</td>
</tr>
<tr>
<td>Open water pond/ <em>Salix spp.</em> woodland alliance (willow thickets)/ <em>Juncus sp.</em> herbaceous alliance (rush marshes)</td>
<td>0.18</td>
</tr>
<tr>
<td>Non-native annual grassland</td>
<td>0.21</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>19.71</strong></td>
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</table>
### Wildlife Species Observed in the Project Study Area (March 11, 2013)

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
<th>Native (Y/N)</th>
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</thead>
<tbody>
<tr>
<td>Accipiter cooperii</td>
<td>Cooper's hawk</td>
<td>Y</td>
</tr>
<tr>
<td>Anas platyrhynchos</td>
<td>Mallard</td>
<td>Y</td>
</tr>
<tr>
<td>Anas crecca</td>
<td>Western coot</td>
<td>Y</td>
</tr>
<tr>
<td>Brachypterus cinereus</td>
<td>Oak titmouse</td>
<td>Y</td>
</tr>
<tr>
<td>Batrachyla attenuata</td>
<td>California slender salamander</td>
<td>Y</td>
</tr>
<tr>
<td>Branta canadensis</td>
<td>Canada goose</td>
<td>Y</td>
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<tr>
<td>Bubo virginianus</td>
<td>Great horned owl</td>
<td>Y</td>
</tr>
<tr>
<td>Buteo lineatus</td>
<td>Red shouldered hawk</td>
<td>Y</td>
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<tr>
<td>Calypte anna</td>
<td>Anna’s hummingbird</td>
<td>Y</td>
</tr>
<tr>
<td>Catharista aura</td>
<td>Turkey vulture</td>
<td>Y</td>
</tr>
<tr>
<td>Catharistus maximus</td>
<td>Swainson's thrush</td>
<td>Y</td>
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<tr>
<td>Colaptes aura</td>
<td>Northern flicker</td>
<td>Y</td>
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<tr>
<td>Conus brachypterus</td>
<td>American crow</td>
<td>Y</td>
</tr>
<tr>
<td>Eganis costasi</td>
<td>San Francisco alligator lizard</td>
<td>Y</td>
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<tr>
<td>Empidonax sp.</td>
<td>Flycatcher</td>
<td>Y</td>
</tr>
<tr>
<td>Haematopus palustris</td>
<td>House finch</td>
<td>Y</td>
</tr>
<tr>
<td>Haematopus sp.</td>
<td>Red phalarope</td>
<td>Y</td>
</tr>
<tr>
<td>Junco hyemalis</td>
<td>Dark-eyed junco</td>
<td>Y</td>
</tr>
<tr>
<td>Melanerpes formicivorus</td>
<td>Acorn woodpecker</td>
<td>Y</td>
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<tr>
<td>Melospiza sp.</td>
<td>Sparrow sparrow</td>
<td>Y</td>
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<tr>
<td>Melospiza linnaeus</td>
<td>California towhee</td>
<td>Y</td>
</tr>
<tr>
<td>Mephitis mephitis</td>
<td>Striped skunk</td>
<td>Y</td>
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<tr>
<td>Minuca phyllosis</td>
<td>Northern mockingbird</td>
<td>Y</td>
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<tr>
<td>Neotoma fuscipes arctoidea</td>
<td>San Francisco dusky-footed woodrat</td>
<td>Y</td>
</tr>
<tr>
<td>Oecolus cyanatus</td>
<td>Black-capped chickadee</td>
<td>Y</td>
</tr>
<tr>
<td>Poecetes rufus</td>
<td>Nuttall's woodpecker</td>
<td>Y</td>
</tr>
<tr>
<td>Poecetes villosus</td>
<td>Hairy woodpecker</td>
<td>Y</td>
</tr>
<tr>
<td>Peris auxuarius</td>
<td>Spotted towhee</td>
<td>Y</td>
</tr>
<tr>
<td>Plastron pictorum</td>
<td>Skilton's skink</td>
<td>Y</td>
</tr>
<tr>
<td>Pusillus rufescens</td>
<td>Chestnut-backed chickadee</td>
<td>Y</td>
</tr>
<tr>
<td>Prothonotarius occidentalis</td>
<td>Racoon</td>
<td>Y</td>
</tr>
</tbody>
</table>

#### Neotoma fuscipes arctoidea
San Francisco dusky-footed woodrat

- **CSC:** Found among oak/bay woodland and riparian areas around the San Francisco Bay Area. Nests in areas with high density of woody vegetation. May also be found in rock outcrops and chaparral habitat types. Sensitive to disturbances.

- **High:** Suitable nesting and foraging habitat present. No CNDDB occurrences are reported within 10 miles of the Study Area, however the species was observed in the Study Area on March 12, 2013.

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**Accipiter cooperii**
Cooper’s hawk

- **Inhabits primarily open, interrupted or marginal woodlands. Nests mainly in riparian groves of deciduous trees. Also nests in oak.**

- **High:** Suitable nesting and foraging habitat present. Observed in Study Area on March 11 & 12, 2013.

Two CNDDB occurrences are reported within 3 miles of the Study Area; the closest occurrence is 3 miles northwest.
Vasona Creek with West Valley College Stream Enhancement Program

Origins of Stream Enhancement and Restoration Efforts

2005 Long Range Development Master Plan EIR

- Identified Vasona Creek Corridor as significant resource capable of supporting sensitive species such as California Red Legged Frog and other native wildlife and plant species

- Developed Mitigations for potential impacts associated with campus construction
Vasona Creek with West Valley College
Stream Enhancement Program

Origins of Stream Enhancement and Restoration Efforts

2009 WVC Educational & Facilities Master Plan

Creek Landscape
The creek is a significant landscape resource for the campus. Opening views into and across the creek will enhance the experience of the campus landscape and improve orientation. The creek is also an educational resource for biological, sustainable, and engineering design. Developing and enhancing the creek experience is important to the overall campus design philosophy.

Recommendations:
• Take advantage of the borrowed views of creek landscape
• Create pedestrian experiences along creeks (creek paths, seating, and site amenities)
• Improve lines of sight across creek (especially near bridge crossings)
• Develop a series of architecturally interesting bridges and creek overlooks to act as markers on the campus
• Incorporate seating and overlooks into bridges where possible
• Develop curriculum related signage along creek, such as plant identity markers or plant community interpretation
• Remove invasive species and dead trees
• Remove construction materials, waste, and debris
• Restore creek (stabilize banks, control erosion, enhance habitat)
• Utilize water quality strategies to reduce pollution in the creek
Vasona Creek with West Valley College Stream Enhancement Program

Santa Clara Valley Water District Grants – History, Status and Future
Active Grant Funded Projects

Products of 2010 Stream Enhancement Planning Grant

2011 Grants Awarded

1. Stream Enhancement Implementation Grants
   1. Stream Stabilization below Bridge #3
   2. Tennis Court Wetlands
   3. Native Vegetation Enhancement Project

2. Watershed Stewardship Grants
   1. Stormwater Pollution Reduction Plan
   2. Trail Plan

Applied for three 2014 SCVWD Grants

1. Stormwater Projects (2)
2. Channel stabilization Phase 2
Over 3,100 feet of stream bank is rated between high to extreme erosion hazard potential.
Vasona Creek within West Valley College
Stream Enhancement Program
Channel Stabilization Project downstream of Bridge #3
Vasona Creek within West Valley College Channel Stabilization Project below Bridge #3

Problem: deeply eroded channel – loss of oak trees

Solution: Raise Creek bed and Reconstruct into weir-step pool channel
Stream Channel Restoration at Cookhouse Meadow: Actions Taken to Reverse the Effects of Cumulative Land Use Impacts on the Meadow-Stream Ecosystem

Craig Oehrli, Michael Hamann
1 Fluvial Hydrologist, 2 Hydrologic Technician, U.S.F.S Lake Tahoe Basin Management Unit

Environmental History

Cookhouse Meadow is the last in a string of four historically formed meadows in the Big Meadow Creek watershed. Cookhouse drainage area is 2641 acres. Meadow surface elevation is 7130 feet. Average stream discharge is 600 cfs. Inter-related effects of grazing, highway construction, recreation, and floods forced the creek to beyond a geomorphic stability threshold. In 1982 the creek declined 12-15 feet below its pre-Kennedy flood stage.

Post-Project Results - Seasonal Ground Water Dynamics

Prior to restoration, ground water elevations fell below a critical level. Needed to support meadow and stream bank vegetation. Geographically, short-term stable meadow species such as sedges were inversely proportional to restoration.

Restoration Actions

Planning and design commenced in 2000. We completed NEPA and design in 2003. Design called for the reconstruction of 2880 feet of meadow type stream along the spine of the central meadow. The existing gully channel was plugged, filled (partially), and the final surface shaped and plugged with mirror soil. Forest Service owners committed to the meadow project in 2005. The gully was plugged and filled, and two natural flows in the current channel in 2006.

Designed by: Swanson Hydrology and Geomorphology

EIP Project # 10353.3

Total Construction Cost = $902,100 (SPLMA round 5)

Problem Statement

The purpose of the project was to reverse the adverse effects of stream location. Stream erosion and flood events caused significant impacts to meadow morphological, seasonal ground water dynamics, and meadow vegetation. Stream bank construction, and to maintain base ground water responses to restoration.

The project began in 2003 to determine that the meadow could not withstand a pre-disturbance condition on its own. Therefore, the U.S.F.S. decided to initiate a water analysis recovery plan to replace the meadow stream. The goals of this project were to increase the desired meadow stream wetland characteristics, reduce seasonal ground water dynamics, and meadow vegetation characteristic of a meadow-stream ecosystem.

Post-Project Results - Meadow-Stream Morphological Relationship

The relationship between form of the meadow and meadow-stream has been restored. The stream will now carry its bank slugs and meadow spring snowmelt event, conveying surficial and nutrients on the meadow surface where they are utilized by emerging meadow vegetation every spring.

Post-Project Results - Meadow Vegetation

Meadow vegetation overall, is recovering a faster pace than expected. The nature of the meadow stream-meadow relationships provides the foundation for moose and meadow vegetation. Furthermore, the system and water cycle enhances the nature trend of controls that can be wet and fire.

Stream bank and Meadow Vegetation - August 2008

Over bank flood - May 2008

Stream bank and Meadow Vegetation - August 2008
Channel stabilization needs:

First 2011 SCVWD Grant project covers 350 feet

Approximately 1,800 feet needed to save oak trees and reduce sediment pollution to creek.
Vasona Creek within West Valley College
Stream Enhancement Program
Tennis Court Wetland Enhancement Project
Vasona Creek within West Valley College Stream Enhancement Program

Tennis Court Wetland Enhancement Project

PROBLEM: Wetland too shallow to support diverse wetland vegetation and habitat; non-native plants dominate surrounding area

Solution: Grade to deepen and support diverse wetland plants; increase emergent vegetation for CRLF
Vasona Creek within West Valley College Native Vegetation Enhancement Project

20 acres
Vasona Creek within West Valley College
Native Vegetation Enhancement Project

Problem: Invasive non native vegetation has overtaken areas of potentially high riparian habitat value.

Solution: Remove non-natives and replace with native species.

Invasive English Ivy

Native plant replacements readily available
Urban Stormwater Pollution Reduction

The West Valley Stormwater Pollution Reduction Plan

Addresses new Stormwater Regulations MS-4 which are coming online in next 5 years – WVC is leading the statewide effort for Community Colleges to meet these requirements.
Urban Stormwater Pollution into waterways represents a major problem for water quality in streams and rivers of the U.S.

Typical Urban Runoff Pollutants occur from rooftops, parking lots, landscaped areas, turf grass, bare soils, pavement, and other urban land covers.

Urban hard surfaces do not allow for infiltration of runoff such that pollutants wash freely into storm drains then into creeks – the volume of runoff also increases often causing erosion in stream channels which destroys habitats and adds excess sediments to streamflow.
These pollutants can harm fish and wildlife populations, kill native vegetation, foul drinking water, and make recreational areas unsafe and unpleasant.

- Sediment
- Oil, grease and toxic chemicals from motor vehicles
- Pesticides and nutrients from lawns and gardens
- Viruses, bacteria and nutrients from pet waste leaky sewer lines and failing septic systems
- Heavy metals from roof shingles, motor vehicles and other sources
- Thermal pollution from dark impervious surfaces such as streets and rooftops
West Valley College has typical urban cover types and potential pollution sources.
WVC Stormwater Drainage System and Land Use Cover Types
WVC Potential Treatments for Stormwater Pollution Reduction

*LID Technology Selection Pyramid*

- Step 1: Surface Infiltration
- Step 2: Subsurface Infiltration
- Step 3: Rainwater Harvesting
- Step 4: Biofiltration
- Step 5: Media Filtration
- Treatment Train Options: Detention and Hydrodynamic Separation
- Storage
Potential Treatments for Specific Pollutants

### BMP Performance

<table>
<thead>
<tr>
<th>BMP Type</th>
<th>BMP</th>
<th>Coarse Sed.</th>
<th>Fine Sed.</th>
<th>NO₃</th>
<th>TN</th>
<th>TP</th>
<th>Fe (II)</th>
<th>Zn (II)</th>
<th>Cu (II)</th>
<th>Pathogens</th>
<th>Oil and Grease</th>
<th>Trash and Debris</th>
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<tr>
<td>Risefilters</td>
<td>Bioswale</td>
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</tbody>
</table>

- **Good**
- **Fair**
- **Poor**

**NR** - Not recommended for treating this parameter without pretreatment due to high probability of system impairment.

* Assumes that sorbent is placed in sedimentation chamber.

** The San Francisco Regional Board staff does not recommend the use of this BMP as it feels that it is ineffective.

Source: Geosyntec Consultants, 2002
WVC Treatment Options - Bioswale
New building LID Design Campus Center
WVC Stormwater Treatments: “Aquatank” Subsurface detention and stormwater storage
WVC Stormwater Treatments: Retrofit storm drain inlets for filtration
WVC Stormwater Treatments
Detention Basins
Vasona Creek Trail Plan

West Valley College is in the middle of the City of Saratoga Trail System.
WVC Vasona Creek Trail Preliminary Alignment

observation decks
Trail Features Proposed
Create a sense of natural environment experience within the urban environment

- Stable surface (DG)
- Drainage and Erosion control
- Avoid Sensitive sites
- Signage for directions and interpretative information
- Trash receptacles
- Access for restoration projects
- ADA access
Funding for Program

Goal: $4.0 million

Phase 1: Channel Stability, Tennis Court Wetland, Native Vegetation

Today

- Grants $600k Through Fall 2013
- Bond $1.5 million
- Grants $900k
- Fundraising $1.0 million

Phase 2: Stormwater Projects

- Planning and Design 2013-14
- SCVWD Grant Funds 2013-14 Due 11/15/13
- Construction 2014-2017
Vasona Creek Restoration Project

Next Steps:

• Permitting and construction 2014
• Workshops for Community (early February 2014)
  – Trail Workshop
  – Stormwater Workshop
• Fundraising
  – More Grants
  – Foundation