



Table of Contents

| | |
|---|----|
| Introduction | 1 |
| Description of the Area | 4 |
| Goals | 10 |
| Stakeholder and Community Outreach..... | 10 |
| Community Forums and Workshops..... | 14 |
| Activities | 17 |
| Landscape Conservation..... | 17 |
| Results | 22 |
| Private Parcel Technical Assistance..... | 22 |
| BMP Assistance..... | 22 |
| Community Science and Stewardship Activities..... | 24 |
| Project Partners and Stakeholders | 31 |
| Lessons Learned | 32 |

Appendices

| | |
|--------------------|--|
| Appendix A..... | Community Watershed Partnership Outreach Brochure and Flier |
| Appendix B..... | Community Watershed Partnership Survey Results |
| Appendix C, D..... | <i>”Omitted for Privacy”</i> Technical Services Summary Tables |
| Appendix E..... | Wet Soils BMP Plan Template |
| Appendix F..... | Soil Infiltration Investigation Report |
| Appendix G..... | Streamkeepers Monitoring Report |
| Appendix H..... | <i>”Omitted for Privacy”</i> Invasive Weeds Mapping and Removal Data |

Figures

| | |
|----------------|--|
| Figure 1..... | Community Watershed Partnership Ranking Map |
| Figure 2..... | South Lake Tahoe CWP and Associated Communities |
| Figure 3..... | Kings Beach CWP and Associated Communities |
| Figure 4..... | CWP Environmental Priorities, South Lake Tahoe |
| Figure 5..... | CWP Environmental Priorities, Kings Beach |
| Figure 6..... | CWP Stewardship Activities by Preference |
| Figure 7..... | Summary Table of Project Deliverables |
| Figure 8..... | 2012 Streamkeepers Monitoring Reaches |
| Figure 9..... | 2013 Snapshot Day Monitoring Sites in the Lake Tahoe Basin |
| Figure 10..... | 2012 Tahoe Resource Conservation District Invasive Plant Mapping |



Acronyms

| | |
|----------------|---|
| BMP..... | Best Management Practices |
| CWP..... | Community Watershed Partnership |
| EIP..... | Environmental Improvement Program |
| NRCS..... | Natural Resource Conservation Service |
| NTCD..... | Nevada Tahoe Conservation District |
| SNPLMA..... | Southern Nevada Public Lands Management Act |
| TMDL..... | Total Maximum Daily Load |
| Tahoe RCD..... | Tahoe Resource Conservation District |
| TRPA..... | Tahoe Regional Planning Agency |
| UNCE..... | University of Nevada Cooperative Extension |

Introduction

The clear waters of Lake Tahoe have earned the title “Jewel of the Sierras.” Each year millions of visitors travel to Lake Tahoe to experience its beauty and take advantage of the myriad of opportunities for recreation and tourism. Unfortunately increased development and urban infrastructure has resulted in the loss of natural pollutant filtering mechanisms throughout the watershed, while at the same time impervious surfaces generate a larger number of pollutants within urban areas.

In order to assist with pollutant load reductions the Community Watershed Partnership (CWP) Program supports implementation of the Basin’s Environmental Improvement Program (EIP), a cooperative public/private effort to preserve, restore and enhance the environment of the Lake Tahoe Region. As required by the Tahoe Regional Planning Agency (TRPA), all private property owners are required to install best management practices (BMPs) that reduce pollutants entering Lake Tahoe. The Total Maximum Daily Load (TMDL) is another mechanism for implementing the EIP program and it requires all storm water jurisdictions in the Basin to decrease pollutant loading from urban runoff as well.

The focus on capturing and treating stormwater has become a priority since the Lake Tahoe TMDL identified that approximately 72 percent of the primary pollutants entering Lake Tahoe come from urban runoff. The Lake Tahoe EIP has established a process for implementing restoration projects, and has provided millions of dollars through the Southern Nevada Public Lands Management Act (SNPLMA) for implementation of pollutant control projects.

Through the development of the CWP Program the Tahoe Resource Conservation District (Tahoe RCD), the Nevada Tahoe Conservation District (NTCD), and the Natural Resources Conservation Services (NRCS) have provided extensive technical assistance and education to private property owners in order to contribute to the reduction of pollutants that effect Lake Tahoe’s unique clarity, beauty and bountiful natural resources for future generations.

After a decade of implementing the BMP program, efficiencies were needed and new community engagement opportunities were identified through stewardship and landscape conservation practices. This led to a more flexible and inclusive program dedicated to finding alternate ways to implementing BMPs. Simultaneously, the Lake Tahoe TMDL was adopted and there was a growing consensus that Tahoe Basin programs needed to improve effectiveness while finding efficiencies. Ultimately the growing desire to integrate multiple resource objectives led to the development of the Community Watershed Partnership.

The CWP program has been developed within the Tahoe Basin through funding provided by the Southern Nevada Public Lands Management Act (SNPLMA). The funding for this program is intended to identify and address natural resource concerns at the sub-watershed level in the Tahoe Basin. The Tahoe RCD, NRCS, and NTCDD are the lead project proponents within this program, however, reliance on input from additional stakeholders including local jurisdictions, state and federal agencies, local residents and community members are considered an imperative and integral component in moving this program forward in a successful manner.

The CWP approach also acknowledges, while many of the environmental improvement projects being implemented around the Tahoe Basin are being conducted by agencies like the U.S. Forest Service or local jurisdictions, each person or homeowner also has an opportunity to become an environmental steward and to contribute to ongoing restoration efforts within their community. The CWP process aims to educate the public and to facilitate communication among environmental agency stakeholders and community members and residents.

In 2002 the Tahoe RCD, NTCDD, NRCS, and TRPA adopted a Memorandum of Understanding to establish a partnership that would provide technical support to homeowners, contractors and property managers in implementing water quality BMPs. Through grant funded incentive programs, the Tahoe RCD and its partners provided cost free property evaluations and BMP implementation plans. The deadline for implementing BMPs was established by the TRPA accompanied by a penalty fee in order to stimulate requests for BMP services. The deadline for Basin-wide implementation, was slated for 2008, this date has since come and gone with little regulatory response. Additional program challenges include public perception and cost; BMP implementation is perceived as burdensome by many property owners, and education and outreach efforts have not been as effective as projected.

After more than a decade, in 2013, approximately three out of every ten private properties in the Tahoe Basin had achieved BMP compliance. In order to accelerate implementation the TRPA has recently begun enforcement activity. This action has resulted in increased implementation in targeted areas. Beyond regulatory action, the Tahoe RCD has continued to provide technical assistance, outreach and education such that private property owners better understand the connection between their land use practices and water quality. This approach also now incorporates opportunities to engage residents in stewardship activities.

In order to better contribute to the larger scale planning efforts in the Basin, the Tahoe RCD reached out to community members with information to help guide their actions related to general landscape management such as native and fire-wise plant care and erosion control

management. This landscape conservation approach included BMP technical assistance but took a holistic approach to tackling natural resource concerns while providing quality of life benefits.

This modified approach resulted in a greater enthusiasm within a new audience; new or novice gardeners began searching out technical assistance. The Landscape Conservation approach provided the Tahoe RCD a new opportunity to re-engage the public and offer site specific, in-person consultations to address homeowner questions and challenges. In fact, after the Angora Fire of 2006, service requests for landscape consultations boomed as homeowners looked for assistance to revegetate and stabilize their property after the construction of their new homes in the burn area. Both the TRPA and the local jurisdictions began to refer homeowner landscaping questions to the Tahoe RCD. The South Tahoe Public Utility District's Turf Buyback Program and the Tahoe RCD's Native Plant Start-up Kit further incentivized soil restoration and revegetation projects.

Today, the Tahoe RCD utilizes the landscape conservation approach within the CWP program to reach the hearts and minds of the Tahoe Basin residents.

Description of the Area

As part of developing the CWP process it became important to identify selection criteria to help focus the project team on priority watershed catchments. Selection of the targeted sub-watershed area and subsequent areas of Community Watershed Partnership were based on the following criteria:

- ✓ pollutant loading, wildfire risk, and presence of invasive species
- ✓ areas identified as high priority by agency representatives and resource managers
- ✓ collaboration and agreement of selected watershed area amongst agency representatives
- ✓ environmental improvement project implementation
- ✓ existing natural resource issues or low BMP compliance
- ✓ expected community participation and enthusiasm

The CWP ranking map shown on the following page (Figure 1) identifies priority CWP areas in Lake Tahoe as created by NRCS partners. Those sub-watersheds shown in Red represent the high priority areas. Not surprisingly these areas also commonly represent dense urban cover. Sub-watersheds shown in orange and yellow tend to represent either mixed use or less populated areas; green sub-watershed areas indicate the low priority sites typically upland forested areas with low population densities.

The target CWP areas identified for this work were South Lake Tahoe HWY 50 corridor and Kings Beach, California. Not only are they densely populated, with extensive impervious surface and erosion hazards, but they are both considered to have disadvantaged communities. In support of the EIP, responsible storm water jurisdictions have implemented a long list of capital improvements to storm water infrastructure. The project list may be viewed at <http://tahoercd.org/tahoe-community-watershed-planning/>.

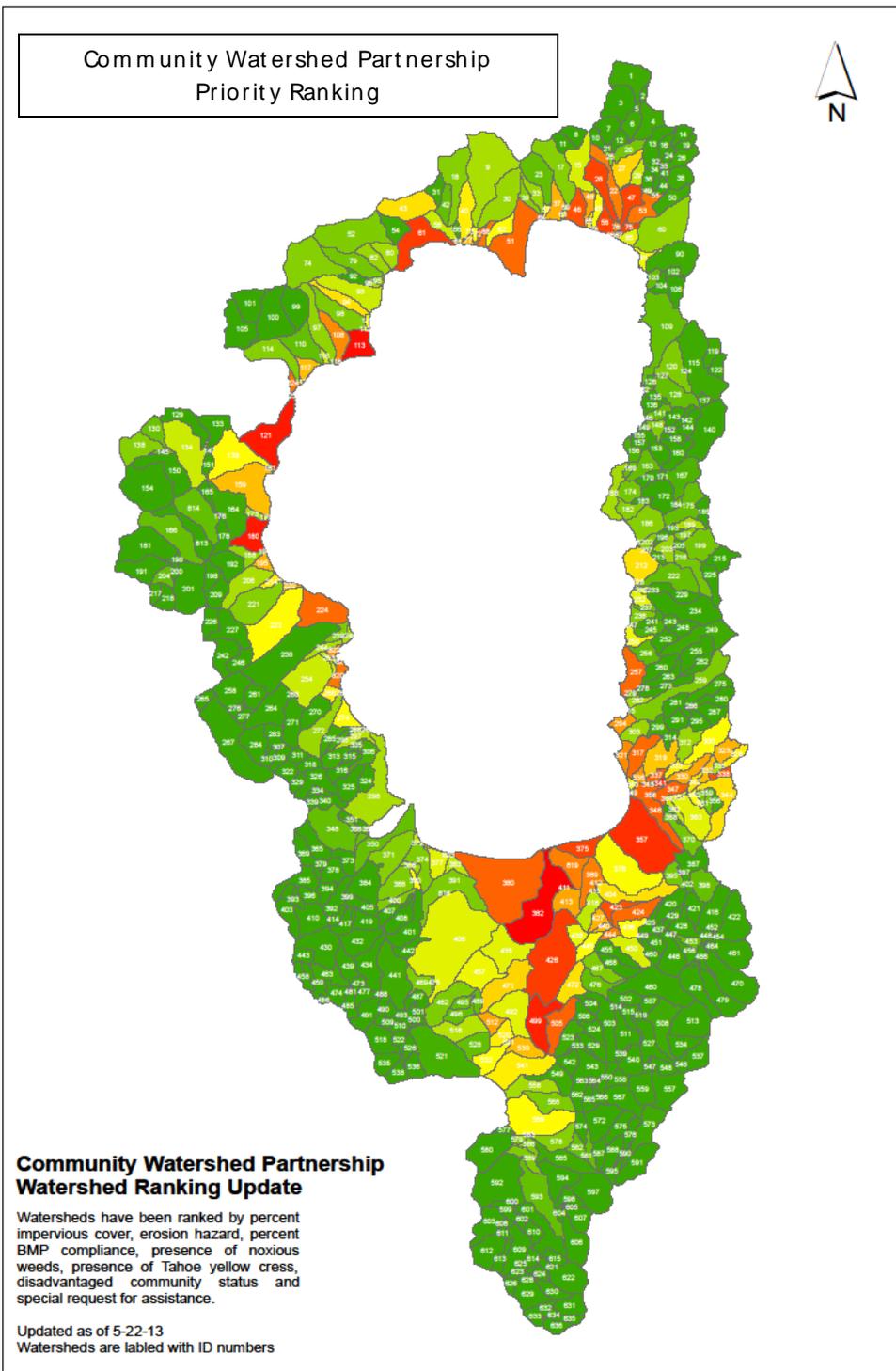


Figure 1: CWP Watershed Ranking

South Lake Tahoe

The South Lake Tahoe CWP focus area covers 5.2 square miles in the communities of Al Tahoe, Sierra Tract, and portions of the “Y” area and the Tahoe Keys (Figure 2). This CWP area includes neighborhoods which lie in close proximity to the lake as well as two primary tributaries, the Upper Truckee River (UTR) and Trout Creek which intersect in the Upper Truckee Marsh before entering Lake Tahoe. The CWP focus area within the Upper Truckee River and Trout Creek Watersheds is located in the uppermost urbanized reaches of the watersheds. The Upper Truckee River sub-watershed is located along the southern end of the Lake Tahoe Basin, and lies within the City of South Lake Tahoe and El Dorado County. At 56.6 square miles, the Upper Truckee River is the largest watershed in the Lake Tahoe Basin; TMDL research also identified this tributary as the greatest contributor of nutrients and sediment as compared with all other tributaries in the Tahoe Basin.

The main channel of the Upper Truckee River (UTR) is 21.4 miles long and originates in the volcanic bluffs surrounding Meiss Meadow near Carson Pass. The river then flows northward through a series of meadows and lakes until it reaches an 800-foot glacial step over, where it enters the head of Christmas Valley. The river flows through Christmas Valley until it is met by Angora Creek, downstream of the present-day Lake Tahoe Golf Course (LTGC). The UTR continues to flow northward through Sunset Ranch, the Lake Tahoe Airport, and to the eastern side of the Tahoe Keys through Cove East where it drains to Lake Tahoe.

The Trout Creek Watershed is the second largest watershed in the Lake Tahoe Basin (it occupies 13 percent of the total land area draining to Lake Tahoe) and is located within the City of South Lake Tahoe and El Dorado County. The area of the watershed is 41.3 square miles and contains several second order streams including Saxton Creek, Cold Creek, and Heavenly Valley Creek. Although Euro-American presence in the Upper Truckee and Trout Creek watersheds created a myriad of relic resource issues related to heavy logging and cattle grazing; more recent impacts (within the last 50 to 60 years) associated with concentrated urban development and recreational activities.

Today, restoration of degraded environmental conditions is paramount in these two watersheds. Much of the efforts have focused on re-connecting stream channels to their historic flood plains as well as capturing storm water runoff from the central Highway 50 corridor. In addition, fuel-reduction activities and habitat restoration have also been a major focus of the urban/wild land interface.

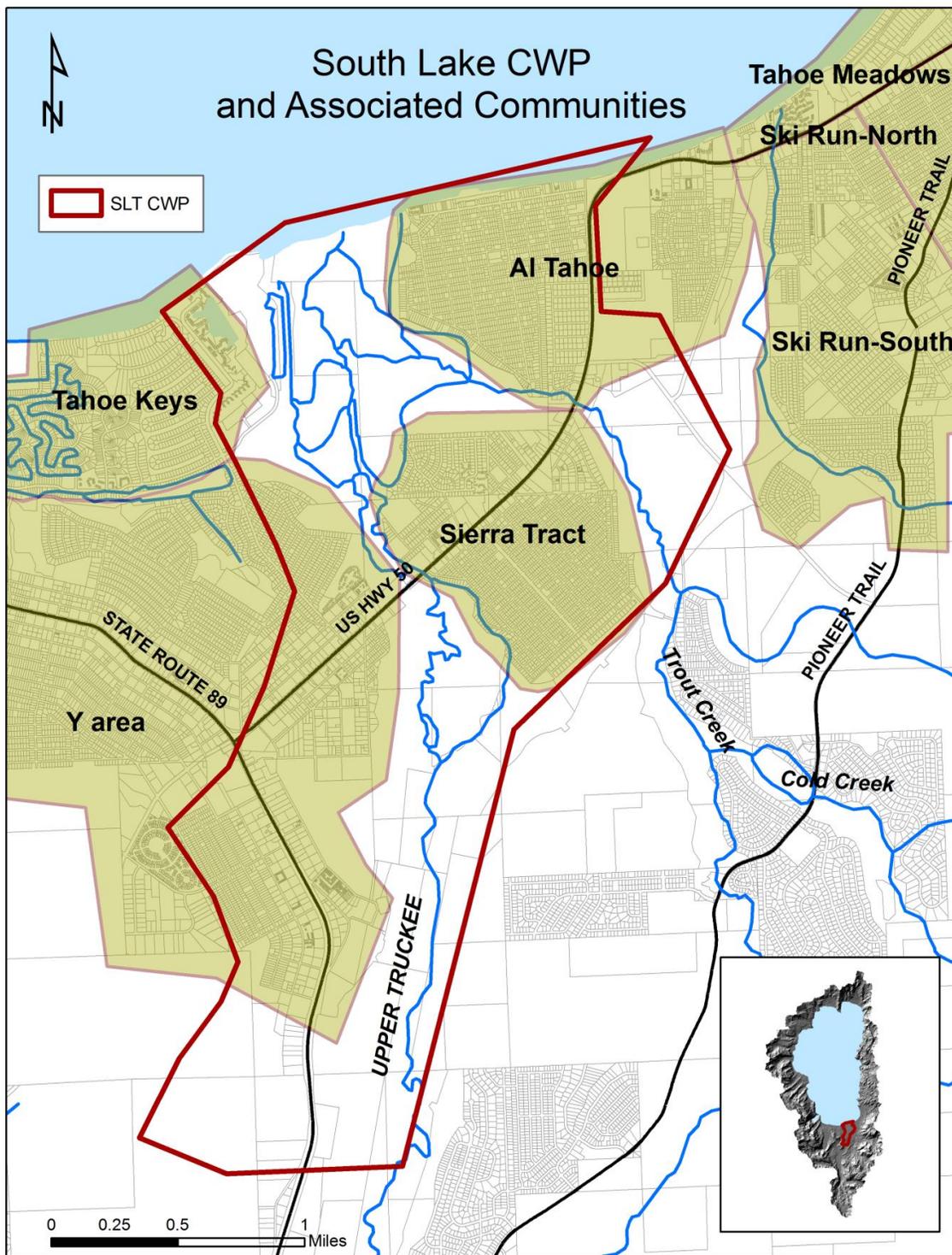


Figure 2: South Lake CWP and Associated Communities

Kings Beach

The Kings Beach CWP Area covers 12.5 square miles and includes the residential areas of Brockway, Kings Beach, and Tahoe Vista (Figure 3). The Kings Beach Watershed is jointly located in the North Eastern portion of Placer County. It contains the subwatersheds of Kings Beach (2.9 square miles), Griff Creek (4.4 square miles), and Tahoe Vista (1.4 square miles). The total drainage area of the watershed is 8.8 square miles.

Griff Creek is approximately 6.4 kilometers long with headwaters west of Martis Peak at 8,742 feet of elevation, and Snow Creek is approximately 5.4 kilometers long with headwaters near Brockway summit at 7,199 feet elevation. The southern portion of the watershed is dominated by privately owned residential and commercial properties, whereas the northern portion is primarily forested area owned and managed by the US Forest Service Lake Tahoe Basin Management Unit.

The Kings Beach area was heavily logged and in the early 1860's, to supply lumber for the silver mines in Virginia City, Nevada and the surrounding areas. Restoration activities are focused on stream and meadow restoration as well as associated impacts related to more recent concentrated urban development and recreational activities.

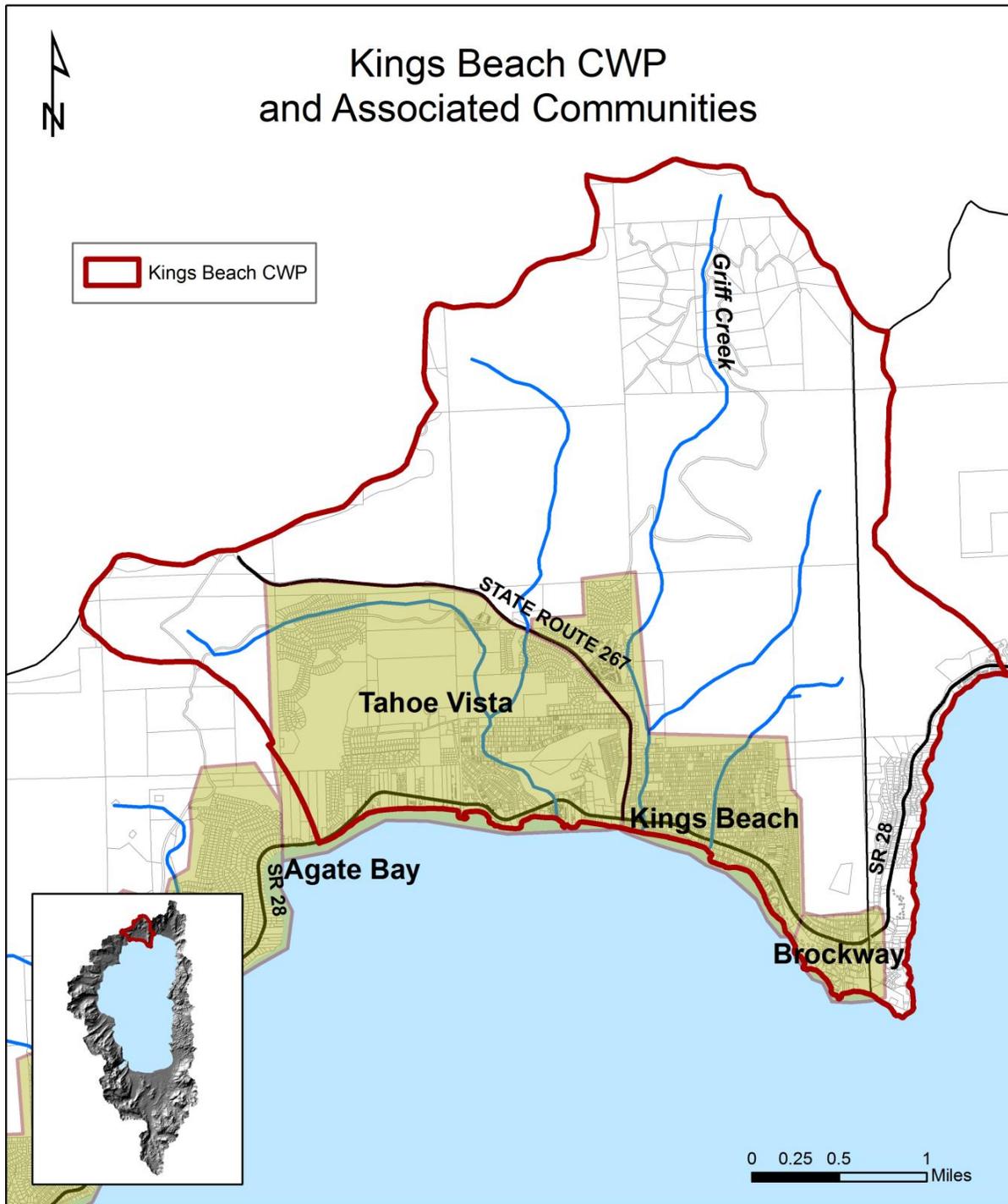


Figure 3: Kings Beach CWP and Associated Communities

Goals

The goals of Community Watershed Partnership were to interact with the community, discover the challenges they face in their watershed, and work with them as well as other stakeholders to come up with solutions. The first step in the process was to interact with the community and solicit feedback from them.

Stakeholder and Community Outreach

Outreach has been an important aspect of involving the residents of the Tahoe Basin, and more specifically the CWP areas. Many different strategies were employed to create awareness and participation in CWP, including:

- Direct mail to targeted areas
- Local newspaper advertising
- Local radio talk shows and advertising
- Cable television interviews
- Online promotion, including website, interactive blog and social media (Facebook & Twitter)
- Neighborhood canvassing by Tahoe RCD staff
- Neighborhood events, including a block party and public forum
- Surveys (online, paper form and informal discussions)
- Community events
- Shared messaging with Lake Tahoe Master Gardeners

The CWP is a new type of conservation initiative in the Tahoe Basin, strategies were employed based on trial and error and availability of resources, including staff time and programmatic funding. The CWP outreach brochure and flier is attached in Appendix A. A brief description and assessment of each of these strategies is included below:

- ***Direct mail to targeted areas***

Direct mail can be an effective way to reach targeted residents, but it is also one of the most costly outreach alternatives. During this reporting period, direct mail from Tahoe RCD was limited to residences who received a BMP plan based on physical characteristics of their property.

In addition to direct mail, Tahoe RCD was able to reach CWP target areas through the contribution of newsletter articles, and bill inserts joint mailers by TRPA. Newsletter

contributions included: “Tahoe in Depth,” the TRPA quarterly newsletter, regarding demonstration gardens, and “The Keys Breeze”, on Conservation Landscaping programs and events, and North Tahoe PUD to promote cost free BMP and Conservation Landscaping Assistance in the Kings Beach community. Tahoe RCD was able to promote the Sustainable Landscaping workshops and Conservation Landscaping technical assistance in the South Tahoe PUD bill insert. Finally, cost free BMP services were offered to selected homeowners in Al Tahoe Community within a TRPA BMP accelerated implementation certified letter.

- ***Local newspaper advertising***

Newspaper advertising proved to be valuable in attracting community members to neighborhood events. According to surveys and informal contact with the community, many members of the South Lake Tahoe community get the majority of their news from local publications, such as the Tahoe Daily Tribune and the Tahoe Mountain News, both of which were used to advertise community events.

- ***Local radio talk shows and advertising***

After performing media research, Tahoe RCD utilized paid and free airtime on KTHO FM radio; the highest rated serving the Lake Tahoe Basin. Staff also appeared on several “morning show” programs to explain CWP to the community. Some forum participants mentioned hearing ads promoting CWP and the forum event.

- ***Cable television interviews***

Staff appeared on “Tahoe Today,” a talk television show on Lake Tahoe Television (Outside TV), available to all cable subscribers in the Lake Tahoe area.

- ***Online promotion, including website, interactive blog and social media***

The website “OurTahoeWatershed.org” was launched in the spring, and was updated continuously throughout the summer, and also promoted on Tahoe RCD social media outlets, such as Facebook and Twitter. The blog was launched as an interactive way to respond to forum comments, online users and community concerns. It is fast becoming an effective way to update the public on ongoing issues, such as cleanup projects, recreation questions and watershed health issues.

- ***Neighborhood canvassing by Tahoe RCD***

In 2013, Tahoe RCD went door to door in the Kings Beach Community offering free BMP technical assistance including BMP evaluations, BMP final inspections, and landscape conservation consultations. During this effort, approximately 125 properties were contacted by leaving a door hanger offering this limited time offer and approximately 20

residents were present during this effort allowing staff to fully explain the program and available services. The information on the door hangers was in both English and Spanish to increase outreach to the large Spanish speaking population that resides within the Tahoe basin. Approximately **32** properties received BMP evaluations from this effort.

- ***Surveys (online, paper form and informal discussions)***

Within CWP target areas, surveys were implemented by Tahoe RCD staff in summer and early fall of 2012 to gain a greater understanding of community identified issues, to solicit community feedback and to help with future CWP planning. Residents and second homeowners of the Tahoe Basin were targeted via CWP neighborhood BBQ events, local farmers' markets, and additional partner outreach events throughout the North Shore and South Shore communities on the California side of the Basin. Surveys were administered hardcopy, online and via smartphone, with a total of 84 participants. The primary focus of these surveys is to identify the environmental priorities of Lake Tahoe residents (Figure 4 & 5) while developing a better understanding of our community's preference of stewardship activity engagement (Figure 6). The Tahoe RCD is specifically interested in the public's level of knowledge and interest in our programs, as well as the level at which residents will fund and or participate in stewardship events. Survey results also allow the Tahoe RCD to discern differences between the North, South and West Shore communities. Complete survey results are included in Appendix B.

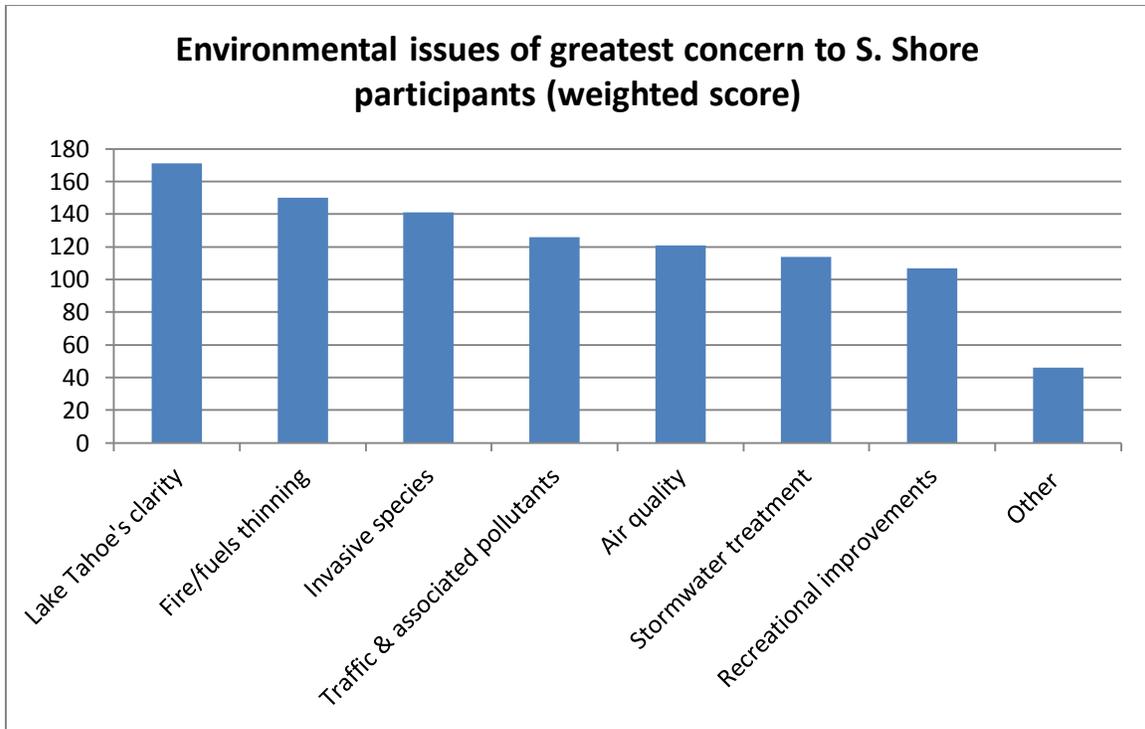


Figure 4: CWP community environmental priorities (South Shore)

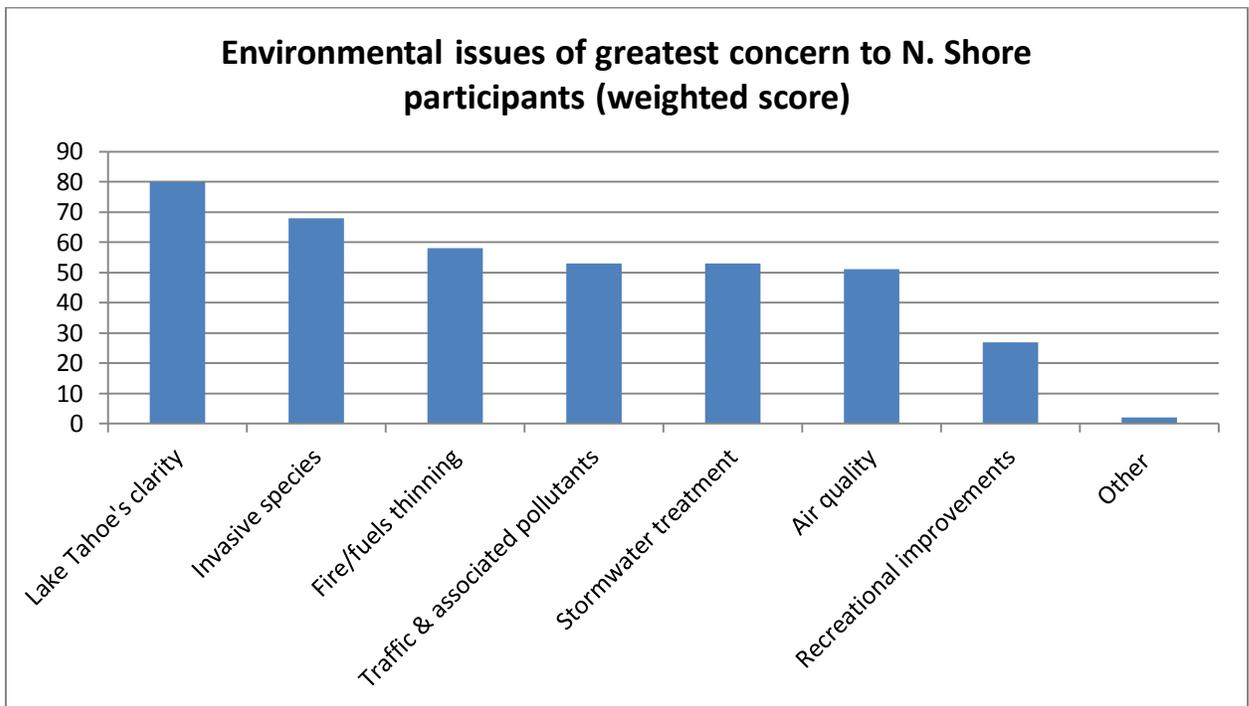


Figure 5: CWP community environmental priorities (North Shore)

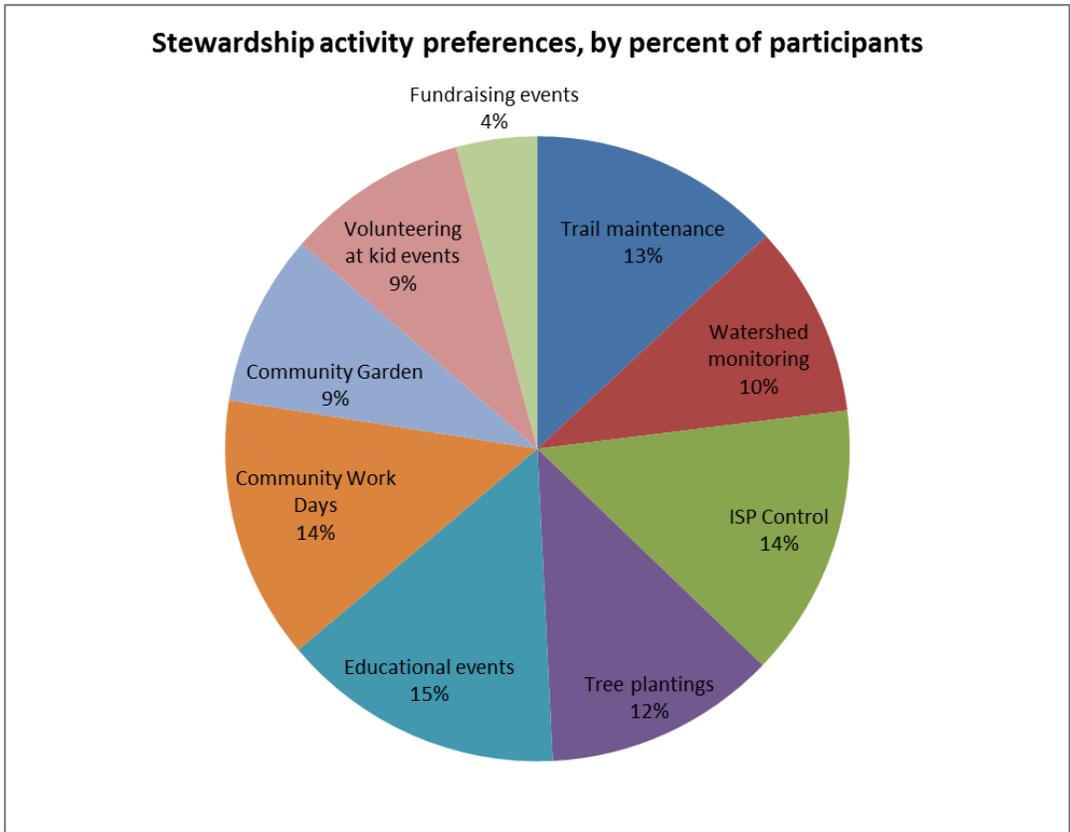


Figure 6: CWP community stewardship activities by preference.

Community Events

Through the participation in established and popular community events, Tahoe RCD was able to conduct outreach in the community with minimal staff commitment and advertising expense. Tahoe RCD was able to provide outreach materials and answer questions related to community environmental projects, conservation landscaping and BMP topics at the following events: Tahoe Truckee and South Shore Earth Day, Autumn Festival, Live at Lakeview free concert series, Farmers Market, Wildfire Awareness Week, Native Species Festival, Lake Tahoe Home and Garden Show and Keep Tahoe Blue’s Summer Kick-off. At these events Tahoe RCD had the opportunity to interact with hundreds of homeowners by sharing conservation landscaping principles and practices.

Community Forums and Workshops

Based on attendance records, attracting community members to attend neighborhood CWP forums proved challenging; therefore, the Tahoe RCD started to look at ways that we could

participate in activities that already had some momentum such as larger public gatherings or events instead of being the sole host and event coordinator. Over the course of this grant, the Tahoe RCD began to look for alternate ways to reach the CWP community. A summary of Tahoe RCD efforts follow:

- ***Community Watershed Partnership Forums: June 27 and June 28, 2012***

Tahoe RCD hosted the Upper Truckee Meadows and the Kings Beach CWP forums to gain community input regarding conservation issues within the target communities and invite partner agencies to distribute information on local environmental projects within these watershed areas. Approximately **45** people were in attendance at the combined events. Here interactive exhibits, presentations and local agency



presence provided educational opportunities, shared project information, addressed specific EIP questions, and collected community feedback on environmental issues of interest. Agencies and environmental groups invited to participate in the events included: California Tahoe Conservancy, City of South Lake Tahoe, Tahoe Regional Planning Agency, US Forest Service, Explore Tahoe, UC Cooperative Extension, South Tahoe PUD, North Tahoe PUD, Placer County, North Tahoe FD, Tahoe Environmental Research Center, Sierra Watershed Education Partnerships, and Truckee Aquatic Invasive Species Program.

- ***Neighborhood Service Team Meeting: April 25, 2013***

The Tahoe RCD participated in the Neighborhood Service Team meeting which included the AI Tahoe community. **Thirty-two** community members participated in the meeting. With community input and facilitation provided by the City of South Lake Tahoe, community members evaluated multiple community project options and selected a BMP demonstration project. The City of South Lake Tahoe will contribute to the project by providing community coordination, construction materials, and other support as needed. The goal is to implement one residential demonstration project within 2014 through complementary funding sources.

- ***Shared messaging with UCCE Lake Tahoe Master Gardeners***

Tahoe RCD coordinated with Lake Tahoe Master Gardener Volunteers to receive and respond to landscape related queries including firewise and waterwise landscaping,

invasive weeds, native plants and erosion control via a question line, email and office hours at the Tahoe RCD, and regular staffing at public events. The Lake Tahoe Master Gardener office is located within Tahoe RCD where programmatic materials and supplies are shared for the sometimes joint implementation of landscape conservation programs, outreach materials and events. In 2013, through a partnership with the Tahoe RCD, volunteer Lake Tahoe Master Gardeners reached **1377** community members including: 980 at workshops, 272 at events, 62 via work with school gardens, 63 in other ways (e.g. office visits).

Through this partnership, Tahoe RCD staff was able to provide three-60 minute presentations as part of the Lake Tahoe Master Gardener Green Thumb Gardening series. Presentations included *BMPs for Single Family Homes* and *Irrigation Efficiency* on August 5th, 12th and 13th in South Lake Tahoe and Tahoe City. The presentations provided information and resources on the integration of vegetation into BMPs, proper selection of plant species based upon property site analysis, and water efficient landscaping practices and technology.

Activities

Landscape Conservation

Encouraging Lake Tahoe residences to practice stewardship of Lake Tahoe's natural resources through participating in Landscape Conservation consultations proved to be an effective outreach tool for the Tahoe RCD. These consultations provide a unique opportunity for the private property owners to invite Tahoe RCD staff onto their property in order to discuss conservation issues and environmental stewardship. As part of this service the Tahoe RCD provided free landscape supplies of native plants and wildflower seed. Over **300** native plants were issued to homeowners and for habitat and restoration projects within the Tahoe basin through this program.

Landscape Conservation technical assistance was provided to **208** property owners through this funding. Here, one-on-one assistance was provided on-site by Master Gardeners trained to address various problems and questions surrounding integrated landscaping techniques and practices. These topics included: identifying and managing invasive weeds, restoring compacted and nutrient poor soil areas for re-establishment of native species, integrating defensible space with water quality BMPs, slope stabilization, water conservation, sustainable turf care, turf conversion and forest health. Resources and information was provided during the on-site consultation and follow-up information was included in a standardized follow-up letter.

Tahoe RCD staff also distributed information and resources on Tahoe specific backyard conservation topics during site visits, enclosed within BMP plan and technical assistance mailers, and in person during site visits, office hours, at events and workshops and through the distribution of Home Landscaping guides at Realtor offices, plant nursery and building supply retailers.

Distributed resources include:

Tahoe RCD, NRCS Backyard Conservation, University of Nevada Cooperative Extension (UNCE) fact sheets and publications, and other publications on the topics of natural resource protection associated with landscaping practices (fertilizer use, water-wise landscaping, sustainable turf care, landscaping for erosion control, invasive weeds, defensible space, plants for the Lake Tahoe Basin and approximately **640** Home Landscaping Guides for the Lake Tahoe Basin and Vicinity).

Workshops and events include:

- ***Sustainable Landscaping Workshops: June 5, July 16, Aug. 20, and Aug. 27, 2013***

Through discussions with private property owners the Tahoe RCD learned that the rising cost of water is of high concern to community residences; specifically those residents who now have water consumption meters versus those paying for a flat consumption rate. In 2012, proper yard fertilization and irrigation in the Lake Tahoe Basin was identified as a priority issue by local agencies to help control pollutant runoff from commercial and residential properties and a collaborative fertilizer and irrigation working group has been established to address Basin needs and to share resources, messaging and funding opportunities.



Through a partnership with South Tahoe PUD, Tahoe RCD and Lake Tahoe Master Gardeners organized four Sustainable Landscaping workshops which served as forums in the in the 2013 CWP target areas: South Lake Tahoe HWY 50 corridor and Kings Beach. These forums were offered in response to the demand for information on how to reduce water use in the landscape while maintaining landscape esthetics, defensible space and erosion control measures.

These 2-hour workshops were packed with helpful resources and included easy to apply information for local homeowners and businesses. The transport of pollutants to Lake Tahoe through the modification of landscape practices such as irrigation, turf maintenance, turf conversion, landscape design and fertilizer management was presented by Tahoe RCD, South Tahoe PUD and Lake Tahoe Master Gardeners. Total workshop attendance was **58** people.

Participants were surveyed to gain an understanding of pre-workshop landscape practices. The survey results showed that less than 50% of workshops participants had turf and about 80% of people were in need of information pertaining to fertilizer and irrigation management. Additionally, approximately 80% of participants showed little knowledge regarding soil condition and its relationships to healthy landscapes and erosion. Survey

results also indicated that participants left with a better understanding of proper fertilizer and irrigation management and how these practices affect pollutant runoff to Lake Tahoe.

- ***Conservation Landscape Tour: August 11, 2013***



The 2013 Conservation Landscape Tour was planned in partnership with South Tahoe PUD and Lake Tahoe Master Gardeners for the Tahoe Keys Community to increase awareness of sustainable landscaping and gardening practices in the CWP target area. The annual Tour provides the Tahoe gardener and homeowner inspiration and education for creating water wise and synthetic fertilizer free landscapes featuring native and Tahoe-adapted plants. This event specifically featured properties in the Tahoe Keys community that had undergone turf conversion projects with incentives provided by South Tahoe PUD's Turf Buy-Back program and District's Landscape Conservation consultation services. The Tahoe Keys community area was highlighted in this tour due to its proximity to the shore zone and the associated amount of pollutants that enter the Tahoe Keys waterways in the form of lawn fertilizer.

The self-guided program invited the community to share first hand experiences with the homeowners and ask questions from resource professionals and volunteers from the District, South Tahoe PUD, TRPA, Lake Tahoe Master Gardeners and ACE AmeriCorps. During the tour, event participants were invited to attend 20 minute educational presentations and enjoy refreshments provided by the Tahoe Keys Property Owners Association. Presentation titles included: *Fertilizing for Green Grass and Tahoe Blue, Tahoe Keys Aquatic Invasive Species Management Program, Water wise Landscaping, Sprinkler or Shower - Water Efficient Irrigation, Happy Soil = Happy Plants* and *Extending the growing season permaculture style*.

- ***BMP Contractors Workshop: April 20, 2012 and April 26, 2013***

The BMP partners hosted an annual workshop to teach contractors how to install small scale BMP projects and utilize the resources and tools available to them through the BMP retrofit process. Successful workshop participants were then placed on an annual BMP Service Providers list. Both years, Tahoe RCD staff contributed to the workshop by offering a series of 30 minute presentation which provided information and resources regarding the integration of vegetation into BMPs and properly selecting plant species based upon property site analysis in addition to general workshop support to support speakers and answer participant questions. Other topics presented at the workshop included: how to use the new TRPA BMP online handbook, how to interpret a BMP plan, how to pass a final inspection, how to avoid costly errors, seasonal high ground water, fertilizer and irrigation management, and BMP maintenance and pre-treatment.

- ***Tahoe Basin Watershed Education Summit***

During the summer of 2012, Tahoe RCD staff executed the first ever Tahoe Basin Watershed Education Summit (TBWES); a three day event that included High Schools from around the Tahoe Basin, and included kids from the City of South Lake Tahoe and Kings Beach communities. TBWES is a new program in the Lake Tahoe Basin creating teams of high school students, teachers, and resource specialists for an extensive watershed assessment in Blackwood Canyon (a secondary TMDL). The data collected by students during the program will assist the US Forest Service with evaluating restoration efforts performed in the area.

Through the Tahoe Basin Watershed Education Summit, students were involved in an integrated experience combining community service, academic achievement, environmental stewardship, and career exploration. They examined vegetation, soil, runoff characteristics and water quality effects of past and present human use in the watershed, and learned how BMPs can improve natural function. The students achieved all this primarily through making geomorphic observations of stream channel characteristics or stream cross sections throughout the watershed. Additionally students surveyed, mapped, and removed terrestrial invasive weeds and learned about bird mist netting at select sites in the project area.

Photo gallery is at - <http://andygiordano.photoshelter.com/gallery/TBWES-2012/G0000NyODE1dY4ys/>

- ***Demonstration Gardens***

The Tahoe RCD is an active partner in four different demonstration gardens: Tahoe City Historic Fish Hatchery, Lake Tahoe Demonstration Garden at Lake Tahoe Community College and the Evans Family Garden in the Angora Community. At these gardens community members and visitors can come learn, enjoy and contribute to our beautiful Lake Tahoe gardens. The gardens illustrate successful, environmentally-friendly landscaping techniques and provide a venue for community inspiration and education.



The Tahoe RCD hosts community service learning events several times a year on any of the gardens. The Tahoe RCD contributed a Demonstration Garden focused article to TRPA’s quarterly newsletter and facilitated over **20** community service volunteer events. At the gardens, the Tahoe RCD presented 7 green thumb gardening classes and coordinated 8 presentations with the Lake Tahoe Master Gardeners.

Results

Outlined below are specific actions the Tahoe RCD implemented to meet CWP Program objectives. These actions include a variety of community strategies because the CWP approach is a fairly new concept. The information presented below is organized by four primary strategies used by the Tahoe RCD: 1) Private Parcel Technical Assistance services, 2) Stakeholder and Community Outreach, 3) Community Workshops and Forums, and 4) Community Science and Stewardship.

Private Parcel Technical Assistance

In alliance with NRCS and the TRPA, the Tahoe RCD accomplished measurable efficiency and overall effectiveness in the implementation of water quality BMPs. This success was attributed to the use of streamlined BMP plans, increased outreach efforts, workshops, and incentive programs which offer free BMP evaluations and technical assistance to encourage homeowners to install BMPs.

BMP technical assistance offered by Tahoe RCD staff includes BMP final inspections, BMP site evaluation plans, BMP system sizing, BMP progress checks consultations explaining TRPA's ordinance, soil tests, turf conversion, landscaping for defensible space, invasive weed, irrigation and fertilizer management and issuing native plants and conservation materials.

BMP Assistance

According to the Chapter 60.4 of TRPA's Code of Ordinances, all homeowners in the Tahoe basin are required to install storm water BMPs on their property to infiltrate storm water and stop fine sediment particles (<16µm) from reaching the lake and degrading Lake Tahoe's famed clarity. Tahoe RCD staff provides BMP assistance to single family homeowners and contractors in California to help homeowners come into compliance with this ordinance. Photos of common storm water BMPs are shown below.



Driveway runoff conveyed by slotted channel drain to infiltration system (left) erosion control under deck (right).

Program efficiencies made meeting the minimum required deliverable for 233 BMP plans and 266 BMP technical assistance events possible. Under this grant, **526** unique private properties received BMP assistance.

For reporting purposes, BMP assistance is categorized as a BMP plan or BMP technical assistance. A BMP plan is a complete site specific design that once implemented and inspected for completion, results in a TRPA BMP Certificate. A BMP technical assistance is typically defined as an event where Tahoe RCD staff conducts a site visit to contribute to the overall BMP design or implementation of the design through soil testing, site analysis, infiltration system sizing, revegetation guidance, or BMP installation final inspection. When BMP technical assistance is provided at a property that is also receiving or has received a BMP plan or other form of BMP assistance, that assistance event is not represented as a required deliverable. Documenting deliverables in this manner represents the actual number of private properties assisted instead of the number of times assistance was provided.

Offering cost free BMP assistance and direct outreach in the CWP areas assisted the District in reaching the required deliverables. Of the **526** properties assisted, **66** resulted in BMP Certificates while only 3 of those certificates were the installation results of BMP plans developed during the same grant reporting period. When a property is BMP certified and the BMPs are maintained for function, it is assumed that sediment and/or runoff no longer leaves the property. Through utilization of the NRCS BMP Calculation Spreadsheet, soil erosion savings can be estimated for the 66 properties certified for BMPs. If the average impervious surface of each property is 2,070 square feet, an estimated 1,657 pounds of sediment will be kept from polluting Lake Tahoe waterways each year. A summary of technical services is included in Appendix C and D. A summary table of the project deliverables can be seen in Figure 7.

| Project Deliverables Summary | Total Service Provided (#) | Minimum Service Required (#) | Service within CWP Area (#) | Service within CWP Area (%) |
|-------------------------------------|--|-------------------------------------|------------------------------------|------------------------------------|
| BMP Plans | 235 | 233 | 157 | 67% |
| BMP Technical Assistance | 291 (66 technical assists resulted in BMP certificates) | 266 | 118 | 41% |

Figure 7: Summary Table of Project Deliverables

Aside from the incentive of offering free BMP assistance to homeowners in the CWP areas, meeting required deliverables was augmented through focused TRPA’s BMP outreach to non-BMP compliant properties and the District’s BMP outreach to select properties exhibiting signs of seasonal high groundwater. Twenty-three of the 235 BMP plans were delivered in the Al Tahoe Community in South Lake Tahoe through collaboration with TRPA. The properties were selected because they were determined to contribute higher than average loading of fine sediments and other pollutants to local water bodies. An additional 37 of the 235 BMP plans were delivered to properties identified by NRCS and Tahoe RCD as site constrained through vegetative indicators of high groundwater. These properties are constrained for stormwater infiltration systems to avoid potential groundwater contamination. BMP recommendations for these sites typically do not require site specific BMP design and BMP recommendations are limited to source control methods such as erosion control through slope stabilization, driveway paving, and soil protection with rock, organic mulch and vegetation. The *Wet Soil BMP Plan* template is attached in Appendix E.

Community Science and Stewardship Activities

A major component of the Community Watershed Partnership is fostering a sense of community and forging a connection to our watersheds, which Tahoe RCD has promoted through its community science and stewardship activities. Community science projects promote awareness of the environment, engage community members in the scientific process, and help educate the public about ongoing environmental issues all while collecting real data. Community stewardship activities were a great opportunity for community bonding while providing environmental education and conservation. Activities performed under this grant follow.

- ***Soils Investigation for Storm water Infiltration: June 2012***



A soils assessment focusing on suitability of public lands for storm water infiltration was conducted within the South –“Y” and Sierra Tract neighborhoods located within the South Lake Tahoe CWP area. The NRCS lead this effort to assist the Tahoe RCD with this project providing leadership and technical assistance. This project was achieved utilizing GIS map layers to find possible sites, testing soil infiltration rates, depth to seasonal high groundwater and fragipan, and a vegetative assessment. The project goal was to contribute data to an inventory that will allow for detailed site-specific soils information for NRCS, City of South Lake Tahoe and other public agencies looking for stormwater treatment opportunities. Tahoe RCD, NRCS and Tahoe Baikal Institute instituted this week long project. The project report is included in Appendix F.

- ***Streamkeepers***

Tahoe RCD staff led an effort to engage community volunteers and local agency staff from the California Tahoe Conservancy, and California Trout to execute two separate South Lake Tahoe Streamkeepers Citizen Monitoring Events. Streamkeepers was developed in attempt to better educate and engage community members of South Lake Tahoe in the monitoring of their local watersheds through a series of annually reoccurring volunteer monitoring events. The mission of the Streamkeepers Monitoring Group is to promote community stewardship through education, collaboration, and action. A total of **10** volunteers and **4** Tahoe RCD staff members monitored water quality, macro invertebrates, stream bank stability, substrate classification, habitat value, and bank cover in three monitoring reaches along Trout Creek in the South Lake Tahoe CWP area (Figure 8). Three sample reaches were identified, and are shown in the map below. The full Streamkeepers monitoring report is included in Appendix G.

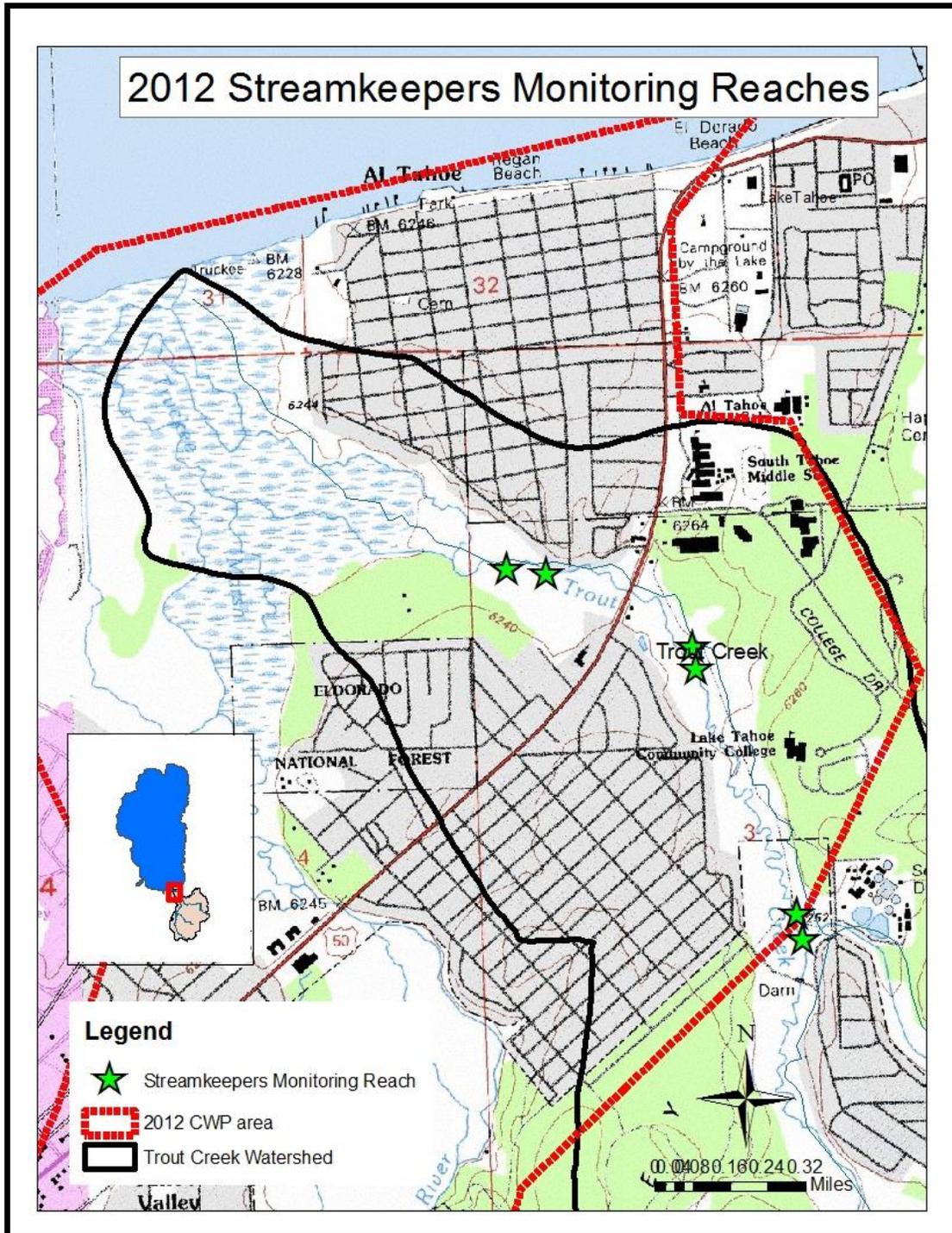


Figure 8: 2012 Streamkeepers Monitoring Reaches

- **Snapshot Day**

The Tahoe and Truckee River Snapshot day is a prime example of citizen monitoring in action. Every year, hundreds of volunteers help measure pH, temperature, dissolved oxygen, turbidity, stream flow, conductivity, total dissolved solids, fecal coliform, nutrients, nitrogen, phosphorus and visual assessments of stream throughout the Tahoe and Truckee watersheds. This year's event was held on May 12, 2013 and marked the 13th anniversary



of the event. The South Shore event was organized by Tahoe RCD in collaboration with the League to Save Lake Tahoe, the North Shore and Truckee River events were organized by Incline Village General Improvement District, Nevada Department of State lands, Truckee River Watershed Council, and the Piute Tribe. Tahoe RCD staff assisted with project planning, equipment calibration, and volunteer recruitment. Within the Tahoe and Truckee

watersheds there were a total of 390 volunteers at 90 monitoring sites (Figure 9). There were over 75 volunteers from the community and local resource agencies that participated in the water quality monitoring activities at 33 sites along the South Shore. The 13th annual Snap Shot Day for 2013 monitoring report can be found at <http://snapshotday.org/wp-content/uploads/2013/09/2013-SSD-Report-Final.pdf>

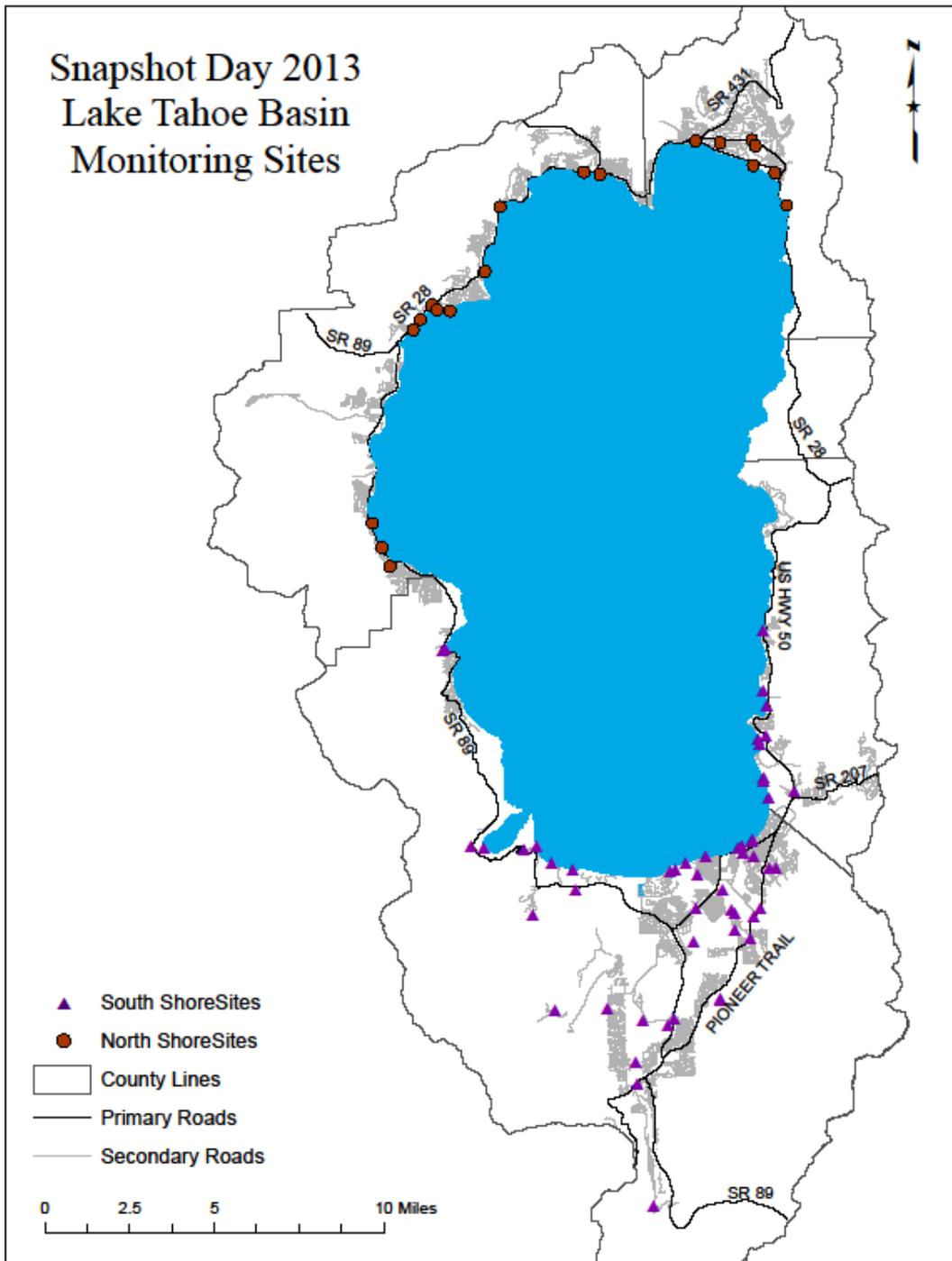


Figure 9: 2013 Snapshot Day Monitoring Sites in the Lake Tahoe Basin

- ***Community Invasive Weed Mapping and Removal***



Tahoe RCD staff led the effort to mobilize community volunteers and Tahoe Basin AmeriCorps members for identification, mapping, treatment and control of invasive plants at select urban stream environment zones of Trout Creek and the Upper Truckee River in South Lake Tahoe, CA. Two community weed pulls were executed in August and September during the summer of 2012. A total of seven community volunteers, **24** AmeriCorps members, and four TRCD staff members surveyed **255** acres within the selected locations. The group mapped **6,032** invasive weeds and treated **3,720** of them. Mapping and control data was presented to The Lake Tahoe Basin Weed Coordinating Group and the EL Dorado County Department of Agriculture for all occurrences within the Community

Watershed Partnership area selected for 2012. See Figure 10 for the mapped invasive weeds and Appendix H for a table of the survey extent, location and description of invasive species.

TRCD 2012 Invasive Plant Mapping

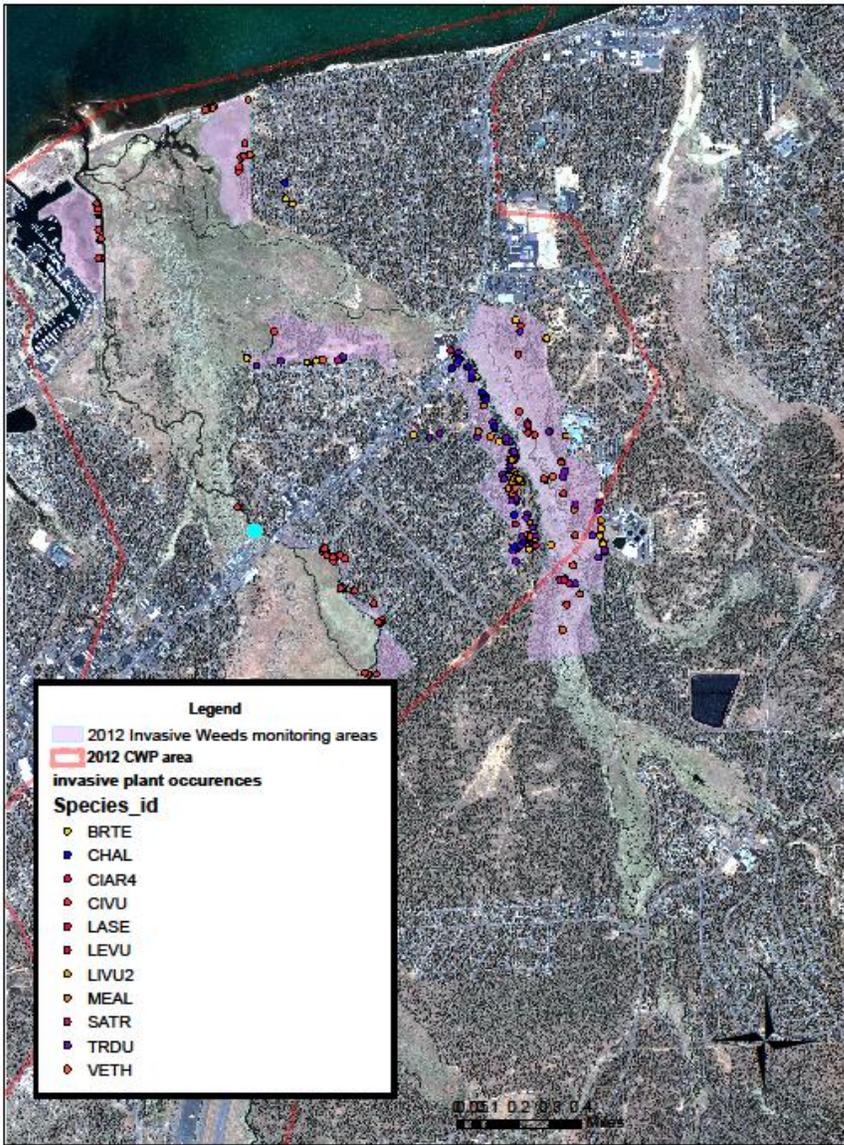


Figure 10: 2012 Tahoe RCD Invasive Plant Mapping

Project Partners and Stakeholders

The CWP initiative involves many stakeholders and partner agencies. Any given watershed area within the Tahoe Basin typically includes a variety of landowners, land managers, residents and stakeholder groups. Partners include but are not limited to:

- Local Community Members & Residents
- El Dorado and Placer Counties
- Municipalities, such as South Lake Tahoe, Kings Beach and Tahoe City
- US Forest Service
- California Tahoe Conservancy
- Local Fire Districts
- Caltrans
- Tahoe Regional Planning Agency
- Lahontan Regional Water Quality Control Board
- Local Public Utility Districts
- University of California and Nevada Cooperative Extension
- Local non-profits

Beyond BMPs, landscape conservation, and stewardship, a major focus of the CWP is to bring together agency representatives to discuss on-going or upcoming environmental restoration projects within the target watershed areas and determine cost effective methods for working across ownership and jurisdictional boundaries. Through this collaborative process the Tahoe RCD can draw upon common values, interests, and opportunities in preserving Lake Tahoe.

The CWP process also provides a forum for agency representatives to share information with local community members on the goals and expected implementation timeframes of larger scale EIP projects and how these may provide opportunities and benefits within the selected watershed areas. Outreach activities, neighborhood conservation events and interactive forums conducted within targeted watershed areas throughout the Tahoe Basin also raise awareness amongst community members and increase the understanding and support for restoration and conservation efforts.

Lessons Learned

While the implementation of conservation measures and community awareness of local environmental issues in the Tahoe Basin have seen measurable increases since the signing of this grant agreement, the established partnership is always seeking new methods of working with the community to facilitate on-the-ground conservation practices. The current decline in funding for implementation of such practices will mean that project proponents and stakeholder groups will need to continue to explore opportunities to find efficiencies, share existing resources, and reduce overall project costs related to conservation driven initiatives.

Some of the programmatic changes instituted to improve efficiencies include:

- Targeting large successful public gathering events to increase community participation
- Targeting education and outreach efforts through stewardship events
- Performing database improvements
- Simplifying BMP plans when soil conditions permit
- Providing in office technical assistance to property owners through photo documentation

The Tahoe RCD also recognizes that landscape consultations were an ideal opportunity to assist homeowners with conservation issues pertaining to their properties and their specific communities. Once on site, Tahoe RCD staff could relate landscaping practices to erosion control and storm water BMPs, invasive weeds, fertilizer and irrigation management integrating conservation practices in a way that encouraged stewardship through education. This type of technical assistance seems to resonate with community members and increased on-site technical assistance requests. Ultimately there is balance between finding program efficiencies and quality outreach to property owners.

Future Program goals include:

- Continued planning and implementation of area-wide treatment of stormwater in targeted watersheds to meet TMDL/EIP needs
- Provide natural resource technical assistance, leadership and education
- Increase community participation in landscape conservation, targeted BMP implementation, defensible space practices, invasive weeds control and fertilizer and irrigation management

In final summary, funding from this grant has allowed the Tahoe RCD to reach thousands of residents and visitors through newsletters, radio broadcast, and mailers. It enabled direct technical assistance to over 290 landowner's, over 200 BMP plans, and 66 final BMP certificates.

This work contributed to pollutant load reductions estimated at greater than 1,600 pounds of sediment per year. The Tahoe RCD also facilitated and organized several environmental stewardship events which engaged hundreds of volunteers in water quality sampling and invasive weed removal. Over 33 tributaries were monitored on the south shore of Lake Tahoe, and 255 acres of terrestrial weeds were mapped, with over 3,000 weeds manually removed by volunteers.

Appendix A: CWP Brochure and Flier

CWP is a holistic conservation initiative which partners environmental organizations and agencies with community members at the neighborhood level throughout the Lake Tahoe Basin.

BE A PART
OF YOUR
COMMUNITY

COMMUNITY
WATERSHED
PARTNERSHIP

WHERE IS CWP HAPPENING?

Community Watershed Partnerships are being developed in your neighborhood through conservation events, stewardship workdays, free resources, educational forums and watershed restoration projects in the Upper Truckee Meadows and Kings Beach Watersheds in summer/fall 2012, including the neighborhoods:

- Al Tahoe
- Y area
- Sierra Tract
- Kings Beach

LEARN MORE!
FREE RESOURCES
TO IMPROVE YOUR
HOME!

VOLUNTEER AS A
COMMUNITY LEADER!

OurTahoeWatershed.org
TahoeRCD.org
info@TahoeRCD.org
530.543.1501 x113



COMMUNITY.
CONSERVATION.
CONNECTION.

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COMMUNITY.
CONSERVATION.
CONNECTION.

COMMUNITY WATERSHED PARTNERSHIP

Kick-Off Events

Upper Truckee Meadows
hw 50 from Al Tahoe to the Y

June 27th
4:30-7:30

LTCC Demo Garden

Kings Beach
Neighborhood

June 28th
5:30-7:30

N. Tahoe Events Center

PLAY A PART IN YOUR COMMUNITY!



- Kids Activities
- Raffle Prizes
- BBQ
- Provide feedback on environmental issues
- Interactive exhibits

LEARN WHATS
HAPPENING IN
YOUR
NEIGHBORHOOD

OurTahoeWatershed.org



SOCIEDAD de CUENCA COMUNITARIA

Eventos de Lanzamiento

Prados Superiores del Truckee
carretera 50 de Al Tahoe al Y

27 de Junio
4:30-7:30

LTCC - Jardín Demostrativa

Kings Beach
vecindario

28 de Junio
5:30-7:30

N. Tahoe Centro de Eventos

JUEGUE un PARTE en su COMUNIDAD!



- Actividades para niños
- Premios de rifa
- Tacos gratis
- Dar sugerencias en temas ambientales
- Exhibiciones Interactivas

APRENDA qué
pasa en su
VECINDARIO

OurTahoeWatershed.org



Appendix B: Community Watershed Partnership 2012 Survey Results

The Lake Tahoe Community Conservation Survey was designed as a tool to help the Tahoe Resource Conservation District (Tahoe RCD) better serve neighborhoods around the Basin through the Community Watershed Partnership (CWP) program.

Surveys were conducted during the summer and early fall of 2012 at CWP neighborhood BBQ events, local farmers' markets, and additional partner outreach events throughout the North Shore and South Shore communities on the California side of the Basin. Surveys were administered hardcopy, online and via smartphone, with a total of 84 participants.

The primary focus of these surveys is to identify the environmental priorities of Lake Tahoe residents while developing a better understanding of our unique communities of interest. The Tahoe RCD is specifically interested in the public's level of knowledge and interest in our programs, as well as the level at which residents will fund and or participate in stewardship events. Survey results also allow the Tahoe RCD to discern differences between the North, South and West Shore communities. After comparing survey results, we found the following trends to be of particular interest and with the potential to inform future project planning:

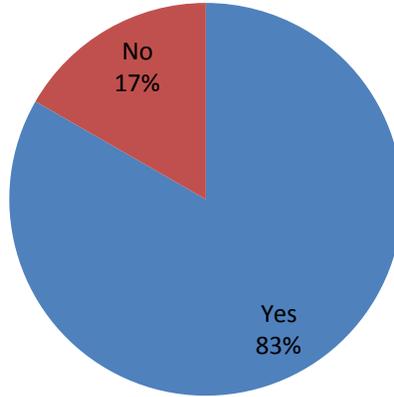
- **Public awareness of Tahoe RCD programs:** 83.3% of all surveyed participants were aware of the Tahoe RCD, with the top three most well-known programs being watercraft inspections; AIS control projects and BMP assistance. CWP was the least well-known at 27.6%. This response is not surprising in that CWP is a fairly new program for the Tahoe RCD; incorporating CWP messaging into more widely-recognized programs could be a strategy for improving community exposure.
- **Primary environmental concerns in the community:** The top ranking environmental issues were: (1st) lake clarity, (2nd) fire/fuels thinning, and (3rd) invasive species. While much of CWP tasks relate directly to lake clarity, little focus has been placed on fire concerns. There is potential to reap benefits in community engagement through CWP by addressing those concerns, perhaps by partnering more closely with the fire districts.
- **Specific community interests in supporting conservation:** By far (62.5%), those surveyed were most interested in learning more about stewardship events (trail maintenance, watershed monitoring, weed pulls, and plantings, etc.) as a way to get involved in local conservation. The top four stewardship activities of interest were: (1st) educational events, (2nd) invasive species control, (3rd) invasive species control, and (4th) trail maintenance. The second-most popular community engagement interest, at 37.5%, was contributing supplies or volunteer hours to community workdays. About 31% of those surveyed were interested in learning more about shared stormwater treatment opportunities. Generally, these results seem to suggest that direct-action community engagement activities with fairly immediate results, such as school program volunteering, weed pulls and outdoor recreation improvements, are ideal for capturing public interest.
- **Financial support for conservation:** Over a quarter (28.6%) of the participants responded that they could not afford to financially support not-for-profit causes. However, the majority of respondents acknowledged that they were willing to volunteer or offer in-kind donations for projects. Perhaps the most effective use of public support would be in accomplishing on-the-ground work with volunteer

muscle (weed pulls, school programs, watershed monitoring, etc.). Only 3 of the survey participants were business owners, making it unreasonable to draw any conclusions on best strategies for building sustainable sponsor partnerships. It may be worthwhile to develop a survey targeting that demographic specifically.

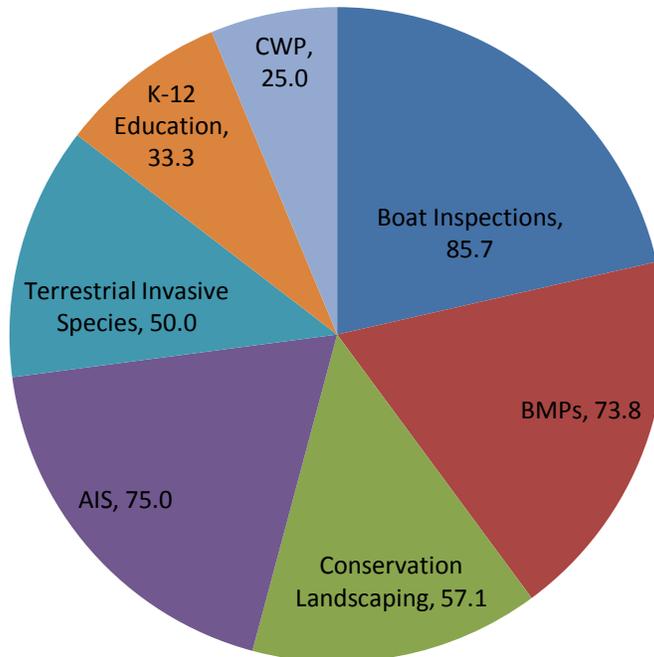
- ***Trends between the Basin communities:*** Not all those surveyed noted which Tahoe Basin community they most identified with, and some surveyed were non-residents, leaving the data set for comparing communities at 48 responses. 2 of these responses were from West Shore residents; a data set small enough that we are not considering it in this analysis. Significant differences between the North and South Shore communities included:
 - *Knowledge of Tahoe RCD:* 17% of North Shore participants were unaware of the Tahoe RCD, while only 3% in the South Shore were unaware. This would suggest an increased branding/general outreach effort may be warranted on the North Shore. Notably, BMP services and watercraft inspections were the most well-known Tahoe RCD programs in both communities.
 - *Community engagement interests:* In both communities, the greatest percentage of those surveyed were interested in stewardship events as a way to get involved in conservation efforts. However, on the North Shore, participants showed equal interest in shared stormwater treatments as in stewardship events; on the South Shore, shared stormwater treatments ranked second, below stewardship. The North Shore participants also indicated a greater interest in donating funds to conservation projects.
 - *Financial support preferences:* A far greater percentage of the South Shore participants, at 31%, indicated they could not afford to financially support non-profit causes, compared to 13% of the North Shore participants. A greater percentage of North Shore participants, at 25%, indicated a preference for supporting environmental causes, in comparison to 19% of the South Shore participants. Community causes were also ranked higher (38%) in the South Shore, than in the North Shore (25%). The North Shore community also expressed an interest in religious causes (12%), while none of the South Shore participants showed an interest in the category.

Overall Results

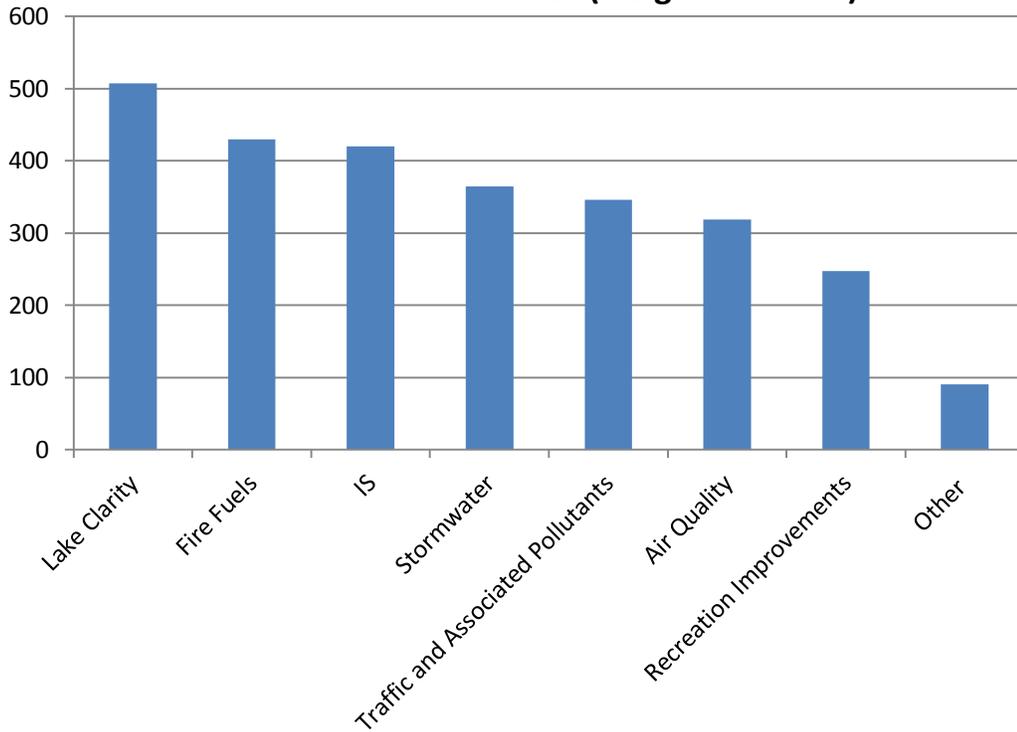
Percent of participants aware of Tahoe RCD



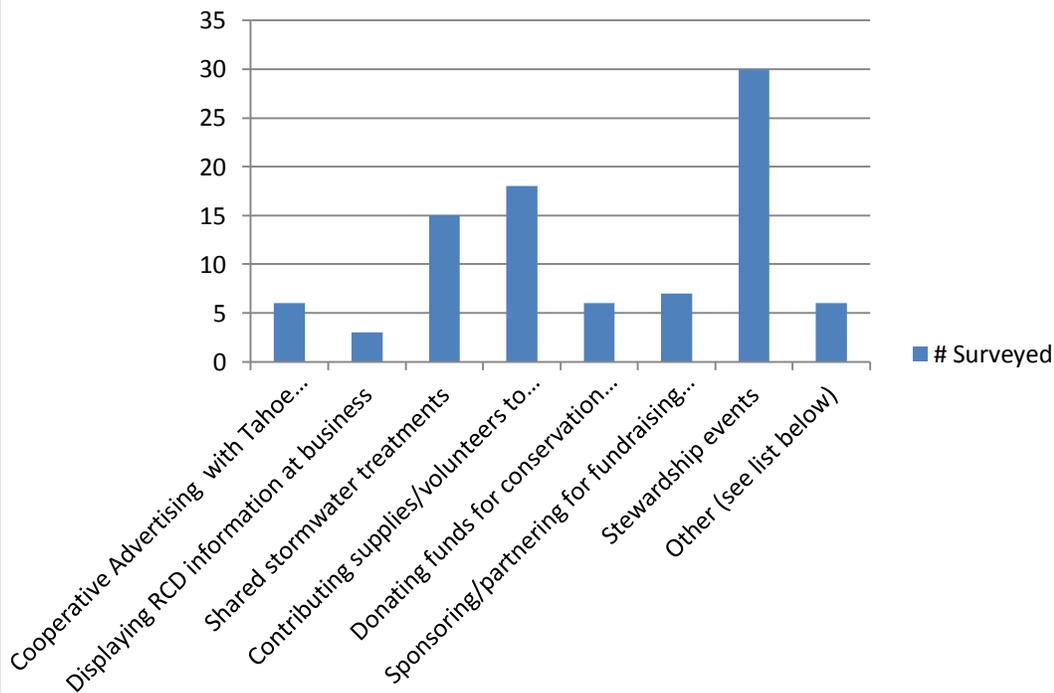
Percent of surveyed public aware of Tahoe RCD by program



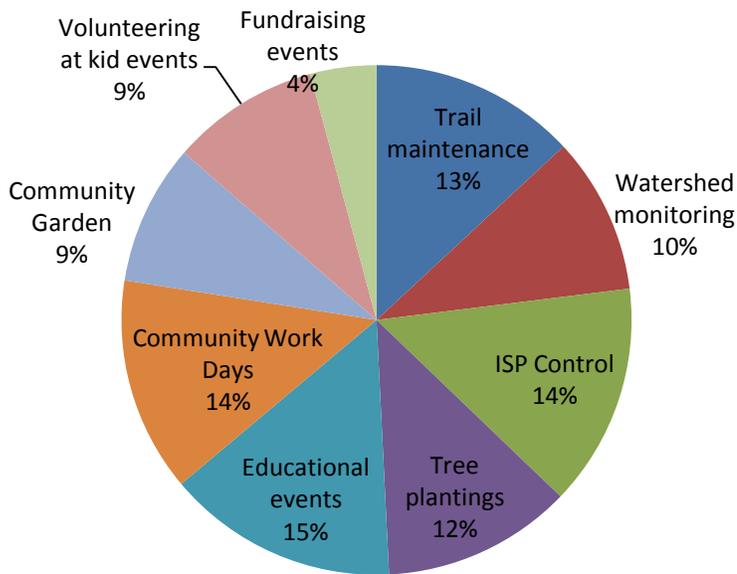
Environmental Priorities (weighted scores)



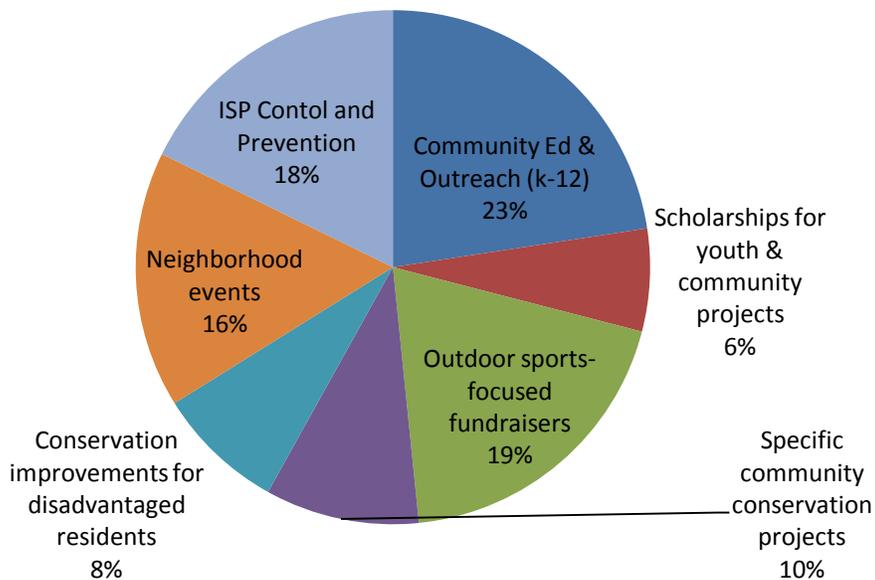
Community engagement preferences



Stewardship activity preferences, by percent of participants

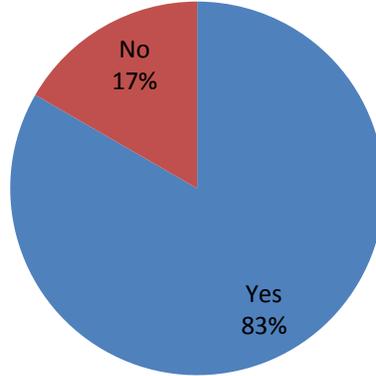


Financial support preferences, by percent of participants

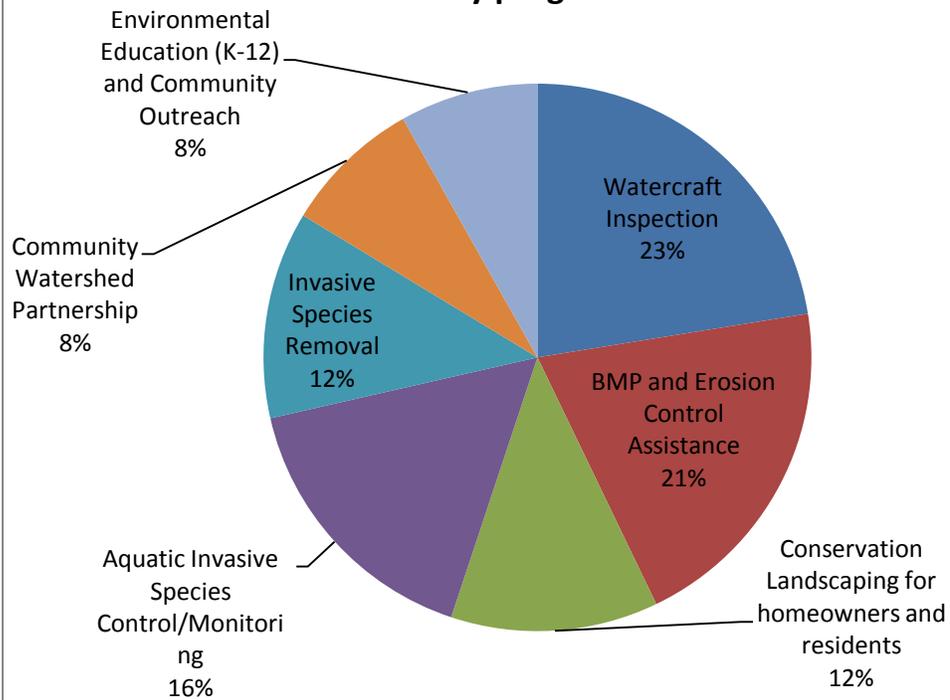


North Shore Results

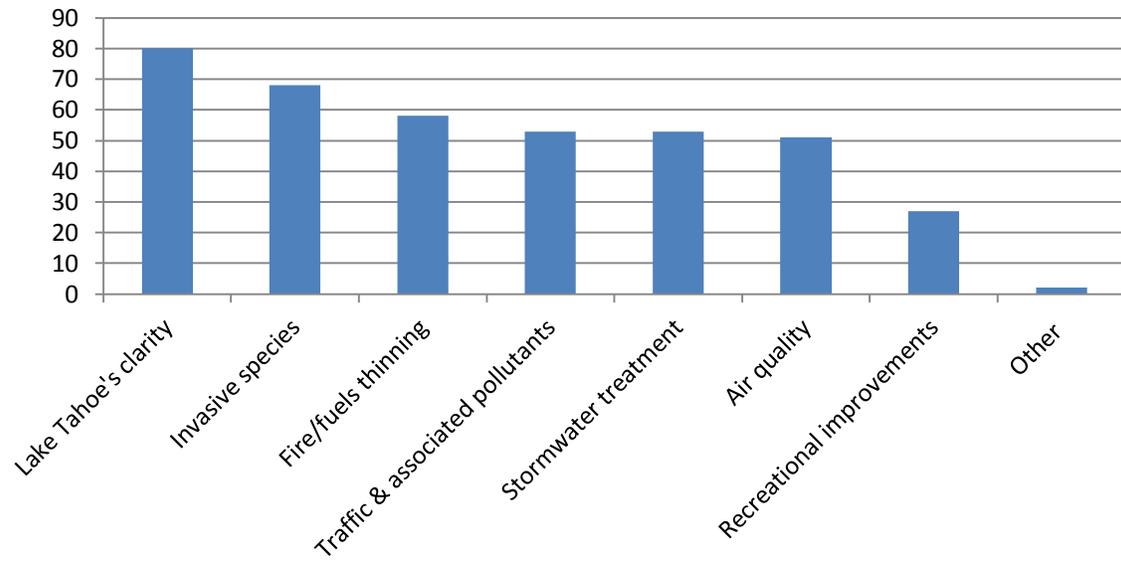
Percent of N. Shore participants aware of Tahoe RCD



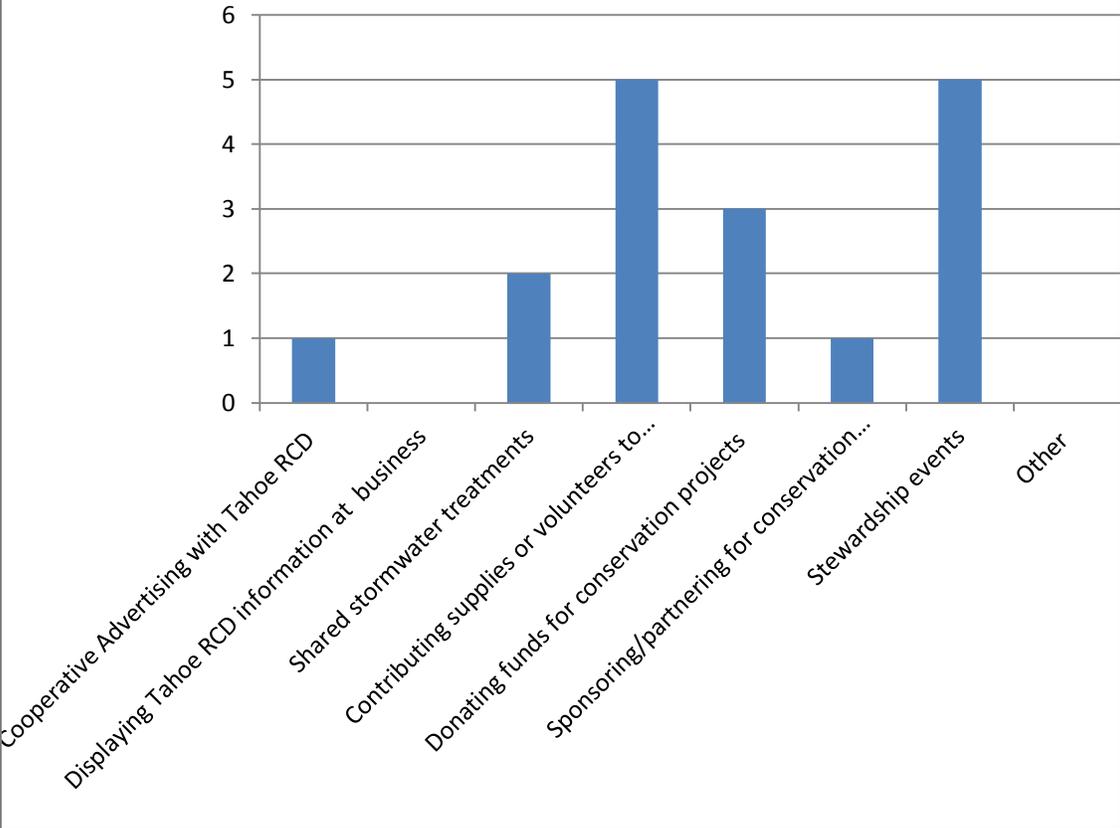
Percent of N. Shore participants aware of Tahoe RCD, by program



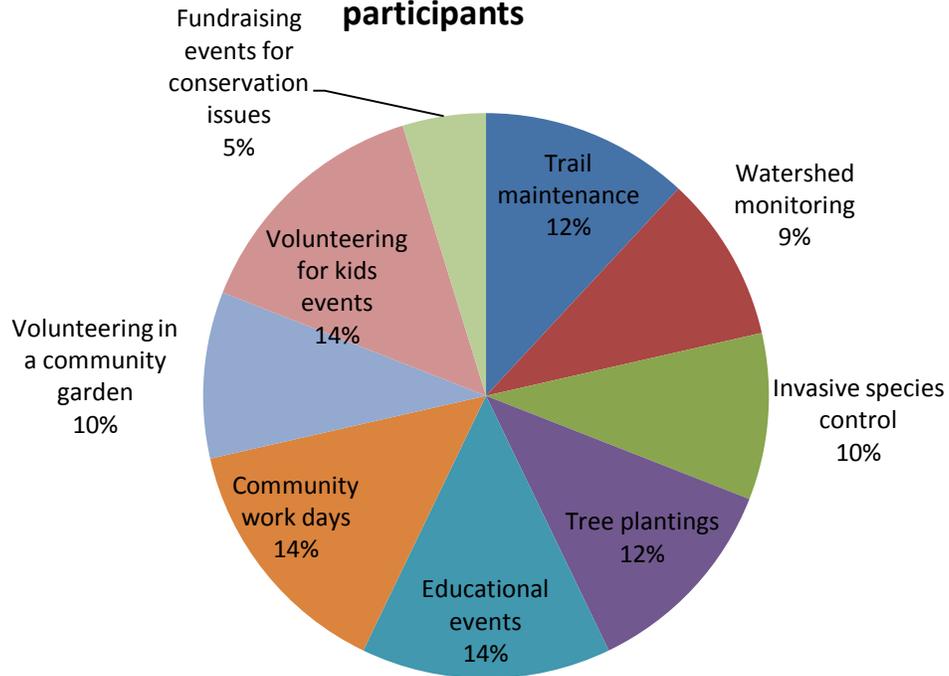
Environmental issues of greatest concern to N. Shore participants (weighted score)



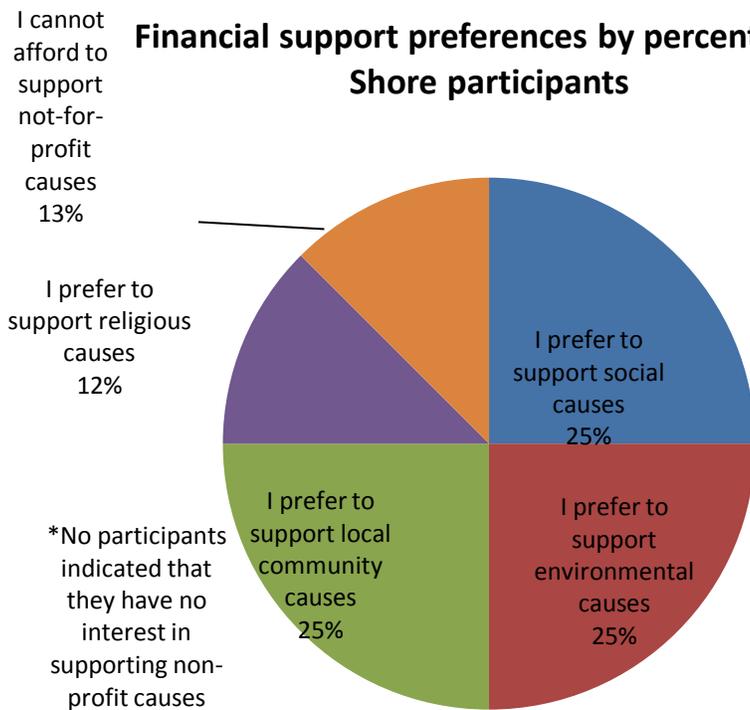
Community engagement preference on the N. Shore, by number surveyed



Stewardship interests by percent of N. Shore participants



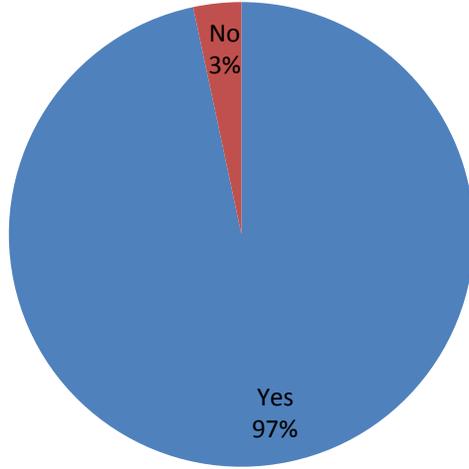
Financial support preferences by percent of N. Shore participants



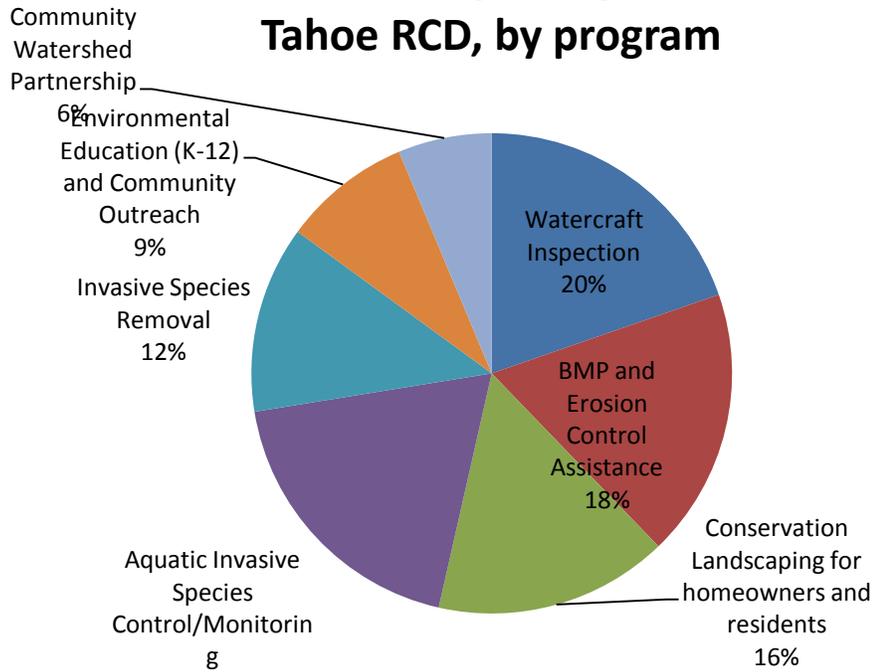
*No participants indicated that they have no interest in supporting non-profit causes

South Shore Results

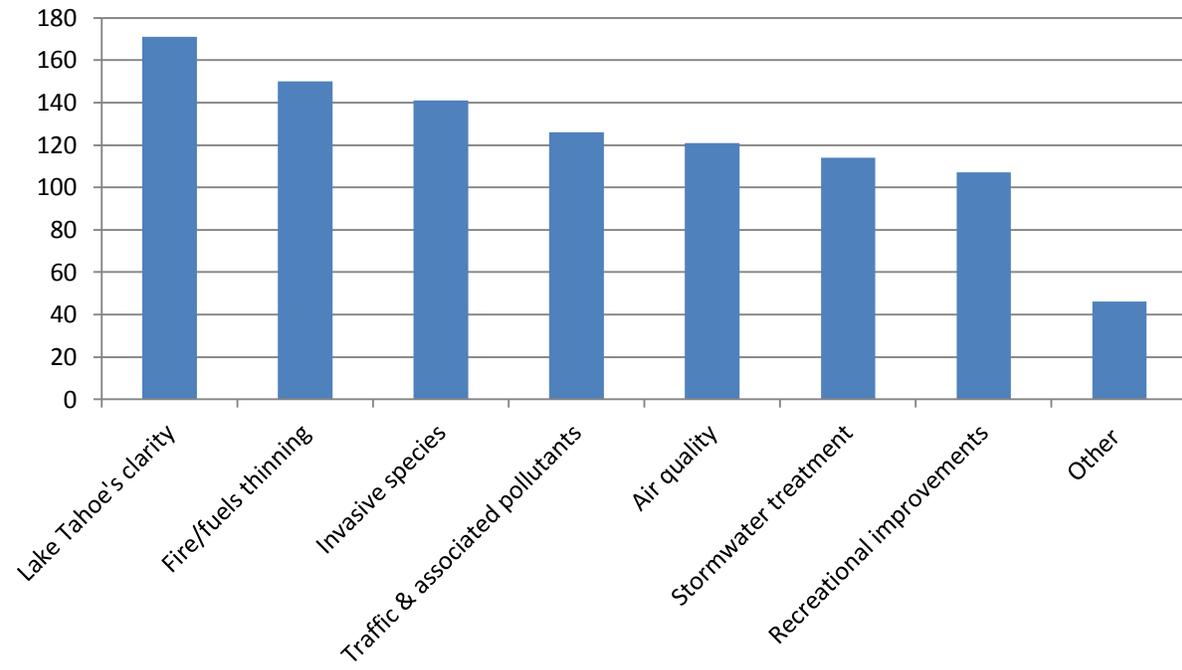
S. Shore participants aware of Tahoe RCD



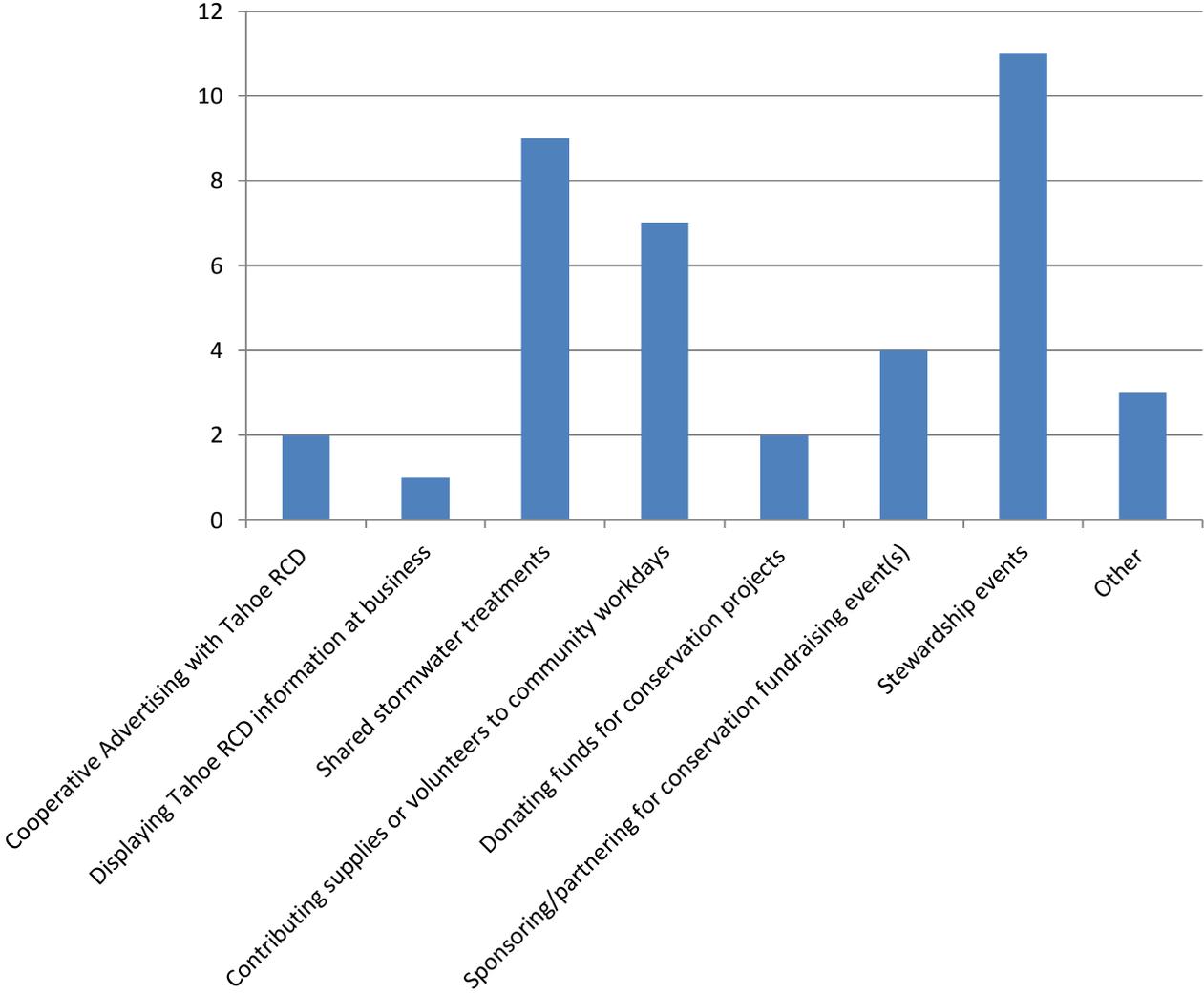
Percent of S. Shore participants aware of Tahoe RCD, by program



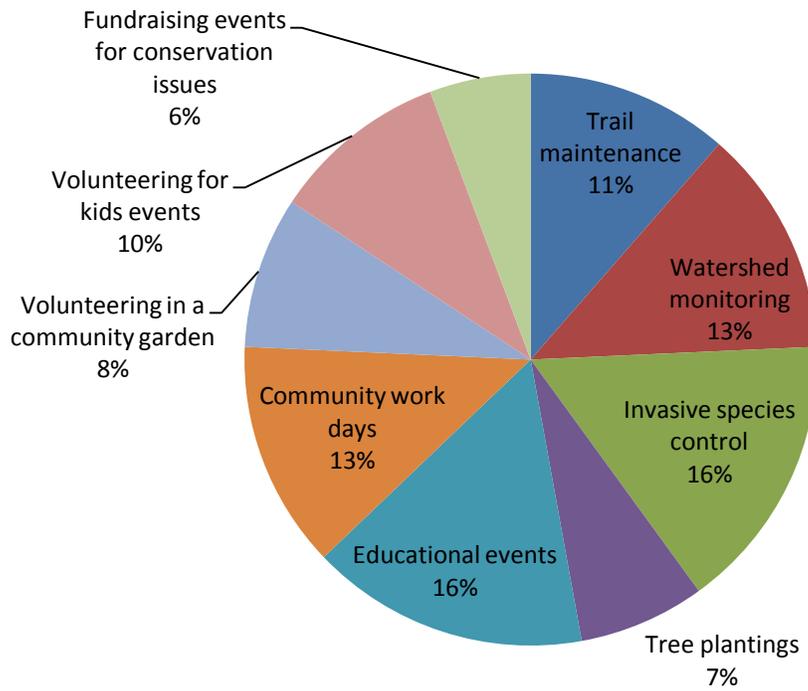
Environmental issues of greatest concern to S. Shore participants (weighted score)



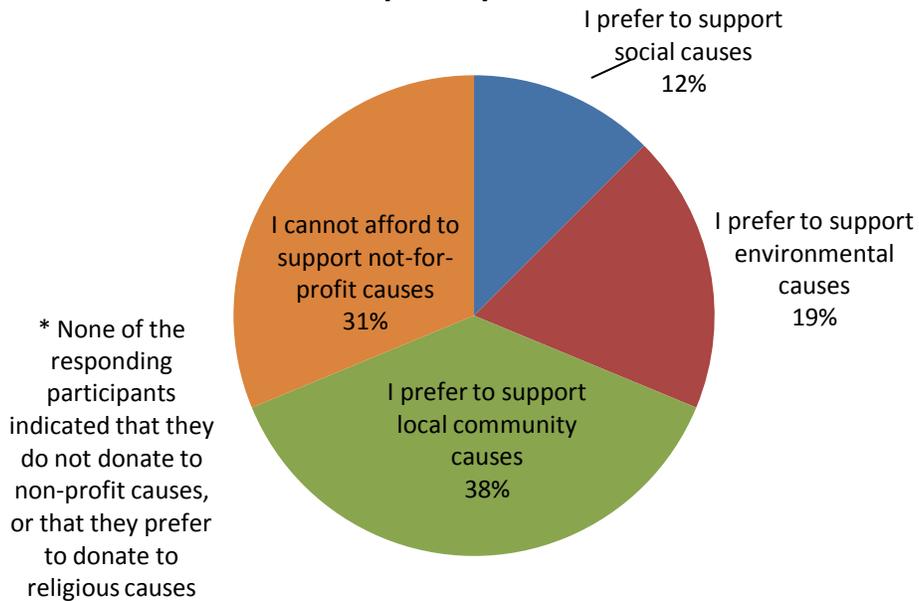
Community engagement interests on the S. Shore, by number of individuals



S. Shore stewardship interests, by percentage of participants



Financial support preferences by percent of S. Shore participants



Appendix C: Technical Assistance Summary Table

Appendix D: BMP Plan Summary Table

Appendix E: Wet Soils BMP Plan Template



TAHOE

RESOURCE CONSERVATION DISTRICT

870 EMERALD BAY ROAD SUITE 108 • SOUTH LAKE TAHOE, CA 96150 • 530.543.1501 PH • 530.543.1660 FAX

August 27, 2013

Dear Homeowner,

The Tahoe Resource Conservation District (Tahoe RCD) has developed this informational packet to assist you with implementing Best Management Practices (BMPs) on your property. This information will help you to comply with Chapter 60 Section 60.4 (Best Management Practices Requirements) of the Tahoe Regional Planning Agency (TRPA) Code of Ordinances. We are contacting you today because your property falls within our 2013/2014 Community Watershed Planning area and we are currently funded to offer you BMP technical assistance. This summer, from the roadside, Tahoe RCD field technicians were able to visually verify property soil characteristics which qualified your property for the enclosed BMP Retrofit Plan.

The Best Management Practices Retrofit Ordinance requires landowners to infiltrate stormwater runoff, stabilize eroding soil, rehabilitate disturbed soil areas, and pave approved roads, driveways and parking areas. **However, due to the acknowledged presence of slowly draining soils that compromise the ability for natural infiltration and/or the presence of soils within close proximity to high ground water, stormwater infiltration treatments cannot be recommended for runoff associated with your property. The presence of these conditions makes your property site constrained for stormwater infiltration BMPs.** Enclosed are *BMP Treatment Descriptions* detailing those treatment options available for your property. This generic BMP packet was created to guide you or your contractor through the process of BMP design and implementation. The information in this packet is property-specific and only relates to BMP treatments on properties that have been identified as site constrained by a Tahoe RCD field technician.

If you are using a contractor to install your BMPs, please be sure to supply them with all of the enclosed information. Before you install your BMPs, refer to the *Living with Fire* guidelines to be sure that the recommended BMP treatments are not in conflict with the most current fire defensible space requirements. You may also request a free fire defensible space inspection by calling the respective fire district that your property exists within.

Before and During Construction:

- Read through and provide your contractor with all enclosed documents
- Utilize Lake Tahoe Standard Drawings for specific BMP treatment requirements

Before you request a final BMP inspection:

- Refer to the *BMP Final Inspection Checklist* to insure the completed work meets the minimum requirements for TRPA's BMP Ordinance
- Submit the *Authorization to Release BMP Site Evaluation Information form* to Tahoe RCD

Provide to the BMP final inspector:

- Approved BMP plans if the infiltration systems were not designed by the Tahoe RCD

YOUR PARTNER IN LAKE TAHOE CONSERVATION

THE MISSION OF THE TAHOE RESOURCE CONSERVATION DISTRICT IS TO PROMOTE THE CONSERVATION AND IMPROVEMENT OF THE LAKE TAHOE BASIN'S SOIL, WATER AND RELATED NATURAL RESOURCES BY PROVIDING LEADERSHIP, INFORMATION, PROGRAMS AND TECHNICAL ASSISTANCE TO ALL LAND MANAGERS, OWNERS, ORGANIZATIONS AND RESIDENTS.



When you are ready for a BMP final inspection or further technical assistance, please utilize the online Service Request Form located at <http://tahoercd.org/contact-tahoe-rcd/>. Please contact me if you have any questions.

Respectfully,

Sarah Bauwens, Watershed Resources Intern

Phone: 530-543-1501 (ext.126)

sbrauwens@tahoercd.org

Enclosures

BMP Treatment Descriptions

BMP Retrofit Site Plan (sample)

BMP Design and Installation Considerations

Site Constraint Tracking Form

Lake Tahoe Standard Drawings

Brief Soil Descriptions (Tahoe)

Materials Calculator

Authorization to Release BMP Site Evaluation Information Form

Yard Fertility Management

BMP Final Inspection Checklist



Mail
PO Box 5310
Stateline, NV 89449-5310

Location
128 Market Street
Stateline, NV 89449

Contact
Phone: 775-588-4547
Fax: 775-588-4527
www.trpa.org

Dear Tahoe Basin Property Owner:

Thank you for your interest in participating in the BMP Retrofit Program! We value your partnership and willingness to work with us to protect Lake Tahoe.

At this time, we have found that your property includes site characteristics (such as high groundwater, slow permeability soils, or rocky soils) that make BMP Retrofit very difficult in terms of stormwater capture and infiltration. Therefore, we recommend that stormwater infiltration BMPs not be installed on your property. Instead, please refer to the attached report outlining the erosion control measures that should be installed on your property.

Once you have completed all erosion control measures for your property, please contact us at 775/589-5202. You will be eligible to receive a "Source Control Certificate." This Certificate demonstrates to TRPA that you have done everything possible to comply with the requirements of the BMP Retrofit Program (Chapter 60.4, TRPA Code of Ordinances).

TRPA is currently exploring options on how to equitably remedy existing difficult retrofit situations so that all property owners in the Tahoe Basin can help control stormwater runoff. Once an appropriate solution has been identified and approved, TRPA will contact you and explain how you can complete the BMP retrofit process to receive a full BMP Certificate of Completion.

Please be aware that as long as you maintain all erosion control BMPs on your property and have a Source Control Certificate, TRPA will not pursue enforcement action for noncompliance with the BMP Retrofit Program. Again, once an equitable solution has been identified, TRPA will outline the process to bring your property into full compliance with Chapter 60.4 and receive a Certificate of Completion.

We appreciate your patience regarding this matter and thank you for doing your part to protect Lake Tahoe.

Sincerely,

A handwritten signature in black ink, appearing to read "Brian Judge".

Brian Judge
Principal Environmental Specialist
Environmental Improvement Program
Acting Stormwater Management Team Leader

imagine. plan. achieve.

Site Constraint Tracking Form

| | | |
|--------------------------|------------------|--------------|
| Property Address: | County: | APN: |
| | | |
| Site Evaluator: | Agency: | Date: |
| | Tahoe RCD | |

The following site constraint(s) has/have been identified on your property:

- Property located in an area with a Seasonal High Water Table/Stream Environment Zone
- Property located on slow soils ($K_{sat} \leq 1"/hr$)
- Property located on rocky soils or in an area with bedrock at or near grade
- Infiltration area restricted due to utility placement
- Infiltration area restricted due to retaining structures
- Steep slopes / Cut and fill slopes
- Infiltration area restricted due to property boundaries
- Conveyance structure cannot be installed due to underground heating unit
- Structure located with no/minimal setback to public right-of-way

Evaluator Notes:

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Considerations while addressing Best Management Practices

Soils: The Tahoe Resource Conservation District (Tahoe RCD) uses the Natural Resources Conservation Service (NRCS) Soil Survey to determine the soil type for properties in the Lake Tahoe Basin. This information is then used to assess the ability of soils to naturally infiltrate runoff and recommend Best Management Practices (BMPs). Please refer to the enclosed *Brief Soil Descriptions* for more information regarding this property's soil type.

Groundwater: Tahoe Regional Planning Agency water quality regulations prohibit BMPs from being installed within one foot of seasonal groundwater levels.

Property Lines: BMP treatment systems must be installed within the property boundary limits. The Tahoe RCD *does not* establish property boundary lines. Before installing BMPs, confirm property boundary lines and any setback requirements established by your local building or planning departments.

Fire Defensible Space: Tahoe RCD staff and the Natural Resources Conservation Service do not have the authority to perform fire defensible space inspections. Fire defensible space information is included with these BMP prescriptions as a courtesy to the Fire Protection Districts. All references and prescriptions for defensible space were provided by the Lake Tahoe Fire Prevention Officers. Through cooperation with the Tahoe Regional Planning Agency, Tahoe Resource Conservation District, Nevada Tahoe Conservation District, Natural Resources Conservation Service, and University of Nevada Cooperative Extension, efforts have been taken to provide a conservation plan and BMP designs that are compatible with Living with Fire guidelines. The final determination that landscaping and BMPs installed for water quality purposes meet defensible space requirements lies solely with the fire protection districts that have the proper authority.

Note that BMP minimum treatment dimensions do not always encompass the 0 to 5 foot non-combustible area. Therefore, the *Materials Calculator* can be used to determine quantities for drain rock armoring that will also meet the defensible space criteria.

Refer to *Living with Fire – Lake Tahoe Basin Second Edition* for more information regarding maintaining a fire defensible landscape while planning BMP implementation.

Please contact the local fire district or department for defensible space requirements and recommendations: Lake Valley FPD (530) 577-2447 South Lake Tahoe FD (530) 542-6160 North Tahoe FPD (530) 583-6913, Fallen Leaf FD (530) 542-1343, Meeks Bay FD (530) 525-7548

Underground Utilities: Before excavating soil for the installation of BMPs, it is imperative that underground utilities be located and marked on the property to avoid damage or service interruption during construction. According to Government Code 4216, the individual conducting excavation is responsible for notifying utilities before digging. Underground Service Alert (USA), the one call system, enables this notification. **Call 811** at least two full working days and not more than 14 days before any excavation occurs. Additional information is available at www.usanorth.org.

Drainage: If stormwater from neighboring public or private properties flows onto the property, contact the local jurisdiction for technical assistance or more information. A licensed engineer may need to be consulted to develop an appropriate solution that protects structures from potential water damage.

TRPA Coverage: It is advisable to document existing conditions before making any changes to the property to avoid losing existing coverage rights. For information on land capability and land coverage, please visit www.trpa.org.

Grading and Temporary BMPs: Tahoe Regional Planning Agency (TRPA) regulations state that between October 15th and May 1st it is prohibited to grade or excavate more than 3 cubic yards of soil. Installation of temporary BMPs is also required on all sites where the vegetation and soil will be disturbed. Temporary BMP practices will help prevent sediment or contaminated water from leaving the site during construction activities. Temporary BMPs are site-specific, must be constantly maintained, and are usually good for only one year or one winter season. Temporary BMPs should be

installed before starting construction and must be maintained until all construction activity is completed and/or until permanent BMPs are installed. In order to maintain properly functioning temporary BMPs, systems should be checked immediately before an impending storm as well as after the storm has passed.

Materials: The Tahoe RCD recommends the use of 3/4 inch to 1-1/2 inch washed drain rock; however, any kind of rock can be utilized to achieve desired aesthetic and use characteristics for the property. You may even use rock found on the property to create a more natural look and to reduce the cost of BMP installations.

Maintenance Considerations: Construct a border around drain rock treatments to contain materials and reduce maintenance. Economical border materials include used lumber, small logs, or cobble-sized rock found on site. Materials such as pressure-treated wood, landscape edging, and/or one of the many recycled composite products available can also be utilized. If using any type of flammable material, ensure that these materials do not connect to the structure to help protect the structure from fire.

Over time, infiltration systems fill in with sediment and fail; therefore, maintenance is required to keep these systems functioning properly. Visually check BMPs after major storms, in the spring, and just before winter to ensure they are working properly. For more information on BMP maintenance, visit the TRPA Stormwater Management Program at <http://www.tahoebmp.org/>.

Structural Integrity:

To the maximum extent allowable by law, the property owner agrees to indemnify, defend, and hold harmless Tahoe RCD, its Board of Directors and its employees (collectively, Tahoe RCD) from and against any and all suits, losses, damages, injuries, liabilities, and claims by any person (a) for any injury (including death) or damage to person or property or (b) to set aside, attack, void, modify, amend, or annul any actions of Tahoe RCD. The foregoing indemnity obligation applies, without limitation, to any and all suits, losses, damages, injuries, liabilities, and claims by any person from any cause whatsoever arising out of or in connection with either directly or indirectly, and in whole or in part (1) the processing, conditioning, issuance, or implementation of these recommendations; (2) any failure to comply with all applicable laws and regulations; or (3) the design, installation, or operation of any improvements, regardless of whether the actions or omissions are alleged to be caused by Tahoe RCD or Property Owner.

Included within the Property Owner's indemnity obligation set forth herein, the Property Owner agrees to pay all fees of Tahoe RCD's attorneys and all other costs and expenses of defenses as they are incurred, including reimbursement of Tahoe RCD as necessary for any and all costs and/or fees incurred by Tahoe RCD for actions arising directly or indirectly from issuance or implementation of these recommendations. Property Owner shall also pay all costs, including attorneys' fees, incurred by Tahoe RCD to enforce this indemnification agreement. If any judgment is rendered against Tahoe RCD in any action subject to this indemnification, the Property Owner shall, at its expense, satisfy and discharge the same.

Photographic Records: Beginning May 1, 2009 a photographic record is required of all BMP installations that entail backfilled excavations on a homeowner's property.

Expiration after 3 years: Beginning May 1, 2009 all evaluations will expire three years from the date the evaluation was conducted. **If homeowners do not complete the recommended BMP installation treatments within this three year time frame, they will be required to call the appropriate agency and have the evaluation reviewed and, if necessary, revised.** This will ensure that all homeowners are incorporating the most current technology and Best Management Practices treatments on their property.

Online Resources

TRPA Stormwater Management www.tahoebmp.org

- BMP Sizing Worksheet
- BMP Property Status Search
- BMP Handbook

- BMP Materials and Providers Lists
- Lake Tahoe BMP Standard Drawings/Installation Guidelines
- BMP Contractors Handbook
- Real Estate Disclosure Form
- Fertilizer Use Information

- *Home Landscaping Guide for Lake Tahoe and Vicinity*

TRPA www.trpa.org

- Site Assessment Application
- Land Coverage/Land Capability Information
- Permitting Information/Application
- Combining BMPs and Defensible Space Information

Fire Defensible Space

- *Living with Fire in the Lake Tahoe Basin Website and Publication* <http://www.livingwithfire.info/tahoe/>
- Public Resource Code 4291: <http://www.fire.ca.gov>

Tahoe Resource Conservation District www.tahoercd.org

- Lake Tahoe BMP Standard Drawings/Installation Guidelines
- Backyard Conservation Tip Sheets
- Calendar of Events
- Dirt Driveway Roadmaps
- *Home Landscaping Guide for Lake Tahoe and Vicinity*
- BMP Materials Calculator
- Release Authorization Form

Best Management Practices Treatment Descriptions

For Properties with Slowly Draining and/or Wet Soil

Revised 7/17/2013

According to the Tahoe Regional Planning Agency (TRPA) Best Management Practice (BMP) retrofit ordinance chapter 60 section 60.4, all homeowners are required to capture and infiltrate runoff generated from impervious surfaces for the protection and restoration of water quality. **However, due to the acknowledged presence of slowly draining soils that compromise the ability for natural infiltration, stormwater infiltration treatments cannot be recommended for runoff associated with your property; instead sediment source control treatments are recommended for property address.** Section 60.4.8.B of the ordinance describes these special circumstances as site constraints, and acknowledges that complete infiltration is not possible on all parcels. Although infiltration BMPs cannot be recommended for this property, sediment source control BMPs can still be implemented; information contained within this packet solely pertains to those BMPs that address sediment source control.

Please be aware that a BMP Certification of Completion for the property cannot be issued until the TRPA has identified and approved an appropriate solution for the site constraint present on this property. However, homeowners are encouraged to complete all recommended sediment source control treatments.

To learn more about the ordinance, visit www.tahoebmp.org. Visit the Tahoe RCD website at www.tahoercd.org to download the most current tip sheets and BMP Standard Drawings and Installation Guidelines.

Complete implementation of these source control BMPs will meet the requirement to receive a Source Control Certificate after a final inspection is completed on the property by Tahoe RCD field technician. ***Please note that this BMP Retrofit Evaluation Packet can only be utilized by specific properties that have been identified as site constrained by a Tahoe RCD staff member, and cannot be utilized on a property that has not received this identification.*** If you have any questions regarding the application of specific treatments on your property, please call the Tahoe RCD Conservation line at (530) 543-1501 x 113 to discuss available options.

Soil and Landscape Areas

Although bare ground may be effective in reducing wildfire threat around the property, there are other options to help stabilize soil. Please be aware that excessive bare ground may increase the soil erosion potential of the property and contribute to the decline in the water clarity of Lake Tahoe.

Options to treat bare soil on the property include, but are not limited to, establishing a mosaic of vegetation and mulch. Combustible mulch should not be used in a widespread manner within 30' of the structure. Sloped sites may require mechanical stabilization methods such as installing retaining walls, rock riprap slope protection and terracing.

Request a conservation landscaping consultation, utilize the Home Landscaping Guide for Lake Tahoe and Vicinity and utilize our online resources to learn more about landscaping and combining BMPs with defensible space in your landscape. Contact the local fire district for information on acceptable defensible space treatment options for your specific property and review the online resource *Living with Fire-Lake Tahoe Basin*.

Restore compacted bare soil areas

If areas on your property have been compacted by vehicular traffic, the soil in these areas should be covered with 2 inches of compost and then tilled to a depth of 6 to 8 inches. This will greatly increase the survival rates for seeds sown and vegetation planted. A combination of native or adapted vegetation and mulch produces a low

maintenance landscape that is highly effective at preventing erosion. There are many native and adapted grasses, plants, shrubs, and trees that can be used. Please review the recommended plant list in chapter 7 of the *Home Landscaping Guide* help identify species to suit individual property and landscaping goals. In order to prevent future soil degradation, parking barriers can be installed to restrict vehicular access to restored areas. Parking barriers can be made from a variety of materials such as split rail fencing, boulders, wood posts, or shrubs. Refer to Lake Tahoe Standard Drawing **BMP-026** for more information on parking barriers.

It is advisable to document existing conditions before making any changes to the property to avoid losing existing coverage rights. For information on land capability/land coverage please visit www.trpa.org. Refer to the enclosed *Paving Residential Dirt Driveways* handout for more information.

Drip Lines

Stormwater falling from roof surfaces onto bare or poorly vegetated soils detaches sediment particles and causes noticeable erosion. To satisfy the BMP retrofit ordinance, potential erosion from roof runoff must be managed on the property. The options outlined below are commonly used methods to manage roof runoff. Select the best options for your property.

For all **drip line** installations, treatments must extend a minimum of 6” inside of the drip line and extend a minimum of 12” beyond the drip line of a single story roof, 18” beyond the drip line of a 2-story roof, and 24” beyond the drip line of a 3-story roof. Border the treatment to retain the material and exclude adjacent soil.

Option 1: Armor bare soil under drip line with 3” layer of drain rock or cobble and border system; Refer to Lake Tahoe Standard Drawing BMP-009 & BMP-002

Install drain rock or cobble directly under the drip line to armor the soil in this area. Before applying rock under drip lines, it is important to break up the existing soil with a hard rake or shovel. When the receiving area of the property slope exceeds 15%, utilize riprap for soil protection. Refer to Lake Tahoe Standard Drawing *BMP-009* for specific requirements and construction considerations.

Low growing, irrigated, herbaceous vegetation can be used in conjunction with rock armor. If utilizing a combination of vegetation and rock armor, please be aware that planter beds are required to meet the dimension standards listed in *BMP-009* and require a border. Refer to the *Living with Fire* guidelines or contact the local fire district for acceptable mulching materials and methods.

Option 2: Maintain existing vegetation/turf under drip line

Vegetation under the drip line protects the soil from the impact of the concentrated roof runoff and promotes stormwater infiltration. An alternate treatment may need to be installed in this area if the condition of the vegetation changes. If utilizing turf or lawn, a border will not be required, assuming that the lawn is healthy and vigorous and excludes loose soil from the treatment. Vegetation in the drip line treatment area must be vigorous (exhibiting roughly 70% canopy cover within three feet of the soil surface), protect the entire treatment area, and persist from year to year. Rock mulch should be utilized to fill the void spaces between the vegetation to protect any bare soil.

Option 3: Maintain or enhance existing vegetation under drip lines

Vegetation under the drip line protects soil from the impact of the concentrated roof runoff and promotes stormwater infiltration. Vegetation in the drip line treatment area must be vigorous (exhibiting roughly 70% canopy cover within three feet of the soil surface), protect the entire treatment area, and persist from year to year. Rock mulch should be utilized to fill the void spaces between the vegetation to protect any bare soil. If the vegetation in the area receiving runoff does not meet the above standards, maintain or enhance the existing vegetation until it does so.

Refer to online resources, *Tahoe Native and Adapted Plants* and the *Home Landscaping Guide*, for plant selection, planting, and care instructions. Examples of adequate vegetation include:

- Maintained grasses or turf that has been established directly up to the foundation
- Low growing non-woody (herbaceous) perennials and annuals with minimal bare soil exposed

Option 4: Gutter conveyance system

Gutter conveyance systems need to remain in good repair and clear of debris in order to remain functional. Redirect and/or extend any gutter downspouts so the energy generated by roof runoff can be dissipated and not discharged directly to bare soils where the potential for erosion is high. The installation instructions for this treatment depend on the product purchased; please refer to product specifications. If there is currently a gutter conveyance system installed on the house, install an energy dissipater under the gutter downspout. To do this, armor the runoff receiving area with rock or adequate vegetation to promote infiltration and minimize erosion. There are many options to dissipate energy under the gutter downspout. Possible options include splash pads/blocks, gravel, rock or adequate vegetation.

Driveways

Scenario 1: Paved Driveway: Flows into right-of-way (roadside drainage or street)

No additional treatment necessary at this time. Homeowners will be notified when the TRPA develops an alternate approach to managing driveway runoff in areas with slowly infiltrating or seasonally wet soils.

Scenario 2: Paved Driveway: Flows back onto property

If driveway runoff flows onto the property, armor the area where water is exiting the paved surface with a 3-inch layer of drain rock, cobble, or riprap. This armoring should be a minimum of 2 feet wide to adequately capture and infiltrate the runoff from the driveway. Before applying drain rock, it is important to break up compacted soil with a hard rake or shovel to increase soil permeability. If the runoff is dispersed onto an area with established vegetation and there are no signs of erosion, this may be an acceptable BMP treatment.

Scenario 3: Unpaved Driveway

Driving on unpaved surfaces compacts the soil making it nearly impermeable. Because stormwater cannot infiltrate into this compacted area, it can leave the property carrying contaminants and sediment into the local waterways. For these reasons, all property owners are required to pave approved roads, driveways, and parking areas. Currently, it is not necessary to install driveway conveyance and infiltration systems when paving the driveway because site characteristics prohibit stormwater capture and infiltration in this area. Grading considerations can make a difference in implementing appropriate source control measures. One option may be to slope the driveway to one side so that all runoff flows into a rock armored or well vegetated area.

Any area of the property that has been compacted due to vehicular traffic needs to be either paved or restored to a point that it can sustain vegetation. Refer to the online resource *Paving Residential Dirt Driveway* (<http://tahoercd.org/publications-links/bmp-driveway-resources/>) and *Standard Drawing BMP-026.1* and the *General Landscaping/Soil Areas* section earlier in this document for more information.

It is advisable to document existing conditions before making any changes to the property to avoid losing existing coverage rights. For information on land capability and coverage, please visit www.trpa.org.

Paving Options

Contact the Building Department for paving and/or encroachment permit information. Encroachment permits can only be issued to a licensed contractor.

The minimum: paving two parking spaces within the property boundary

The standard paving permit will allow you to pave the minimum amount of off-street parking required by your local jurisdiction. This is usually two off-street parking spaces, approximately 400 square feet. A paving permit is not a verification of existing coverage or use. If you want to verify coverage a site assessment is necessary. For more information on land capability/land coverage visit <http://www.trpa.org>.

Paving more than the minimum

It is advisable to complete the site assessment process if paving more than the minimum to avoid potential loss of rights to existing coverage. In some instances a site assessment may be required in order to receive a paving permit. For more information on land capability/land coverage, visit <http://www.trpa.org>. Larger driveway installations that involve the grading of more than 3 to 7 cubic yards of soil may require a grading permit.

Refer to the *Paving Residential Dirt Driveways* document available at <http://tahoercd.org/publications-links/bmp-driveway-resources/> for more information.

Storage Areas

Install appropriate BMP for storage area

Storage areas are those used for long term storage of vehicles, trailers, boats, snow or any other materials that are seldom moved off of the property, resulting in minimal soil erosion and compaction. Mulching is one of the simplest and most beneficial conservation practices a homeowner can use for erosion control. Mulching protects the soil from erosion and reduces compaction from the impact of heavy rain and material storage. Possible mulches include woodchips, redwood or cedar bark, drain rock, and cobble (3"-10" diameter rock). Apply chosen mulch material at a uniform 3" depth.

Restore all compacted bare soil areas

If there are any areas that are not treated with the methods mentioned above, cover soil with 2 inches of compost and till to a depth of 6 to 8 inches and plant, seed, and/or till in 2-3 inches or wood chip or tub grindings to depth of 6-12 inches. A combination of native or adapted vegetation and mulch produces a low maintenance landscape that is highly effective at preventing erosion. Learn more by reading the *Common Ground* document available at http://www.trpa.org/documents/press_room/2012/BMP_DSBrochure.pdf. There are many native and adapted grasses, plants, shrubs, and trees that can be used. Please review the recommended plant list in chapter 7 of the *Home Landscaping Guide* to help identify species to suit individual property and landscaping goals. In order to prevent future soil degradation, parking barriers can be installed to restrict vehicular access to restored areas. Parking barriers can be made from a variety of materials such as split rail fencing, boulders, wood posts, or shrubs. Refer to Lake Tahoe Standard Drawing *BMP-026*. Upon request, the Tahoe RCD can provide additional restoration guidance.

Refer to the *Living with Fire- Lake Tahoe Basin* guidelines or contact the local fire district for acceptable organic mulching materials and methods.

It is advisable to document existing conditions before making any changes to the property to avoid losing existing coverage rights. For information on land capability/land coverage please visit www.trpa.org.

Decks / Stairs / Walkways

Homeowners are responsible for stabilizing bare soil under elevated structures and/or around the perimeter of low elevated structures. To protect the soil under these structures from water and wind erosion, refer to the relevant treatment descriptions listed below. All deck treatments require borders to contain the drain rock and exclude adjacent soil.

Install drain rock under elevated structure (decks, stairs, and walkways) and border system; Refer to Lake Tahoe Standard Drawing BMP-010

Install a 3-inch layer of drain rock, cobble or rip rap under the entire footprint of the elevated structure and extend one foot past the edges to protect the soil in this area from water and wind erosion. Border the treatment to retain the rock and exclude adjacent soil. In the case that established, low growing, irrigated vegetation, such as lawn or dense vegetative cover exists underneath and around the perimeter of the low elevated structure; the vegetation will function as the BMP. To calculate drain rock quantities required, use the following formula: (Length in feet x Width in feet x Depth in feet)/27 = Cubic Yards.

Install drain rock around perimeter of low elevated structure (decks, stairs, and walkways) and border system; Refer to Lake Tahoe Standard Drawing BMP-011 for installation instructions

Install a 3-inch layer of drain rock or cobble around the perimeter of the low elevated structure and as far as is accessible underneath the structure. Extend one foot past the edges. Border the treatment to retain the rock and exclude adjacent soil. In the case that established, low growing, irrigated vegetation, such as lawn or dense vegetative cover exists underneath and/or around the perimeter of the low elevated structure, the vegetation will function as the BMP. To calculate drain rock quantities required, use the following formula: (Length in feet x Width in feet x Depth in feet)/27 = Cubic Yards.

Install drain rock around perimeter of enclosed deck and border system

Install a one foot wide, 3" layer of drain rock or cobble around the perimeter of the enclosed deck. Border the outside edges of the rock armor to retain the material and exclude adjacent soil. In the case that established, low growing, irrigated vegetation, such as lawn or dense vegetative cover, exists around the perimeter of the low elevated structure, the vegetation will function as the BMP. To calculate drain rock quantities required, use the following formula: (Length in feet x Width in feet x Depth in feet)/27 = Cubic Yards.

Install rock slope protection (riprap) under elevated structure on steep slopes; Refer to online resource Lake Tahoe Standard Drawing BMP- 010, 040, 041

Install rock slope protection (riprap) under the elevated structure to dissipate runoff velocity and prevent erosion. Rock slope protection works best when integrated with a layer of filter fabric or other permeable weed blocking materials. Refer to pages 16 - 19 of the *Home Landscaping Guide* for more information on slope stabilization practices.

Install armor treatment adjacent to patio/walkway and border system; Refer to Lake Tahoe Standard Drawing BMP- 006, 007

Armor the area where water is exiting the impermeable surface with a 3-inch layer of drain rock, cobble, or riprap. This armoring should be a minimum of one foot wide to adequately capture and infiltrate the runoff from the impermeable surface. Before applying drain rock, it is important to break up compacted soil with a hard rake or shovel to increase soil permeability. If the runoff is dispersed onto an area with established vegetation and there are no signs of erosion, this may be an acceptable BMP treatment.

Slope Stabilization

If steep slopes exist on the property, it is important to stabilize them to prevent potential movement of sediment into the local waterways and eventually into Lake Tahoe. A variety of options are available to homeowners who have eroding slopes on their properties. While gentler slopes may be stabilized with vegetation, mulch, and/or erosion control blankets, steep slopes may require the use of riprap, terracing, or retaining walls. Refer to pages 16 - 19 of the *Home Landscaping Guide* for more information on slope stabilization practices.

Install rock slope protection (riprap), terracing, and/or appropriate vegetation and mulch to stabilize slope; Refer to online resource Lake Tahoe Standard Drawing BMP-040, 041, 042, 043

Gentle slopes can be stabilized with vegetation, mulch, and/or erosion control blankets. Steeper slopes may require the use of terracing, riprap, or retaining walls constructed from boulders, rocks, concrete blocks, or wood products. Large projects and walls higher than 4 feet (measured from the bottom of the footing to the top of the wall) require professional engineering expertise and building permits. If manufactured products are used, follow the manufacturer's specifications for proper installation. Refer to pages 16 - 19 of the *Home Landscaping Guide* for more information on slope stabilization.

Install rock slope protection (riprap)

Riprap (larger angular rock material) may be used to stabilize steep slopes. It is a good practice to spread native or adapted seed on the slope prior to rock placement. Rock slope protection works best when integrated with vegetation.

Install retaining walls or terracing

Retaining walls and terraces are a good way to stabilize steep eroding slopes. Common building materials include boulders, rocks, concrete blocks, or wood products.

A building permit is required for the construction of retaining walls that are over 4 feet in height measured from the bottom of the footing to the top of the wall. Large projects and walls higher than 4 feet require professional engineering expertise. If manufactured products are used, follow the manufacturer's specifications for proper installation. When installing retaining walls or terraces, please contact the local building service department to verify building codes.

Typical BMP Treatments

use appropriate material in the 5-foot noncombustible zone

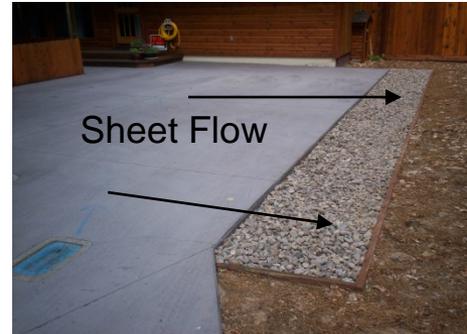


Erosion Control at Perimeter of Low Deck

Erosion Control under Elevated Deck

Roof Runoff flows to Energy Dissipater under Gutter Downspout

Roof Runoff falls to Turf



Roof Runoff falls to Vegetated Bed

Roof Runoff falls to Rock Armor

Sloped Driveway Conveys Runoff to Rock Armor

Slope Stabilized with Retaining Wall, Rock and Vegetation

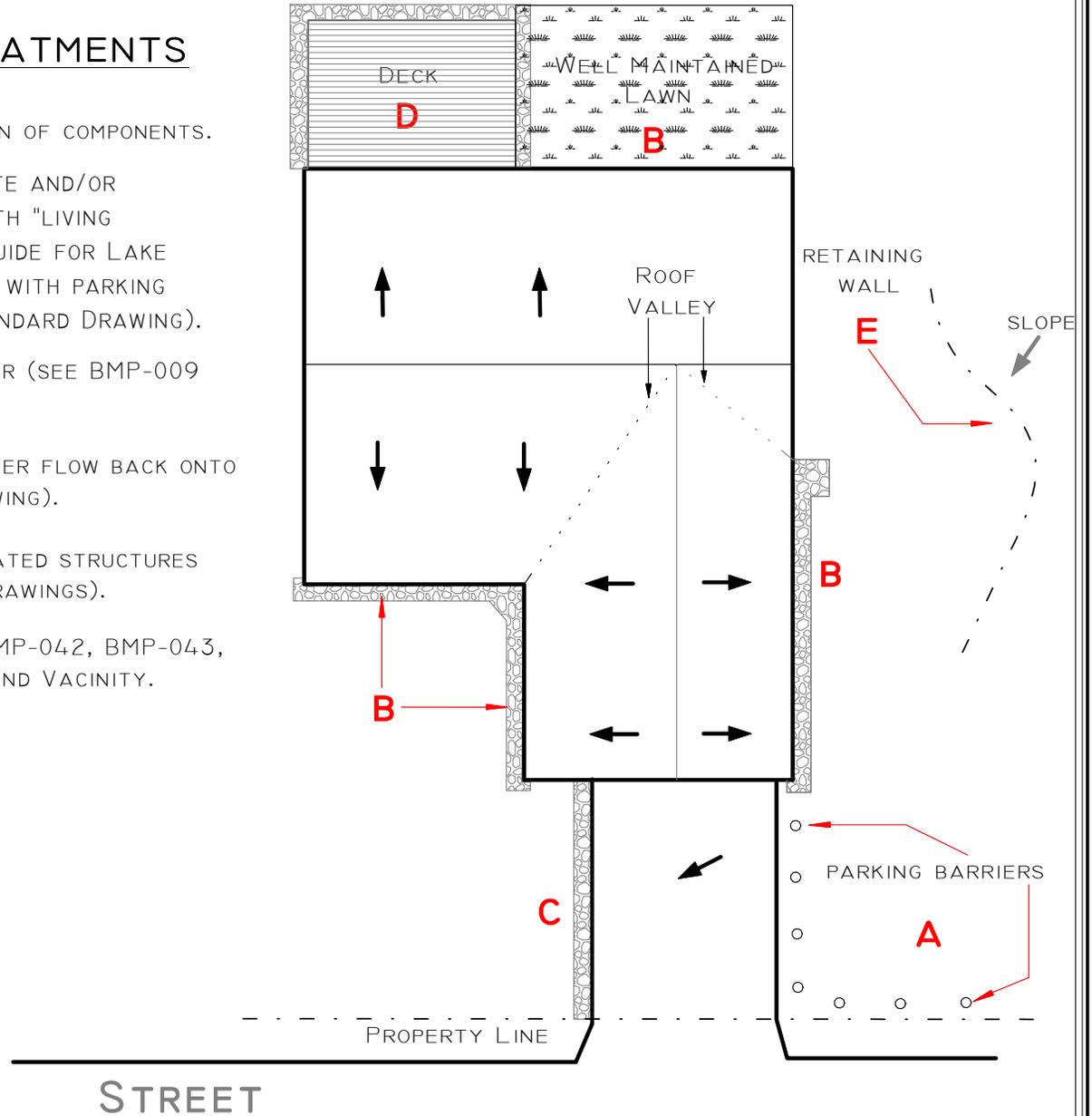
TYPICAL SOURCE CONTROL TREATMENTS

PLACEMENT OF SYSTEMS IS DEPENDENT UPON SPECIFIC SITE CHARACTERISTICS. DIAGRAM SHOWS RELATION AND LOCATION OF COMPONENTS.

- A** SOIL AREAS: MAINTAIN EXISTING VEGETATION; VEGETATE AND/OR MULCH TO RESTORE AND STABILIZE (IN ACCORDANCE WITH "LIVING WITH FIRE" GUIDELINES AND THE HOME LANDSCAPING GUIDE FOR LAKE TAHOE AND VACINITY); PROTECT RESTORED SOIL AREAS WITH PARKING BARRIERS AS NEEDED (SEE BMP-003 LAKE TAHOE STANDARD DRAWING).
- B** ROOF RUNOFF: INSTALL ARMORED DRIP LINE WITH BORDER (SEE BMP-009 LAKE TAHOE STANDARD DRAWING).
- C** DRIVEWAYS: ARMOR RUNOFF RECIVEING AREA WHERE WATER FLOW BACK ONTO PROPERTY (SEE BMP-024 LAKE TAHOE STANDARD DRAWING).
- D** DECKS: EROSION CONTROL FOR ELEVATED AND LOW ELEVATED STRUCTURES (SEE BMP-010 AND BMP-011 LAKE TAHOE STANDARD DRAWINGS).
- E** STABILIZE ERODING SLOPES(SEE BMP-040, BMP-041, BMP-042, BMP-043, AND THE HOME LANDSCAPING GUIDE FOR LAKE TAHOE AND VACINITY).

LEGEND

-  TURF OR VEGETATED GROUNDCOVER
-  DRAIN ROCK ARMOR
-  IMPERVIOUS SURFACE/ STRUCTURE OUTLINE
-  IMPERVIOUS SURFACE FLOW
- A** RECOMMENDED TREATMENT



TAHOE RESOURCE CONSERVATION DISTRICT

EXAMPLE BMP RETROFIT SITE PLAN
LAKE TAHOE, CA

| | | | |
|----------|-----------|------|------------|
| DESIGNED | TAHOE RCD | DATE | 07/17/2013 |
| CHECKED | | DATE | |
| APPROVED | | DATE | |

THIS EXAMPLE BMP SITE PLAN IS FOR THE DESIGN AND INSTALLATION OF BEST MANAGEMENT PRACTICES ONLY. IT IS NOT A VERIFICATION OF LAND COVERAGE, LAND CAPABILITY, UNITS OF USE, OR OTHER DEVELOPMENT CAPACITIES REGULATED BY THE TAHOE REGIONAL PLANNING AGENCY (TRPA) NOR IS IT A CONCEPTUAL APPROVAL OF ANY UNRELATED FUTURE PROJECT. THESE VERIFICATIONS REQUIRE THE SUBMITTAL OF A SEPARATE APPLICATION TO THE TRPA FOR REVIEW AND APPROVAL. BMP TREATMENTS MUST BE INSTALLED WITHIN THE PROPERTY BOUNDARY LINES. ANY REFERENCE TO A PROPERTY BOUNDARY LINE IS AN APPROXIMATION. BEFORE ANY INSTALLATION CONFIRM PROPERTY BOUNDARY LINES.



BMP Final Inspection Checklist

2/11 Rev.

APN _____ Site Address _____ County _____

Inspector _____ Agency _____ Date ___/___/___

This form assists inspectors to assess whether Best Management Practice (BMP) treatments are complete and functioning. Previous Tahoe Regional Planning Agency and Resource Conservation District Site Evaluations will be considered in recommendations for pass/fail determinations. "Yes" answers indicate correct BMP installation. "No" answers indicate a missing or incorrect BMP installation. "N/A" answers indicate that the question does not apply to the property. Any property that passes final inspection with a "No" must have an explanation in the comments section. If the property does not pass a final inspection, evaluators shall document any necessary corrective steps in the comments section.

Date of Site Evaluation ___/___/___ Evaluator _____ Agency _____

BMP Treatments designed by:

RCD Contractor/Consultant Property Owner Other: _____

Open Space, Yard and Landscape Areas

Yes N/A No

| | | | |
|--|--------------------------|--------------------------|--------------------------|
| 1. Have all visual signs of erosion (eroding slopes, rills, gullies, unstable flow channels, etc.) been addressed through appropriate stabilization methods (vegetation, mulch, terraces, retaining walls, riprap, or other appropriate method)? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Comments: | | | |
| 2. Have compacted bare soil areas been aerated (tilled or ripped), vegetated and/or mulched, and, if appropriate, blocked from vehicular access? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Comments: | | | |

Driveways

Yes N/A No

| | | | |
|---|--------------------------|--------------------------|--------------------------|
| 3. Are driveways paved with runoff conveyance and infiltration systems installed and, if required or applicable, are infiltration systems installed with containment borders, filter fabric, and a sediment trap? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Comments: | | | |
| 4. Was a water test conducted (for at least 10 minutes with a hose) to verify runoff conveyance and infiltration systems are connected and functioning? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Comments: | | | |

Storage Areas**Yes N/A No**

5. Are storage areas (boats, trailers, snow, automobiles, etc.) stabilized with appropriate vegetation and/or mulch?

Comments:**Roof Drip Lines and Decks****Yes N/A No**

6. Is all stormwater runoff from roof drip lines mitigated by an appropriate treatment system (rock, prefabricated, or vegetated systems with containment borders where applicable)?
When applicable, are the associated conveyance systems such as gutters and downspouts functional?

Comments:

7. Is the soil under decks, walkways, and elevated structures adequately protected from erosion with appropriate BMPs? Are containment borders included around drain rock treatments?

Comments:**BMP Maintenance****Yes No**

8. Are all BMPs maintained and functioning correctly (conveyance and infiltration systems, soil and slope stabilizations, etc.)?

Comments:**Installation Verification**

9. What type of documentation was provided to or by the inspector to verify proper installation?
 Photos Calculations Approved Site Evaluation Approved Design Changes

Comments:**Certification****Yes No**

IS THE PROPERTY ELIGIBLE FOR A **BMP CERTIFICATE OF COMPLETION**?

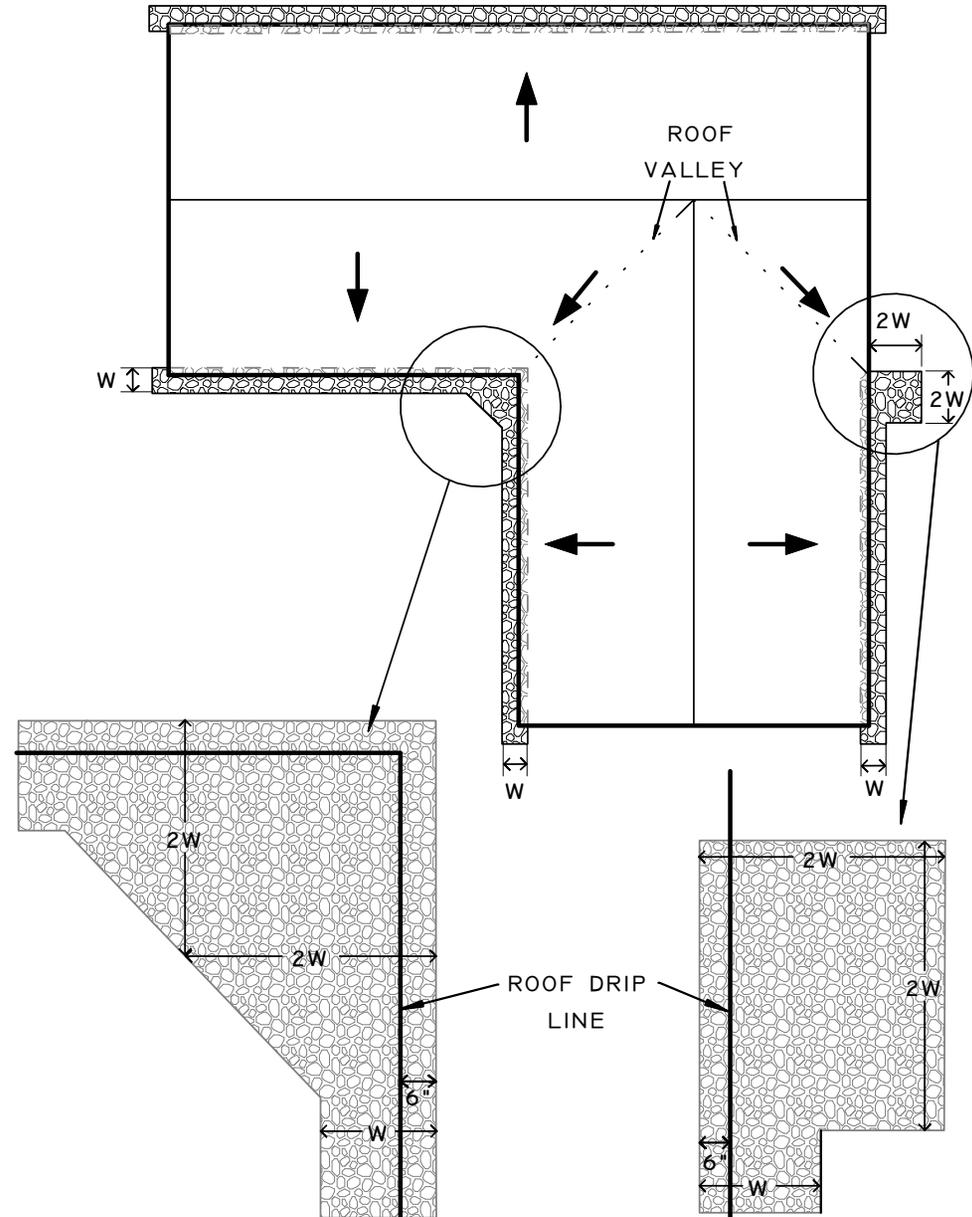
Comments:

IS THE PROPERTY ELIGIBLE FOR A **BMP SOURCE CONTROL CERTIFICATE**?

Comments:

CONSTRUCTION NOTES

1. THIS DETAIL APPLIES TO ROOF DRIP LINES THAT REQUIRE ADDITIONAL ARMOR TO PROTECT THE SOIL WHERE ROOF VALLEYS CONCENTRATE FLOW AND PROJECT RUNOFF BEYOND THE STANDARD WIDTH TRENCH OR DRAIN ROCK ARMOR TREATMENT.
2. REFER TO APPLICABLE STANDARD DRAWINGS, BMP-001, "DRIP LINE INFILTRATION TRENCH," OR BMP-009, "ARMORED DRIP LINE," FOR MORE DETAIL.
3. "W" IS THE WIDTH OF THE DRIP LINE TREATMENT AS DEFINED IN THE BMP "SITE EVALUATION RECOMMENDED TREATMENTS" FORM.
4. WHEN ESTIMATING THE QUANTITY OF DRAIN ROCK REQUIRED, ACCOUNT FOR THE AREA BEYOND THE STANDARD WIDTH TREATMENT WITH A 3" MINIMUM LAYER OF 3/4" TO 1 1/2" DRAIN ROCK. OTHERWISE, USE APPROPRIATE DEPTH TO ESTIMATE QUANTITY OF LARGER ROCK MATERIAL SUCH AS RIPRAP.



LEGEND

- IMPERVIOUS SURFACE/
STRUCTURE OUTLINE
- - - ROOF VALLEY
- IMPERVIOUS SURFACE FLOW
- ▨ DRAIN ROCK

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
IN COOPERATION WITH
**TAHOE RESOURCE CONSERVATION DISTRICT, AND
NEVADA TAHOE CONSERVATION DISTRICT**

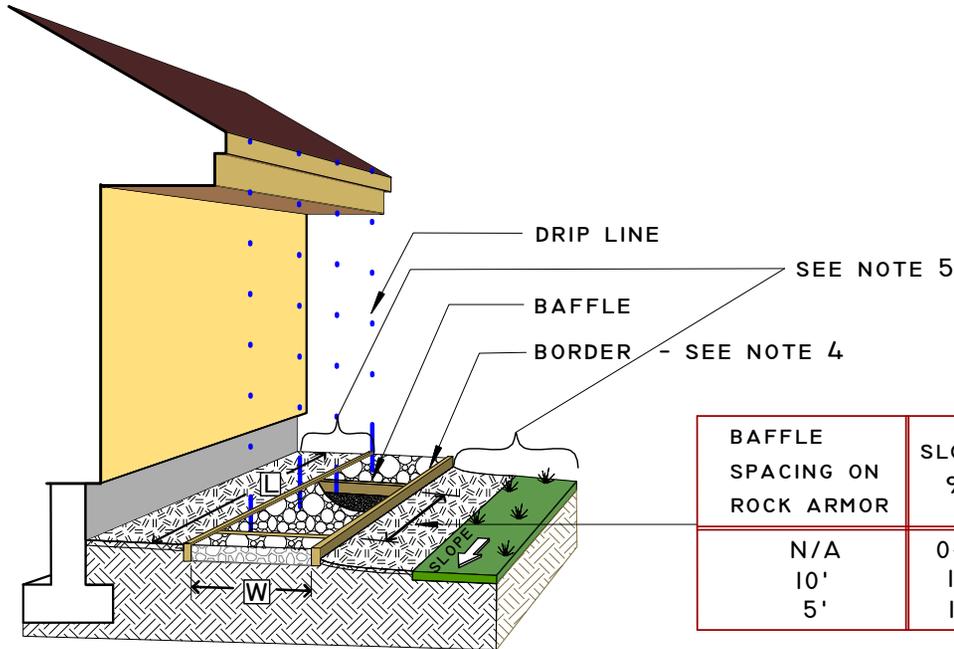
DRAWN BY: _____ APPROVED BY: _____ DATE _____

DMGG/MPB

THIS STANDARD DRAWING IS BASED ON A REFERENCE TO THE NRCS STANDARD PRACTICE 570 - STORMWATER RUNOFF CONTROL. THIS DRAWING IS INTENDED TO ASSIST THE DESIGNER IN PREPARATION OF A COMPLETE SITE SPECIFIC DESIGN, AND IT IS NOT TO REPLACE THE INDEPENDENT JUDGMENT AND ANALYSIS BY A QUALIFIED DESIGNER.

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(RESIDENTIAL USE ONLY)
BEST MANAGEMENT PRACTICE
ARMORED DRIP LINE

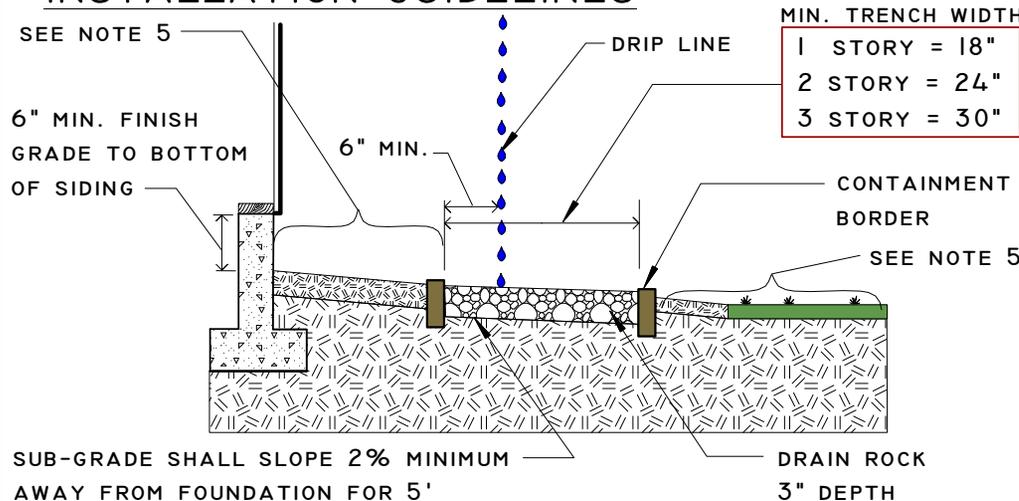


| BAFFLE SPACING ON ROCK ARMOR | SLOPE % |
|------------------------------------|------------|
| N/A | 0-10 |
| 10' | 10 |
| 5' | 15 |

CONSTRUCTION NOTES

- UNLESS SPECIFIED OTHERWISE, THE MINIMUM TRENCH WIDTHS SHOWN IN THE INSTALLATION GUIDELINES REFLECT THE MINIMUM REQUIREMENTS FOR THE BMP RETROFIT ORDINANCE. SEE BMP-002 FOR DETAILS OF TRENCHES LOCATED UNDER ROOF VALLEYS.
- ARMOR SOIL WITH A 3" MINIMUM CONTINUOUS LAYER OF ROCK. WASHED 3/4" TO 1 1/2" DRAIN ROCK OR COBBLE IS RECOMMENDED. NATIVE ROCK CAN BE SUBSTITUTED IF AVAILABLE.
- ON SLOPED DRIP LINES OVER 10%, CONTAIN THE DRAIN ROCK WITH BAFFLES AS SHOWN OR SUBSTITUTE LARGER RIPRAP FOR DRAIN ROCK. AN ALTERNATIVE PRACTICE IS TO CONSTRUCT A SWALE OR SUBSURFACE DRAIN TO COLLECT AND CONVEY RUNOFF TO AN INFILTRATION SYSTEM LOCATED A MINIMUM OF 10' AWAY FROM THE FOUNDATION. SEE BMP-004 AND BMP-005 FOR DETAILS.
- CONTAINMENT BORDERS ARE REQUIRED. OPTIONS FOR MATERIALS INCLUDE PRESSURE TREATED LUMBER, RECYCLED COMPOSITES, BRICK, STONE, COBBLE, OR OTHER LANDSCAPE EDGING MATERIAL. FIRE DEFENSIBLE SPACE GUIDELINES FOR LAKE TAHOE RECOMMEND A NON-COMBUSTIBLE AREA WITHIN 5 FEET OF A STRUCTURE. COMBUSTIBLE MATERIAL SHALL NOT CONNECT FROM THE BORDER TO THE STRUCTURE.
- CONSULT WITH YOUR LOCAL FIRE PROTECTION DISTRICT WHEN LANDSCAPING NEAR STRUCTURES. VISIT WWW.LIVINGWITHFIRE.INFO/TAHOE FOR GUIDELINES ON THE DEFENSIBLE SPACE ZONE.
- REGULARLY SCHEDULED MAINTENANCE IS NECESSARY TO MAINTAIN FULL FUNCTION. MAINTENANCE INCLUDES INSPECTION, REMOVAL, AND PROPER DISPOSAL OF PINE NEEDLES AND ACCUMULATED SEDIMENT.

INSTALLATION GUIDELINES



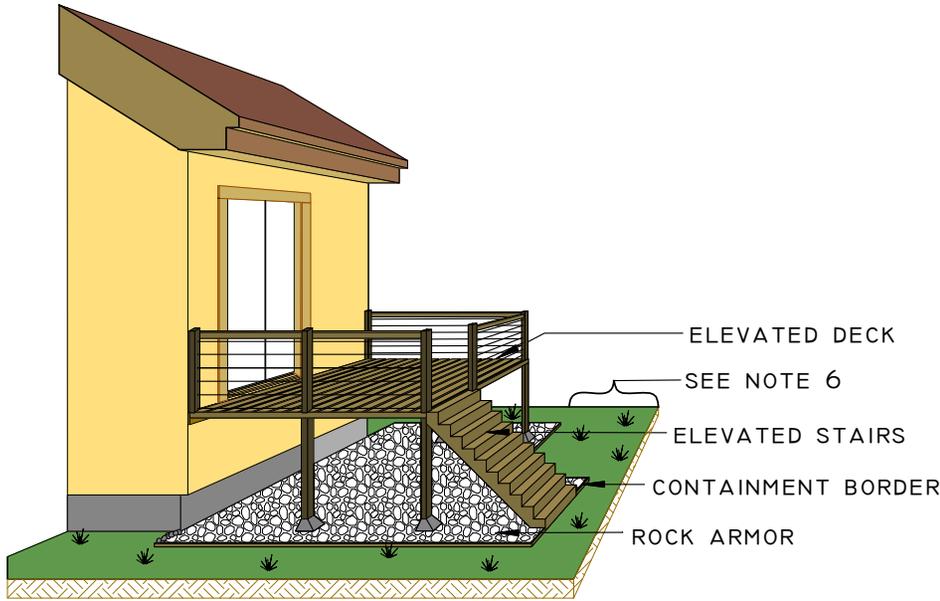
US DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

IN COOPERATION WITH
**NEVADA TAHOE CONSERVATION DISTRICT, AND
TAHOE RESOURCE CONSERVATION DISTRICT**

| | |
|-----------------------|----------------------|
| DRAWN BY: DMGG/MPB | APPROVED BY: DATE |
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CONSTRUCTION NOTES

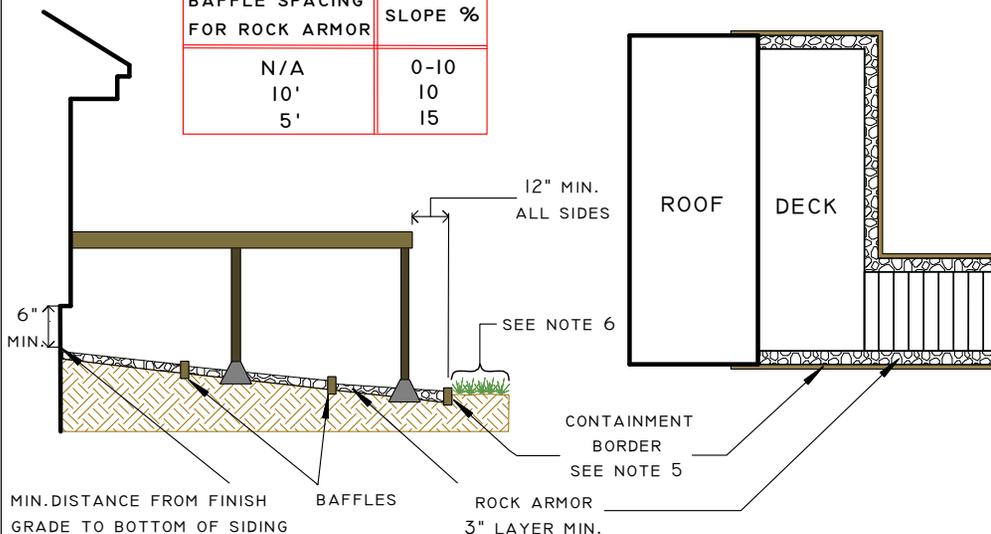
1. SUB-GRADE SHALL SLOPE 2% MINIMUM AWAY FROM FOUNDATION FOR 5'.
2. PLACE ROCK ARMOR BELOW THE ENTIRE ELEVATED STRUCTURE FOOTPRINT AND EXTEND 12" OUT FROM THE PERIMETER. INACCESSIBILITY MAY LIMIT TREATMENT UNDER ENTIRE FOOTPRINT.
3. 3/4" TO 1 1/2" DRAIN ROCK OR COBBLE IS RECOMMENDED FOR ROCK ARMOR ON SLOPES BETWEEN 0 AND 15%. INSTALL BAFFLES AS SHOWN TO CONTAIN ROCK ON SLOPES BETWEEN 10% AND 15%. NATIVE ROCK CAN BE SUBSTITUTED IF AVAILABLE. USE ROCK SLOPE PROTECTION ON STEEPER SLOPES. SEE BMP-040 AND BMP-041 FOR DETAIL.
4. FINISH GRADE OF ROCK SHALL BE AT LEAST 6" BELOW WOOD SIDING TO MAINTAIN EARTH TO WOOD SEPARATION REQUIRED BY LOCAL BUILDING CODES.
5. CONTAINMENT BORDERS ARE REQUIRED. OPTIONS FOR MATERIALS INCLUDE PRESSURE TREATED LUMBER, RECYCLED COMPOSITES, BRICK, STONE, COBBLE, OR OTHER LANDSCAPE EDGING MATERIAL. FIRE DEFENSIBLE SPACE GUIDELINES FOR LAKE TAHOE RECOMMEND A NON-COMBUSTIBLE AREA WITHIN 5 FEET OF A STRUCTURE. COMBUSTIBLE MATERIAL SHALL NOT CONNECT FROM THE BORDER TO THE STRUCTURE.



6. CONSULT WITH YOUR LOCAL FIRE PROTECTION DISTRICT WHEN LANDSCAPING NEAR STRUCTURES. VISIT WWW.LIVINGWITHFIRE.INFO/TAHOE FOR GUIDELINES ON THE DEFENSIBLE SPACE ZONE.
7. REMOVE PINE NEEDLES AND ACCUMULATED SEDIMENT TO MAINTAIN FULL FUNCTION. KEEP AREA CLEAR OF STORED MATERIALS SUCH AS FIREWOOD, LUMBER, HOUSEHOLD ITEMS, ETC.

INSTALLATION GUIDELINES

| BAFFLE SPACING FOR ROCK ARMOR | SLOPE % |
|-------------------------------|---------|
| N/A | 0-10 |
| 10' | 10 |
| 5' | 15 |



U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
IN COOPERATION WITH
**TAHOE RESOURCE CONSERVATION DISTRICT, AND
NEVADA TAHOE CONSERVATION DISTRICT**

| | | |
|-----------|--------------|------|
| DRAWN BY: | APPROVED BY: | DATE |
| DMGG/CLT | | |

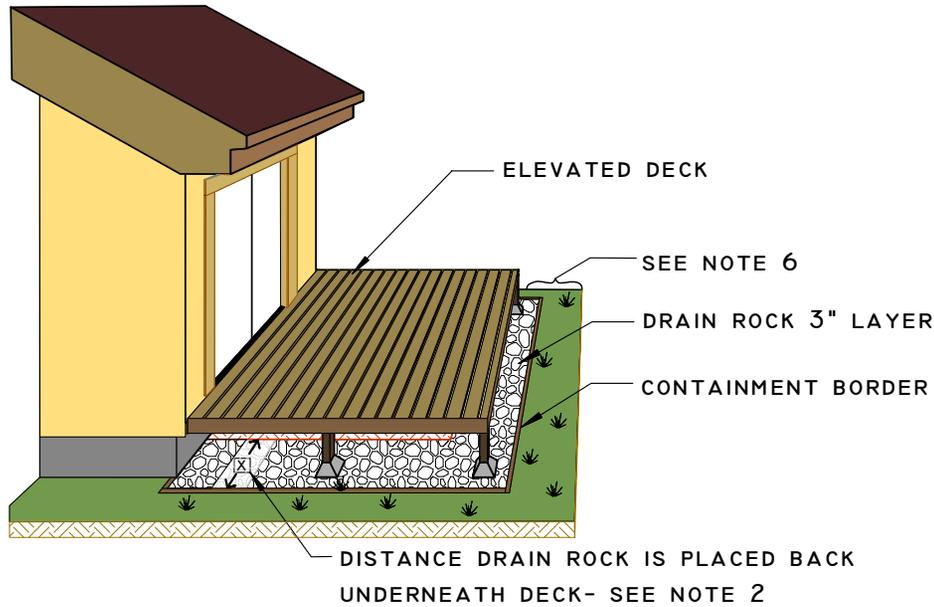
THIS STANDARD DRAWING IS BASED ON A REFERENCE TO THE NRCS STANDARD PRACTICE 570 - STORMWATER RUNOFF CONTROL. THIS DRAWING IS INTENDED TO ASSIST THE DESIGNER IN PREPARATION OF A COMPLETE SITE SPECIFIC DESIGN, AND IT IS NOT TO REPLACE THE INDEPENDENT JUDGMENT AND ANALYSIS BY A QUALIFIED DESIGNER.

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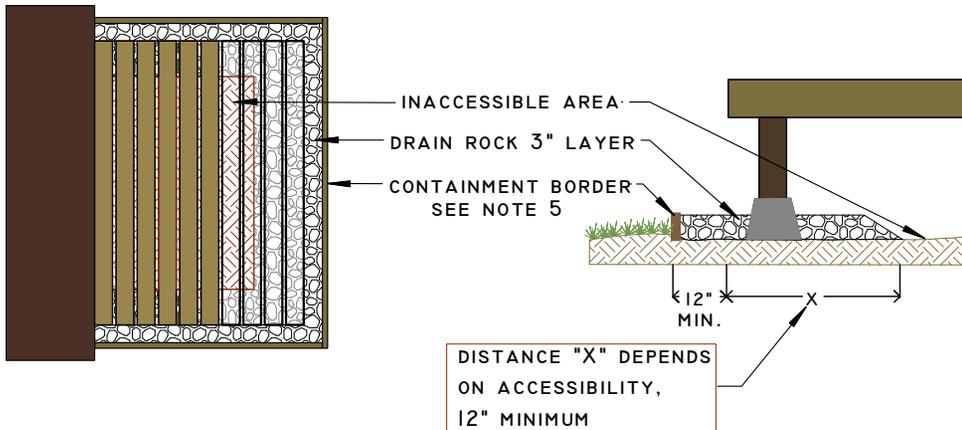
(RESIDENTIAL USE ONLY)
BEST MANAGEMENT PRACTICE
**EROSION CONTROL
FOR LOW ELEVATED STRUCTURES**

CONSTRUCTION NOTES

1. SUB-GRADE SHALL SLOPE 2% MINIMUM AWAY FROM FOUNDATION FOR 5'.
2. PLACE ROCK ARMOR AS FAR BACK UNDER THE LOW ELEVATED STRUCTURE AS POSSIBLE. INACCESSIBILITY MAY LIMIT TREATMENT UNDER THE ENTIRE FOOTPRINT. EXTEND ROCK ARMOR 12" OUT FROM THE PERIMETER OF THE STRUCTURE.
3. 3/4" TO 1 1/2" DRAIN ROCK OR COBBLE IS RECOMMENDED FOR ROCK ARMOR. NATIVE ROCK CAN BE SUBSTITUTED IF AVAILABLE. USE RIP RAP ON STEEPER SLOPES.
4. FINISH GRADE OF DRAIN ROCK SHALL BE AT LEAST 6" BELOW WOOD SIDING TO MAINTAIN WOOD AND EARTH SEPARATION REQUIRED BY LOCAL BUILDING CODES.
5. CONTAINMENT BORDERS ARE REQUIRED. OPTIONS FOR MATERIALS INCLUDE PRESSURE TREATED LUMBER, REDWOOD, RECYCLED COMPOSITES, BRICK, STONE, COBBLE, OR OTHER LANDSCAPE EDGING MATERIAL. FIRE DEFENSIBLE SPACE GUIDELINES FOR LAKE TAHOE RECOMMEND A NON-COMBUSTIBLE AREA WITHIN 5 FEET OF A STRUCTURE. COMBUSTIBLE MATERIAL SHALL NOT CONNECT FROM THE BORDER TO THE STRUCTURE.
6. CONSULT WITH YOUR LOCAL FIRE PROTECTION DISTRICT WHEN LANDSCAPING NEAR STRUCTURES. VISIT WWW.LIVINGWITHFIRE.INFO/TAHOE FOR GUIDELINES ON THE DEFENSIBLE SPACE ZONE.
7. REMOVE PINE NEEDLES AND ACCUMULATED SEDIMENT TO MAINTAIN FULL FUNCTION. KEEP AREA CLEAR OF STORED MATERIALS SUCH AS FIREWOOD, LUMBER, HOUSEHOLD ITEMS, ETC.



INSTALLATION GUIDELINES

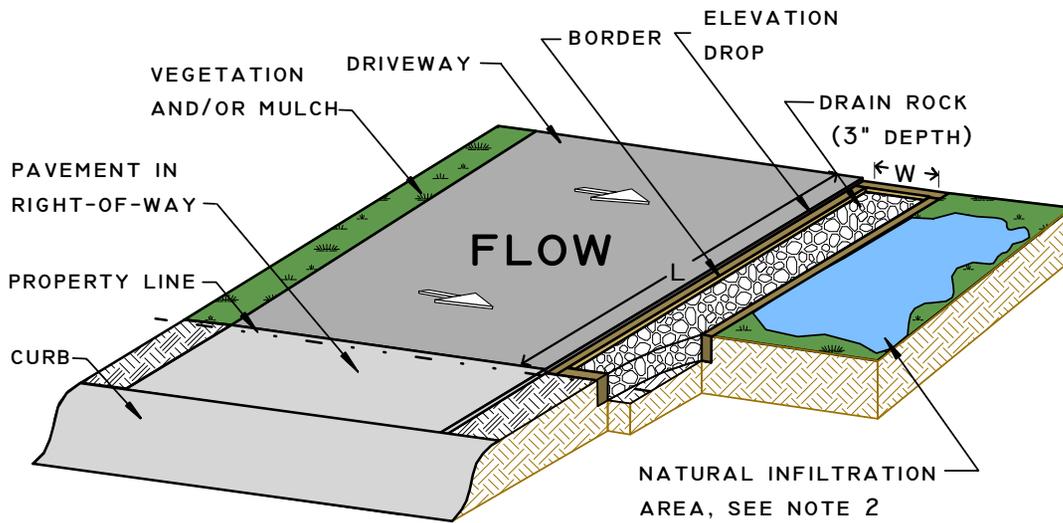


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| U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE IN COOPERATION WITH | | |
| TAHOE RESOURCE CONSERVATION DISTRICT, AND NEVADA TAHOE CONSERVATION DISTRICT | | |
| DRAWN BY: | APPROVED BY: | DATE |
| DMGG | | |

THIS STANDARD DRAWING IS BASED ON A REFERENCE TO THE NRCS STANDARD PRACTICE 570 - STORMWATER RUNOFF CONTROL. THIS DRAWING IS INTENDED TO ASSIST THE DESIGNER IN PREPARATION OF A COMPLETE SITE SPECIFIC DESIGN, AND IT IS NOT TO REPLACE THE INDEPENDENT JUDGMENT AND ANALYSIS BY A QUALIFIED DESIGNER.

USDA IS AN EQUAL OPPORTUNITY PROVIDER AND EMPLOYER

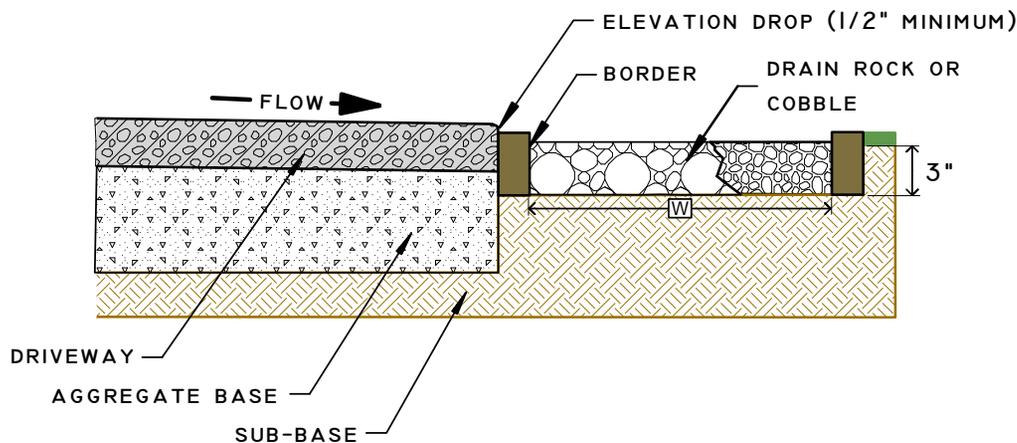
(RESIDENTIAL USE ONLY)
BEST MANAGEMENT PRACTICE
DRIVEWAY EDGE ARMOR



CONSTRUCTION NOTES

1. THIS PRACTICE APPLIES TO DRIVEWAYS THAT DO NOT REQUIRE A CONVEYANCE TO CAPTURE RUNOFF. THE DRIVEWAY MUST UNIFORMLY SLOPE 2% MIN. TOWARD THE SIDE AND WATER CANNOT LEAVE THE SITE. SEE BMP-003 FOR DETAILS ON ALTERNATIVE PRACTICES THAT CAPTURE, CONVEY AND TREAT RUNOFF.
2. REFER TO THE BMP "SITE EVALUATION RECOMMENDED TREATMENTS" FORM FOR SITE SPECIFIC BMP DIMENSIONS AND ASSOCIATED NATURAL INFILTRATION TREATMENT AREA THAT APPLIES TO YOUR SITE.
3. BORDER NEXT TO DRIVEWAY MUST BE PLACED LOWER THAN DRIVEWAY SURFACE ELEVATION TO ALLOW RUNOFF TO ENTER SYSTEM EVENLY.
4. ARMOR SOIL WITH A 3" MINIMUM CONTINUOUS LAYER OF ROCK. WASHED 3/4" TO 1 1/2" DRAIN ROCK OR COBBLE IS RECOMMENDED. NATIVE ROCK CAN SUPPLEMENT DRAIN ROCK OR BE SUBSTITUTED IF AVAILABLE.
5. CONTAINMENT BORDERS ARE REQUIRED. OPTIONS FOR MATERIALS INCLUDE PRESSURE TREATED LUMBER, RECYCLED COMPOSITES, BRICK, STONE, COBBLE, OR OTHER LANDSCAPE EDGING MATERIAL. FIRE DEFENSIBLE SPACE GUIDELINES FOR LAKE TAHOE RECOMMEND A NON-COMBUSTIBLE AREA WITHIN 5 FEET OF A STRUCTURE. COMBUSTIBLE MATERIAL SHALL NOT CONNECT FROM THE BORDER TO THE STRUCTURE.
6. *REGULARLY SCHEDULED MAINTENANCE IS NECESSARY TO MAINTAIN FULL FUNCTION. MAINTENANCE INCLUDES INSPECTION, REMOVAL, AND PROPER DISPOSAL OF DEBRIS, PINE NEEDLES AND ACCUMULATED SEDIMENT.*

INSTALLATION GUIDELINES



U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

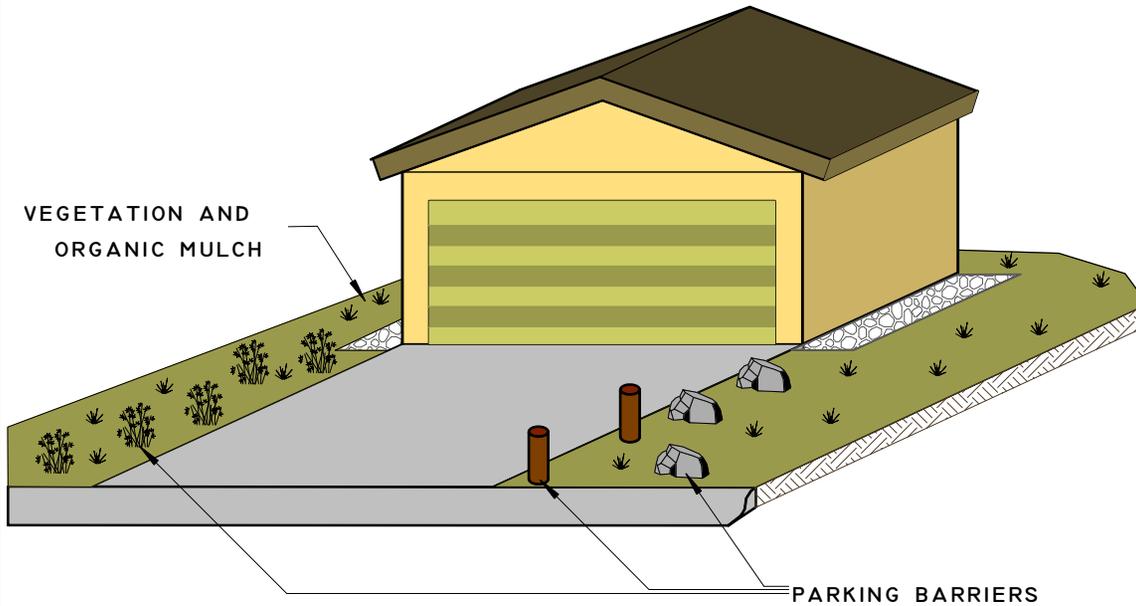
IN COOPERATION WITH
**TAHOE RESOURCE CONSERVATION DISTRICT, AND
NEVADA TAHOE CONSERVATION DISTRICT**

| | | |
|-----------|--------------|------|
| DRAWN BY: | APPROVED BY: | DATE |
| DMGG/MPB | | |

THIS STANDARD DRAWING IS BASED ON A REFERENCE TO THE NRCS STANDARD PRACTICE 570 - STORMWATER RUNOFF CONTROL.

THIS DRAWING IS INTENDED TO ASSIST THE DESIGNER IN PREPARATION OF A COMPLETE SITE SPECIFIC DESIGN, AND IT IS NOT TO REPLACE THE INDEPENDENT JUDGMENT AND ANALYSIS BY A QUALIFIED DESIGNER. INFILTRATION SYSTEM SIZING IS CALCULATED BASED ON THE HYDRAULIC CONDUCTIVITY OF THE SOILS ON SITE AND VOLUME OF RUNOFF BEING CAPTURED.

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CONSTRUCTION NOTES

1. PARKING BARRIERS SHALL BE PLACED TO RESTRICT VEHICULAR ACCESS ON DISTURBED SOIL AREAS.

BOULDERS:

BOULDERS SHALL BE GREATER THAN 18" DIAMETER AND BE KEYED IN TO THE SOIL A MINIMUM OF 6"

POSTS:

WOOD POSTS SHALL BE A MINIMUM OF 2' ABOVE GRADE, AND ANCHORED IN A CONCRETE FOOTING

SHRUBS OR WELL ESTABLISHED VEGETATION:

THIS PARKING BARRIER IS NOT RECOMMENDED IN AREAS USED FOR SNOW STORAGE

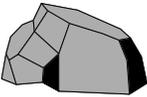
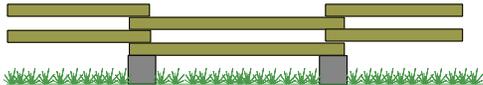
FENCING

POSTS SHALL BE ANCHORED IN A CONCRETE FOOTING

2. INFORMATION ON REHABILITATING DISTURBED SOIL AREAS CAN BE FOUND ON THE NRCS "DIRECT SEEDING OF DISTURBED AREAS" TIP SHEET.

3. *REGULARLY SCHEDULED MAINTENANCE INCLUDING SERVICE, REPAIR, OR REPLACEMENT OF COMPONENTS IS NECESSARY TO MAINTAIN FULL FUNCTION.*

TYPICAL PARKING BARRIERS

| | |
|---|--|
|  <p>BOULDERS</p> |  <p>SHRUBS OR WELL ESTABLISHED VEGETATION</p> |
|  <p>WOOD POSTS</p> | <p>FENCING</p>  |

| | | |
|---|--------------|------|
| U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE IN COOPERATION WITH TAHOE RESOURCE CONSERVATION DISTRICT, AND NEVADA TAHOE CONSERVATION DISTRICT | | |
| DRAWN BY: | APPROVED BY: | DATE |
| SKB | | |

THIS STANDARD DRAWING IS BASED ON A REFERENCE TO THE NRCS STANDARD PRACTICE 561 - HEAVY USE AREA PROTECTION SYSTEMS.

THIS DRAWING IS INTENDED TO ASSIST THE DESIGNER IN PREPARATION OF A COMPLETE SITE SPECIFIC DESIGN, AND IT IS NOT TO REPLACE THE INDEPENDENT JUDGMENT AND ANALYSIS BY A QUALIFIED DESIGNER.

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Materials Calculator

in Cubic Yards

For calculating drain rock quantities at a 3" depth

| Width of treatment | Linear Feet | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|--------------------|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | 18 inches | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 |
| 24 inches | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.4 | 0.4 |
| 30 inches | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.4 | 0.4 | 0.4 | 0.4 | 0.5 |
| (5 feet) | | | | | | | | | | | | | | | | | |
| 60 inches | 0.2 | 0.3 | 0.3 | 0.4 | 0.4 | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 | 0.7 | 0.7 | 0.7 | 0.8 | 0.8 | 0.9 | 0.9 |

| Width of treatment | Linear Feet | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 |
|--------------------|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | 18 inches | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.5 | 0.5 | 0.5 |
| 24 inches | 0.4 | 0.4 | 0.4 | 0.4 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.7 |
| 30 inches | 0.5 | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.7 | 0.7 | 0.7 | 0.7 | 0.8 | 0.8 | 0.8 | 0.8 |
| (5 feet) | | | | | | | | | | | | | | | | | |
| 60 inches | 1.0 | 1.0 | 1.1 | 1.1 | 1.2 | 1.2 | 1.3 | 1.3 | 1.3 | 1.3 | 1.4 | 1.4 | 1.5 | 1.5 | 1.6 | 1.6 | 1.7 |

| Width of treatment | Linear Feet | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
|--------------------|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | 18 inches | 0.5 | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.7 | 0.7 | 0.7 |
| 24 inches | 0.7 | 0.7 | 0.7 | 0.7 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 |
| 30 inches | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.1 | 1.1 | 1.1 | 1.1 | 1.2 |
| (5 feet) | | | | | | | | | | | | | | | |
| 60 inches | 1.7 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.1 | 2.1 | 2.2 | 2.2 | 2.3 | 2.3 |

Use this calculation sheet to determine minimum BMP drip line treatments or to determine the amount of drain rock needed for rock armoring in the five-foot non-combustible area. Measure the length of the eaves for drip line calculations or along the foundation or footings of building structures for fire defensible space calculations. When adding linear feet for fire defensible space, subtract 5 feet from inside corners and add 5 feet to outside corners of structures. Find this length on the calculation sheet and coordinate it with the width criteria. Drip line treatments must extend a minimum of 6" inside and 12" beyond the drip line of a single story roof (18" total), 18" of a two-story roof (24" total), and 24" of a three-story roof (30" total). Local fire defensible space requirements include a five-foot non-combustible soil surface treatment, such as turf or rock, around the perimeter of building structures.

$$(\text{Length in Feet} \times \text{Width in Feet} \times \text{Depth in Feet}) / 27 = \text{Cubic Yards}$$



TRCD / NRCS
 870 Emerald Bay Road
 Suite 108
 South Lake Tahoe, CA 96150
 Phone: 530-543-1501 x 113
 Fax: 530-543-1660



The Tahoe Resource Conservation District asks for your assistance in helping us to continue keeping our services free of charge to landowners like you. We are asking you to allow us to release your BMP Retrofit Site Evaluation to our funding agencies. Once you have signed below please return either by fax (530-543-1660) or mail (870 Emerald Bay Rd, Suite #108 SLT, CA 96150).

PRIVACY POLICY for the Backyard Conservation and BMP Retrofit Program

The information provided to and complied by the *Tahoe Resource Conservation District*, in partnership with USDA is confidential until the landowner allows for its release*. This policy is followed for all work completed by the District, including Best Management Practices (BMP) Retrofit site evaluations.

WHAT BENEFITS ARE THERE TO RELEASING MY BMP SITE EVALUATION PLANNING INFORMATION?

If you allow the District to release your BMP site evaluation, we will be able to work with you from design to certification. The District has been given the authority by the Tahoe Regional Planning Agency (TRPA) to complete Certificate of Completion inspections for landowners that we have worked with.

Also, if you authorize the release of your BMP site evaluation, it will be posted on a web-based database that may be viewed by you, or your agent (realtor, contractor, or your designated property manager). This may help you to transfer documents quickly in order to complete real estate transactions, or to communicate quickly with a number of contractors to obtain bids.

If you do not release this information, be advised that once you have installed your BMPs as prescribed in your site evaluation to improve water quality, the *Tahoe Regional Planning Agency* will require that you release the 'Site Evaluation' to them, in order for them to accept your installation and send you a *Certificate of Completion* showing that you have met their Ordinance requirements.

AUTHORIZATION TO RELEASE BMP SITE EVALUATION INFORMATION

I hereby give authorization to the Tahoe Resource Conservation District to release my BMP site evaluation information to any person who requests it. I understand that upon this release the BMP information becomes a matter of public record and is accessible to anyone who requests that information under the California Public Records Act.

X _____.

Printed Name _____ DATE _____

Property Address _____

Mailing Address _____

Telephone # home: _____ mobile: _____

* Confidentiality based on rights outlined in the Privacy Act of 1974 and the protection of my personal information under USDA, NRCS General Manual Part 408.



Yard Fertility Management

USDA, Natural Resources Conservation Service

What is Yard Fertility Management?

Fertility Management in your yard and garden means maintaining a healthy plant and soil environment by supplying the right amount of nutrition, in the right place, at the right time.



Plant Nutrition

Twenty nutrients have been identified that are required by plants. Of these, nitrogen, phosphorus, and potassium are required in relatively large amounts. Nitrogen stimulates vegetative growth, phosphorus encourages flowering and fruiting, and potassium helps a plant resist stress and disease.

Calcium, sulfur, and magnesium are also required in comparatively large quantities. These six nutrients are referred to as macronutrients. The other nutrients, referred to as micronutrients, are required in very small amounts. These include such elements as copper, zinc, iron, and boron. While both macro and micronutrients are required for good plant growth, over-application can be as detrimental as a deficiency. Over-application of plant nutrients not only may impair plant growth and increase its susceptibility to pest but may contaminate groundwater by leaching through the soil or pollute surface waters by washing away.

Fertilizers and Soil Amendments

All fertility supplements, both natural and chemical, have the potential to impair water quality if used in excessive amounts. You can eliminate or minimize your dependence on fertilizer by landscaping with the many beautiful native and adapted grasses, shrubs, and trees that have little need for fertility supplements. When fertility supplements are necessary, consider alternatives to chemical fertilizers such as compost and mulching of lawn clippings. Organic soil amendments are easy to use, safer for the environment and the gardener, and can save you time and money!

Fertilizing With Compost

Compost supplies essential plant nutrients, including micro nutrients not found in most mineral and chemical fertilizers, and is especially beneficial in improving the condition of the soil. By keeping the soil loose, compost allows plant roots to grow well throughout the soil, allowing them to extract nutrients from a larger area. A loose soil enriched with compost is an excellent habitat for earthworms and other beneficial soil microorganisms that are essential for releasing nutrients for plant use. Fertilizing with compost adds organic material to the soil which increases the soil's water holding capacity and reduces the need for frequent watering. The nutrients from mature or stable compost are also released slowly so there is little concern for "burning" the plant with an over-application.

If preparing a bed before planting, compost may be worked into the soil to a depth of 6 to 12 inches. If adding to existing plants, carefully work the compost into the upper 2 to 3 inches of soil around the base of the plants.

Compost can also be applied to a lawn: Using high quality fine textured compost apply a thin layer (less than 1/4 inch) to the lawn and spread with a rake. When compost is distributed evenly, water for 15 to 20 minutes. After this, water your lawn as you normally would but allow seven to eight days before mowing.



Mulching of lawn clippings

Leaving grass clippings on the lawn, when done properly, provides many benefits including:

- ✓ Shading the surface of the soil which helps prevent moisture loss
- ✓ Help decompose thatch
- ✓ Saves time and energy from raking and reduces waste sent to landfill.

- ✓ **Can provide up to 2 lbs (a years worth) of Nitrogen annually!**
- ✓ Provides Phosphorus and Potassium

Lawn clippings are very high in nitrogen and clippings less than one inch in length break down rapidly and actually help decompose thatch. A good rule of thumb is to mow when your grass is dry and 3 to 3-1/2 inches tall. Never cut it shorter than 2 to 2-1/2 inches or remove more than one third of the leaf surface at any one mowing. If you must mow when the grass is wet or remove more than one inch, clippings should be removed and composted. See the Backyard Conservation tip sheet for *Yard Waste Composting*.

Mineral and Synthetic Fertilizer

If mineral or synthetic fertilizer is selected for use, its application should be tailored to the needs of the plants and the soils in your area. Over application of phosphorus is a concern for Tahoe soils. Phosphorus is a highly mobile nutrient and can easily be leached out of our coarse textured soils or carried by runoff into waterways causing algae blooms. Therefore fertilizers with little to no phosphorus are recommended for the Lake Tahoe Basin. Too much fertilizer or fertilizer applied when the plant is not actively growing will move beyond the root zone before it can be used, resulting in wasted money and potential pollution.

Mineral and Synthetic Fertilizers are available in many different formulations. All fertilizers will be labeled with a “guaranteed analysis” which shows the percentage of nitrogen, phosphorus, and potassium. A formulation recommended for Tahoe soils is 27-0-12. This fertilizer contains 27% N, 0% P, and 12% K.

Be sure to choose the right fertilizer formulation for your needs. Plants differ in their nutritional needs and a fertilizer developed for vegetables will not be appropriate for lawns or shrubs. For chemical fertilizer use, pelletized slow release fertilizers are the best choice for most lawn and garden situations.

When fertilizing lawns in the early summer and late summer, apply only 1/2 to 3/4 pound of actual nitrogen per 1000 square feet of lawn on each application (maximum of 2 applications per year).

Timing

For the most efficient use and to decrease the potential for pollution, fertilizer should be applied when the plants have the greatest need for the nutrients. Plants that are not actively growing do not have a high requirement for nutrients. Therefore, applications of nutrients to dormant plants, or plants growing slowly due to cool temperatures, are more likely to be wasted. Late season applications of nitrogen fertilizers are not recommended for the cold climate of the Lake Tahoe Basin. Since nitrogen encourages vegetative growth, if it is applied in the fall it may reduce the plant's ability to harden properly for winter and leave the plant more susceptible to early frosts.

Safe and Effective Fertility Management

- ✓ Choose the right fertility amendment for your needs and apply in the right amount at the right time.
- ✓ Sweep up any fertility amendment spilled on hard surfaces and reapply to the grass or garden area.
- ✓ **Do not use any fertilizer within 25 feet of a stream or riparian area.**
- ✓ Never apply fertilizers to frozen ground or snow.
- ✓ Leave a natural filter strip of grass, trees, and/or shrubs next to the shoreline.
- ✓ Do not over water! Too much water will leach nutrients out of the root zone before they can be used. See our *Turf Water Management* tip sheet for more information.
- ✓ When in doubt do not hesitate to contact your local conservation district or the NRCS for additional advice.

For Further Information Contact:

In Nevada

Nevada Tahoe Conservation District
775-586-1610 x 28

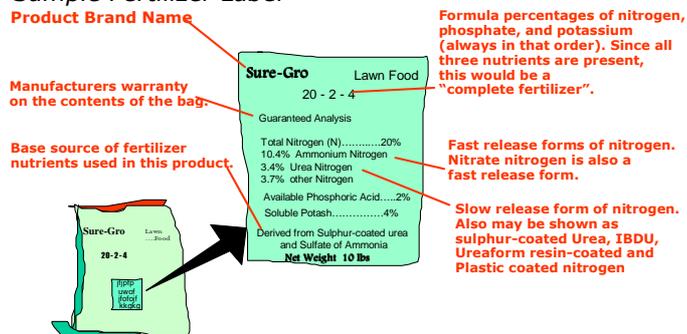
In California

Tahoe Resource Conservation District
530-543-1501

Or

Natural Resources Conservation Service
530-543-1501

Sample Fertilizer Label



Appendix F: Soil Infiltration Investigation Report

Soil Investigations on public lots within the project area:

In 2012 the NRCS, Tahoe RCD and the TBI joined together to investigate soil characteristics on selected public lots within the city of South Lake Tahoe. The purpose of these investigations was to begin discussion about the suitability of these undeveloped lots for installation of storm water treatment facilities such as infiltration basins. Two main soil characteristics or attributes were examined to help determine suitability. These attributes were Saturated Hydraulic Conductivity (Ksat) and depth to restrictive feature such as a high water table or a fragipan.

The dominant soil series in the test area are Jabu, Christopher, and Marla. These soils are derived from glacial outwash, are typically sandy loam in texture and gently sloping. The Jabu soils do have fragipans and high water tables associated with the pan. Marla soils are wetter/shallower to a seasonal high water table but lack the fragic properties of the Jabu series. Christopher soils are coarser in texture, lack the shallow water table and the pan, and barring compaction tend to be the most permeable of the three. All three of these soil types, and the soils in this area in general, tend to be susceptible to compaction, especially if disturbance happens when the soils are moist.

A constant head permeameter (chp) was used to determine the ksat for each lot. The chp is simply a modified Mariotte bottle that was designed for quick accurate assessment of Ksat in field situations. The reported Ksat was determined by taking multiple test measurements at each lot. This was done to help account for the highly variable nature of Ksat on a landscape. Testing depth was approximately 12 inches.

The depth to a seasonal high water table was determined by soil investigations using a bucket auger and examining for redox features. The redox features are assumed to represent a seasonal high water table of significance as redox features take time to develop. In other words, the redox features indicate that water was at that level long enough for these features to form. This does not mean that there will be a water table at that depth every year, but that in the past, there has been a water table there for some length of time.

The results revealed fairly consistent numbers in Ksat throughout the area. About 2 inches per hour was common for these locations. The slowest sites measured approximately 1"/hour while the fastest site was over of 11"/hr. Two inches/hour may seem like a low number, however, this is a reasonable number for most parts of the county for things like septic design. Eleven inches/hour on the other hand, in some parts of the country, would not be permitted to install septic systems due to their rapid permeability and perceived lack of filtration. Fragipans and seasonal high water tables were observed on several of the lots. Frequently the depth of observation was limited, large rocks within the soil profile for example. Therefore, fragipans and seasonal high water tables may exist but below the observed depth.

| Parcel | Ownership | CHP A | CHP B | CHP C | CHP D | CHP AVG | Fragipan inches | SHWT inches | Characteristic Vegetation | Comments |
|--------|-----------|-------|-------|-------|-------|---------|-----------------|-------------|--|--|
| 1 | ■ | 0.4 | 1.5 | 3.6 | 2.0 | 1.9 | 32 | | Jeffery, Lodgepole, White fir, Mule's ear | Weak pan |
| 2 | ■ | 2.5 | 3.6 | 3.6 | 1.7 | 2.8 | 24 | 8 | Jeffery, few Lodgepole, White fir, Mule's ear, grass, Scouler willows nearest to D | Pan measured at A/B, Redox measured at C/D. Slope down towards stream bed from A-D |
| 3 | ■ | 2.5 | 6.0 | | | 4.3 | | Surface | Mule's ear, lodgepole, rose, incense cedar up slope, reed and rush down slope | CHP sites at upward part of slope. Don't trust site 3A reading! |
| 4 | ■ | 4.5 | 3.0 | 2.5 | 3.0 | 3.3 | | | Jeffery, Mule's ear | Site A: originally water drained instantly, re-did this in new hole. |
| 5 | ■ | 10.0 | 13.0 | | | 11.5 | | | Same as Site 3 | *Adjacent to site 3, only one soil sample for both sites |
| 6 | ■ | 1.8 | 1.8 | | | 1.8 | | 12 | Jeffery, Lodgepole, White fir, Cinquefoil, Willow, Aspens, grass | One soil sample for 6/7 |
| 7 | ■ | 1.7 | 2.2 | | | 1.9 | | | Same as Site 6 | Same as Site 6 |
| 8 | ■ | 2.9 | 3.0 | 0.8 | 0.7 | 1.9 | | 36 | Sage brush, bitter brush, grass, mule's ear, white fir, Jeffery | Redox measured near site A |
| 9 | ■ | 0.8 | 2.8 | 2.5 | 3.8 | 2.4 | | | Jeffery, White fir, White thorn | Slope, dry soil |
| 10 | ■ | 5.0 | 0.2 | 0.8 | 4.0 | 2.5 | 29 | | Jeffery, White fir, Manzanita, White thorn | On top of hillside. Shallow Horizon A. C/D next to road. |
| 11 | ■ | 4.0 | 4.5 | 1.6 | 0.8 | 2.7 | | | Same as 10 | Same as 10 |

| Parcel | Ownership | CHP A | CHP B | CHP C | CHP D | CHP AVG | Fragipan inches | SHWT inches | Characteristic Vegetation | Comments |
|--------|-----------|-------|-------|-------|-------|---------|-----------------|-------------|--|---|
| 12 | ■ | 4.8 | 1.5 | 2.6 | 0.3 | 2.3 | 18 | | | |
| 13 | ■ | 0.1 | 1.0 | 2.5 | 2.0 | 1.4 | | | Bare undrestory, Jeffery on half of site, Lupin, Arrow-leaf balsam root, Butter and eggs | Flat site. Soil very sandy and dry, potential fragipan/ hard pan just below O Horizon |
| 14 | ■ | 0.8 | 4.8 | 1.4 | 0.7 | 1.9 | | 36 | Jeffery, Lodgepole, grass | Flat, grassy. Additional measurement at A/B site: 1.75 |
| 15 | ■ | 2.3 | 3.5 | 1.3 | 2.0 | 2.3 | | 27 | Lodgepole, forbes and grasses, roses | |
| 16 | ■ | 1.0 | 1.1 | | | 1.1 | | | Jeffery, Lodgepole, roses | |
| 17 | ■ | 3.5 | 2.1 | | | 2.8 | | 27 | Jeffery, few Lodgepole, rose bush, willow (may be planted), cheatgrass near Auger site | |
| 18 | ■ | 1.0 | 1.0 | | | 1.0 | 33 | 33 | Jeffery, Fir, grass | |
| 19 | ■ | 3.5 | 2.8 | | | 3.2 | | 18 | Jeffery, Lodgepole, mule's ear, grass | Adjacent to 18 |
| 20 | ■ | 1.3 | 1.9 | 0.1 | 3.6 | 1.7 | 36 | 36 | Jeffery, bitter brush, grasses and forbes | Weak pan |
| 21 | ■ | 3.7 | 0.4 | 0.4 | 0.2 | 1.2 | 36 | | Jeffery, bitter brush, grasses | Weak pan, compacted soil, low permeability. Flat |
| 22 | ■ | 2.8 | 0.8 | 3.5 | 1.5 | 2.1 | | 38 | A/B: Jefferys, firs, rose and currents. C/D: grasses/forbes, vetch | Only 1 flag found (A/B). Sites C/D chosen based on difference in vegetation (more grasses/forbes and vetch vs. Jefferys, firs, rose and currents) |

Established Series

Rev: WRL/ET

05/2007

CHRISTOPHER SERIES

The Christopher series consists of very deep, somewhat excessively drained soils that formed in glacial outwash derived from granodiorite. The Christopher soils are on glacial outwash terraces in the tahoe basin. Slopes range from 0 to 30 percent. The mean annual precipitation is about 660 millimeters and the mean annual air temperature is about 5 degrees C.

TAXONOMIC CLASS: Mixed, frigid Dystric Xeropsamments

TYPICAL PEDON: Christopher Loamy coarse sand on a southeast facing (136 degree), 3 percent slope at an elevation of 1981 meters. When described on 08/09/2002 the soil was dry throughout. Colors are for dry soils unless otherwise noted.

Oi--0 to 3 cm; Pine litter

A--3 to 20 cm; brown (10YR 5/3) loamy coarse sand, very dark grayish brown (10YR 3/2) moist; 85 percent sand; 14 percent silt; 1 percent clay; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; few very fine, fine and medium roots throughout; many very fine interstitial pores; 9 percent gravel; moderately acid, pH 6.0; abrupt smooth boundary. (8 to 25 cm thick)

Bw1--20 to 66 cm; yellowish brown (10YR 5/4) loamy coarse sand, brown (10YR 4/3) moist; 85 percent sand; 14 percent silt; 1 percent clay; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; few fine and common medium and very coarse roots throughout; many very fine interstitial pores; 2 percent cobbles 6 percent gravel; moderately acid, pH 5.7; clear smooth boundary.

Bw2--66 to 107 cm; yellowish brown (10YR 5/4) loamy coarse sand, dark yellowish brown (10YR 4/4) moist; 80 percent sand; 17 percent silt; 3 percent clay; moderate medium subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; few fine and medium roots throughout; many very fine interstitial pores; 2 percent cobbles 7 percent gravel; moderately acid, pH 5.9; clear wavy boundary.

Bw3--107 to 155 cm; yellowish brown (10YR 5/4) loamy coarse sand, dark yellowish brown (10YR 4/4) moist; 80 percent sand; 18 percent silt; 2 percent clay; moderate fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; few fine, very fine and very coarse roots throughout; many very fine interstitial pores; 9 percent gravel and 5 percent paracobbles; slightly acid, pH 6.1 (the combined thickness of the Bw horizons is 76 to 191 cm thick)

TYPE LOCATION: El Dorado County, California, 2418 feet south and 1849 feet west of Section 21, Township 12 N., Range 18 E., 38 degrees 52, minutes, 28.97 seconds north latitude and 119 degrees, 59 minutes, 37.41 seconds west longitude, NAD83 - U.S.G.S Quad: South Lake Tahoe, Calif. - Nev.

RANGE IN CHARACTERISTICS:

Soil moisture: usually moist between depths of about 12 and 35 inches but is dry in all parts from late June until mid-October

Soil temperature: 5 to 8 degrees C.

Control section:

Reaction: Strongly acid to Slightly acid.

Rock fragments: 1 to 15 percent, with 2 to 15 percent gravel, 0 to 10 percent cobbles and paracobbles, individual horizons have more fragments.

Clay content: averages 0 to 7 percent clay

Mineralogy: mixed

A horizon(s):

Hue: 10YR

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 3 or 4 dry; 2 or 3 moist

Organic matter: 1 to 5 percent

Texture (less than 2 mm): Loamy coarse sand or loamy sand

Clay content: 0 to 5 percent

Content of rock fragments: 1 to 30 percent

0 to 5 percent cobbles

1 to 10 percent gravel

Bw horizons:

Hue: 10YR

Value: 4 through 6 dry; 4 or 5 moist

Chroma: 3 or 4 dry; 3 or 4 moist

Organic matter: 0.25 to 1.25 percent

Texture (less than 2 mm): Loamy coarse sand or Loamy sand

Clay content: 0 to 7 percent

Content of rock fragments: 1 to 30 percent

0 to 10 percent cobbles

1 to 10 percent gravel

C horizon where present:

Hue: 10YR

Value: 4 through 6 dry; 4 or 5 moist
Chroma: 3 or 4 dry; 3 or 4 moist
Organic matter: 0.25 to 1 percent
Texture (less than 2 mm): Loamy coarse sand
Clay content: 1 to 5 percent
Content of rock fragments: 10 to 55 percent

COMPETING SERIES: These are the [Cagwin](#) and [Cassenai](#) soils. Cagwin is 20 to 40 inches to soft bedrock. Cassenai is formed in colluvium on mountainslopes and has 15 to 35 percent fragments in the control section.

GEOGRAPHIC SETTING: Christopher soils are on glacial outwash terraces. Slopes are 0 to 30 percent. These soils formed in colluvium, alluvium and glacial outwash weathered from granodiorite. Elevation is 1895 to 2090 meters. The climate is subhumid with cool dry summers and cold moist winters. Mean annual precipitation is 530 to 990 millimeters. The mean annual temperature is 5 to 8 degrees C. Frost free season is 40 to 90 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the [Gefo](#), [Jabu](#), [Marla](#) and [Oneidas](#) soils. The Gefo soils have an umbric epipedon. Jabu and Oneidas soils have argillic horizons. Marla is somewhat poorly drained.

DRAINAGE AND PERMEABILITY: Somewhat excessively drained; very low to medium runoff; rapid permeability. The soils are not flooded.

USE AND VEGETATION: This soil is used for wildlife, recreation, timber, and urban development. Vegetation is predominantly Jeffrey pine with an understory of green leaf manzanita, antelope bitter brush, mountain whitethorn, mahala mat, mules ear and lupin spp.

DISTRIBUTION AND EXTENT: These soils are of minor extent in the Tahoe Basin of California and Nevada in MLRA 22A.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Davis, California

SERIES ESTABLISHED: El Dorado County, (Tahoe Basin area), California. The Source of the name is from a local lake.

REMARKS:

Diagnostic horizons and features recognized in this pedon are:
Particle Size Control Section for this pedon: 28 to 103 cm, portions of the Bw1, Bw2, and Bw3

Appendix G: Streamkeepers Monitoring Report

**The South Lake Tahoe Streamkeepers
~ A Citizen Monitoring Group ~
Draft Summer 2012 Monitoring Report**



January 2013

Prepared by the Tahoe Resource Conservation District in concert with the Community
Watershed Partnership Program

Table of Contents

| | |
|-------|--|
| I. | Introduction..... |
| II. | Monitoring Goals and Objectives |
| III. | Summer 2012 Monitoring..... |
| IV. | Methodology and Materials |
| V. | Data Presentation and Discussion |
| VI. | Conclusion |
| VII. | Works Cited |
| VIII. | Appendix..... |

Introduction

The South Lake Tahoe Streamkeepers Citizen Monitoring Group (Streamkeepers) are a volunteer based citizen monitoring group that was created in partnership with the Tahoe Resource Conservation District (Tahoe RCD) and California Trout (CalTrout) in the Spring of 2012. Streamkeepers was developed in attempt to better educate and engage community members of South Lake Tahoe in the monitoring of their local watersheds through a series of annually reoccurring volunteer monitoring events.

The purpose of this initial report is to provide a complete program description of The South Lake Tahoe Streamkeepers and to present data collected during the 2012 Streamkeepers monitoring events.

Program Description

The mission of the Streamkeepers Monitoring Group is **to promote community stewardship through education, collaboration, and action.**

Streamkeepers is designed to encourage community members throughout the South Lake Tahoe region to become active environmental stewards. By providing volunteer experiences that are both educational and action oriented, the Streamkeepers seek to develop an ever-expanding base of citizen volunteers that can reliably provide watershed information to the Tahoe RCD and CalTrout as well as function autonomously as community stewards in their everyday life. The functional benefits of all Streamkeepers volunteer opportunities are designed to be two fold; to educate community members regarding current ecological conditions and resource issues in the community; and to capture sound scientific information that can be used to further the understanding of local ecosystems. In creating the educational components of volunteer opportunities, the Tahoe RCD compiles and organizes resources that are designed to provide volunteers with a sound cultural, scientific, and ecological understanding of the South Lake Tahoe watersheds.

The Streamkeepers program is also designed to assist partner organizations in the collection of stream habitat and water quality data. In the situation where partner organizations have the desire to capture information that is out of the capacity of their organization to do so, Streamkeepers seeks to identify those opportunities and provide volunteer assistance where appropriate. In utilizing the existing partnerships of the Tahoe RCD and CalTrout, Streamkeepers has the potential to be of a high degree of utility to those organizations with identified opportunities.

Streamkeepers was partially created to extend the efforts and capture engaged volunteers created through the event Snapshot Day. The long-standing annual water quality monitoring event occurs every spring and has historically recruited hundreds of volunteers, but rarely does participation continue through the summer and fall. It is speculated that participation slows over the summer as large scale monitoring events occur less frequently and small scale events are often less publicized. Acknowledging this decline in summer participation, Streamkeepers was created with the intention of retaining volunteer interest in watershed monitoring created through the efforts of Snapshot Day. It is standard procedure of Streamkeepers to contact all previous Snapshot Day volunteers that have expressed interest in watershed monitoring prior to any planned Streamkeepers event.

Monitoring Goals and Objectives

The primary goals of the Streamkeepers Citizen Monitoring Group are as follows:

- To better understand the physical and biological conditions of the watersheds in the South Lake Tahoe region
- To educate and empower citizens to become watershed stewards
- To aid watershed managers in the identification of restoration and/or conservation opportunities

The primary objectives of the Streamkeepers Citizen Monitoring Group are as follows:

- Produce an annual Streamkeepers Monitoring report to share with the public on the Tahoe RCD website
- Identify funding opportunities and secure long term financial support for citizen-based monitoring actions in the Lake Tahoe Basin
- Create targeted monitoring inquiries that can provide better understanding of watershed condition in relation to management practice, land use, and other natural occurrences within the watersheds of the South Lake Tahoe region
- Educate community members regarding watershed process and function in attempt to increase community-based stewardship action
- Identify existing organizational needs for watershed monitoring and incorporate interagency efforts into Streamkeepers events

Summer 2012 Monitoring

Tahoe RCD and CalTrout collaborated on three separate monitoring events during the field season of 2012. The first event was the 13th annual Lake Tahoe Snapshot Day held basin-wide on May 12th. Snapshot day is an annual volunteer-based monitoring event in early spring that utilizes volunteer groups to measure Lake Tahoe tributaries for water quality and habitat

integrity. The second and third collaborations were comprised of two separate Streamkeepers events on August 22nd and August 25th, respectively, which sought to measure stream conditions as well as map and treat invasive weeds. Physical and biological indicators related to stream bank stability, bed sediment, macroinvertebrates, and water quality were collected in three South Lake Tahoe locations during these events.

All Streamkeeper data collected in the summer of 2012 occurred at selected locations within the urban corridor of the Trout Creek Watershed. Although both Trout Creek and the Upper Truckee River were originally slated for monitoring during the 2012 summer field season, due to the lack of in-stream flow associated with the mild winter of 2012, only Trout Creek was sampled. The selection of Trout Creek was based upon the identification of The Trout Creek Watershed as a CWP focus areas for the summer 2012 field season. Community members in this sub-watershed were specifically targeted for participation in stewardship events through Tahoe RCD's network of social media, newsletter releases, press releases, and member lists. A complete description of the CWP program and focus areas can be accessed through the Tahoe RCD website (tahoercd.org).

A total of 11 participants appeared for the August 25th event. Volunteers were recruited by sending an invitation email to all CalTrout and Tahoe RCD volunteers, by posting an event flier on the Tahoe RCD website, and by posting fliers around the City of South Lake Tahoe. A group picture of all the participants from the August 25th event can be seen below in Figure 1.



Figure 1. South Lake Tahoe Streamkeepers Participants - 2012.

Watershed Background

The Trout Creek Watershed is the second largest watershed in the Lake Tahoe Basin (it occupies 13 percent of the total land area draining to Lake Tahoe) and is located primarily in the Eastern portion of El Dorado County and partially in the Western portion of Douglas County. The area of the watershed is 41.3 square miles and contains the main hydrologic features of Saxton Creek, Cold Creek, Trout Creek, and Heavenly Valley Creek. An image of the Trout Creek Watershed is presented below in Figure 2.

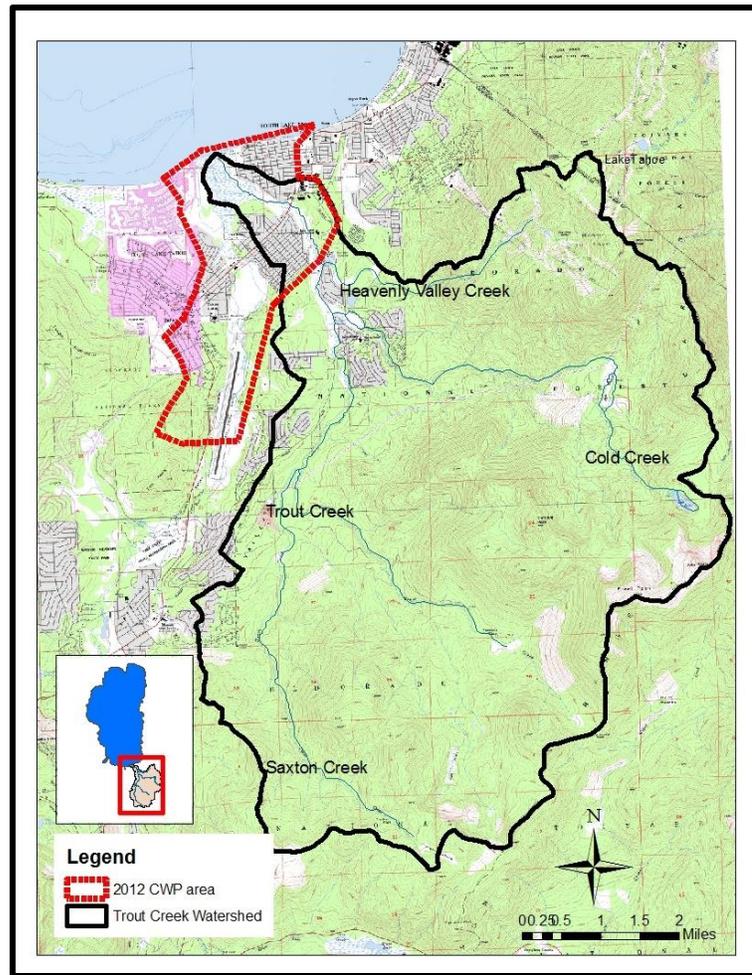


Figure 2. Trout Creek Watershed located in the southern portion of the Lake Tahoe Basin, California.

Trout Creek originates south of Freel Peak in the Carson Range of the Sierra Nevada mountain range. It converges with Saxon Creek in Lake Valley, with Cold Creek and Heavenly Valley Creek north of Pioneer Trail, and then enters the Upper Truckee Meadows before finally draining into Lake Tahoe (Rowe). The main channel length of Trout Creek is approximately 19.5 km long.

The watershed includes the residential areas of Al Tahoe, the Sierra Tract, Black Bartt, Montgomery Estates, Golden Bear, and Apalachee as well as the Montgomery Estates Community Watershed Planning Area. The southern portion of the watershed is primarily rural US Forest Service land, whereas the northern portion of the watershed consists of the urbanized City of South Lake Tahoe.

Trout creek was once one of the most productive fisheries in the Tahoe Basin and held special significance for the Washoe tribe. Trout Creek (*mathOcahuwO'tha* in Washoe, meaning "White Fish river") was an important fall camp for the tribe. Due to a growing population in Lake Valley and continued disturbances and degradation of fish populations and habitat, the tribe discontinued use of the Trout and Cold Creek area in the 1940's.

Small scale logging began in the Trout Creek area in 1859 and within the Tahoe Basin in the early 1860's to supply lumber for the silver mines in Virginia City, Nevada and the surrounding areas. Logging impacts within the Trout Creek watershed included 13 miles of railroad, 16 miles of wagon haul roads, two miles of "V" flume, and 28 logging camps. It is noted that the highest density and most severe erosion in the South Shore occurred along Trout and Saxon Creeks.

After the decline of the logging industry in Lake Valley, extensive grazing of cattle and sheep began to take place in the headwaters and riparian areas of the watershed. A ditch system and a series of small dams were developed along the tributaries on Trout and Cold creeks to water the meadows during dry summer months. By today's standards, impacts from sheep and cattle in the watershed would likely be excessive and unnecessary (Lindström, 2000).

Today, the Trout Creek Watershed is occupied by roughly 3160 single family and multiple family dwellings, and is commonly used by residents and visitors alike for swimming, fishing, biking, and dog walking. The creek is closely bordered by urban development in multiple areas including The Lake Tahoe Community College as well as the communities of Montgomery Estates, the Sierra Tract, and Al Tahoe. Within the southern portion of the watershed where Trout Creek winds through the urbanized corridor in The Upper Truckee Meadows, there are currently three separate roads that intersect and cross Trout Creek; Highway 50, Pioneer Trail, and Martin Ave. It is important to note, that where areas adjacent to the watershed are urbanized and contain a high density of residents, user trails along-side and leading up to the creek occur in a higher density and are more traveled upon than those in less developed areas of the watershed.

In accordance with the LRWQCB Basin Plan, Trout Creek is listed with the following beneficial uses: SPWN, MIGR, WILD, COLD, COMM, REC-1, REC-2, GWR, AGR, MUN. According to LRWQCB beneficial uses, a body of water is afforded unique management conditions and provisions. A full description of each beneficial use can be found in **table 5** in the appendix.

Monitoring Locations

The Streamkeeper monitoring events at Trout Creek focused primarily on the lower sections of the watershed where Trout Creek flows through the extensive urban Stream Environment Zone (SEZ), merges with the Upper Truckee River in one of the largest meadow systems in the Lake Tahoe Basin (the Upper Truckee Marsh), before it finally reaches Lake Tahoe at Cove East. The selection of this monitoring area was based upon the severity of historic and current environmental impacts within the meadow system; impacts from upstream development and land management actions; proximity to volunteers in the City of South Lake Tahoe; as well as ease of access to monitoring sites.

Three monitoring reaches, or linear segments along the creek, were selected within the monitoring area for the Streamkeepers monitoring events. The first reach, identified as TC-BB1, is located upstream from the confluence of Trout Creek and the Upper Truckee River and below the intersection of Highway 50 at the bridge; the second reach, identified as TC-AB1, is roughly 930 feet upstream of the Highway 50 bridge; and the third reach, identified as TC-AB2 is located just downstream of the confluence of Heavenly Valley Creek and Trout Creek roughly 470 feet below the intersection of Trout Creek and Martin Avenue in South Lake Tahoe, California. **Figure 3** below provides a display of the approximate locations of the three stream reaches for the Streamkeepers monitoring events in relation to Highway 50, The Upper Truckee River, Lake Tahoe Community College and Lake Tahoe.

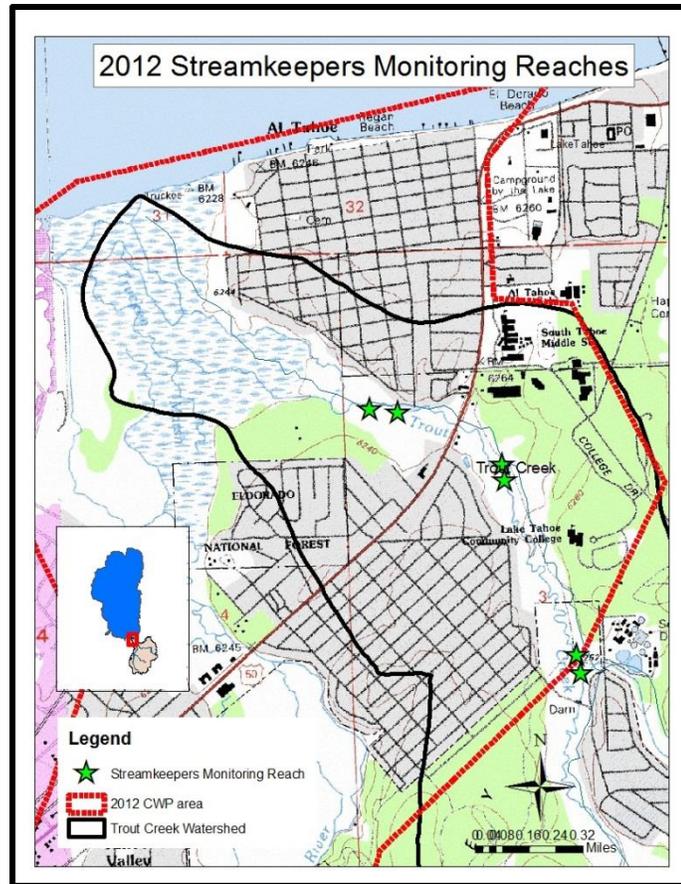


Figure 3. Upstream and downstream locations of three Stream Condition Survey Sites located on Trout Creek, South Lake Tahoe, California.

The specific geographic location of each reach can be found in **Table 4** of the Appendix. It is important to note, that all geographic coordinates are taken in the NAD 1983 coordinate system.

Methodology and Materials

Collection methodologies for all Streamkeepers monitoring data were created based upon protocols established by the California State Water Resources Control Board (SWRCB) through the Surface Water Ambient Monitoring Program (SWAMP). Although SWAMP monitoring protocols were not used directly, simplified versions that effectively capture the same information, but to a less technical extent, were created for ease of volunteer use and comprehension. Monitoring procedures utilized by the Streamkeepers include water quality sampling, benthic macroinvertebrate sampling, stream bank stability assessment, stream bed substrate sampling, and invasive weed mapping. The physical and chemical measurements that comprise the individual

components of water quality include Ph, water temperature, Dissolved Oxygen (DO), electrical conductivity, turbidity, and in select locations, fecal coliform bacteria. Blank versions of data collection forms can be found in the appendix of this document.

Monitoring equipment utilized during Streamkeepers events consist of an assortment of instruments and kits. The measurement of water quality parameters, as mentioned above, is captured through the use of two instruments and one kit: a handheld Hannah pH meter with built-in thermometer (0.02 unit and .10 C resolution); a hand-held Oakton Total Dissolved Solids (TDS) conductivity meter (10 μ S/cm resolution); and a Chemet DO kit (1 mg/L resolution below 6 mg/L and 2 mg/L resolution above 6 mg/L). All monitoring instruments and kits are directly under possession by the Tahoe RCD and are calibrated prior to the beginning of each monitoring season to assure the scientifically sound collection of data.

Benthic macroinvertebrate samples were taken, but due to a suspected low number of individuals found, and due to funding shortages needed to send samples to a laboratory to process the samples, no laboratory analysis was conducted for this component. In order to completely process and assign a Benthic Macroinvertebrate (BMI) score, laboratory analysis of macroinvertebrates requires a minimum of 500 sampled organisms. In both reaches sampled, it was generally deduced by team leaders that the minimum number of 500 organisms was not exceeded, and therefore the samples were not submitted for further analysis

Prior to the August 25th volunteer event, selected group leaders were required to attend a special training event in order to increase their capacity as educators and event facilitators. It is the understanding of CalTrout and the Tahoe RCD, that with previous experience and understanding of sampling methodologies, team leaders are better suited to aid untrained volunteers and field any inquiries that may arise. Team leader training for the August 25th Streamkeepers event was led by Kim Gorman, Tahoe RCD Watershed Coordinator and Field Biologist, on August 22nd along Trout Creek in the Upper Truckee Meadows near the Lake Tahoe Community College (see **figure 3** for general geographic location). During the training event, team leaders were introduced to field protocols that address qualitative visual assessment, photo-documentation, water quality measurement, and water sampling. As a desired key element of these trainings, team leaders become confidently familiar with Streamkeepers methodologies and equipment through the direct application and use thereof.

Water Quality Standards and Thresholds

In accordance with the Environmental Protection Agency (EPA) Clean Water Act (CWA) of 1972, the third chapter of the Lahontan Regional Water Quality Control Board (LRWQCB) Basin Plan establishes water quality standards for the entire Lahontan Basin, with more stringent requirements for the Lake Tahoe Basin hydrologic unit (which occurs entirely within the Lahontan Basin). Unique water quality standards exist for Trout Creek for TDS, Cl, SO₄, B, N, P, and Fe but not for the remainder of parameters listed in **Table 1** below. For those standards that are not directly provided for Trout Creek, the standards for the Lake Tahoe Hydrologic Unit are used in place.

Table 1. Water quality standards for surface waters of Trout Creek, as established by the LRWQCB.

| Parameter | Standard |
|------------------|--|
| TDS | 50/60 |
| Cl | .15/ .20 |
| SO ₄ | - |
| B | - |
| N | .19/- |
| P | .015/- |
| Fe | .03/- |
| DO | 30 day Mean no less than 6.5 and one day minimum of 4.0 mg/L for Lahontan waters designated as "cold freshwater habitat" (CA) |
| Turbidity (NTU) | Turbidity shall not exceed 3 Nephelometric Turbidity Units (NTU). In addition, turbidity shall not exceed 1 NTU in shallow waters not directly influenced by stream discharges |
| pH | 7 - 8.4 |
| Temperature | Shall not exceed 15° C |
| Conductivity | the mean annual electrical conductivity shall not exceed 95 umhos/cm at (50EC at any location in the Lake) |

Data Presentation and Discussion

Figures 4 - 6 contain the relative percentage of substrate class, bank stability, and bank cover in a side-by-side display to provide a means for comparison among the three surveyed reaches.

For substrate class, percentages ranged between 23% and 46% for the silt, clay, or mud class, between 54% and 68% for the sand class; and between 0% and 12% for the gravel class. TC-BB1 was composed of 23% silt, clay, or mud; 68% sand; and 10% gravel. TC-AB1 was composed of 46 % silt, clay, or mud; 54% sand; and 0% gravel. TC-AB2 was composed of 23% silt, clay, or mud; 65 percent sand; and 12 % gravel.

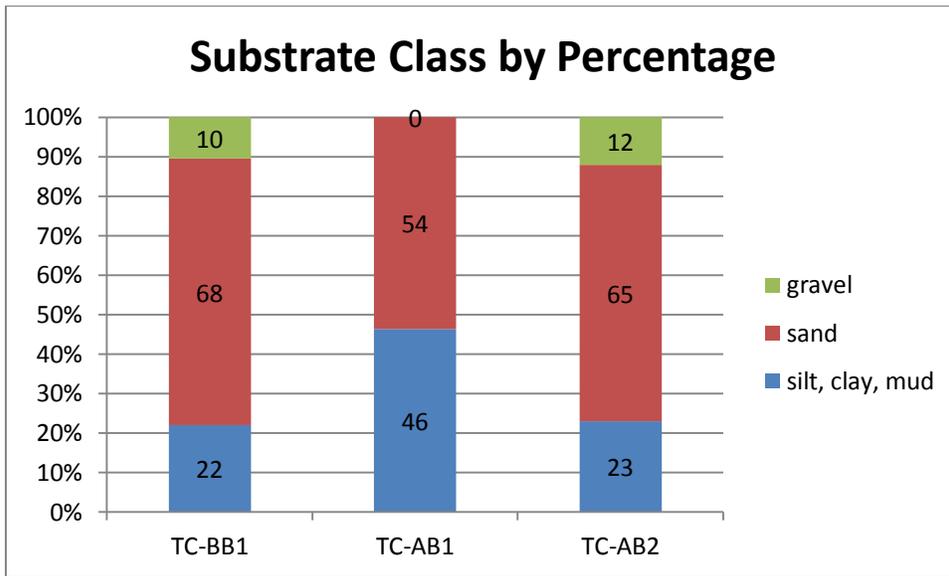


Figure 4. Substrate class by relative percentage for transects TC-BB1, TC-AB1, and TC-AB2

For bank stability, percentages ranged between 9% and 72% for the stable classification; 9% and 63% for the potential to erode classification; and from 9% to 59% for the eroding classification. The banks of TC-BB1 were rated as 36% stable, 9% with potential to erode, and 55% eroding. The banks of TC-AB1 were rated as 64% stable, 27% with potential to erode, and 9% eroding. The banks of TC-AB2 we rated as 59% stable, 32% with potential to erode, and 9% eroding.

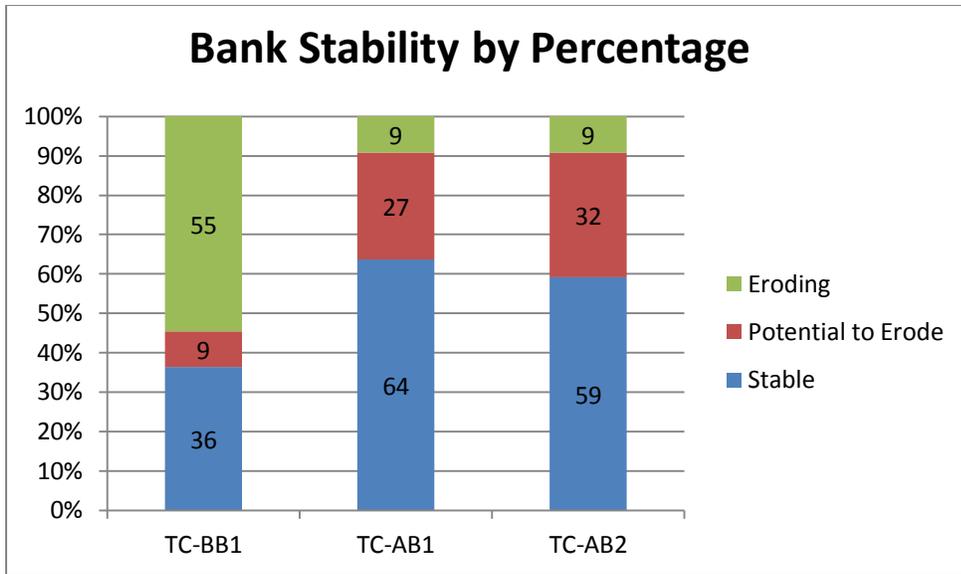


Figure 5. Bank stability by relative percentage for transects TC-BB1, TC-AB1, and TC-AB2

For bank cover, percentages ranged between 0% and 4% for rock, 63% and 93% for vegetated, 0% and 5% for wood, and 5% to 32% for bare. The banks of TC-BB1 were covered with 4% rock, 91% vegetation, and 5% were bare. The banks of TC-AB1 were covered with 63% vegetation, 5% wood, and 32% were bare. The banks of TC-AB2 were composed of 82% vegetation and 18% were bare.

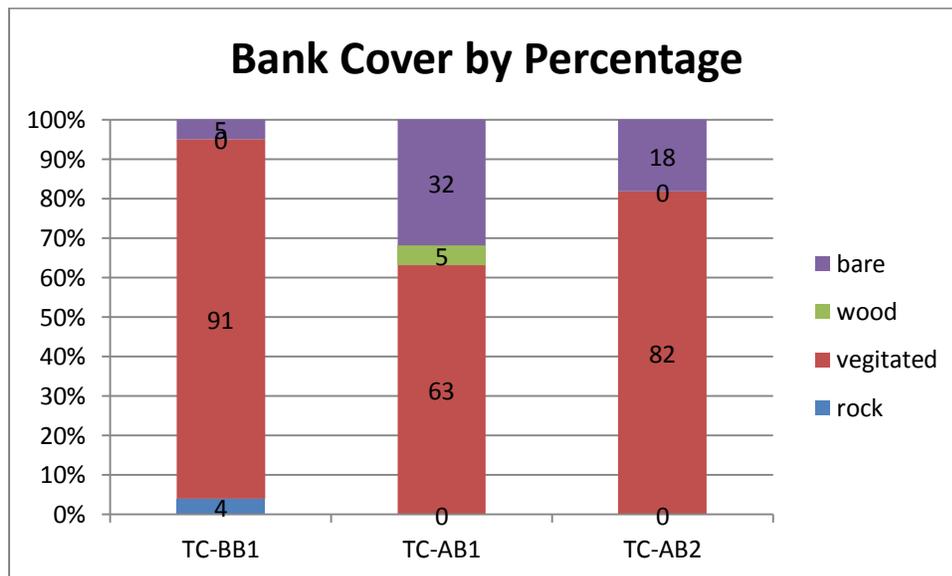


Figure 6. Bank cover by relative percentage for transects TC-BB1, TC-AB1, and TC-AB2

Tables 1 and Table 2 presented below represent the water quality measurements taken at transect TC-BB1 and TC-AB2 respectively. Water quality measurements for TC-AB1

were not taken during team leader training session at transect TC-AB1, and therefore no data is available. As the proper device for measuring conductivity was unavailable during both Streamkeepers events, no data was collected in regard to that indicator, but the value of the indicator is still upheld by the group.

Table 2. Water quality measurements taken at transect TC-AB1

| Parameters | Units | 1st Result | 2nd Result | Avg. Result |
|--------------|-------|------------|------------|-------------|
| Temperature | °C | 14 | 14 | 14 |
| DO | mg/L | 10 | 10 | 10 |
| TDS | µS/cm | 60 | 60 | 60 |
| pH | - | 8.2 | 7.7 | 8 |
| Conductivity | µS/cm | | | |

Table 3. Water quality measurements taken at transect TC-AB2

| Parameters | Units | 1st Result | 2nd Result | Avg. Result |
|--------------|-------|------------|------------|-------------|
| Temperature | °C | 13.9 | 13.4 | 13.65 |
| DO | mg/L | 9 | 9 | 9 |
| TDS | µS/cm | 70 | 70 | 70 |
| pH | - | 7.5 | 7.4 | 7.45 |
| Conductivity | µS/cm | | | |

Conclusion

The field season of 2012 represents the initial set of Streamkeepers data within the Upper Truckee Meadows along Trout Creek and proves infeasible to track any changes in physical condition within the watershed. However, despite the pitfall of not providing information on temporal condition change, this set of data functions to provide baseline information and acts as a screening level effort that can provide information that does not require a precise, technical level of analysis. From the information gathered in this initial year of the program, Streamkeepers can prepare future monitoring events with more focus and question-driven approach. For example, in review of the differences

It may be in the best interest of the Streamkeepers and Tahoe RCD to create a platform for volunteer opportunities that requires less professional guidance. Although the professional oversight necessary to organize and guide volunteers is not organizationally overbearing,

there may be a higher chance of developing long term community driven stewardship if there were additional outlets for volunteering that were not specifically confined to monitoring events. In addition to gathering water quality and stream habitat data, an auxiliary purpose of the Streamkeeper events is to further develop the Tahoe RCD's ability to produce community supported events.

Works Cited

Lindström, Susan. "Chapter Two: A Contextual Overview of Human Land Use and Environmental Conditions." *Lake Tahoe Watershed Assesment*. Vol. 1. Berkely: Pacific Southwest Research Station, 2000. N. pag. Print.

Rowe, Timothy G., and Kip K. Allender. Rep. no. 00-4001. USGS, n.d. Web.

Appendix

Table 4. Geographic location (captured using NAD 1983) for the upstream and downstream boundaries of the bioassessment reaches monitored in 2012 by the Streamkeepers Monitoring Group.

| Name of Reach | Downstream Latitude | Downstream Longitude | Upstream Latitude | Upstream Longitude |
|----------------------|----------------------------|-----------------------------|--------------------------|---------------------------|
| TC-BB1 | 38.93273 | -119.98368 | 38.93254 | -119.98212 |
| TC-AB1 | 38.93013 | -119.97643 | 38.92945 | -119.97631 |
| TC-AB2 | 38.92178 | 119.97266 | 38.921 | -119.97249 |

Table 5. Definition of Beneficial Uses

| Abbreviation | Definition |
|--------------|--|
| SPN | Spawning, Reproduction, and Development. Beneficial uses of waters that support high quality aquatic habitat necessary for reproduction and early development of fish and wildlife. |
| MIGR | Migration of Aquatic Organisms. Beneficial uses of waters that support habitats necessary for migration, acclimatization between fresh and salt water, or temporary activities by aquatic organisms, such as anadromous fish. |
| WILD | Wildlife Habitat. Beneficial uses of waters that support wildlife habitats including, but not limited to, the preservation and enhancement of vegetation and prey species used by wildlife, such as waterfowl. |
| COLD | Cold Freshwater Habitat. Beneficial uses of waters that support cold water ecosystems including, but not limited to, preservation and enhancement of aquatic habitats, vegetation, fish, and wildlife, including invertebrates. |
| COMM | Commercial and Sportfishing. Beneficial uses of waters used for commercial or recreational collection of fish or other organisms including, but not limited to, uses involving organisms intended for human consumption. |
| REC-1 | Water Contact Recreation. Beneficial uses of waters used for recreational activities involving body contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, and use of natural hot springs. |
| REC-2 | Noncontact Water Recreation. Beneficial uses of waters used for recreational activities involving proximity to water, but not normally involving body contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, and aesthetic enjoyment in conjunction with the above activities. |
| GWR | Ground Water Recharge. Beneficial uses of waters used for natural or artificial recharge of ground water for purposes of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers. |
| AGR | Agricultural Supply. Beneficial uses of waters used for farming, horticulture, or ranching, including, but not limited to, irrigation, stock watering, and support of vegetation for range grazing. |
| MUN | Municipal and Domestic Supply. Beneficial uses of waters used for community, military, or individual water supply systems including, but not limited to, drinking water supply. |

SOUTH SHORE STREAMKEEPERS

Site Set-Up

STREAM NAME: _____

Site Name: _____

Weather Condition: _____

Crew Name: _____ Date: _____ Time: _____

Locate top and bottom of Site, measure out 150 m, with a total of 11 transects.
Flag each transect at 15 m intervals; label 1-11.

GPS points: Bottom (0m) and Top of Reach (150m).

Photos: Bottom (0m), Middle (75m), and Top (150m); facing upstream and then downstream. (6 total)

GPS Points

Datum:

Stream Transects



150 m
135 m
120 m
105 m
90 m
75 m
60 m
45 m
30 m
15 m
0 m

Bottom of Reach: _____

Top of Reach: _____

PHOTO LOG (enter photo #)

| Transect | Upstream | Downstream |
|----------|----------|------------|
| Bottom | | |
| Middle | | |
| Top | | |

Camera type _____

SOUTH SHORE STREAMKEEPERS

Macroinvertebrates

Macroinvertebrate sampling will take place at each transect (11 total).

These samples will be composited in to a single sample for analysis.

Start at the bottom of the reach at Transect #1 and work your way up to Transect #11.

Sampling such that you alternate between left bank, center, and right bank as you move upstream.

Starting at the left bank, move 25% across the transect and take a sample; 1 ft², 1" deep for 1 min.

Make sure your net is perpendicular to Flow or you will lose your sample!

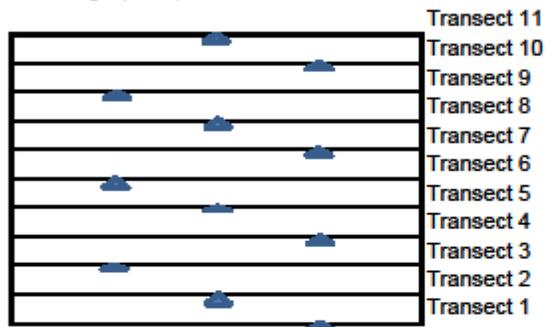
For the second Transect - move to center or 50% across the transect, and take a sample as before.

For the third Transect move to 75% across the transect and take a sample.

Continue in this manner until the final transect has been sampled, elutriate samples and pick bugs.

Place paper label inside bottle as well as on the outside, ethanol to preserve.

Margin, Center, Margin (MCM) Method



Equipment:

5 gallon bucket

Sieve

Tweezers

Tray with sides

Ethanol

D-Net

2-3, 1 Liter wide mouth bottles

Labels

Sample Glove

Waiders/Water shoes

SOUTH SHORE STREAMKEEPERS Substrate Classification

Stream Name: _____

SITE NAME: _____

Name: _____ Date: _____ Time: _____

*Grab a handful
of substrate
and measure it!*

| SUBSTRATE TYPE | |
|----------------|------------------------|
| | Silt, Clay, Mud < .01" |
| | Sand < 0.1" |
| | Gravel 0.1-2" |
| | Cobble 2-10" |
| | Boulder > 10" |
| | Solid Bedrock |

| Substrate Class | Transect Number | | | | | | | | | | | |
|---------------------------|-----------------|------|------|------|------|------|------|------|------|------|------|------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | |
| Silt, clay, mud | | | | | | | | | | | | |
| Sand | | | | | | | | | | | | |
| Gravel | | | | | | | | | | | | |
| Cobble | | | | | | | | | | | | |
| Boulder | | | | | | | | | | | | |
| Solid Bedrock | | | | | | | | | | | | |
| Total Percentage = | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| | | | | | | | | | | | | |
| <i>Loose</i> | | | | | | | | | | | | |
| <i>Moderately Packed</i> | | | | | | | | | | | | |
| <i>Tightly Packed</i> | | | | | | | | | | | | |
| Total Percentage = | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |

Site Description:

SOUTH SHORE STREAMKEEPERS

Stream Bank Stability

| Transect # | Stream Bank Condition | | | |
|------------|-----------------------|-------|------------|-------|
| | Left Bank | Notes | Right Bank | Notes |
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |
| 5 | | | | |
| 6 | | | | |
| 7 | | | | |
| 8 | | | | |
| 9 | | | | |
| 10 | | | | |
| 11 | | | | |

L R Banks - Enter the following: E= Eroding P = Potential to erode S = Stable
 Notes - Enter the following: R = Rock V= Vegetation W= Wood B= Bare

PHOTO LOG

| Transect # | Picture Number | |
|------------|----------------|------------|
| | Left Bank | Right Bank |
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |
| 8 | | |
| 9 | | |
| 10 | | |
| 11 | | |

Camera type: _____

South Shore Streamkeeper's

Water Quality Survey

Date: _____
Time: _____ Site Name: _____
Participants: _____

Walk downstream below the first transect so you don't disturb macroinvertebrate data collection.

| Parameters | Units | 1st Result | 2nd Result | Avg. Result |
|--------------|-------|------------|------------|-------------|
| Temperature | °C | | | |
| DO | mg/L | | | |
| Turbidity | NTU | | | |
| pH | - | | | |
| Conductivity | µS/cm | | | |

Color = _____
Odor = _____

What we measure, and why:

Temperature: Controls the rate of metabolic and reproductive activity of aqautoc

DO: In general dissolved oxygen below 4 mg/L is stressful for most organisms,

Turbidity: Can block out light needed for submerged aquatic vegetation, and clouds

pH: Measures the amount of hydrogen ions in solution; essentially most living

Conductivity: Measures the amount of ions in solution such as chloride, nitrate,

South Shore Streamkeeper's

Stream Reach Survey

Pool : Riffle Ratio =

Date: _____

Time: _____

* Number of pools divided by number of riffles

Site Nam _____

Participants: _____

Reach Habitat

Large woody debris
 Small organic debris
 Overhanging debris
 Overhanging vegetation
 Overhanging bank
 Aquatic Vegetation
 Boulders

| Abundant | Moderate | Sparse | | None |
|----------|----------|--------|--|------|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Human Alterations to Habitat

Channelization
 Diversions
 Culverts
 Bridges
 Grabage/Litter
 Roads/HWYs
 Detention ponds/BMPs
 Invasive weeds
 Other

| Feature Present | | Notes |
|-----------------|--|-------|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Land Use

Past and present

Appendix H: Invasive Weeds Mapping and Removal Data