



CABY INTEGRATED REGIONAL WATER MANAGEMENT PLAN  
PROPOSITION 84, ROUND 2 IMPLEMENTATION GRANT



# 5 WOLF CREEK WATERSHED: RESTORATION, STORM WATER SOURCE CONTROL AND FLOOD MANAGEMENT

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<b>GENERAL INFORMATION</b>	
<b>Project Title</b>	<b>Wolf Creek Watershed: Restoration, Stormwater Source Control, and Flood Management</b>
<b>Abstract</b>	The overall goal of this project is to improve the hydrologic and ecologic function of Peabody Creek in Grass Valley while addressing local flooding issues, incorporating green infrastructure stormwater management elements, and actively engaging local community members in stewardship of the creek.
<b>Organization</b>	American Rivers
<b>Partner Organizations</b>	City of Grass Valley, Wolf Creek Community Alliance, Sierra Native Alliance, PR Design & Engineering
<b>Disadvantaged Community</b>	Yes
<b>Grant Funds Requested</b>	\$342,499
<b>Non-State Match</b>	\$0 (DAC waiver applied for)
<b>Total Budget</b>	\$342,499
<b>Watershed</b>	Wolf Creek/Bear River Watershed
<b>County</b>	Nevada
<b>Status of Project Design</b>	The project team has conducted site visits and developed preliminary design options for the project. However, no formal design documents have been completed.
<b>Titles of Plans and Specifications submitted in hard copy format</b>	<ul style="list-style-type: none"> <li>• Odefey, J. et al. (2012) Banking on Green: A Look at How Green Infrastructure Can Save Municipalities Money and Provide Economic Benefits Community-wide.</li> <li>• Center for Neighborhood Technology. (2010). The Value of Green Infrastructure: A Guide to Recognizing Its Economic, Environmental and Social Benefits.</li> <li>• Coyle, Kevin. (2005). Environmental Literacy in American. The National Environmental Education and Training Foundation. Washington D.C.</li> </ul>

	<ul style="list-style-type: none"> <li>• Center for Watershed Protection. (1998). Better Site Design: A Handbook for Changing Development Rules in Your Community. Ellicott City, MA.</li> <li>• EPA. (2007). Reducing Stormwater Costs Through Low Impact Development Strategies and Practices. Environmental Protection Agency. Washington D.C.</li> <li>• EPA. (2008) National Water Program Strategy: Response to Climate Change. Environmental Protection Agency. Washington D.C.</li> <li>• EPA. (2012). National Water Program 2012 Strategy: Response to Climate Change. Environmental Protection Agency. Washington D.C.</li> <li>• Foster, J., Lowe, A., and Winkelman, S. (2011). The Value of Green Infrastructure for Urban Climate Adaptation. The Center for Clean Air Policy. Washington, D.C.</li> <li>• National Research Council. (2009). Urban Stormwater Management in the United States. The National Academies Press. Washington D.C.</li> <li>• Willams, E. and Wise, W. (2006) Hydrological Impacts of Alternative Approaches to Storm Water Management and Land Development. Journal of the American Water Resources Association. Middleburg, VA.</li> <li>• Null, S., Viers, J., and Mount, J. (2010). Hydrologic Response and Watershed Sensitivity to Climate Warming in California’s Sierra Nevada. Center for Watershed Sciences, University of California at Davis. Davis, CA.</li> <li>• Lancaster, Brad. (2006). Appendix 3 – Water-Harvesting Calculations Rainwater Harvesting for Drylands – Volume 1. Rainsource Press. Tucson, AZ.</li> <li>• American Concrete Pavement Association. (2007). Stormwater Management with Pervious Concrete Pavement. Skokie, IL.</li> </ul>
<p><b>Status of CEQA, NEPA, and other environmental laws</b></p>	<p>Once the project is funded, the City of Grass Valley will lead permitting for both the installation of pervious concrete and restoration of the Upper Floodplain (see site map), including, CEQA, 401,404, streambed alteration, and encroachment permits. The City of Grass Valley was the lead agency for CEQA in Phase I, which was a Categorical Exemption (Class 33 Small Habitat Restoration a-d), and anticipates a similar CEQA finding for this phase.</p>
<p><b>Work that will be completed prior to October 2013 (assumed contract date)</b></p>	<p>The first phase of the project is complete and included removal of invasive species, re-vegetation with native species, and initial restoration of the Upper Floodplain on a half-acre site along Peabody Creek.</p>
<p><b>Procedures for coordination with partner agencies and organizations</b></p>	<p>This highly collaborative project is a continuation of American Rivers’ efforts to partner with local agencies and organizations to implement green infrastructure stormwater management throughout the headwaters region of the Sierra Nevada. This project was jointly developed and will be implemented by four diverse organizations: American Rivers (a national</p>

	<p>conservation organization with an established local office), the City of Grass Valley (a disadvantaged community), Wolf Creek Community Alliance (a local watershed group), and the Sierra Native Alliance. At the start of the project, American Rivers will convene a kick-off meeting with the project team and will coordinate regular team and stakeholder meetings throughout the project term. Additionally, American Rivers will ensure coordination with DWR and CABY IRWMP members and fulfill any requirements for sharing or coordinating water quality data with DWR or State Water Resources Control Board and others.</p>
<p><b>Description of synergies or linkages between other CABY IRWMP projects</b></p>	<p>This project is part of a larger initiative across the region that seeks to elevate DAC projects to ready to proceed status. This project also manifests the CABY priorities of efficiency, restoration and community involvement that are associated with all of the projects in this Proposal. Further, this project is a key model for small jurisdictions across the region for developing alternative solutions to ever larger and expensive infrastructure solutions. As with the other infrastructure projects in the suite this project also brings substantive natural resource benefits as well, meeting several CABY objectives within a single project.</p> <p>This project also supports the following CABY linkages and synergies objectives, articulated in the Introduction to the Proposal: selection of projects at multiple elevations: developing a mix of localized projects that address clear single-location needs with projects that have a regional impact; inclusion of pilot, demonstration or model projects whose benefits can then be expanded through implementation of similar projects across the region; siting of projects across all of the primary CABY watersheds; including projects that directly address the resiliency of natural and infrastructure systems; inclusion of projects which result in direct water conservation and/or use efficiencies; creation of implementation actions/projects that represent adaptive management options in response to climate change; pairing projects that create synergies of impact internally and between projects; balancing infrastructure and natural resource projects within each implementation package; and creating a balance of project sponsors across all stakeholder groups, including DAC, governmental agencies and non-profit organizations. The project will also collaborate with three other CABY projects in this proposal to train and employ Native Youth from the Native Youth Conservation Corps.</p>
<p><b>Status of acquisition of land or rights of way if applicable</b></p>	<p>All work takes place on land owned by the City of Grass Valley.</p>
<p><b>If project is part of a multi-phased project, describe how the project can operate as a</b></p>	<p>The proposed project has been designed to proceed in three phases. Phase 1 is complete and included removal of invasives, revegetation with native species, and initial establishment of floodplain on a half-acre site along</p>

<p><b>stand-alone project</b></p>	<p>Peabody Creek.</p> <p>Phase 2 is the focus of this request and will be implemented as a stand-alone project. Phase 2 involves:</p> <ul style="list-style-type: none"> <li>• An assessment of Wolf Creek watershed to: 1) identify pollutant sources in the water-quality impaired watershed, 2) identify and prioritize areas that contribute to flooding in the City of Grass Valley, and 3) determine high-priority sites that would be good candidates for installation of green infrastructure stormwater management elements</li> <li>• A green infrastructure stormwater source control program that has two elements: 1) downspout disconnection and rain barrel installation, education, and outreach and 2) pervious pavement training and installation</li> <li>• Floodplain restoration on a centrally located open space site to reduce erosion and downstream flooding, infiltrate and treat stormwater, and decrease pressure on the City of Grass Valley’s wastewater treatment facilities during storms</li> <li>• Completion of planning and designs for a downstream floodplain site so that it is shovel-ready and once restored will further abate erosive peak stormwater flows and surface water pollution in the watershed</li> <li>• Revision of antiquated FEMA flood maps</li> <li>• Development and implementation of an updated water quality monitoring plan</li> </ul> <p>Phase 3 involves restoring the floodplain just downstream of the Phase 2 floodplain site and expanding installation of green infrastructure stormwater elements throughout the City of Grass Valley and the Wolf Creek watershed.</p>
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**SPECIFIC GOALS AND OBJECTIVES OF THE PROJECT**

<p><b>CABY Goal and Primary Issue</b></p>	<p><b>Measurable Objectives</b></p>
<p><b>Ensure sufficient water quality to support healthy ecosystems and dependent organisms: Headwaters Protection, Wastewater Management, Contamination</b></p>	<ul style="list-style-type: none"> <li>• 10 acre feet of runoff per year slowed down and cleaned through green infrastructure stormwater treatment controls</li> <li>• Revegetate and restore 325 linear feet of stream bank.</li> <li>• Restore .5 acres of floodplain</li> </ul>
<p><b>Preserve and restore watershed health: Terrestrial Invasive Species</b></p>	<ul style="list-style-type: none"> <li>• Invasive plants removed from .5 acres</li> <li>• 10 interns trained in invasive species removal and control</li> </ul>

<p><b>Maintain and enhance functioning landscapes that provide sustainable services for humans: Flooding, Disadvantaged Communities</b></p>	<ul style="list-style-type: none"> <li>• .5 acres of floodplain restored</li> <li>• 8 acre feet per annum of increased stormwater infiltration</li> <li>• FEMA-designated flood map revised</li> <li>• 1 high-priority project implemented in a DAC</li> </ul>
<p><b>Overarching Objective: Education and Outreach will be integrated into all CABY projects and programs</b></p>	<ul style="list-style-type: none"> <li>• 200 community members receive information about how to control runoff at their homes</li> <li>• 20 residents control runoff at its source</li> <li>• 3 trainings to contractors about pervious concrete</li> </ul>
<p><b>Overarching Objective: Share useable data and information across the region</b></p>	<ul style="list-style-type: none"> <li>• Regular data updates to CABY website and state and all other relevant databases and agencies.</li> </ul>
<p><b>Overarching Objective: All planning in region to be coordinated to ensure communication and shared solutions.</b></p>	<ul style="list-style-type: none"> <li>• 2 interpretive signs developed and installed</li> <li>• Project-specific webpage created</li> <li>• 1 collaborative watershed assessment</li> </ul>

## PURPOSE AND NEED OF THE PROJECT

Grass Valley—a disadvantaged community that was established in the 1850s during the Gold Rush—is located in the Sierra Nevada Foothills northeast of Sacramento. Grass Valley is the second largest city in the county, and the median household income of its residents is 60% of the state average. In the last 20 years, Grass Valley has grown by approximately 50 percent, and growth projections (based on projections of the CA Department of Finance) predict that the population will increase another 60% by 2020. This steady and ongoing development has created large tracts of impervious surface in the town and surrounding region, and many of the area’s creeks have been locked in concrete and funneled into underground culverts and pipes.

This continues to greatly alter the area’s natural hydrology, impacting the function of remaining natural systems and putting pressure on the City’s aged sewer system. Every year, winter storms bring heavy rain and instead of soaking into unpaved land, stormwater runs off of hard surfaces like rooftops, parking lots, roads, and sidewalks, concentrating and intensifying in volume so that it erodes stream banks, causes local flooding, carries pollutants such as bacteria and heavy metals into local waterways, and contributes to sewer overflows. In recent years, rain storms have easily exceeded the capacity of the antiquated sewer system, forcing the City to discharge partially treated wastewater into Wolf Creek and its tributaries, which are part of the Bear River watershed and provide drinking water to Southern Nevada County and Placer County. The State Water Resources Control Board has now listed 23 miles of Wolf Creek and its associated tributaries (including Peabody Creek) as impaired under Section

303(d) of the Clean Water Act and put an applicable TMDL schedule for fecal coliform in place. Additionally, as shown in Grass Valley flood maps, a significant number of Grass Valley's residents are at risk from flooding. This year, a large storm not only caused the City to release partially treated wastewater into Wolf Creek, but residents and businesses through the city experienced flooding.

Despite the City's population growth and known problems associated with stormwater management, much of its water infrastructure (which was first installed in the late 1800s) has not been updated, and many needed repairs have been too costly for this disadvantaged community to undertake. Conventional methods for addressing the community's issues (managing stormwater runoff and reducing flooding and pollutant loading) present numerous problems. These engineered "solutions," such as enlarged sewer pipes, underground storage tanks, and treatment plant expansions, cost enormous sums, require expensive maintenance over time, and are only partially effective in solving water quality and flooding problems.

A 2009 study by the National Research Council advocates for increased reliance on approaches to development that restore hydrologic functions through runoff management techniques that harvest, evapotranspire, or infiltrate precipitation (NRC 2009). Commonly referred to as "green infrastructure," these runoff control measures reduce the accumulation of runoff and transport of pollutants by managing rain close to where it falls rather than conveying it downstream. According to the EPA, green infrastructure is proven to reduce peak flows during storm events by providing infiltration through soil, which can reduce the burden on wastewater treatment systems. In contrast to conventional methods, which treat rain as a waste product, green infrastructure techniques such as those proposed in this project—floodplain restoration, downspout disconnection, rain barrels, and pervious pavement—help to restore a more natural hydrology in a community's landscape and are less costly to install and maintain. Additionally, in the face of a changing climate, green infrastructure can play an increasingly important role to reduce local impacts for community resources and waters (EPA 2008). By reducing the volume of runoff entering the wastewater treatment system and increasing natural features that can soften the effects of storm surges and flooding, green infrastructure can add resiliency to local climate change adaptation planning. This is even more critical in a headwaters region such as CABY, which provides more than 60 percent of the state's drinking water. Communities throughout this region were established during the Gold Rush era, and many are struggling to update their water infrastructure and balance growth with community and ecosystem needs in a changing climate.

All aspects of this project will help rainwater to reach pervious surfaces so that it can infiltrate into the ground, rather than sluicing across pavement, picking up pollutants, and building into ever bigger volumes. The project includes floodplain restoration to help abate erosive peak flows and flooding and a source control program that will expand disconnection of rainwater downspouts onto landscaped areas, the use of rain barrels, and installation of pervious pavement.

The project includes initial implementation of these elements, but it also lays the ground work for expanding green infrastructure throughout Grass Valley and the CABY region by training local contractors to pour pervious pavement and creating education materials local residents can use to manage stormwater runoff on their property. Thus, this project will directly reduce the risk of sewer overflows, flood flows, and the pressure on the City's wastewater treatment system. It will also minimize erosion and sedimentation, reduce pollutant loads, and over time, provide capital cost savings to a disadvantaged community.

## DESCRIPTION OF THE PROJECT

Peabody Creek flows from the hills outside of downtown Grass Valley through residential neighborhoods and along the edge of a local park before joining Wolf Creek, which is a major tributary to the Bear River and provides drinking water to Southern Nevada County and Placer County. Both Wolf and Peabody Creek represent a unique opportunity for restoration and stewardship in an area where most creeks have been lost due to development or buried in an underground network of culverts. Both Wolf and Peabody could be a vibrant, healthy heart of the watershed and community, providing important habitat and ecosystem functions such as floodplains that abate erosive peak flows, but development in the past 100 years has altered their natural hydrology and greatly impacted the health and function of these creeks. As a result, as previously noted, Wolf and Peabody have been listed as impaired under Section 303(d) and there is an applicable TMDL schedule for fecal coliform in place. Additionally, there is consistent flooding in the low-lying areas of the watershed.

As development, growth, and climate change put increasing pressure on Grass Valley's resources, innovative and holistic responses are needed to address water quality and flooding issues. This collaborative and highly replicable project will directly address existing issues by restoring floodplain and building the foundation of a broad and robust green infrastructure stormwater source control program that can be expanded throughout the CABY region. The project's dual focus of mitigating hydromodification impacts associated with development while implementing floodplain restoration that will increase hydrological and ecological function provides an important model for increasing headwaters resilience, which is critical throughout the Sierra Nevada region and beyond.

This project includes three primary cost-effective elements that will abate flooding, reduce erosive peak flows in the watershed, and reduce water quality impacts:

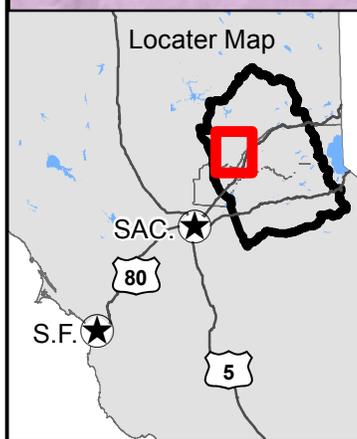
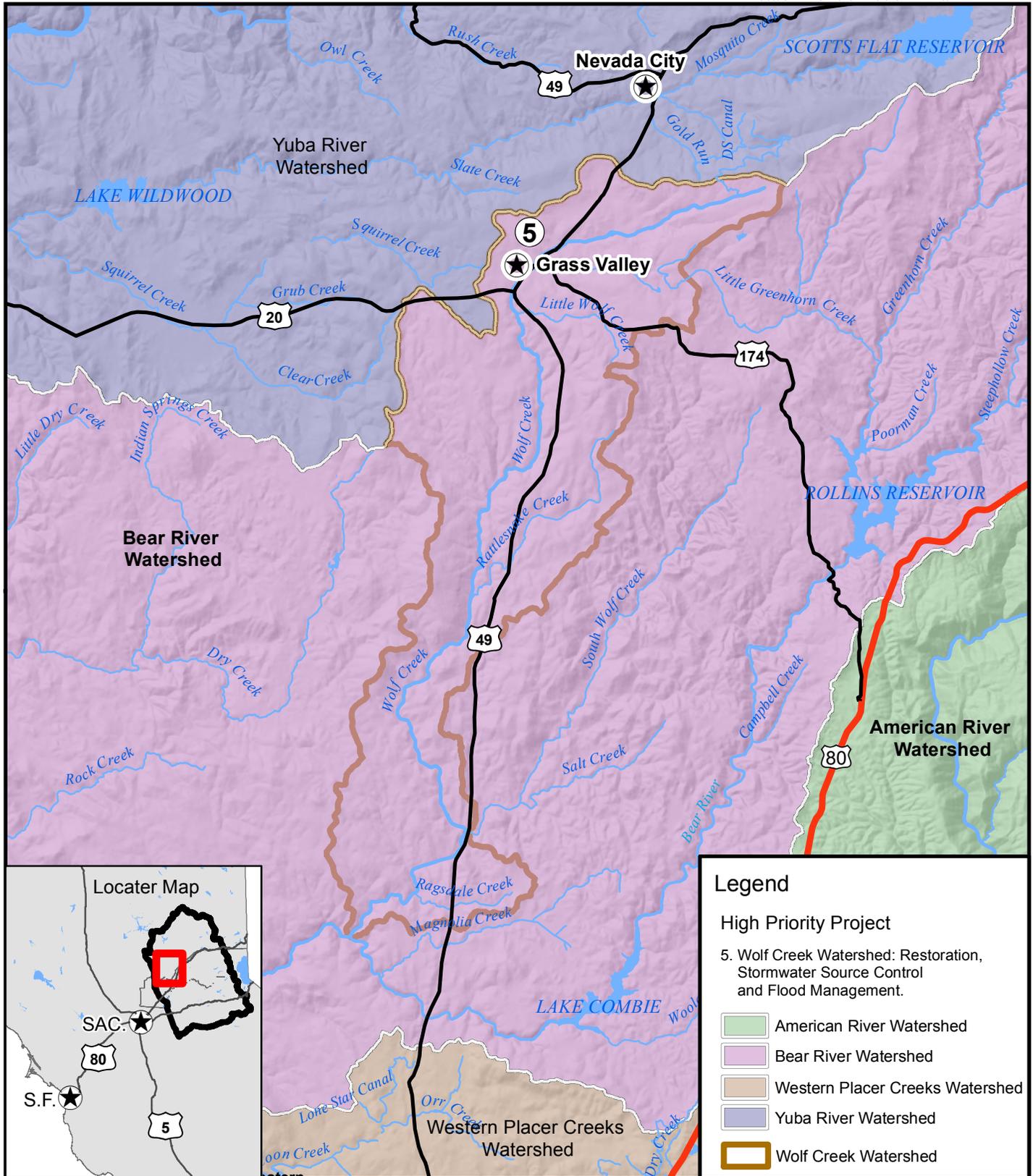
- 1) floodplain restoration on two high-priority sites;
- 2) stormwater source control management (through downspout disconnection, rain barrels, and contractor training and installation of pervious pavement); and
- 3) watershed assessment to determine additional high-priority areas that contribute to pollutant loads and flooding and would be good candidates for installation of green infrastructure stormwater management elements. Additionally, the modeling completed as part of the watershed assessment will also be used to update antiquated FEMA flood maps.

The floodplain restoration sites are on Peabody Creek and were deemed high priority through the project development process undertaken by the project team during development of the CABY IRWMP update. The sites are located in an open-space area in a dense residential neighborhood that is just outside historic downtown. It is one of the few areas in town where the creek is daylighted and residents can actually see one of their local waterways.

The primary anticipated outcomes we expect as a result of project activities include:

- Priority pollutant and stormwater overload contributors in watershed identified and prioritized
- One high-priority site is restored so that eroding streambanks stabilized and floodplain is functional
- Second high-priority site made shovel-ready
- Volume, pollutant load, and erosive peak flows of stormwater runoff in the watershed reduced

- Water storage in the upper Bear River watershed increased
- Stormwater infiltration is increased and sediment and erosion are reduced by directing stormwater into the ground instead of into pipes
- FEMA-designated floodplain maps revised to accurately reflect the landscape
- Increased green jobs in a DAC
- 7,500 square feet of pervious concrete installed throughout the watershed
- Water quality protected through the capture and infiltration of “first flush” runoff, which normally contains the highest pollutant concentrations, at multiple sites throughout the watershed
- DAC residents are engaged in watershed stewardship and protection and treat stormwater runoff on their properties
- Project benefits quantified and communicated through effective monitoring and demonstration activities
- Replication of green infrastructure stormwater management facilities promoted in the Sierra headwaters region through education and outreach



Coastwaters, American, Bear & Yuba River  
Integrated Regional Water Management

## Project 5 Wolf Creek Watershed: Restoration, Stormwater Source Control and Flood Management



# Peabody Creek Restoration Project

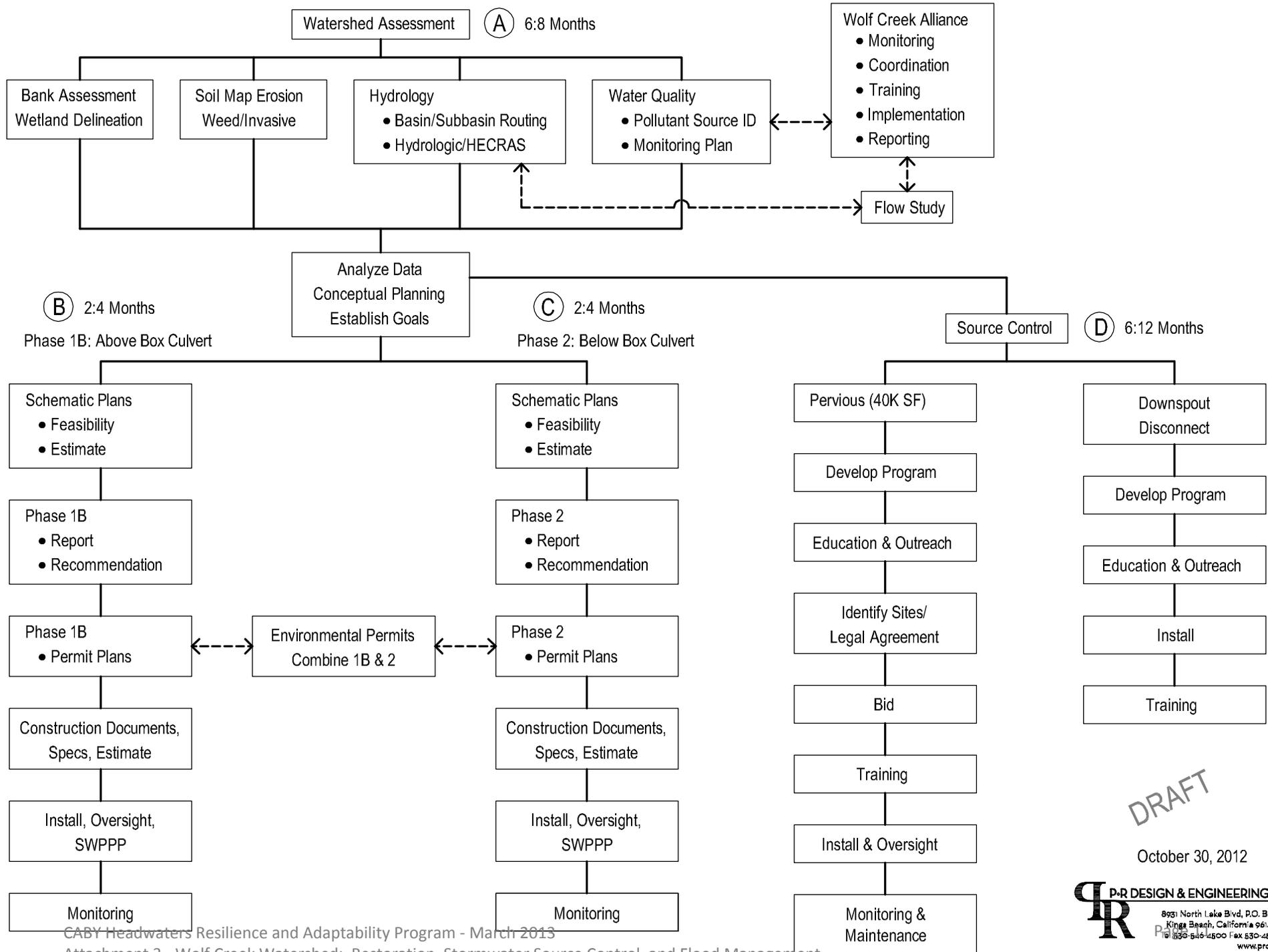
Attachment 3 - Work Plan



Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community



# CABY Project Flow Chart



DRAFT

October 30, 2012

## PROJECT WORK TASKS

### Budget Category (A) DIRECT PROJECT ADMINISTRATION

#### **TASK 1: DIRECT PROJECT ADMINISTRATION**

Project management and administration is a critical aspect of a successful project. Under this task, American Rivers, with support of project partners, will take the lead in fiscal management and developing and managing subcontracts and grants, as well as meeting reporting and performance requirements, finalizing the work plan, convening project team meetings, developing project information, and coordinating with funders and partners. In addition, American Rivers and CABY will be responsible for outreach and dissemination of project materials and results.

##### **Subtask 1.1: Administration, Management, and Reporting**

Under this subtask, American Rivers will manage the subgrant administered by the Sierra Fund (the CABY project lead). American Rivers will provide invoices, reports and deliverables to The Sierra Fund in a format acceptable to DWR.

##### **Subtask 1.2: Labor Compliance**

American Rivers has managed contracting and compliance for public works projects funded by Federal (ARRA), State (DWR, SWRCB), and county sources requiring labor compliance. Our labor compliance program includes contractual agreements and on-site education to ensure State labor practices are followed.

##### **Subtask 1.4: Coordination with Partner Agencies and Organizations**

American Rivers has more than 30 years of experience building successful partnerships with diverse agencies and organizations. American Rivers staff includes contracting counsel, project managers, and administrative staff experienced with complex partnerships. We anticipate regular team and stakeholder meetings, and agreements detailing expectations of each partner.

Task	Task Title	Deliverables
<b>1</b>	<b>Direct Project Administration</b>	
1.1	Administration, Management and Reporting	<ul style="list-style-type: none"> <li>• Final Workplan and Schedule</li> <li>• Signed agreement with The Sierra Fund</li> <li>• Finalized Subcontracts</li> <li>• Quarterly, Final and post-completion reports</li> <li>• Copies of press releases, outreach materials and monitoring reports</li> </ul>
1.2	Labor Compliance	<ul style="list-style-type: none"> <li>• Adherence to Labor Code Compliance through Board policies, administrative regulations and contracting procedures and</li> </ul>

		documents.
		<ul style="list-style-type: none"> <li>• Submission of Labor Compliance Program</li> </ul>
1.4	Coordination with partner agencies	<ul style="list-style-type: none"> <li>• MOUs/Participating agreements between American Rivers and partners</li> <li>• Meeting minutes and agendas</li> </ul>

**Budget Category (B)**  
**LAND PURCHASE/EASEMENT**

N/A

**Budget Category (C)**  
**PLANNING/ DESIGN/ ENGINEERING/ ENVIRONMENTAL DOCUMENTATION**

**TASK 2: ASSESSMENT OF STORMWATER AND POLLUTION LOADS IN WATERSHED**

The goal of this task is to: 1) identify pollutant sources in Wolf Creek watershed, which is water-quality impaired, 2) identify and prioritize areas that contribute to flooding in the City of Grass Valley, and 3) determine high-priority sites that would be good candidates for installation of green infrastructure stormwater management elements.

Wolf Creek, including tributary Peabody Creek, is 303 (d) listed for fecal coliform. In addition, the City of Grass Valley has identified excess stormwater discharge and resultant flooding in the watershed as high priorities. This planning task is critical to ensure that future stormwater management efforts are strategically designed and located so they accomplish the greatest benefit. Under this task, American Rivers and Wolf Creek Community Alliance (WCCA) will review water quality data so ongoing water quality monitoring efforts can be optimized. We will also conduct GIS and field analyses to prioritize source control areas based on the ability to relieve flooding.

**Subtask 2.1: Identify pollutant sources**

American Rivers will lead this task in coordination with WCCA. The goal of this task is to identify priority pollutant sources in the watershed and gather data that can be used to guide future implementation efforts to improve water quality. Two organizations have been collecting data in the Wolf Creek watershed for the past 12 years: WCCA and the Nevada County RCD. WCCA with support from the State Water Resources Control Board has conducted ongoing fecal coliform monitoring at two sites in Peabody Creek, with a published QAPP and monitoring plan. Under this task, American Rivers will analyze WCCA and Nevada County RCD data in order to update monitoring procedures for identifying fecal coliform sources and ensure future coordination within the watershed.

**Subtask 2.2: Prioritize stormwater contributing areas for control measures**

American Rivers will lead this task, which is aimed at identifying and prioritizing sites that are high-priority candidates for green infrastructure stormwater source control. In this subtask, drainage maps will be analyzed and field surveys, including landowner interviews, will be conducted to identify and prioritize stormwater contributing areas for source control to reduce downstream flooding.

Task	Task Title	Deliverables
<b>2</b>	<b>Assessment of Stormwater and Pollutant Loads in Watershed</b>	
2.1	Identify Pollutant Sources	<ul style="list-style-type: none"> <li>• GIS maps of fecal coliform sources and source reaches</li> <li>• Updated Monitoring Plan</li> </ul>
2.2	Prioritize stormwater contributing areas for control measures	<ul style="list-style-type: none"> <li>• GIS maps and analysis reports of priority source control areas</li> </ul>

### **TASK 3: RESTORATION DESIGN**

American Rivers will lead this task with participation of the City of Grass Valley and PR Design & Engineering (PRDE). PRDE is a green design and civil engineering firm that has partnered with American Rivers on past green infrastructure stormwater management projects (including an existing project in Nevada City, which has been funded by DWR). This goal of this task is to complete planning and designs for two sites that were determined to be high priority through the CABY project development process: the Upper Floodplain and the downstream stretch/Lower Floodplain (see attached map). The Upper Floodplain plans and designs developed under this task will be used to complete on-the-ground restoration that is the focus of Task 7 (below). The plans and designs developed under this task for the downstream stretch/Lower Floodplain will be used to implement Phase 3, which will be the subject of future grant proposals to state and foundation sources.

The planning and design elements associated with the Upper Floodplain will focus on a 5-acre site, and will include a management plan for the restored site that minimizes the level of ongoing maintenance required. The planning and design elements associated with the Lower Floodplain will focus on approximately 400 linear feet of eroding stream channel and the Lower Floodplain, which is a currently disconnected basin that is approximately 0.5-acres between the Scotia Pines neighborhood and Condon Park. Phase 3 will restore the downstream stretch and reconnect the Lower Floodplain, according to plans and designs developed under this task.

#### **Subtask 3.1: Geotechnical Analysis**

The goal of this subtask is to analyze existing conditions and identify site constraints and opportunities. It will be implemented on both the Upper Floodplain and downstream stretch/Lower Floodplain.

#### **Subtask 3.2: Planning and Conceptual Designs**

Under this subtask, American Rivers and PR Design and Engineering (PRDE) will develop two to three restoration concepts for the extensive Phase 3 stream channel and floodplain restoration, between Walsh Road and Condon Park. We will also develop designs for pervious pavement installations and for adaptive management measures on the Upper Floodplain restoration, above Walsh Road. The survey and hydrologic modeling required for design will also be used for Task 5: Update Flood Insurance Rate Map (FIRM) for Peabody Creek. Throughout the design processes, we will conduct public stakeholder meetings in collaboration with WCCA to ensure broad support.

#### **Subtask 3.3: Engineering and Technical Design**

Under this subtask, PRDE will complete designs and construction documents for pervious pavement installations in the Wolf Creek watershed and restoration on the Upper Floodplain of Peabody Creek, above Walsh Road. PRDE, with assistance from American Rivers and the City of Grass Valley, will also complete designs for the extensive Phase 3 stream and floodplain restoration between Walsh Road and Condon Park up to, but not including, the preparation of construction documents. Construction documents and permitting will initiate the next phase for restoration in this reach and will be funded by other sources.

Task	Task Title	Deliverables
<b>3</b>	<b>Assessment of Stormwater and Pollutant Loads in Watershed</b>	
3.1	Geotechnical Analysis	<ul style="list-style-type: none"> <li>• Findings and recommendations technical memos</li> </ul>
3.2	Planning and Conceptual Design	<ul style="list-style-type: none"> <li>• Survey data in GIS format</li> <li>• Conceptual design for Phase 3 restoration between Walsh Road and Condon Park</li> <li>• Conceptual designs for pervious pavement installations</li> <li>• Conceptual designs for Upper Floodplain above Walsh Road</li> </ul>
3.3	Engineering and Technical Design	<ul style="list-style-type: none"> <li>• Final schematic, permit plans, specifications</li> <li>• Estimate for pervious pavement installations</li> <li>• Construction documents for pervious pavement installations</li> <li>• Construction documents for restoration of Upper Floodplain above Walsh Road</li> <li>• Final schematic permit plans for Phase 3 restoration between Walsh Road and Condon Park</li> </ul>

#### **TASK 4: ENVIRONMENTAL PERMITTING**

The City of Grass Valley will lead permitting for both the installation of pervious concrete and restoration of the Upper Floodplain, above Walsh Road, including, CEQA, 401,404, streambed alteration, and encroachment permits. CEQA was completed for Phase 1 of the project, which was determined to be a Categorical Exemption. We expect the same determination for this phase of the project.

Task	Task Title	Deliverables
<b>4</b>	<b>Environmental Permitting</b>	<ul style="list-style-type: none"> <li>• CEQA complete</li> <li>• Additional permitting complete</li> </ul>

**TASK 5: UPDATE FLOOD INSURANCE RATE MAP (FIRM) FOR PEABODY CREEK**

American River will coordinate this task, which will be implemented by PRDE (under subcontract to American Rivers). This task was determined to be a high priority for the City of Grass Valley during the CABY project development process. This task will relieve the disadvantaged residents adjacent to the project site of unnecessary but currently mandatory flood insurance that is required by FEMA's antiquated flood map for the site. This portion of the project is designed to proceed in conjunction with Task 3 because survey, mapping, and modeling activities needed for both tasks overlap, thus coordinating these tasks will afford an economy of scale.

**Subtask 5.1: Survey property for finish elevations and prepare certified topographic map**

American Rivers will contract with a licensed surveyor to complete required surveys.

**Subtask 5.2: Complete required hydrologic modeling**

American Rivers will contract with a professional engineer to update the existing (2010) HEC-RAS model with new survey data from Subtask 5.1, complete FEMA-required modeling and validate the model with Check-RAS.

**Subtask 5.3: Complete Letter of Map Revision**

With the support of the City of Grass Valley, the contracted engineer will complete a conditional Letter Of Map Revision or LOMR (FEMA MT-2, Form 2)

**Subtask 5.4: Prepare annotated FIRM showing the revised Special Flood Hazard Area**

In this subtask the contracted engineer will provide an updated Flood Insurance Rate Map (FIRM).

Task	Task Title	Deliverables
5	Update Flood Insurance Map for Peabody Creek	
5.1	Survey Property	<ul style="list-style-type: none"> <li>• Certified Topographic Map</li> </ul>
5.2	Complete required modeling	<ul style="list-style-type: none"> <li>• HEC-RAS files</li> </ul>
5.3	Complete Letter of Map Revision	<ul style="list-style-type: none"> <li>• LOMR</li> </ul>
5.4	Revised Special Flood Hazard Area	<ul style="list-style-type: none"> <li>• Updated FIRM</li> </ul>

**Budget Category (D)**  
**CONSTRUCTION/IMPLEMENTATION**

**TASK 6: STORMWATER SOURCE CONTROL PROGRAM**

American Rivers will lead this task, which is focused on establishing a robust green infrastructure stormwater management program in Grass Valley. We aim to create a highly exportable model that can be implemented throughout the CABY region and in the larger Sierra Nevada region. This task involves two primary activities: 1) education and outreach to Grass Valley residents on proven low-impact development (LID) techniques they can implement on their property for on-site stormwater management and 2) training contractors and installing pervious pavement on 7,500 square feet of City of Grass Valley-owned property.

**Subtask 6.1: Stormwater Source Control**

American Rivers with assistance from WCCA will conduct outreach to local homeowners and residents to educate them about LID techniques such as downspout disconnection and rain barrels. The purpose of this outreach and education is to engage residents in ongoing stewardship of the watershed and protection of their community through implementation of the techniques on their own property. This will be done by presenting to local groups, tabling at public events, and going door to door in priority neighborhoods. The LID techniques mentioned capture stormwater as it leaves roofs and infiltrates it in a way that mimics natural hydrology. The residential source control program will be patterned after other successful programs American Rivers has implemented in Portland, Chicago, and Milwaukee. It will be the first program in the CABY region to help landowners sustainably manage stormwater runoff on site.

**Subtask 6.2: Pervious Pavement Installation**

American Rivers will lead this task, with participation of PRDE. The goal of this task is to train licensed contractors in the installation and use of pervious pavement and to install 7,500 square feet of pervious pavement on City of Grass Valley-owned property throughout the watershed. Pervious pavement is a recognized stormwater source control BMP that is growing in popularity nationwide. American Rivers has successfully partnered with PRDE in the past to offer trainings at a pervious pavement installation site. This proved to be a successful, popular, and informative educational setting. There is currently only one demonstration project in the CABY region and few local contractors with the required training, experience and certification to install pervious pavement.

Task	Task Title	Deliverables
<b>6</b>	<b>Stormwater Source Control Program</b>	
6.1	Stormwater Source Control	<ul style="list-style-type: none"> <li>• Source Control Program Implementation Plan</li> <li>• Source Control Program presentation</li> <li>• Source Control education and outreach materials</li> <li>• Surveys conducted to quantify number of residents who implemented LID strategies</li> <li>• Source Control Program Final Report</li> </ul>
6.2	Pervious Pavement Installation	<ul style="list-style-type: none"> <li>• Licensed Contractors trained in pervious pavement installation</li> <li>• 7,500 square feet of pervious pavement installed</li> </ul>

**TASK 7: FLOODPLAIN RESTORATION**

American Rivers will lead this task with participation of the City of Grass Valley, the Sierra Native Alliance, and PRDE. The goal of this task is to reconnect a high-priority floodplain site with Peabody Creek (known as the Upper Floodplain site, see attached map) to reduce erosive peak flows and pollutant loads in the watershed by allowing stormwater to slow down, spread out, and infiltrate into the ground. This will be accomplished by installing rock grade controls, stabilizing stream banks, and revegetating the site with native plants. The grade

controls will allow the floodplain to be re-engaged with the creek and eliminate streambed scour in the restored reach. In addition, the apron leading into the culvert under Walsh Road will be extended to limit growth of invasive watercress at the culvert mouth, which threatens to block stormwater flow through the culvert. Restoration of this site will also involve modifying the current routine maintenance of the site and will reduce the required future maintenance. Instead of aggressive weed removal, which is accomplished by “mucking out” the stream channel and riparian zone to remove invasive weeds, the site will only need initial maintenance and monitoring to ensure establishment of native plants and proper engagement of the floodplain.

Task	Task Title	Deliverables
7	Floodplain Restoration	<ul style="list-style-type: none"> <li>Upper Floodplain engaged and riparian zone restored</li> </ul>

**Budget Category (E)**  
**ENVIRONMENTAL COMPLIANCE/ MITIGATION/ ENHANCEMENT**

N/A

**Budget Category (F)**  
**CONSTRUCTION ADMINISTRATION**

N/A

**Budget Category (G)**  
**OTHER COSTS**

**TASK 8: DEVELOP AND MAINTAIN CABY PROJECT-SPECIFIC WEBPAGE**

The goal of this task is to ensure that all CABY members and members of the public have access to updated and thorough information about the implementation and characteristics of the project. CABY staff or contractors will provide this information through the maintenance of a webpage on the CABY website. CABY staff or contractors will post project progress reports, status updates, and other similar materials (or link them) to this webpage. The webpage will be designed and brought online activated within the first quarter after contract agreement. The page will be updated periodically.

Task	Task Title	Deliverables
8	Develop and Maintain CABY Specific Webpage	<ul style="list-style-type: none"> <li>Complete and Updated Webpage</li> </ul>

**TASK 9: PERFORMANCE MEASURES AND MONITORING PLAN**

American Rivers will lead this task, which is aimed at developing an innovative and robust monitoring and performance assessment program, which will be used to measure performance of this project and can also be exported elsewhere in the CABY region to measure impact of green infrastructure and floodplain restoration projects. In addition, our monitoring and performance measure tracking plan is designed to measure the impact of education and outreach activities for a range of audiences, to promote early learning and replication.

Task	Task Title	Deliverables
9	Performance Measures and Monitoring Plan	<ul style="list-style-type: none"> <li>• Monitoring Report</li> <li>• Performance measures tracked and reported in Final Report</li> </ul>

**Budget Category (H)**  
**CONSTRUCTION/IMPLEMENTATION CONTINGENCY**

N/A