Hangtown Creek Master Plan

Prepared for:
The City of Placerville

Prepared by:
The Hangtown Creek Master Plan Committee

DRAFT

JANUARY
1.21.2007

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January 21, 2007

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HANGTOWN CREEK MASTER PLAN -

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ACKNOWLEDGMENTS –

"...a ditch somewhere – or a creek, meadow, woodlot, or marsh...
These are places of initiation, where the borders between ourselves
and other creatures break down, where the earth gets under our nails
And a sense of place gets under our skin.
...Everybody has a ditch, or ought to. For only the ditches and the fields,
the woods, the ravines – can teach us to care enough for all the land."

Robert Michael Pyle, The Thunder Tree, 1993

Cleaning up Hangtown Creek behind Town Hall on Earth Day 1999

This document is dedicated to the Hangtown Creek Stewardship Committee, Community Pride, and member Helen Ramstad for sponsoring the majority for funding printing costs of the draft Plans and to:

Debra Power: Hangtown Creek Stewardship Committee representative to the Hangtown Creek Master Plan Committee, member of Community Pride and El Dorado Union High School teacher. Prepared and presented the proposal approved by the City Council 1/25/2000 that establish the Hangtown Creek Master Plan Committee. Conducted environmental studies, with her EDUHS students along Hangtown Creek. Authored and compiled Section II & IV that includes biotic & abiotic factors of the watershed, existing creek conditions and recommendations.

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EXECUTIVE SUMMARY

On January 25, 2000, the Placerville City Council unanimously agreed to the following 10 goals and to the development of a Master Plan for Hangtown Creek (Plan). On _/_/_ the City Council unanimously approved the adoption of Res. #__ (see Appendix _), adopting the Hangtown Creek Master Plan.

HANGTOWN CREEK MASTER PLAN GOALS

Goal I: Enhance and Maintain Riparian and Aquatic Habitat
Goal 2: Watershed Protection, Erosion, and Flood Control
Goal 3: Enhance Aesthetic, Historic, and Prehistoric Values
Goal 4: Enhance Creek Access and Public Spaces
Goal 5: Pedestrian and non-motorized Access be Provided as Practical, Feasible and Safe
Goal 6: Provide Educational and Stewardship Opportunities
Goal 7: Promote Land-Use that Incorporates Creek Compatibility with Respect for Private property
Goal 8: Develop a Financial Plan
Goal 9: Map Watershed in the Placerville Area
Goal 10: Public Awareness Campaign

PURPOSE AND NEED

The 1989 Placerville General Plan contains many goals and policies focused on improving Hangtown Creek. This document seeks to further develop these goals and policies: (This Plan is a comprehensive document designed to improve water quality through watershed-based water management policies. Identify other measures needed to maintain or restore fish and wildlife habitat, support native trout fishery, associated with a healthy creek. Provide educational opportunities for nature study and historic interpretation, enhance recreational and non-motorized travel opportunities, and ensure flood control and erosion control measures are integrated into planning efforts).
The Plan should be seen as the document that launches efforts to better understand and enhance Hangtown Creek; it is a beginning and it will need to be adjusted as new information and technology are developed through the efforts of individuals, community groups, agencies, and grants.

PROPOSED CREEK RESTORATION AND PRESERVATION ACTIVITIES

The following activities are planned (project priorities will be set by funding opportunities): Remove the sewer from Hangtown Creek; Establish setbacks from Hangtown Creek and waterways; Daylight Hangtown Creek and tributary's; Restore the riparian areas and beautify Hangtown Creek; Provide public access and connectivity to pedestrian pathways along the greenways; Provide educational materials to property owners and public volunteers with information on stewardship projects that enhance the beauty and health of Hangtown Creek; and Establish a creek celebration day.

PUBLIC INVOLVEMENT

This Plan is the result of efforts by members from the Hangtown Creek Stewardship Committee, Community Pride, Trails NOW, The Heritage Association, and other civic organizations working with the Placerville City Council and Planning Commission, City Staff, and State and Federal Agencies.

FEDERAL REQUIRMENT

The United States Environmental Protection Agency (U.S. EPA) has established the following two-phased program to address storm water discharges from municipal separate storm sewer systems (MS4s), industrial and construction activities to surface waters (e.g., creeks, rivers and lakes):

- *The Phase I regulations require that storm water management programs be developed and implemented by Large MS4s (serving populations of 100,000 people or more), certain industrial activities and construction activities disturbing five acres or more.*
- *The Phase II regulations require that storm water management programs be developed and implemented by Small MS4s (serving populations of less that 100,000) and construction activities disturbing one acre or more.*

In California, the federal storm water regulations for Small MS4s are being implemented through Water Quality Order NO. 2003-01005-DWQ National Pollution Discharge Elimination System (NPDES) General Permit No. CAS000004 Waste Discharge Requirements for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems (General Small MS4 Permit), which was adopted April 30, 2003 by the State Water Resources Control Board (SWRCB). The state has specifically identified the City of Placerville (City) as the owner and operator of a Small MS4. Owen Engineering & Management Consultants, Inc.

This Plan will preserve and enhance our creek through the use of management measures such as revegetation, stormwater filtration and shading. Federal, State, and community cooperation and funding from government and non-government agencies will be sought to achieve the Plan's goals. A significant product of this management effort will be to contribute to the City's ability to meet State and Federal regulatory requirements under the Clean Water Act and other regulations.

The Master Plan will provide a forum for developing multi-agency agreements among the following agencies:

- California Department of Fish & Game
- U.S. Fish & Wildlife Service
- U.S. Army Corps of Engineers
- U.S. Environmental Protection Agency
- Central Valley Regional Water Quality Control Board
- California Department of Water Resources
- El Dorado County Resource Conservation District
- Caltrans Adopt-a-Highway Program
- El Dorado County Planning Department
- City of Placerville

CONCLUSION

The Hangtown Creek Master Plan is the result of a broad community effort to improve Hangtown Creek. The Plan provides the outline/concepts for activities that will lead to a watershed-based approach to enhancement and restoration of the creek. It is a plan that will change as information and technology evolves. It is a plan that will lead to a greatly improved natural environment, the ability of people to interact and enjoy the creek, and measurable economic and aesthetic benefit for the City of Placerville.

TABLE OF CONTENTS

EXECUTIVE SUMMARY.....4

SECTION I: INTRODUCTION

- The Creek Setting.....8
- Popular History of Hangtown Creek.....10
- Ancient History of Hangtown Creek.....12

SECTION II: GEOGRAPHY OF HANGTOWN CREEK

- Biotic & Abiotic Components of Hangtown Creek.....14
  (Numbered Separately)

SECTION III: GOALS, OBJECTIVES, POLICIES, & STANDARDS.....32

Goal 1: Enhance and Maintain Riparian and Aquatic Habitat.....
Goal 2: Watershed Protection, Erosion and Flood Control.....
Goal 3: Enhance Aesthetic Historic and Prehistoric Values.....
Goal 4: Enhance Creek Access and Public Spaces.....
Goal 5: Pedestrian and Non-motorized Access be Provided as Practical, Feasible and Safe.....
Goal 6: Provide Educational & Stewardship Opportunities.....
Goal 7: Promote Land-Use that Incorporates Creek-Compatibility with Respect for Private Property.....
Goal 8: Develop a Financial Plan.....
Goal 9: Map the Hangtown Creek Watershed in the Placerville Area.....
Goal 10: Establish a Public Awareness Campaign.....

SECTION IV: RESTORATION, PUBLIC ACCESS & GREENWAYS IMPROVEMENTS IN EACH REACH..(Numbered Separately.....46

The Urban Reaches.....
The Natural Reaches.....
The Rural Reaches.....
Watershed, Stream Restoration, Tributaries, Storm drains.....

- Pedestrian Paths.....
- Creek Crossings.....
- Creekside Parks.....
- Watershed and Channel Restoration Action Plan in Reaches.....
- Watershed Restoration Action Plan in Reaches.....

SECTION V: IMPLEMENTATION.....91

- Action Plan of Creek Master Plan Implementation Policies.....

GLOSSARY AND INDEX.....92 & 93
BIBLIOGRAPHY AND WEBILOGRAPHY.....94
APPENDICES, MAP, RESOURCES, AND BACKGROUND.....99

ORGANIZATION OF THE PLAN –

The Plan includes background, policies, schematic improvement plans, cost estimates and appendices.

Title & Credits

Executive Summary

Table of Contents

Section I:
Introduction: The Creek Setting, Cultural History of Hangtown Creek, and Ancient Geographic History of the Hangtown Creek Watershed:
Discusses the existing geography of the Creek. Includes background, history: description of the reaches and a vision statement that outlines the over-arching vision for the preservation, enhancement and restoration of the Creek.

Section II:
The Geography of Hangtown Creek:
Biotic & Abiotic Components of Hangtown Creek.

Section III: Goals and Policies
Goals; describes goals, policies and objectives that will guide restoration and preservation. in the Hangtown Creek Greenway. Implementation measures are included here along with a chart of watershed management measures.

Section IV: Hangtown Creek Greenways and Restoration
Public Access; Greenways and Restoration: Identify Reaches & Projects.

Section V: Design Guidelines - Implementation & Action Plan:
Watershed implementation measures matrix & maps.

Glossary and Index
Bibliography and Webilography
Appendices, Resources, Map and Background

Includes several technical topics in some detail. These topics include: Notes from the Field, Creek Studies, a Habitat Restoration Plant Palette, Design Standards, Watershed Management Measures Matrix; Action Plan; Maintenance Plan, The Planning Process, Habitat Restoration, a Flood Energy Dissipation, Preliminary Cost Projections, Funding Sources, Brochure, Watershed Map of waterways, drainages, & public spaces, and resolution adopting the Hangtown Creek Master Plan by the City of Placerville.

SECTION I

INTRODUCTION: The Creek Setting

Placerville is situated in a long narrow ravine running east and west with ravines that run north and south and intersect Hangtown Creek. Street names that are still in use that identify the ravines and tributaries of Hangtown Creek, (Spring Ravine, Clay Ravine, Spanish Ravine, Cedar Ravine, etc.) The water that enters Hangtown Creek from these tributaries is joined by underground water from the ridges to the north and south of the creek. Placerville is honeycombed with abandoned quartz mines and the shafts and tunnels of those mines collect and hold underground water like cisterns. The small creek that runs down Benham Street is a good example. The water in this creek comes from the main shaft of the Pacific Mine. The water that runs in Hangtown Creek converges with the water in Weber Creek then joins the South Fork of the American River that finally enters Folsom Lake making it an important link in the western watershed system of the Sierra Nevada.

Hangtown Creek Watershed is located on the west slope and lower foothills of the Sierra Nevada Mountains. It encompasses 6,079 acres in western El Dorado County and a portion of it is included in the city limits of Placerville. Hangtown Creek flows west from its headwaters near the Smith Flat area through Placerville to its confluence with Weber Creek. Weber Creek flows into the South Fork American River and Folsom Reservoir. Creek elevation ranges from 1,200 to 2,600 feet. The area is characterized by a Mediterranean climate with abundant sunshine in the summer and moderate precipitation in the winter with the majority of it falling between November and April. The annual precipitation range is approximately 35 to 40 inches.

Placerville and its sphere of influence are developing from a rural area into an urban bedroom community of Sacramento. Historic Hangtown Creek provides an important and essential riparian corridor that separates bustling Highway 50 in our quaint old town Placerville with a natural greenway and calming open space buffer. Hangtown Creek is at the heart of Placerville's unique and romanticized gold rush history and over the last 155 years has been taken for granted and used or abused according to the policies of the day. Now in the 21st Century the new goal for the creek is protection and restoration.

The Hangtown Creek Master Plan Committee was formed in January 2000 by the City Council and was given the task of preparing a Master Plan and Watershed Map for the creek. The intent of the Plan is to develop short and long-range goals and standards that will guide restoration of Hangtown Creek, and preserve and enhance its natural, educational, cultural, economic resources and value for the community.

The Hangtown Creek Master Plan Committee success in moving the Plan forward is a result of a strong coalition of interested parties (stakeholders) interested in restoration efforts, and comprised of the City of Placerville (one council member, one planning commissioner and three staff members), members of Hangtown Creek Stewardship Committee and Community Pride; with the assistance of: the California Native Plant Society, Heritage Association of El Dorado County, Trails Now, El Dorado High School, El Dorado County Resource Conservation District, and interested private citizens.

As a major tributary to Weber Creek, the vitality of Hangtown Creek has an effect on the health of the South Fork of the American River watershed. The Master Plan is a community driven plan with a focus on volunteerism and recognizes the limited resources of the City and Agencies, provides guidelines for activities that will focus on Hangtown Creek with a holistic approach to watershed enhancement that will result in successful restoration of the creek.

Tourism has increased over the last ten years and historic Placerville has become a point of destination. The business community on Historic Main Street relies on the natural and historical elements of the town to encourage visitors to stay longer and shop more. The Hangtown Creek Master Plan will also focus on providing cool, shaded picnic areas. The Hangtown Creek watershed map will serve as a roadmap for future improvements.

In the final analysis, the Hangtown Creek Master Plan will guide improvement to the natural environment; will provide an opportunity for people to interact and enjoy the creek; and will provide measurable economic, educational and aesthetic benefits for the City of Placerville.

CULTURAL HISTORY OF HANGTOWN CREEK –

After the news of the gold discovery was reported to Congress in December of 1848, the fever spread and in early 1849 there started the greatest gold rush in history. With the establishment of sea routes and main overland routes from the east, tens of thousands of gold seekers poured into El Dorado looking for their fortune. Hangtown Creek was one of the first tributaries of Weber Creek to be explored.

Hangtown Creek and its tributaries were usually dry during the summer months hence the first name of the camp "Dry Diggins". In early 1849 several men were accused of robbery and murder. They were captured, tried, convicted and hung from a huge oak tree that stood on the south bank of the creek. Dry Diggings then took on the nickname Hangtown and the creek became known as Hangtown Creek. Citizens have always fancied the nickname and the city has endorsed it by adopting an official seal which depicts a hangman's noose attached to the branch of a tree and a miner bent at the creek panning for gold.

In the early 1850s, Dry Diggins was renamed Placerville in honor of the great deposits of placer gold discovered in the ancient, gold-laden channel called the Deep Blue Lead. $1,800,000 of placer gold was taken from the ancient riverbed between Spanish Ravine and the town Plaza. Commerce in mining, lumber, agriculture and transportation began in the early 1850s and the growing demand for equipment, food, clothing, repairs and services allowed business to spring up along the banks of historic Hangtown Creek.

In 1851 hard rock mining started. Giant systems of water ditches were built, running water through every ravine to reach more new claims. The Deep Blue Lead was opened and hydraulic mining began. With every new mining technique the town boomed again and with every new technology the demand for water grew. A few enterprising men recognized this need.

In 1851 the South Fork and Placerville Canal was formed which supplied water from Weber Creek to Coon Hollow. In 1853 the Gold Hill Canal Company was formed which delivered water directly from Hangtown Creek to the miners and farmers on the land that lay between Weber Creek and the South Fork of the American River. Between 1854 and 1907 many companies went into business, gaining water rights and laying ditches and canals. In 1922 the El Dorado Water Company built the Weber Dam Project and in 1925 this company led to the formation of the El Dorado Irrigation District. E. I. D. purchased 31,500 acres of land and water rights. Five districts were formed, Placerville being one of them. Their first office was on Coloma Street in Placerville. In 1929, E.I.D. built a filtration and chlorination plant on Sacramento Hill for the water supply to Placerville.

Another powerful water company in the area was the El Dorado Water and Deep Gravel Mining Company, formed in 1873. They purchased all of the main ditches and canals and acquired many of the patents to the gold mines that ran from Poverty Point south to Weber Creek. In 1907 the Placerville Gold Mining Company purchased all of the E.D.W.

& D.G.M.C. water rights holdings and in 1916 transferred the water system to Western State Gas & Electric Company which in turn became Pacific Gas & Electric Company.

Although the face of Placerville has changed, the creek is the one feature that has remained consistent: dry sometimes, flooded sometimes, diverted sometimes, deepened sometimes and manipulated for the needs of the day.

This remembrance of a lady who was a child at the beginning of the 20th century in Placerville best describes the human connection to the creek. *"I remember the creek, beloved of all the children, coming back to life again after the winter doldrums. Perhaps its fascination for us was the fact it was forbidden territory. It was fun to look down upon it from blackberry bedecked banks or bridges in the spring and watch the furious activity going on below. Skaters skipped over clear water; a species of tiny water bugs by the hundreds joined in a fast whirling dance on a pool's surface; bright red salamanders lurked in the shadows and if you kept very quiet frogs carried on a spring concert. Pollywogs wriggled up and down, stick bugs slowly negotiated the creek bottom and dragonflies darted here and there. Small trout dined on the insect feast Nature had provided. In spring linnets and other songbirds were in full voice, and there was a mysterious feathered troubadour who was to us the very voice of the season. He seemed to range up and down the creek just before dawn. We never managed to see him, but his special voice told us that spring had officially arrived. It was difficult to understand how such a lovely thing as the creek could be dangerous, although at times it did have a queer odor. Usually it smelled of mint and the heady fragrance of leaves warmed by spring sunshine."*

In 1900, homes were just beginning to adopt indoor plumbing. The waste was leached out by very crude septic systems or dumped into holding ponds which were flushed weekly into the creek. This method was not unique to Placerville, nor was it considered a slovenly way of waste disposal. In the summer of 1937, Placerville voted to issue bonds of $50,000 for a sewer project and applied to the newly formed federal Public Works Administration for assistance to build a main sewer line and sewage disposal plant. With the approval of $41,000 from the PWA, work began in February of 1938. The Hangtown Creek bed was chosen for the new, safe and efficient sewer line based on the cost of locating the line in the creek verses trenching and filling surface ground. In February of 1939, the project was completed and the system was up and running. Between the years of 1939 and 1980, the City upgraded and maintained new sewer lines throughout the city, connecting them to the main line. In 1980, the City hired Culp, Wesner & Culp to construct a new Hangtown Relief Sewer Line in the creek, based on the same reasoning as the 1939 project. Both sewer lines are in use today. It has been many years since the creek was used to dispose of waste, Hangtown Creek's new roll in the development of Placerville holds great promise.

It is the author's goal that City of Placerville will adopt the HCMP to restore the stream corridor, and use its management authority to protect the watershed; then, 50 years from today, historic Hangtown Creek will be enjoyed as a cool, quiet space full of small wonders in the middle of a busy City and the mysterious feathered troubadour will have returned.

ANCIENT GEOLOGIC HISTORY OF HANGTOWN CREEK

Moderate to gently sloping volcanic ridges characterize a portion of the landform within the watershed. Hangtown Creek flows through a moderately steep, relatively narrow valley bordered by exposed granitic rocks, and steeply dipping, faulted and folded metamorphic sequences. Stream patterns result from the confined, laterally controlled valley that physically caused Hangtown Creek to be "channelized" in certain areas. The geology within the Hangtown Creek Watershed is complex for such a small area. The geological history of the Hangtown Creek watershed is as interesting as its cultural history. If we could take a time machine excursion in geologic time we would find a progression of fascinating events.

The oldest rocks in the watershed belong to an era called the Paleozoic by geologists. This name literally means "old age." In this ancient period there was only one continent on our planet, called Pangea. Hangtown Creek and California did not exist as a land mass on Pangea but was instead a part of a deep ocean basin on the west side of an island volcanic chain similar to today's Japanese Islands. Fine-grained sediments settled on this basin and were left undisturbed for a considerable amount of geologic time while the volcanic island chain slowly drifted eastward and eventually attached itself to what are today the Rocky Mountain states. The "docking" of this island chain (known by geologists as Sonomia) became an important component in the later history of Hangtown Creek and California. The fine-grained sediments along the oceanic basin were left undisturbed until in the Mesozoic Era when a series of geologic events changed things drastically.

The Mesozoic Era, (Middle Age), is well known by geologists to be an exciting time, as the continent of Pangea broke apart through the plate tectonic process. Off the west coast, which at the time is approximately where the west boundary of Idaho, Nevada and Arizona are now, another volcanic island chain was drifting eastwards. The Stinkine Islands ranged from what is today Alaska and some think stretched as far as today's northern Mexico. The rate of movement for this island chain and a complicated geological process still not well understood by geologist resulted in what is today the Sierra Nevada Mountains. The fine-grained sediments from the Paleozoic were trapped between Sonomia and the Stinkine Islands and started to fold like a carpet on a slippery floor. Eventually the pressure and heat was so severe for the fine-grained sediments that the materials slowly changed into what remains today in the Hangtown Creek Watershed – slate and phyllite. The Stinkine Island chain didn't stop once it reached the continent (like the earlier Sonomia Islands) but instead was forced below the continent into a subduction zone. In this process some of the granitic rocks of the Sierra Mountains were created from the partial melting of the Stinkine Island chain.

As the island chain was forced downward it carried a large amount of oceanic water that interacted with the hot and pressurized rock to form veins of quartz. Within the quartz veins were deposits of gold, silver, and other precious metals that were later discovered

and mined by the Forty-niners. Today's serpentine with its rich content of minerals of chromite and forms of asbestos define where blocks of the unmelted Stinkine rocks interacted with the iron and magnesium rich rocks found near the "basement" within the subduction zone.

The mountain building process in the Mesozoic Era continued into the Cenozoic Era (new era). Also, during the Cenozoic a series of westward trending rivers were draining the mountains formed by Sonomia. The mountain building process was constantly creating shifts in the river patterns such that river gravels were frequently left high and dry as a result. The Sonomian Mountains were rich in gold and the erosive power of these rivers carried sediment westward and deposited the gold in the uplifting Sierra Nevada Mountains. These deposits were discovered and placer-mined by the Forty-niners.

The mountain building process also included faulting. In the Hangtown Creek Watershed a relict from this mountain building is the Melones Fault Zone that trends in a northerly direction and traverses the middle of the watershed. In the Late Cenozoic Era, a volcanic mountain range was formed on top of the Sierra Mountains in response to shifting plate tectonic movement. This mountain range resembled the present-day Cascade Mountain Range with its tall volcanoes. Volcanic lava flows and mudflows tumbled down the flanks of the mountains capping the old slate, phyllite, serpentine and river gravels. Some of these volcanic flows can be seen capping some of the ridges within the Hangtown Creek Watershed.

In summary, the geologic history of the Hangtown Creek watershed is a representative view of the geologic history of our state. Over a lengthy period of time two volcanic island chains moved eastward; the first docking in present day Nevada while the second was partially melted to form the granitic rocks of the Sierras. The partial melting of this second island chain created the quartz veins and serpentine deposits found in the minerals that made "Old Hangtown" internationally famous. Rich gold-bearing gravels in river-draining slopes in Nevada formed the second source of gold in placer deposits. Volcanic deposits from a now eroded volcane mountain range later capped all of this complicated geology.

SECTION II

GEOGRAPHY OF HANGTOWN CREEK

(Last revision 01/19/07)

The geography and existing conditions of the Hangtown Creek corridor is presented in two parts: 1) Biotic and abiotic factors that impact Hangtown Creek, and 2) Adjacent Land Use. Discussion of present-day conditions is included in this section. Public Access to recreational, ecological and historical/cultural greenways and recommended improvements for each reach/subreach is addressed in Section IV.

BIOTIC & ABIOTIC COMPONENTS OF HANGTOWN CREEK

Many biotic (living) and abiotic (nonliving) factors play a role in sustaining life within the Hangtown Creek Watershed. The biotic factors of Hangtown Creek include living organisms ranging from large, migrating mammals to small benthic macroinvertebrates (water-dwelling insects). Abiotic components of the Hangtown Creek ecosystem include a variety of physical and chemical factors that affect the quality of the watershed. Abiotic factors include: air, soil, and water quality that is impacted by adjacent land uses. Past research results for biotic and abiotic components are described below.

Biotic Factors

Wildlife & Fisheries Habitat

The Hangtown Creek Watershed presents a large variety of wildlife habitat. Riparian and woodland habitats are the most prominent *(Rivas)*. The riparian woodland occurs at each end of the creek. Where the natural channel extends from Jaquier Road to Broadway Road, the stream displays canopy cover with large, mature, native trees such as alder, big leaf maple, incense cedar, ponderosa pine, Douglas fir, blue oak, and willow that serve as habitat for wildlife. This same canopy exists downstream from the Hangtown Creek Treatment Plant to the confluence with Weber Creek. Above and below the "rural reaches," a riverine habitat exists within a grout and rip-rap lined channel. Within the City of Placerville, the viable creek ecosystem is frequently compromised by encroaching man-made structures such as impervious surfaces, commercial buildings, and U-shaped channels that serve to degrade aquatic environments.

Wildlife alongside Hangtown Creek is varied. The stream is documented by the CA Department of Fish and Game as a wildlife migration corridor, particularly near the Placerville Drive onramp

to Highway 50 (Lehr 1996). Common animals that probably live in the Hangtown Creek watershed include: California wood ducks, mule or black-tailed deer, coyote, bobcat, and raccoon, striped skunk, lizards, toads, snakes, and tree frogs. The Hangtown Creek Watershed is documented by Placerville General Plan background documents (June 1976) as hosting over 125 different species of mammals, birds, reptiles, amphibians, fish, and plants (see Appendix I: Wildlife Species & Habitat Restoration). Rare, endangered, and protected wildlife species are also considered "likely" to inhabit the stream corridor (pg VII-7). The most likely Federally Threatened Species to be found in proximity to Hangtown Creek is the red-legged frog *(rana aurora dratonii*) and the ringtail cat *(Bassariscus astutus)* (CDFG 2005, ED County RTP 2005). The red-legged frog generally inhabits "quiet pools along streams" such as Hangtown Creek while the ring-tail cat also prefers "rock or brush near water" (pg. VII-7). California and Federal Species of Special Concern include the California mountain *(rana muscosa)* and foothill yellow-legged frog *(rana boylii)* (CDFG 2005, ED County RTP 2005). Protected species such as the horned lizard and the San Joaquin whipsnake could also be found in grassland habitats proximal to the wetted stream (pg. VII-7). Fifty two Special Status Species are documented for El Dorado County by their El Dorado County RTP Program EIR (EDC 2005). Almost seventy species are documented by the California Department of Fish & Game Natural Diversity Database (CDFG 2005). The Hangtown Creek Watershed Master Plan will provide goals, objectives, policies, standards, and implementation measures to help the community protect species and stay in compliance with existing federal legislation.

California Wood Duck: Community volunteers and the California Waterfowl Association have re-established wood duck habitats along Hangtown Creek. Students at El Dorado High School received a donation of lumber in 1998 from the El Dorado Irrigation District. The students milled the lumber, constructed wood duck boxes, and installed the habitats under the supervision of adult mentors from the California Waterfowl Association. Students used GIS software to monitor and map the locations of wood duck habitats ranging from Gold Hill to the Welcome Sign Area in Placerville (Subreach C-6). EDHS students and mentors from the California Waterfowl Association have documented wood duck nesting sites within the Hangtown Creek Watershed.

Rainbow Trout: Hangtown Creek is classified by the California Department of Fish & Game as a Class I Rainbow Trout Fishery. Class I fisheries are high quality trout streams with sufficient natural reproduction that sustains the trout populations at, or near, the stream's carrying capacity. These streams are often small and contain small or slow-growing trout, particularly at their headwaters. Class I trout streams, such as Hangtown Creek, do not require stocking or hatcheries to sustain their Rainbow Trout populations. The trout populations in Hangtown Creek include both migrating and native fish. Rainbow trout in the deeper pools indicate the high biotic quality of the natural reaches. Trout in the western reaches utilize the presence of suitable spawning gravels. Fish migration upstream is barricaded by the Coolwater Creek Water Treatment Plant. Although a large proportion of Hangtown Creeks sits on bedrock above the treatment plant, small intermittent pools with gravels do exist.

Yearly monitoring indicates that various trout species have continued to adapt to this urban stream. Rainbow trout populations have remained stable from 1995-2000. The California Department of Fish & Game, in conjunction with El Dorado High School students, conducted

five electrofishing surveys from May 1995 to April 2000. The study area is located between Spring Street and Center Street. The average reach length is 283 feet. Standard California Department of Fish & Game protocols are always followed. Using the Seber-LeCren two-sample population estimation method (see glossary), the reach is estimated to contain an average of approximately 25 Rainbow Trout. These surveys document that rainbow trout populations for Hangtown Creek have remained stable at approximately 350 - 450 trout/mile since the 1994-95 school year (see table). Averages of 204 rainbow trout are adults that are greater than 6 inches (152.4 mm) in length. Adults constitute approximately 41% of the total trout population. The rainbow trout weighed an average of 77.7 grams. Expanding the average weight and population yields an average of 15.75 lb trout/surface acre. Unfortunately, trout biomass (trout/acre) has continued to decrease since the 1994-95 elecrofishing survey. Since rainbow trout per mile data indicates a stable population (approximately 400 rainbow trout/mile from 1996-2000), the continued decrease of biomass may be indicative of a period of younger trout or environmental degradation that tends to stunt fish growth. Water quality test results indicate the latter isn't likely (See Water Quality Results below). However, future water quality and rainbow trout habitat protection is essential and will be contingent upon allowances for human encroachment made by responsible agencies such as the CA Dept of Fish & Game, U.S. Fish & Wildlife, Caltrans, City of Placerville and the El Dorado Resource Conservation District.

Total populations of fish are also documented as stable. Average total fish populations vacillate yearly between approximately 1,000 – 2,500 fish per mile. This may simply be due to annual fluctuations in abiotic factors such as precipitation and water flow. Water temperature is not likely a factor as temperatures have consistently stayed within the 12-14° ranges over the five-year testing period (1995-2000). A peak average of 6809 total fish per mile was documented in 2000, indicating total fish populations may be increasing. The Hangtown Creek Master Plan provides for best management practices that help our community protect the existing aquatic habitats and ultimately continue improving trout and total fish populations over time. Best management practices will include restoration of degraded fish habitat and protection of existing ones: setbacks (limits imposed on human activities that encroach upon the riparian environment), in-stream boulders, bank stabilization, vegetation management that provides sufficient tree canopy for shading, daylighting to create open drainages of Hangtown Creek and its tributaries (See Section III, Goal 1: Enhance & Maintain Riparian & Aquatic Habitat).

ACADEMIC SCHOOL YEAR OF STUDY	SECTION LENGTH (Feet)	TROUT POPULATION (Extrapolated Total Trout / Mile)	ADULT TROUT POPULATION (Adult Trout / Mile)	RAINBOW TROUT BIOMASS (Pounds / Surface Acre of Water)	SACRAMENTO SUCKER (Fish/Mile)	CALIFORNIA YELLOW PERCH (Fish/Mile)	GREEN SUNFISH (Fish/Mile)	TOTAL FISH POPULATION (Fish/Mile)
1994-1995	214	617	605	26.7	486	197	49	1,152
1995-1996*	---	---	---	---	---	---	---	---
1996-1997	277	444	76	19.9	917	976	38	2,360
1997-1998	260	366	185	17.5	351	199	20	930
1998-1999	333	396	84	6.3	1015	1075	0	2,486
1999-2000	333	396	71	8.3	1340	5056	16	6,809
2000-PRESENT**	---	---	---	---	---	---	---	---
AVERAGE	283	444	204	15.8	822	1501	25	2747

* Electrofishing survey not performed for this school year.

Benthic Macroinvertebrate Populations: Benthic macroinvertebrates serve as an essential food source for trout and other fish populations. They are bottom-dwelling invertebrate organisms that can be seen with the unaided eye. Macroinvertebrates live, crawl and attach themselves to the bottom of streams and rivers. Most macroinvertebrates are aquatic insects or are in the aquatic stages of life (nymphs and larvae). Worms, leaches, and fresh-water clams are also included.

Benthic macroinvertebrates are useful biotic indicators of stream ecosystems and water quality because: 1) each species has a limited range of sensitivity to physical & chemical conditions in the water, 2) they often live longer than one season, 3) they cannot escape pollutants, and 4) they are easily collected. The distribution of aquatic macroinvertebrates is the result of many factors such as water temperature, discharge patterns (depth, slope, width, and turbulence of the water bottom), substrate (stream bottom composition), and food availability. Evaluating Hangtown Creek water quality is directly linked to numbers of species and their "tolerance" to pollutants. Pollutants tend to reduce the number of species (biodiversity or taxa richness) by eliminating sensitive organisms.

El Dorado High School students have monitored macroinvertebrate populations at the Welcome to Placerville sign area of Hangtown Creek from 1994 through 2000. Macroinvertebrate collection protocols established by the EPA Region 10 "In-Stream Biological Monitoring Handbook" were followed. The macroinvertebrate data of Hangtown Creek is limited however, because past human activities such as vertical retaining walls have resulted in erosion of basal gravels and therefore reduces the number of adequate riffles in the study area. Riffle lengths near downtown Placerville are frequently stunted. Given these challenges, students used the Pollution Tolerance Index from Global Rivers Environmental Education Network to assess diversity of macroinvertebrates. Although this method does not take into consideration the abundance of types of organisms, this method does serve as a red flag for moderate to severe pollution. The table below summarizes the taxa richness in the samples. Taxa richness is determined by a large variety of number of orders of organisms which occurs in healthy streams. The number of organisms such as stoneflies, mayflies, dobson fly larvae, and caddis fly larva has increased from 1996 to 2000. Because these organisms are very sensitive to pollutants, their increase indicates improved water quality. Pollution-tolerant species such as bloodworms and leaches first found in 1994 have not been detected since 1996.

SCHOOL YEAR	ORGANISMS IN GOOD WATER QUALITY (Number of Types /ft^2)	ORGANISMS IN FAIR WATER QUALITY (Number of Types /ft^2)	ORGANISMS IN POOR WATER QUALITY (Number of Types /ft^2)
1994-1995	-----	-----	-----
1995-1996	-----	-----	-----
1996-1997	2	3	3
1997-1998	3	4	3
1998-1999	3	2	4
1999-2000	5	5	3
2000-PRESENT*	-----	-----	-----
AVERAGE	3.25	3.5	3.25

* *Testing terminated until further notice for potential loss of public access is resolved.*

Vegetation

Vegetation alongside Hangtown Creek is quite variable. Native wetland vegetation is interspersed between sections of non-native agricultural land uses such as apple orchards and vineyards at the headwaters. The riparian woodlands at each end of the City of Placerville displays dense canopy cover with large, mature, native trees such as big-leaf maple, cottonwood, willow, alder, yellow and grey pine, and dogwood. Private landowners have planted exotic plant species such a vinca and ivy extensively. Many sections are choked with invasive, exotic (nonnative), and weedy plant species. Removal of exotic vegetation and replacement with CA natives by community volunteers is ongoing. Within the City of Placerville, Himalayan blackberries and Ailanthus severely limits public access to Hangtown Creek. This may prove a benefit for areas where blackberry brambles have limited human access and thus impacts. These berries may indeed serve as habitat protection for threatened, rare, or endangered species. Habitat requirements include "quiet pools" that are necessary for red- and yellow-legged frog and "rock or brush near water" for ringtail cat habitat. (1)

Abiotic Factors Affecting Hangtown Creek

Beneficial Uses of Water

Hangtown Creek Watershed is within the larger South Fork American River Watershed that forms part of the Sacramento River hydrologic region. Hydrologic regions of California are based on divisions established by the California Department of Water Resources. Each hydrologic region exhibits similar precipitation, runoff, sediment supply, climate, geologic, and tectonic conditions. The Regional Water Quality Control Board for the State of California has designated beneficial uses for California's waters that may be protected against quality degradation. Beneficial uses for the South Fork American River above and below Placerville include municipal and domestic water supplies, irrigation, hydroelectric power generation, contact and non-contact recreation, canoeing and rafting, warm (below Placerville) and cold

freshwater habitat, cold-water spawning habitat and wildlife habitat. A beneficial use does not apply equally to all surface waters that contribute water to the South Fork American River nor does it include all of the water bodies. Specific beneficial uses vary from watershed to watershed. For Hangtown Creek Watershed, uses may include non-contact recreation, warm and cold freshwater habitat for fish and macroinvertebrates, wildlife habitat, and irrigation.

Water Quality Monitoring

El Dorado High School students monitored the water quality of Hangtown Creek from 1994 to 2000. As part of the Global Rivers Environmental Education Network (GREEN), nine tests were conducted every spring at the Welcome to Placerville sign area. The tests include: 1) Dissolved Oxygen [DO], 2) Fecal Coliform, 3) pH, 4) Biochemical Oxygen Demand [BOD], 5) Temperature, 6) Phosphate ions [PO_4^-], 7) Nitrates [NO_3], 8) Turbidity, and 9) Total Suspended Solids [TSS]. (1) Repeatability was provided for because all tests were performed by volunteers at eight different locations within the Welcome to Placerville project area. According to GREEN protocols, these nine tests are completed, recorded and a yearly average Overall Water Quality Index computed. The Overall Water Quality Index was designed by professionals and educators to help students quantify environmental factors that are normally not quantifiable. The Overall Water Quality Index average for the entire five years is 73, indicating that Hangtown Creek is a suburban stream with "good" water quality.

Dissolved Oxygen: The presence of oxygen in a stream is essential for supporting aquatic plants and animals, particularly fish. Eight dissolved oxygen tests were performed each spring (1995-2000) using the Winkler titration method. Although Winkler test kits are affordable, they are not considered sufficiently accurate by EPA standards. They still provide however, enough accuracy to serve as red flags for volunteers to alert local agencies of potential problems. Because regular monitoring of Hangtown Creek is not a priority for busy agencies such as the City of Placerville, EID, and El Dorado County, ongoing test results of Hangtown Creek are not available. Local volunteers have taken on the task and are presently securing digital equipment for future monitoring efforts that will have the necessary quality assurance and quality controls after Caltrans Improvements are complete.

Most healthy streams have at least 8.0 mg/L of oxygen dissolved in the water. Dissolved oxygen at Hangtown Creek ranges from an average low of 7.8 mg/L (1998-1999) to a high of 12.1 (1996-1997). This exceptionally large DO may be due to an unusually heavy spring runoff for that year. Hangtown Creek averaged 9.6 mg/L of dissolved oxygen for the five-year testing period. Disregarding the 1996-1997 year's test results as exceptionally high, the average DO is still 8.98 mg/L. The average percent saturation ranges from 99.6% (1996-1997) to a low of 64.3% in 1998-1999. The five-year average percent saturation of Hangtown Creek is 87.2%. Streams that consistently have dissolved oxygen values of 90% percent saturation are considered healthy. Dissolved oxygen values may indicate Hangtown Creek is a healthy urban environment for aquatic plants and animals' survival.

Fecal Coliform: Fecal coliform bacteria are found in the digestive tracts of warm-blooded animals. Though not pathogenic, fecal coliform bacteria are used as indicators of pathogens that may threaten public health – hepatitis, dysentery, and even typhus. If fecal coliform counts rise above 200-colonies/100 mL of water, there is a public-health risk due to a greater chance that pathogenic organisms are also present. Hangtown Creek runs alongside the 21-inch sewer main for the City of Placerville. The sewer pipe was installed in the streambed in 1951 in response to the construction of Highway 50 through Placerville. The biggest concern for sources of fecal bacteria entering Hangtown Creek has been from a leaky sewer pipes. In 1996-1997, the average colony count peak of 153.3 colonies/100mL was brought to the City management's attention. To protect public health, the sewer pipe was lined by the City of Placerville in 1997.

Fecal coliform bacteria were monitored every spring between 1995 and 2000. GREEN Rivers standard millipore filtering protocols were followed. Appropriate sterilization techniques were employed. The average fecal coliform for Hangtown Creek from 1995-2000 is 77.5 colonies per 100 mL of water. Testing positive for fecal coliform only confirms the presence of warm-blooded animals, however. Further testing to confirm the source of fecal coliform is from human waste (sewer pipe) is recommended; beyond the scope and safety of high school students, these tests should be performed by the CA Department of Health. Although Hangtown Creek fecal colonies are less than the 200 colonies/100mL benchmark of "risk to public health," this positive identification of fecal matter does indicate the need for determining its source as well as ongoing vigilance in protecting the waters of Hangtown Creek.

pH: The pH test measures the H+ ions of Hangtown Creek. A pH value of 7.0 is neutral. Most streams in the United States range from 6.5 to 8.5. Most trout and macroinvertebrates (animals such as mayfly nymphs, stonefly nymphs, caddisfly larvae that serve as food for trout) can tolerate a pH range of 7 – 9. The pH ranged from a yearly average high of 8.0 (1999-2000) to a low of 7.3 (1995-1996). The average pH for Hangtown Creek from 1994-2000 is 7.6. This is another indicator that Hangtown Creek is a healthy ecosystem that deserves protecting.

Biochemical Oxygen Demand: Biochemical oxygen demand (BOD) is a measure of the amount of oxygen used by aerobic microorganisms as they consume organic wastes in the water. Potential sources of organic waste include urban runoff such as sewage, unprotected storm drains, fertilizers, and lawn wastes. Wastewater treatment plants, lumber mills, and agricultural runoff also contribute organic material. BOD is of concern because wildlife such as trout and their food sources (mayflies, stoneflies) can frequently be robbed of dissolved oxygen they need to survive. Biochemical oxygen demand for Hangtown Creek was measured at the eight sites every spring from 1995-2000. The yearly average biochemical oxygen demand ranged from a low of 2.35 mg/L (1997-1998) to a high of 5.68 mg/L (1998-1999). BOD for Hangtown Creek averages 4.05 mg/L over the five years. This indicates Hangtown Creek is not impacted by natural or human sources of organic material.

Temperature: Water temperature is very important for monitoring water quality. Temperature directly affects the amount of dissolved oxygen available to aquatic wildlife as well as controlling the rate of photosynthesis. Thermal pollution caused by the stream warming as it flows through an urban area, can affect aquatic organism's sensitivity to pollutants, toxicants, parasites, and disease. Rainbow trout are a cold water species that are particularly vulnerable to warm water temperatures because they require water temperatures not exceed 60 °F (16 °C).

Water temperatures were measured each spring from 1995-2000 at eight locations at the Welcome to Placerville study area. As these tests were conducted prior to securing digital equipment that can be calibrated, alcohol Celsius thermometers were used. Despite this limitation, water temperatures are consistent. Water temperature at the study area ranges from an average of 14.8° C (1995-1996) to an average low of 11.7° C (1997-1998). The average temperature is 13.6° C over the five-year period. Water temperature variations over a 1-mile distance change, on average, about 1.1 degrees Celsius. This indicates that Hangtown Creek continues to recover from human impacts: construction, vegetation removal resulting in soil erosion, loss of tree canopy to shade the water, and stormwater runoff from warmer, impervious surfaces (streets, parking lots, & sidewalks).

Phosphates: Phosphorous is a nutrient needed for growth in both plants and animals. Phosphorus is considered a "growth-limiting" factor because plant growth is limited by the amount of phosphorus. In most streams, phosphorous (PO_4^- ions) is usually present in low concentrations, less than 0.1 mg/L for non-polluted streams.

Total phosphates were monitored again at the welcome sign area. Tests were repeated at eight locations at midstream. Again, wet chemistry methods were used according to GREEN protocols. This color comparator method is documented with accuracy up to 5 mg/L. The range of total phosphates for Hangtown Creek was highest in 1999-2000 with an average of 0.2750 mg/L and trace amounts were found in 1997-1998. This apparent temporary spike in total phosphates skews the five-year average of phosphorous for Hangtown Creek to 0.0836 parts per million whereas the average is only 0.0358 mg/L for the previous four years. Potential sources for the increased phosphorus are numerous: animal waste, human waste leaking from the sewer pipe, storm drainages, soil erosion, or fertilizers. Other possible sources of phosphorous that need to be monitored regularly include: loss of streamside vegetation that absorbs nutrients, runoff of detergents from merchants and homeowners, and drainage of wetlands upstream.

Nitrates: Nitrogen is an element that is essential for all living plants and animals. In aquatic environments, nitrogen is converted into nitrates (NO_3) by bacteria. Sewage is the primary source of nitrates from humans. Natural bodies of water generally have low levels of nitrates. Sources include: improper sewage treatment, broken septic systems, fertilizers, and cattle.

Nitrates were tested each spring at the Welcome sign area. Again, wet chemistry methods (low range of 0.0 – 1.0 mg/L) were used. Normal values of nitrates in healthy streams do not exceed __10_ mg/L. Yearly average nitrate values range from a high of 2.8 mg/L (1999-2000) to a low

of 1.0 mg/L (1996-1997). Hangtown Creek has an average of 1.7 parts per million over the five-year period. Again, low amounts of this nutrient are indicative of a healthy stream.

Turbidity: Turbidity measures the clarity of the water. Highly turbid waters generally have large amounts of suspended solids such as silt, clay, and organisms in the water. Suspended solids also absorb sunlight, then warms the stream water which can hold less oxygen for cool water trout. Turbidity is usually a function of waste discharge, runoff, siltation, and algal growth.

Because turbidimeters have only recently become affordable for volunteers, the LaMotte turbidity test kits were used for the five years of testing. Exacting and precise data from these test kits is not possible. With that in mind, the turbidity ranges from an exceptionally high value of 32 JTU (1996-1997) to a low of 1.9 JTU in 1999-2000. The large value for this year (1996-1997) can be explained as a season of high runoff resulting in highly turbid waters which is further supported by large DO values (12.1 mg/L & 99.6 % saturation), large fecal coliform counts (153.5 colonies), and the largest change in temperature (2.5° C) for the same year. Hangtown Creek averages only 7.1 Jackson Turbidity Units (JTU) for the last three normal years of streamflow. The normal turbidity for a healthy stream is _10__ JTU. This continues to support Hangtown Creek has good water quality as these tests are conducted during times of spring runoff when waters are churned.

Suspended Solid: Total suspended solids (TSS) include any residue such as dissolved or suspended solids in the water. Natural sources of TSS can range from leaves and other plant material, soil particles from runoff, decayed plant and animal matter, dissolved or inorganic materials such as calcium, phosphorous, and iron. Man-made sources include: salts, fertilizers, wastewater, industrial wastes, and sewage. High concentrations of total suspended solids can reduce water clarity, slow photosynthesis, bind with toxicants, increase water temperature, and clog fish gills.

Total solids were tested yearly at the Welcome to Placerville project area. Each spring eight tests were conducted using GREEN protocols. Electronic balances are calibrated yearly with a precision of .1%

Streams with TSS above _10__ g/mL are considered unhealthy aquatic habitat. Total suspended solids range from a high of 0.4807 g/mL (1998-1999) to a low of 0.0126 g/mL (1997-1998). The very high values of TSS as well as the high turbidity values for 1998-1999 are likely the result of exceptionally turbulent waters from spring runoff for that year. This yearly average pulls the 5-year average for Hangtown Creek TSS up to 0.1204 g/mL (120.4 mg/L), whereas the normal average is about 0.0304 g/mL. Despite the one year increase, these TSS values at Hangtown Creek are in line with bodies of water considered healthy habitat for fish and wildlife.

These nine water quality tests are indicators that Hangtown Creek appears to be a healthy aquatic environment. Based upon Global Rivers Environmental Education Network (GREEN) protocols, the data gathered from 1995-2000 serves as evidence that Hangtown Creek water quality is good. Hangtown Creek is a viable riparian ecosystem that provides habitat for aquatic fish and wildlife that deserves protection.

SCHOOL YEAR	AVERAGE DISSOLVED OXYGEN (mg/L) [% Saturation]	AVERAGE TEMPERATURE (Degrees Celsius)	FECAL COLIFORM (Colonies / 100 mL)	pH	BIOCHEMICAL OXYGEN DEMAND (BOD) (mg/L)	AVERAGE TEMPERATURE CHANGE (Degrees Celsius / 1-Mile)	AVERAGE PHOSPHATE (PO_4) (parts / million)	AVERAGE NITRATE (NO_3) (Parts / Million)	AVERAGE TURBIDITY (JTU – Jackson Turbidity Units)	TOTAL SUSPENDED SOLIDS (Grams / mL
1994-95	—	—	—	—	—	—	—	—	—	---
1995-96	7.9 [77.0%]	14.8	28.0	7.3	4.71	0.0	0.0200	1.6	18	0.0414
1996-97	12.1 [99.6%]	14.5	153.5	7.5	3.81	2.5	0.0357	1.0	32	0.0186
1997-98	10.2 [96.2%]	11.7	2.5	7.4	2.35	0.0	0.0000	1.2	8.1	0.0126
1998-99	7.8 [64.3%]	13.4	191.6	7.7	5.68	2.0	0.0875	1.7	11.3	0.4807
1999-2000	10.0 [98.9%]	13.7	11.9	8.0	3.69	1.0	0.2750	2.3	1.9	0.0488
2000-Present*	---	---	---	---	---	---	---	---	---	---
AVERAGE	9.6 [87.2 %]	13.6	77.5	7.6	4.05	1.1	0.0358***	1.7	14.3	0.1204

** Testing terminated until further notice because potential loss of public access to Hangtown Creek must be resolved.*
*** Each yearly average is based upon multiple tests performed at eight different locations in the study area.*
**** Average listed is based upon first four years of data because values for 1999-2000 (0.2750 ppm) are exceptionally large.*

Air Quality Monitoring of Hangtown Creek

Air pollution refers to any chemical/physical change, either natural or caused by humans, to the atmosphere that results in the degradation of air quality. The primary air pollutants for the narrow Highway 50 corridor/canyon are gas-powered vehicles, which are multiple-source air pollutants. Three air pollutants from automobiles have been the focus of volunteer monitoring: SO_2, NO_2, CO. These corrosive gaseous pollutants are known to have a direct effect on human, plant, and wildlife health. Sulfur oxides, particularly sulfur dioxide (SO_2) and nitrous oxides such as nitrogen dioxide (NO_2) are generally associated with acid deposition that ultimately impacts water quality of Hangtown Creek. Air pollutants in conjunction with solid particulate matter (SPM) play an important role in the formation of smog. Air pollutants must be controlled in order to stay within the limits set by state (California Clean Air Act) and federal legislation (Clean Air Act). There is still much to be done to ensure the air is kept clean, safe and suitable for humans and living organisms.

Air quality monitoring efforts along Hangtown Creek are not documented by agencies such as the EPA, EID, El Dorado County, or the City of Placerville. Air quality sampling was performed by volunteers at the Welcome to Placerville sign area from 1995 – 2000. Redundancy was provided by each test being performed at the eight test sites. All tests were provided by LaMotte Testing Equipment. GREEN Protocols were followed. Although these test kits do not meet EPA standards for quality assurance and quality control, they have validity for volunteers to use as red flags for potential problems requiring agency attention and further testing.

Particulate Matter: Solid particulate matter (SPM) includes substances released directly into the air. Soot and combustion products result from the burning of hydrocarbons. Sulfur oxides and nitrous oxides can also produce photochemical smog. Environmental Protection Agency (EPA) standards are 150-micrograms/cubic meter over a 24-hour period. PM.10 (< 10 microns)

is a health hazard to human respiratory systems. Quantifiable particulate matter data by volunteers or agencies is not available for Hangtown Creek.

Sulfur Oxides: The primary sources of sulfur dioxide (SO_2) in Placerville are vehicles traveling within the very narrow (___ ft) Highway 50 corridor. Sulfur dioxide measurements at Hangtown Creek ranged from a high of ____ (199_ - 199_) and a low of ___ ppm (199_ - 199_) over a 24-hour period. Sulfur dioxide averages ____ ppm over the five-year period. It appears to hover around 0.15 parts per million (ppm) at the Welcome to Placerville Sign area. This compares to the EPA maximum allowable limits of ___ ppm.

Carbon Monoxide: Carbon monoxide (CO) is produced from incomplete combustion in automobiles. It is a hazard to human health as carbon monoxide inhibits the blood's ability to transport oxygen. Sixty to ninety percent of carbon monoxide emissions come from vehicles. The California Clean Air Act requires communities take responsibility for controlling these pollutants. The maximum allowable limit for CO is ____ over a 24-hour period. Carbon monoxide measurements at Hangtown Creek ranged from a high of ____ (199_ - 199_) and a low of ___ ppm (199_ - 199_) over a 24-hour period. The five-year average carbon monoxide for Hangtown Creek is ___ . *(Still to do here!)*

Nitrogen Oxides. Nitrous oxides such as nitrogen dioxide (NO_2) are corrosive and strongly oxidizing. The main source of nitrogen dioxide is combustion of gasoline and oil. Eight percent of nitrogen dioxide comes from motor vehicles. Acute exposure ranges from 2-8 parts per million. The maximum exposure for 30-minute periods is 50 ppm. Death can occur between 100-200 ppm. The maximum allowable limit for one hour is 0.25 ppm. Nitrogen dioxide measurements at Hangtown Creek ranged from a high of ____ (199_ - 199_) and a low of ___ ppm (199_ - 199_) over a 24-hour period. Nitrogen dioxide averages ____ ppm over the five-year period.

ACADEMIC SCHOOL YEAR	AVERAGE SULFUR DIOXIDE [SO_2 (ppm)]	AVERAGE CARBON MONOXIDE [CO (ppm)]	AVERAGE NITROGEN DIOXIDE [NO_2 (ppm)]
1994 – 1995	-----	-----	-----
1995 – 1996	-----	-----	-----
1996 – 1997	-----	-----	-----
1997 – 1998	-----	-----	-----
1998 – 1999	0.015	30.8	0.195
1999 – 2000	0.150	22.5	0.640
2000 – Present*	-----	-----	-----
AVERAGE**	-----	-----	-----
EPA MAXIMUM ALLOWABLE LIMIT***	**0.140 ppm**	**50.0 ppm**	**0.053 ppm**

** Testing terminated until further notice because potential loss of public access to Hangtown Creek must be resolved.*
*** Each yearly average is based upon multiple tests performed at eight different locations in the study area.*
****SOURCE: Environmental Protection Agency .*

In 1951, the stream was realigned parallel to Highway 50 to accommodate construction of the highway through downtown Placerville. Nutritive soils, as well as spawning gravels have since been eroded and Hangtown Creek presently sits on bedrock in many sections in downtown Placerville. Since 1951, some reaches are recovering as evidenced by sporadic macroinvertebrate habitat and spawning gravels for fish. Outside the City of Placerville, soils along Hangtown Creek appear rich in nutrients with a variety of sediment grain sizes/textures and dark organic material.

El Dorado High School students have tested soils of Hangtown Creek at the Welcome to Placerville sign area under the guidance of the Natural Resource Conservation Service (NRCS). Tests were repeated at eight locations at the study area. Only soil texture results are quantifiable, while nitrogen, potassium and phosphorus test results are descriptive (low, medium, high amounts). Tests for organic content are not available.

Parent material is one of the strongest influences on soil formation within the watershed. Because of the complexity of the parent material as described in the geology of the area, many different kinds of soils have formed in the Hangtown Creek Watershed (See map _____). Soil texture analysis is used as an indicator of soil type and its ability to sustain plant life. The most preferred soils are loams (40% sand, 40% silt, & 20% clay). Soil texture analysis indicates most soils above the top bank are silts (grain size .002 - .05 mm in diameter) with very little organic content. The percent of silt sized particles is ... *(need to find this info in the files!)* The silty texture does have the benefit of retaining water because the grains are small and prevents water from percolating through too fast.

Soil nutrients are also essential for healthy plant growth along Hangtown Creek. When these nutrients are missing, plants become stunted and erosion control becomes an issue, particularly along the banks of a U-shaped streambed severely altered with vertical retaining walls. Three soil macronutrients (nutrients needed in large quantities) were tested regularly from 1995-2000 – nitrogen, potassium, and phosphorous. These three nutrients are usually found in trace amounts outside the lower bank, which indicates soil quality from mid-bank to top-bank of Hangtown Creek is poor. Soil pH ranges from 7.5 to 8.0 from lower to top bank, which is appropriate for metamorphic and igneous source rock material.

Adjacent Land Use

Hangtown Creek Watershed is a neglected watershed that includes numerous paved roads, municipal, commercial & residential developments, agricultural areas, paved parking lots, and trails. Streams in urban watersheds have a character different from that of streams in forested, rural, or even agricultural watersheds. The amount of impervious area can be linked directly to the amount of surface runoff during storm events and changes in stream condition. The annual volume of storm water runoff can increase by up to 16 times its pre-development rate with proportionate reductions in ground water recharge. (6) The peak discharge associated with bank-

full flow (1.5 - 2 year return storm) can increase sharply in suburban streams such as Hangtown Creek. Stream channels experience more bank-full flood events each year and are exposed to erosive velocities for longer intervals. Impervious cover prevents rainfall from infiltrating soils and less flow is available to recharge groundwater. During extended periods without rainfall, base flow levels are often reduced in suburban streams. Changes in the quantity of water leaving a watershed are directly proportional to the amount of impervious surface and reduced filtration in the watershed. Loss of topsoil, soil compaction, and loss of vegetation decreases infiltration and base flows, and increases storm flow and runoff. Stream geomorphology can change dramatically depending on the combination of historical and current activities.

Human activities have altered the stream course and channel characteristics such as bank-full width, gradient, substrate materials, sinuosity, and vegetation cover for Hangtown Creek. It has been straightened and channelized from a long history of mining activities, road and highway construction, and development along the stream corridor, resulting in the potential for degradation such as: 1) loss of cover vegetation, 2) threatened water quality, 3) increased water temperature (from lack of shade as well as increased pollutants), and 4) reduced food availability for wildlife. These changes threaten the numbers and varieties of native species that cannot tolerate ecologic degradation. These human interventions can cause ecologic shifts towards aquatic species composition to "tolerant" species. Public attention and concern for best-management practices/ implementation measures (See Appendix ___) that balance human utilitarian purposes with the restoration, rehabilitation, and recovery of the Hangtown Creek ecosystem continues to improve. The Hangtown Creek Watershed Master Plan will provide for continued guidance in achieving best management practices within the entire Hangtown Creek Watershed (See Goal 1, Section III).

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California Department of Fish & Game. 2005. Threatened & Endangered Species. http://www.dfg.ca.gov/te_species/index/

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Red-legged frog Red-legged Frogs are nationally listed as Special Concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and they are on the provincial Blue List. A subspecies of Red-legged Frogs, the California Red-legged Frog, was recently listed as Threatened by the state of California, for similar reasons.
http://wlapwww.gov.bc.ca/wld/frogwatch/whoswho/factshts/redleg.htm
Great pic go here http://www.heinphoto.com/heros/DSC_15460-Red-Legged_Frog.htm

The U.S. Fish and Wildlife Service listed the Red-legged frog, Rana aurora draytonii, as a threatened species under the United States Federal Endangered Species Act of 1973, as amended, in the Federal Register dated May 23, 1996, and effective June 24, 1996. Scientist, professionals, environmentalists, and landowners all agree, this species is not believed to exist and is extirpated in Madera County. The California Department of Fish and Game Natural Diversity Data Base surveys indicate no recent sightings of this species in the Sierra Nevada mountains south of Amador County. Populations of two Yellow-legged frogs, Rana boylii [foothill] and Rana muscosa [mountain] are extremely rare and declining http://www.crcd.org/redfrog.html

Horned lizards http://uts.cc.utexas.edu/~varanus/phryno.html
General Plan Policy: 2.8.1.1. • **El Dorado County, California**: County Code; Chapter 17.14 Outdoor ... or subalpine habitats. CSC California **horned lizard** (Phrynosoma coronatum (frontale)

Send to Josette
http://www.edctc.org/pdf/non%20agenda%20pdf/RTP_EIR/5_Ch%203_Setting_Impacts_Mitig.pdf
Lists of species
http://www.project184.org/doc_lib/documents/2001/1101/P-184_Workplan_(Attachment_A)_09_20_01.pdf

SECTION III

HANGTOWN CREEK MASTER PLAN GOALS, OBJECTIVES, POLICIES, STANDARDS, AND WATERSHED BASED IMPLEMENTATION MEASURES

"This perspective is conductive to a holistic view of environmental problems and their solutions. A holistic view will improve water quality and, at the same time provide for erosion and flood control by "softening" the urban landscape to allow water to soak into the soil, where it nourishes plants, recharges aquifers, and supports the base flow of streams during dry periods. In this way, soil and vegetation are utilized to filter, transform, bind up, or otherwise neutralize much of the pollutants found in urban stormwater runoff. Onsite stormwater management measures – impervious surface reductions, permeable pavements, small surface and subsurface infiltration basins, bioretention cells, vegetated swales, soil rehabilitation high-performance plantings, green roofs, rain gardens, and others – can support wildlife habitat, beautify properties and neighborhoods, provide recreational amenities, create rewarding jobs, reduce urban "heat island" effects, and more. Removing culverts in order to "daylight" previously buried streams and dried-up wetlands are an especially dramatic and useful restoration activity. Among its many benefits, daylighting can reduce flooding problems caused by undersized culverts; cut the costs of replacing deteriorated culverts; improve water quality by exposing flows to air, sunlight, vegetation and soil; provide new urban recreational amenities and wildlife habitat; benefit nearby residents and businesses by improving property values or generating pedestrian traffic; and reconnect people to nature by restoring something that once seemed lost forever."

Watershed, Stormwater and Creek Restoration - Rocky Mountain Institutive 2000

The Following Goals were approved by the City Council on January 25, 2000 to use in the drafting of the Hangtown Creek Master Plan:

Goal 1: Enhance and Maintain Riparian and Aquatic Habitat
Goal 2: Watershed Protection, Erosion, and Flood Control
Goal 3: Enhance Aesthetic, Historic, and Prehistoric Values
Goal 4: Enhance Creek Access and Public Spaces
Goal 5: Pedestrian and Non-motorized Access be provided as Practical, Feasible and Safe
Goal 6: Provide Educational and Stewardship Opportunities
Goal 7: Promote Land-Use that Incorporates Creek Compatibility with Respect for Private property
Goal 8: Develop a Financial Plan
Goal 9: Map Watershed in the Placerville Area
Goal 10: Public Awareness Campaign

Streams are critical to maintaining the quality of life in our cities, (they provide valuable fish and wildlife habitat with open spaces where they are needed most, where people live,) our City's fish-bearing stream and open channel waterways and drainages offer recreational opportunities, provide effective open spaces, improves water quality & quantity, add to adjacent property values, protect our watershed, allow groundwater recharge, give a connection to nature, provide for student studies and educational opportunities. The following goals, policies, objectives, and implementation measures will not only identify community values, it will guide future stewardship projects to increase education, funding and volunteerism.

GOAL 1: ENHANCE AND MAINTAIN RIPARIAN AND AQUATIC HABITAT

OBJECTIVE 1: Enhance degraded riparian, aquatic, uplands, and impermeable area habitats.

POLICY 1: Encourage provisions for promoting the following watershed-based measures:
(See when, where & how in action plan/design guidelines)

- Areas for fish passage, spawning habitat, gravel rims, resting habitat in deep cool pools, and summer rearing habitat for fingerlings and smolt.
- Feeding, nesting and shelter for birds, passerines.
- Creek stabilization, Tributary vegetation, boulder placement.
- Daylighting of streams, tributaries and stormdrains.
- Open channel drainage, retention ponds.
- Reestablishment of riparian vegetation, slope restoration.
- Establishment of open space, public spaces & easements.
- Waste clean-up, and enforcement of laws against dumping chemicals, hazardous waste, pesticides, herbicides, & other activities that impact health of the stream
- Protect streamside habitat on seasonal and ephemeral drainages to provide pervious areas to reduce storm flows to creek, provide habitat refuges & corridors and supply critical seasonal water.

POLICY 2: The City shall encourage the day-lighting of the Hangtown Creek in future developments.[1]

OBJECTIVE 2: Maintain riparian & aquatic habitat by promoting holistic measures.

POLICY 1: New development shall be sited to protect native tree species, riparian vegetation, important concentrations of natural plants, and important wildlife habitat, to minimize visual impacts and to provide for continuity of wildlife corridors.[2]

POLICY 2: The City shall require that new development incorporate sound anti-pollution practices that meet or exceed best management practices, to protect water quality.[3]

POLICY 3: The City shall encourage the use of native plants in both public and private landscaping.[4]

POLICY 4: The City shall promote the development of streamside mini-parks that enhances habitat.[5]

GOAL 2: WATERSHED PROTECTION, EROSION, AND FLOOD CONTROL

OBJECTIVE 1: Encourage stewardship techniques for watershed protection that utilize development standard recommendations that provide for protecting water quality and reducing stormwater-related flooding. *(See Watershed Stormwater Management Matrix Chart)*

POLICY 1: No new structures improvements, or grading activities shall be allowed that do not enhance riparian habitat.

IMPLEMENTATION MEASURE 1: The City shall amend its General Plan and ordinance code as necessary to maintain a 50-foot setback area adjacent to all "rural reaches" of Hangtown Creek (identified as Reaches_____ in this Plan).

IMPLEMENTATION MEASURE 2: The City shall amend its General Plan ordinance code as necessary to maintain a 15-foot setback area adjacent to all "urban reaches" of Hangtown Creek (identified as Reaches_____in this Plan).

IMPLEMENTATION MEASURE 3: The City shall amend its General Plan ordinance code as necessary to maintain a 25-foot setback area adjacent to all "waterways" of the Hangtown Creek Watershed (identified in appendix _____in this Plan in accordance with the General Plan goal: "The City shall amend the Zoning Ordinance to require setbacks from watercourses in accordance with Policy V.D.1." and the General Plan Implementation: "The City shall make every effort to protect riparian vegetation. To this end, buildings and improvements shall be setback from watercourses").[6]

POLICY 2: Encourage increased shading throughout the creek area to maintain water temperatures in Hangtown Creek that support the native cold-water fishery.

POLICY 3: The City is encouraged to seek funding for the installation of filtration systems to treat stormwater run-off originating from existing parking lots.

POLICY 4: Seek ways to control and discourage herbicide and pesticide use on public and private spaces within 50 feet of the creek to ensure chemicals do not have an impact to water quality.

POLICY 5: Reduce stormwater-related flooding and damage to stream and wetland habitat, and increase infiltration.

IMPLEMENTATION MEASURE 1: City shall adopt design guidelines re (see Section V) that includes the following practices:

- Minimize impervious cover to improve water absorption;
- Spread run-off over pervious areas to improve water absorption;
- Utilize narrow roads to reduce paved (impervious) surface;
- Utilize open-channel drainage to improve water absorption;
- Protect natural areas to improve water holding capacity in watershed; and,
- Maintain stream riparian areas to improve water-holding capacity.

IMPLEMENTATION MEASURE 2: The City shall work with Community Pride, the Hangtown Creek Stewardship Committee and other interested organizations and agencies to encourage:

- Shading parking lots with vegetation to reduce heat load
- Protecting riparian areas with stream setbacks
- Restricting the removal of native riparian vegetation

POLICY 6: The City shall ensure that channel improvements to creeks and tree and brush clearance activities along creeks within the city do not unnecessarily disturb riparian vegetation.[7] *(See Maintenance Plan)*

IMPLEMENTATION MEASURE 1: Prohibit culverting, lining or piping of streams, except at driveways and road crossings.

IMPLEMENTATION MEASURE 2: Wherever feasible, replace concrete channels with natural unlined channels.

IMPLEMENTATION MEASURE 3: For parking lots of 25 or more stalls, commercial sites with 10,000 sq. ft. or more, and houses of 10 units or more implement run-off management plans that retain the first ¾" of rainwater (stormwater) on site.

GOAL 3: ENHANCE AESTHETIC, HISTORIC, AND PREHISTORIC VALUES

OBJECTIVE 1: Land modifications and revegetation efforts shall enhance the aesthetic and historic elements of the Hangtown Creek watershed area.

POLICY 1: Design standards shall be used in a way that retains the historic flavor that gives the Hangtown creek area its unique character.

POLICY 2: The City shall protect and manage Placerville's tree cover for ecological, aesthetic, and economic reasons. Protect riparian tree cover and areas of wildlife corridors.[8]

POLICY 3: The City shall develop design concepts and implementation plans for visually enhancing city entrances in the creek area.[9]

POLICY 4: The City shall coordinate its efforts with The Hangtown Creek Stewardship Committee, Community Pride, and the Heritage Association.

POLICY 5: The City shall encourage the reclamation of scarred hillsides[10] in the Hangtown Creek watershed.

POLICY 6: The City shall encourage creative site planning for developments in hillside and environmentally sensitive areas [11] in the Hangtown Creek area.

POLICY 7: The City shall encourage public art and social events in the [12] Hangtown Creek area.

POLICY 8: The City shall encourage Caltrans to continue programs to landscape the Highway 50 right-of-way [13] in the Hangtown Creek area.

POLICY 9: The City shall endeavor to maintain natural land features and vegetation along Highway 50 by promoting high quality construction within the[14] Hangtown Creek area.

POLICY 10: The City shall encourage and promote the enhancement of the visual distinctiveness of Highway 50 entrances to Placerville[15] near Hangtown Creek.

GOAL 4: ENHANCE CREEK ACCESS AND PUBLIC SPACES

OBJECTIVE 1: Create creek public access for restoration, the establishment of greenways and maintenance.

POLICY 1: The City shall encourage the use of, among other things:

- Seating areas with benches; Pervious paving materials only;
- Picnic tables; Informal signage; Use "No Spray" signage; Exercise facilities;
- Lighting that does not impede nocturnal wildlife. Footbridges and footpaths;
- Trash receptacles; and, Decorative fencing and safety fencing.
- Trails & Pathways in Greenways that provide safe, minimally invasive ways of accessing the creek area. Provide trail access for educational opportunities so youth can learn about wildlife, habitat and geology in a safe environment.

OBJECTIVE 2: Encourage merchants and local businesses to enhance their own facilities with such things as outdoor cafes, and creekside seating areas, and encourage the City to waive additional parking fees for the expansion of businesses when pedestrian amenities are included such as bike racks, park benches, public access and pathways.

IMPLEMENTATION MEASURE 1: The City shall prepare an improvement plan for Hangtown Creek that provides for pedestrian access, aesthetic enhancement, and public safety.[16]

IMPLEMENTATION MEASURE 2: The City shall prepare and adopt an open space and/or conservation easement program for the protection of open space and scenic areas.[17] in the creek area. To this end, the mapping of the watershed shall identify opportunities for pedestrian easements, public spaces and drainages.

GOAL 5: PEDESTRIAN AND NON-MOTORIZED ACCESS BE PROVIDED AS PRACTICAL, FEASIBLE AND SAFE

OBJECTIVE 1: Satisfy the needs of highway users, cyclists, pedestrians and local business while maintaining the integrity of the environment.

POLICY 1: The City shall coordinate with Trails Now!, Community Pride, the Hangtown Creek Stewardship Committee, Caltrans and the RCD in their efforts to establish Pedestrian Trails and public spaces in creek zones.

POLICY 2: The City shall coordinate a watershed mapping program which includes an overlay of public spaces, and identifies opportunities for trail linkages, pedestrian paths and open space easements. This mapping will help to implement the following state mandates:

A. Demands for trail-oriented recreational use (Public Resources Code 5076). (Cities and counties must consider such demands in developing specific open space programs.) (See City mandate re Open Space Easement program.)
B. The retention of all publicly owned corridors for future use (e.g., abandoned rail lines, utility corridors, easements etc.).
C. The feasibility of integrating city and county trail routes with appropriate segments of the California recreational Trials System (Public Resources Cod 5076). (See the California Recreational Trails Act, commencing with Pubic Resources Code 5070.)

GOAL 6: PROVIDE EDUCATIONAL & STEWARDSHIP OPPORTUNITIES

OBJECTIVE 1: Hangtown Creek will continue to serve as a living classroom with a curriculum that includes: hydrology, plant ecology, wildlife ecology, stewardship and restoration.

POLICY 1: The Hangtown Creek Stewardship Committee and Community Pride will provide an annual inventory to the city documenting creek restoration projects, student environmental studies, and watershed educational programs. Educational programs shall include a storm drain stenciling program, an herbicide education program, and a watershed protection program (neighborhood & development stewardship).

POLICY 2: The City shall develop a nature study area with a good representation of local plant communities.[19]

POLICY 3: Provide opportunities for students to display interpretive exhibits that describe indigenous vegetation, indigenous wildlife, and cultural activities (See sample brochures) near the creek area.

POLICY 4: The City shall monitor the health of the riparian zone, and support student efforts to raise trout for release into the creek.

POLICY 5: The City shall encourage service-learning activities such as constructing park benches, picnic tables, footbridges, and public trash receptacles in the creek area.

IMPLEMENTATION 1: Establish an outreach program that encourages involvement of the Placerville schools and Scouts in Hangtown Creek Stewardship Committee and Community Pride work projects along Hangtown Creek.

GOAL 7: PROMOTE LAND-USE THAT INCORPORATES CREEK-COMPATIBLILITY WITH RESPECT FOR PRIVATE PROPERTY

OBJECTIVE 1: Identify private property within the watershed and encourage these property interests, property owners to become involved with Hangtown Creek improvement plans.

POLICY 1: Encourage local businesses and merchants to take an active role in making Creek-related improvements.

POLICY 2: The Hangtown Creek Stewardship Committee, Community Pride, and other organizations and agencies will serve in an advisory role regarding all matters that relate to compatibility between Hangtown Creek-related improvements and private property interests.

IMPLEMENTATION MEASURE 1: Establish an advisory process.

GOAL 8: DEVELOP A FINANCIAL PLAN

OBJECTIVE 1: Provide methods for seeking alternative funding sources for a Hangtown Creek Watershed Maintenance and Improvement program.

POLICY 1: Encourage the City to work with the Hangtown Creek Stewardship Committee, the Community Pride Committee and other agencies in applying for grants.

IMPLEMENTATION 1: The City is encouraged to establish a process to encourage cooperation between local community groups and state and federal agencies such as the El Dorado Resource Conservation District, The Regional Water Quality Control Board, The Department of Fish & Game, The Department of Fish & Wildlife Service and other entities in acquiring grants, on-site mitigation funds, and land & water conservation funds that will help to improve water quality in the Hangtown Creek Watershed.

GOAL 9: MAP WATERSHED IN THE PLACERVILLE AREA

OBJECTIVE 1: Protect Placerville's natural vegetation and diverse wildlife within the Hangtown Creek watershed.

POLICY 1: Provide information and identify water input sources to Hangtown Creek so as to guide restoration and enhancement activities.

POLICY 2: Educate the public on how Hangtown Creek waters and the Hangtown Creek watershed are linked.

IMPLEMENTATION MEASURE 1: The Hangtown Creek Master Plan Watershed Map shall include:

- Perennial and intermittent streams including buried and exposed sections
- Points of discharge for surface run-off
- Impervious surfaces (buildings, parking lots and paved areas)
- Delineation of the riparian vegetation & public spaces

IMPLEMENTATION 2: Use the Hangtown Creek Master Plan watershed map to set priorities for restoration and monitoring.

IMPLEMENTATION 3: Use the map in public outreach presentations to inform others about the water linkages in the watershed and how their actions can affect the linkages (e.g. fertilizer and pesticides in run-off, chemical dumping in street drains, erosion from poorly designed roads).

POLICY 3: — Use the watershed map to identify areas that may allow for:

- Reducing impervious cover;
- Spreading run-off over pervious areas;
- Utilizing narrow roads;
- Shading of asphalt and riparian areas;
- Watershed protection in reaches;
- Establishment of creek-side setbacks;
- Utilizing open-channel drainage;
- Conserving natural areas;
- Revegetation;
- Reducing herbicide and pesticide use.

GOAL 10: PUBLIC AWARENESS CAMPAIGN

OBJECTIVE 1: Promote Hangtown Creek assets while working in the stream and fundraising for the stream.

OBJECTIVE 2: Encourage and promote public awareness of watershed-based water quality protection.

POLICY 1: The City shall support Hangtown Creek Stewardship.

IMPLEMENTATION 1: Establish a Hangtown Creek Day to celebrate the creek with clean up and planting.

IMPLEMENTATION 2: Establish a Walking Tour of the Hangtown Creek Watershed and Creek . (See appendix)

IMPLEMENTATION 3: Continue the public spaces inventory program (Community Pride and the Hangtown Creek Stewardship Committee). (See appendix)[20]

POLICY 2: The City is encouraged to coordinate and seek recommendations from the Hangtown Creek Stewardship Committee, Community Pride and other Organizations and agencies on work involving removal and replacement of creek vegetation.

POLICY 3: The City shall encourage volunteer groups, schools and agencies to monitor water, air and soil quality parameters.

IMPLEMENTATION 1: Work with Community Pride, the Hangtown Creek Stewardship Committee, and cooperating agencies to develop handouts, mailers on the benefits of watershed protection. Handouts will include a Watershed Management Matrix which shows to the benefits of watershed protection in the reduction of stormwater runoff and health of the creek and to encourage stewardship within the community. Example follows:

WATERSHED MANAGEMENT MATRIX

WATERSHED MANAGEMENT MATRIX

Measures to Enhance & Improve Hangtown Creek (Watershed, Storm Water & Stream Restoration)

Function or Benefit

Features	**A. HABITAT** Riparian Aquatic Wildlife(food/shelter)	**B. Watershed** Water quality, and Drainage	**C. Amenities** Nearby Nature, Visual & Rural	**D. Community** Open So., Scenic, Buffers & Parks	**E. Cir&AirQuality** Air, Noise, Alt. Transportation Energy
1. Shade (Preserve extg., asphalt and Waterways)	X	X	X	X	X
2. Setbacks (Streams Gorges & Waterways)	X	X			
3. Daylight (Streams, Stormdrains and Natural Drainages)	X		X		
4. Open Channels (Filter and ReCharge)		X	X	X	X
5. Op.Sp./Pub/Ease. (Separate&Connected)		X			
6. Cluster (Habitat)		X			
7. Corridors (Crossing, and connectivity)	X				
8. NativeLandscaping (Habitat & Energy)	X				
9. Ped's & Calming (Narrow Rd's, Energy)	X	X	X		X
10. Stormwater (Reduce & Filter, Remove Pollutants, Daylight, Swales and Retention areas)		X			

ACTION PLAN for IMPLEMENTATION DESIGN GUIDELINES

Goal 1: Enhance and Maintain Riparian and Aquatic Habitat
- Habitat Restoration Guidelines

Goal 2: Watershed Protection, Erosion, and Flood Control
- Watershed Protection, Landscape Improvements, and Stormwater Mitigation Guidelines

Goal 3: Enhance Aesthetic, Historic, and Prehistoric Values
- Architecture, Unique Settings
- Cultural Resources
- Public Art, Framework Guidelines

Goal 4: Enhance Creek Access and Public Spaces
- Walls, Fences, and Pedestrian Gates
- Walkways, Paths, and Trails
- Pedestrian Walkways
- Hiking Trails
- Bikeways and Bike Path Guidelines

Goal 5: Pedestrian and Non-motorized Access be provided as Practical, Feasible and Safe
- Parking, Traffic Control and Parking Unique Settings, Loops & Links to Sidewalks and Children's Play Areas, Trail Connections, Walking for Recreation Guidelines

Goal 6: Provide Educational and Stewardship Opportunities
- Interpretive Signage Guidelines

Goal 7: Promote Land-Use that Incorporates Creek Compatibility with Respect for Private property
- Site Furnishings, Benches, seating
- Lighting
- Trash Enclosures and Receptacles
- Dog Waste Disposal
- Open Classrooms
- Drinking Fountains
- Dog Drinking Fountain
- Bike Racks
- Guidelines

Goal 8: Develop a Financial Plan
- Baseline Conditions, Input, & Output
- Native Plant Inventory
- Habitat Restoration Plant Palette
- Exotic Plant Removal Guidelines

Goal 9: Map Watershed in the Placerville Area
- Baseline Conditions
- Native Plant Inventory
- Habitat Restoration Plant Palette
- Exotic Plant Removal Guidelines

Goal 10: Public Awareness Campaign
- Baseline Conditions, Input, and Output
- Native Plant Inventory
- Habitat Restoration Plant Palette
- Exotic Plant Removal Guidelines

PLACERVILLE HABITAT RESTORATION PLANT PALETTE (INPUT)

Hangtown Creek Plant Species List for The City of Placerville

Adopted by: Community Pride and the Hangtown Creek Stewardship Committee 11/95

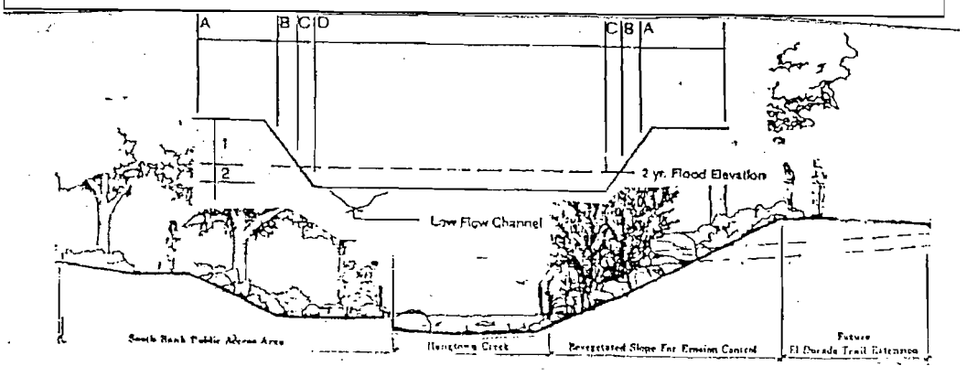
Botanical Name	Common Name
A. Top of Bank	
Woody Plants	
Quercus wislizenii	Interior Live Oak
Quercus kelloggii	Black Oak
Arbutus menziesii	Madrone
Psuedotsuga menziesii	Douglas Fir
Ceanothus sp.	Ceanothus
Umbellaria californica	California Bay
Aesculus californica	Buckeye
Styrax officinalis	Snowdrop bush
Cercis occidentalis	Western Redbud
Heteromeles arbutifolia	Toyon
Grasses and Wildflowers	
Nasella cernua	Nodding Needlegrass
Elymus glaucus	Blue Wildrye
Melica californica	California Melic
Calochortus sp.	Mariposa Lily
Brodiea sp., Tritelia sp.	Brodiea (s)
Diclostemma sp.	Calif. Diclostemma
Escholtzia californica	California Poppy
Lupinus sp	Lupine
B. Mid-bank	
Woody Plants	
Quercus lobata	Valley Oak
Acer macrophyllum	Big-leaf Maple
Cornus nutalli	Pacific Dogwood
Rosa californica	California Rose
Vitis californica	California Grape
Symphoricarpos albus	Snowberry
Calycanthus occidentalis	Spicebush
Sambucus mexicanus	Blue Elderberry
Aristolochia californica	Pipevine
Grasses and Wildflowers	
Hordeum brachyanthrum	Meadow Barley
Melica californica	California Melic
Deschampsia cespitosa	California Hairgrass
Danthonia californica	California Oatgrass
Elymus tritcoides	Creeping Wildrye
Carex feta	Green-sheath Sedge

Botanical Name	Common Name
C. Lower Bank	
Woody Plants	
Alnus rhombifolia	White Alder
Populus fremontii	Fremont'sCottonwood
Fraxinus dipetala	California Ash
Acer negundo	Box Elder
Willows Salix sp.	Willow shrub and tree
Sambucus mexicana	Blue Elderberry
Symphoricarpos albus	Snowberry
Rosa californica	California Rose
Nitis californica	California Grape
Acer macrophyllum	Big leaf maple
Herbaceous Species	
Muhlenbergia rigens	Deergrass
Elymus triticoides	Creeping Wildrye
Festuca rubens	Red Fescue
Deschampsia cespitosa	Calif. Hairgrass
Danthonia californica	Calif. Oatgrass
Carex feta	Green-seath Sedge
Carex barbarae	Santa Barbara Sedge
Carex pachystacha	Thick-head Sedge
Carex pregracilis	Clustered FieldSedge
Carex senta	Rough Sedge
Juncus, balicus, xiphoides	Rushes
Woodwardia fimbriata	Chain Fern
Adiantium filis-femina	Lady Fern
D. Channel Bottom	
Woody Plants	
Rosa californica	California Rose
Salix sp	Willow
Alnus rhombifolia	Alder
Herbaceous Species	
Carex and Juncus	Rush and Sedge
Darmera peltata	Indian Rhuberb
Equisetum arvense	Scouring Rush
Equisetum arvense	Horsetail
Eleocharis acicularis	Least Spikerush
Leersia oryzoides	Rice Cut-grass
Paspalum distichum	Joint Paspalum

Streamside Revegetation - Plant List

Planting location for shrubs and trees reflect adaptability of vegetation to specific ecological zones, moisture regimes, and flood magnitudes and frequencies, resilience to disturbance, and shading of water and other water quality benefits.
All planting within the creek approved by Fish and Game.

JJ-12/97



CREEK MAINTENANCE PLAN (OUTPUT)

CREEK MAINTENCE PLAN CREEK VEGETATION MANAGEMENT

Approved by Hangtown Creek Stewardship Committee and Placerville Community Pride 3/14/00

Goal: Adopt a vegetation management program to minimize chances of the creek flooding, to restore and maintain a more native vegetation community, and to improve fish habitat.

Background: During high storm flows, the waterways that run through Placerville should flow as freely as possible to minimize chances of flooding. As more waters in the Hangtown Creek watershed are culverted, impervious surfaces increased, and less-natural drainage systems are utilized, high storm water flows into Hangtown Creek will continue to increase. With no maintenance, growth of non-native blackberries and thickets of non-native and native trees develop, reducing the channel's capacity to carry storm flows. During high storm flows these thickets also trap debris, further slowing flows. The slower flows raise the water level, which increases the chances the water will overflow its channel. Also, as thickets trap debris, they offer more resistance to high-energy storm flows. This puts a greater force on the trees, increasing the chance they will be uprooted. Uprooted trees lodging at a narrow point in the channel or under an overpass or culvert probably present the greatest risk of flooding. By removing non-native trees such as tree of heaven, "cherry" plum, and Lombard poplar, managing native trees for proper spacing, and removing lower limbs greatly improves the capacity of the channel to carry storm flows. Properly spaced trees grow more vigorously and develop stronger root systems and are less likely to be uprooted. If the larger trees have their lower branches removed to the high water level they offer much less resistance to flow than an untrimmed tree. A well maintained tree canopy also provides shade & cooling, and protects habitat for fish.

Objectives: Removal of non-native blackberries vegetation. Blackberries develop dense thickets that choke out native marsh vegetation lowers channel storm capacity, and make the area impenetrable. Non-native blackberry stands can be replaced with native marsh vegetation and other plants. (See attached Native Riparian Plant List.) The native marsh vegetation, which consists mostly of various native grasses, sedges and rushes, offers less resistance to storm flows, improved aesthetics and wildlife values, and excellent erosion control. Fortunately, marsh plants are cu scattered along the creek. Removing competition from blackberry and other weeds would allow the March plants to spread on their own in many areas. Other weeds of concern that should be targeted for removal, control are fennel, sweet white clover, and annual grasses and star thistle.

Implementation - Methodology: Available methods of weed control and vegetation removal include gas by powered string and bladed trimmers, chain saws, and gas powered hedge type cutters, hoes and diggers, picks, loppers and hedge shears. By properly timing and repeating these activities, weed competition can be reduced and eliminated, and native vegetation cover can be enhanced Herbicide use should be evaluated carefully for each situation. Spraying should be limited to work necessary to protect public safety. Blanket long-term use of herbicides in an area is frequently counterproductive j It often creates stands of resistant noxious weeds (as seen along county roads Herbicide use on blackberries usually kills only the top growth. The plants usually resprout underground stems and therefore require repeated spraying. Also, a thicket of dead top growth remain. Finally, many blackberry stands are covering remnant native arch plants. Spraying runs the risk of killing the desirable plants ; in contrast, if the blackberry is cut three or o lines a year, the remnant March plants can grow and spread more vigorously. As the natives grow and spread, they offer more competition to the blackberry and its regrowth is significantly slowed. While the initial cut in a dense non-native blackberry stand is time consuming, recutting takes much less time

Recommendation: Prior to any work being done within the creek channel. CP & the HCSC will contact Fish & Game. Community Pride & the Hangtown Creek Stewardship Committee will be notified ahead of time to allow workers time to flag the plants to be removed or preserve.

ENDNOTES

1. Placerville General Plan, Pages 76-77, #3. *"The City shall encourage the uncovering of the Hangtown Creek in future developments."*
2. Placerville General Plan, Pages 50 – 51, #3. *"New development shall be sited to protect native tree species, riparian vegetation, important concentrations of natural plants, and important wildlife habitat, to minimize visual impacts and to provide for continuity of wildlife corridors."*
3. Placerville General Plan. Page 49, #5. *"The City shall require in new development sound anti-pollution practices to protect water quality."*
4. Placerville General Plan. Pages 50 – 51, #6. *"To retain the natural landscape character of Placerville, introduced plants in public and private landscaping should be subordinate to and compatible with existing natural landscape."*
5. Placerville General Plan, Page 53, #6. *"The City shall promote the development of streamside mini-parks."*
6. Placerville General Plan, Page 55-56, #5. *"The City shall amend the Zoning Ordinance to require setbacks form watercourses in accordance with Policy V.D.1."* Responsibility: City Council, Community Development Department. TF: FY 89-90.
7. Placerville General Plan, Pages 50 – 51, #2. *"The City shall ensure that channel improvements to and tree and brush clearance activities along creeks within the city do not unnecessarily disturb riparian vegetation."*
8. *Placerville General Plan, Pages 50 – 51, #3. The City shall protect and manage Placerville's tree cover for ecological, aesthetic, and economic reasons. Protect riparian tree cover and areas of wildlife corridors*
9. Placerville General Plan, Page 74, #8. *" The City shall develop design concepts and implementation plans for enhancing visual image at city entrances."*
10. *Placerville General Plan, hillsides*
11. *Placerville General Plan, creative site plan*
12. *Placerville General Plan, #9 "The City shall encourage public art and social events in the downtown area."*
13. *Placerville General Plan, #1. "The City shall encourage Caltrans to continue programs to landscape the Highway 50 right-of-way and interchanges."*
14. *Placerville General Plan, #3. "The City shall endeavor to maintain natural land features and vegetation along Highway 50 by promoting high quality construction within the adjacent Highway 50 corridor."*
15. *Placerville General Plan, #4. "The City shall promote the enhancement and visual distinctiveness of Highway 50 entrances to Placerville on the west and east."*
16. *Placerville General Plan, #5. "The City shall prepare and adopt an improvement plan for Hangtown Creek providing for pedestrian access, aesthetic enhancements and public safety." Responsibility: City Council, Community Development Department; Pubic Works Department. Time Frame: FY 91-9217.*
17. *Placerville General Plan, #7. "The City shall prepare and adopt an open-space and/or conservation easement program for the protection of open space and scenic areas." Responsibility: City Council, Community Development Department. Time Frame: FY 90-91.*
18. *Placerville General Plan, #7. "The City shall encourage the establishment of foot trails and bicycle paths along Hangtown Creek in the Broadway area."*
19. *Placerville General Plan, #5. "The City should develop an area with a good representation of plant communities and wildlife as a nature study area."*
20. *Placerville General Plan. Design Standard Recommendations for watershed & creek area. (add another page here...*

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