Lytle Creek Harmonious Watershed Planning from Wilderness to Metropolis

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1. Introduction

Existing conditions for several environmental, social and economic factors were researched. The research helped identify the relationships between factors at play in shaping the Lytle Creek watershed. Each of these factors may contribute to issues and opportunities for watershed management. The review of potential contributing factors was not intended to be a comprehensive inventory of conditions. The project team selected factors that were important considerations for management of the watershed. The research provided the basis for establishing recommended goals, objectives, and action items.

2. Setting and History

Lytle Creek is located on the eastern slopes of the San Gabriel Mountains in the Transverse Ranges of the state of California. The Transverse Ranges are the only set of mountains in the entire state that are oriented in an east-west fashion, with the San Gabriels on the west and the San Bernardinos to the east. This is due to the geology of the area. The San Gabriel Mountains are on located on the Pacific Plate which is moving clockwise in a northwest direction, while the San Bernardino Mountains are located on the North American plate which is moving southeast. Both plates are grinding past each other and are separated by the San Andres fault line which creates the Cajon Pass.

According to recent research, the San Gabriel Mountains are one of the most rapidly rising ranges on the planet, being pushed up by all the folding and faulting along the plate boundaries. The mountain range is growing an average of 1.5 inches per year (Robinson, 1991). The San Gabriels are also the fastest eroding mountains in the state. This is evidenced by large aggregate deposits creating alluvial fans that extend out from the base of the mountains. Also evidence of the large aggregate deposits is the presence of several sand and gravel mining operations just outside the upper Lytle Creek Watershed.

Lytle Creek Watershed is a sub-watershed of the Santa Ana River Watershed, as Lytle Creek is a tributary to the Santa Ana River. Over 80% of Lytle Creek lies in the headwaters. As Lytle Creek exits the San Gabriels, it joins with the Cajon Wash in an urban environment. Once the creek reaches this point, the channel is lined with concrete, and water flows to the Santa Ana River out the Pacific Ocean.

The human history of Lytle Creek can be told in conjunction with the overall history of the state of California. The prehistoric inhabitants of the Lytle Creek area are known as Serrano Indians. Their village, called “muscupiabit” or “place of pinyon pines”, was located in what is now the San Bernardino Valley (Robinson, 1991). These early hunters and gathers depended upon the Lytle Creek Watershed for survival. Water flows regularly through the creek attracting animals for hunting and the hillsides were once

covered by a dense grove of pinion pine trees which provided a food staple. The Serranos also traded with the native peoples of the Mojave Desert and those of the coastal plain. The environment of the area made for an abundant life.

In 1602, explorer Sebastian Vizcaino claimed California for Spain, however it was so far removed from the mother country, it took years for Spanish inhabitants to arrive. In 1769 an initial expedition of Spanish Franciscan Padres were sent to Alta California to establish a chain of missions along the California coast, each one connected by "El Camino Real" or "the King's Highway". The goal of the mission system was to spread Christianity and the European lifestyle to the native people. In 1771 the Mission San Gabriel was established about 45 miles west of the San Bernardino Valley. Three years later, in 1774, the DeAnza Expedition arrived in the San Bernardino Valley (Robinson, 1991). In 1810 the padres of the San Gabriel Mission established a "capilla" or "chapel" on the Feast day of St. Bernardino de Sienna creating the "Estancia de San Bernardino". The "estancia" or "outpost" served as a horse, cattle, and sheep ranch, by successfully bringing water down Mill Creek. The San Gabriel Mission was very prosperous in comparison the other missions mainly because of the number of herds maintained in the San Bernardino Valley. Desert native people were notorious for stealing horses, cattle and sheep by the hundreds, via the Cajon Pass.

In 1821 Mexico gained independence from Spain and California came under Mexican rule. In 1833 the Mexican Government enacted the Secularization Act ending mission rule throughout California (Robinson, 1991). Land once owned and managed by the mission system was being given out to Mexican citizens. In 1842, a grant of the San Bernardino Rancho, consisting of about 40,000 acres, was issued to the prominent Lugo sons and to Diego Sepulveda. In 1848 the Treaty of Guadalupe Hildago makes California part of the United States.

The great California gold rush occured in 1849, with California becoming a state in 1850. Then, in 1851 Brigham Young sent 3 companies of Latter Day Saints, via the Cajon Pass, out to settle the San Bernardino Valley. One of the companies was led by Captain Andrew Lytle. Captain Lytle recognized the abundance of water flowing from "an imposing and dark canyon" (Robinson, 1991). The Latter Day Saints were soon called back to serve Brigham Young, however a number settlers remained making their home along Lytle Creek. Captain Lytle left for San Bernardino and was never associated again with the creek that was named for him (Robinson, 1991). Those religious pioneers that remained in the area negotiated with the Lugo family to purchase the 40,000 acre San Bernardino Rancho in 1852 and in 1854 the City of San Bernardino was officially incorporated with a population of 1,200, 900 of them Mormon. Eventually, San Bernardino becomes the county headquarters. In 1862 gold was discovered in nearby Holcomb Valley, bringing in a number of prospectors to the valley. There is evidence to suggest that in 1865 horse thieves used the upper Lytle Creek as a refuge for stolen animals. In 1886 the Santa Fe Railroad established a transcontinental link in which all three major railroads converged in San Bernardino (Santa Fe, Union Pacific, and Southern Pacific) (Robinson, 1991).

Throughout history a number of settlers arrived in the area via the Cajon Pass. The word "cajon" is Spanish for "box" and is derived from the fact that upon entering the pass from the San Bernardino Valley, the canyon has ridges on three sides. Not technically a pass, instead Cajon Pass is a series of shallow notches in a long ridgeline (Transverse Ranges) that connects the Mojave Desert to the coastal lowlands. Cajon Pass has long served as a transcontinental route beginning with the Old Spanish Trail that served as a footpath/horse trail; the Salt Lake-Los Angeles Trail that served as a wagon trail; the Atchinson, Topeka, Santa Fe Trail, a railroad; Historic Route 66, a highway, and Interstate 15, a freeway.

The community of Lytle Creek, California is located at 2,750 feet elevation in the Lytle Creek Watershed (Sperling, 2006). The Creek has three forks, the North, Middle and South forks. The North Fork and Middle Fork meet just west of the community of Lytle Creek, and the South Fork joins them soon after. In 1890, during Southern California's "Great Hiking Era", Glenn Ranch was a popular resort along Lytle Creek. With the major railroad companies offering competitive "rate wars", people from the east coast flocked to California primarily to enjoy the climate. In the 1920's, the Applewhites and Glenn families had a large and profitable vacation destination along Lytle Creek which offered trout fishing, horseback riding, hiking, and mineral hot springs. This remained a premier destination for over 70 years (Robinson, 1991). With the rise in popularity of the automobile, the overnight resort began to decline as people were now able to drive to the mountains and return home in one day. The community of Happy Jack along Lytle Creek was also a major population center. Today, Scotland is the 2nd largest community in the watershed.

The Lytle Creek community has a present day population of 1,164, with a median age of 41.6 and average household size of 2.22. The majority of the residents are "white" (95%), followed by "Hispanic" (8.22%), and then "Asian" (2.07%). The average household income is $50,821 (bestplaces.net, 2006). The median home age is 44.8 years, meaning that half of the residential structures in Lytle Creek were constructed prior to 1960's. The average cost of a home is $301,800. the number of homes that are owned is 65%, and the number of homes rented is 19%. 43.5% of the population votes Democrat and 55.3% vote Republican. Lytle Creek residents commute an average of 38.6 minutes per day, each way, to reach their perspective places of employment (bestplaces.net, 2006).

Today, San Bernardino County is one of the fasted growing counties in California. According to the U.S. Census Bureau, the population percent change from April 1, 2000 to July 1, 2005 was 14.9%. In land mass, San Bernardino County stretches 55 miles from the Transverse Ranges east to the Colorado River. Urban development from the Los Angeles Basin now reaches to San Bernardino County. Population demands have created stresses on the Lytle Creek Watershed that require a holistic approach to planning to create an effective, inclusive, dynamic Watershed Management Plan.

3. Existing Conditions

3.1 Possible Stakeholder Groups

The following stakeholder groups were identified. A brief description of their functions is provided, where known. This is not intended to be a comprehensive list. It is representative of the diversity and complexity of interests to be considered in the watershed management plan.

Regional Organizations and Utilities

1. Santa Ana Watershed Project Authority (SAWPA)
    a. Working to meet the goals of the Santa Ana Integrated Watershed Program. The watershed will have completely utilized $250M that was allocated in Prop 13, and will have leveraged it to build over $800M in projects.
    b. Working with their member agencies and with all watershed organizations and stakeholders, they are identifying the priority projects and preparing a competitive proposal that will be submitted for consideration.
    c. They are also submitting projects for Prop 50 funding.
    d. Member Districts:
        i. Western Water District
        ii. Eastern Municipal Water District
        iii. Inland Empire Utilities Agency
        iv. Orange County Water District
        v. San Bernardino Valley Municipal Water District
2. Metropolitan Water District
    a. Responsible for wholesaling of water imported to serve communities in their 6 county service territory. Has multiple geographic sub units.
3. Southern California Edison
    a. Operates the Lytle Creek hydro-electric power facility
4. Fontana Mutual Water Company
    a. Extracts, treats, transmits and distributes potable water to customers in Fontana and other adjacent communities
5. Cucamonga County Water District
    a. Takes water from surface water from 4 local canyons watersheds
    b. in 2000 delivered 48,000 acre-feet to 140,000 people
    c. water available supply 51,800 acre-feet/year
    d. surplus 3,800 acre-feet/year
    e. expected total water demand by year 2020 = 70,310 acre-feet/year
    f. expects to increase the water supply by relying more on groundwater source through drilling of new wells and conservation efforts.
6. West San Bernardino Co. Water District
    a. is a member of the Lytle Creek Water Conservation Association and works over 200 acre spreading grounds.
    b. Takes water from Lytle Creek surface flow and Lytle Creek groundwater
    c. in 2000 delivered 18.3 million gallons/day to 52,000 people in 31.7 square mile area (80% of the demand was for residential use)

d. water available supply- 36.5 million gallons/day (water comes from 20 wells and a water filtration facility)
e. surplus 18.2 million gallons/day
f. expected total water demand by year 2020 = 28 million gallons/day
g. will rely primarily on Lytle Creek surface flows. They have a total of 3 reservoirs (68.75 million gallons of reservoir storage), they also built a 24" line across Lytle Creek.
h. contingency plan states 4 stages of rationing during drought.

Governmental Agencies

1. U.S. Forest Service- San Bernardino National Forestr
   a. Front County Ranger District- Cajon Ranger Station
   b. Lytle Creek Ranger Station
      i. Watershed Restoration
      ii. Cooperative Planning
2. Federal Energy Regulatory Commission
   a. Regulates all hydro power in the U.S.
3. U.S. Fish & Wildlife Service
4. U.S. Army Corps of Engineering
5. California Department of Transportation (Cal Trans)
   a. Pavement Rehabilitation Project in progress
6. California Dept. of Fish & Game
7. Santa Ana Regional Water Quality Control Board
8. County of San Bernardino Flood Control District (Zone 2)
9. City of Rancho Cucamonga
10. City of Fontana
11. City of Rialto
12. Fontana Sheriff Station (San Bernardino County Sheriff)
13. Fontana Unified School District

Local Communities

1. Visitors to Applewhite Campground
2. Visitors and property owners of Glenn Ranch
3. Residents and property owners of Scotland
4. Visitors to Stonehouse Campground
5. Visitor to Joe Elliot Campground
6. Residents and property owners of Happy Jack
7. Incorporated and unincorporated communities in western San Bernardino Valley, the San Gabriel Mountans and the San Bernardino Mountains that may be affected by activities in the watershed

Non-Profit Organizations

1. Habitat for Humanity
   a. Non-profit, ecumenical Christian housing ministry that builds and rehabilitates houses through volunteer labor and donations of money and materials

   b. Builds with the help of the homeowner (partner) families.
   c. Habitat houses are sold to partner families at no profit, financed with affordable loans.
2. Lytle Creek Community Center
   a. Publishes The Canyon (local community publication)
   b. Reports on:
      i. Local residents news
      ii. Building Restoration Committee
3. Lytle Creek Canyon Fire Co.
4. Lytle Creek Fire Safe Council, Inc.
5. Lyle Creek Senior Citizens Assoc., Inc.
6. Lytle Creek Community Church
7. Environmental Justice Coalition for Water
8. Lytle Creek Watershed Coalition
9. Lytle Creek Water Conservation Association

Other Stakeholders/Possible Partners

1. REI, Inc.
   a. Sporting goods co-op that sponsors volunteers to clean up Lytle Creek
2. Lytle Creek Citizen Corps Sub-Council
   a. Homeland security group
3. Shooting Range Concessionaire and customers
4. Universities

3.2 Climate and Geography

The Lytle Creek watershed experiences a Mediterranean climate, like most of southern California, with cool, wet winters and dry, warm summers. In the town of Lytle Creek, California, the average winter low temperature is 35.4 degrees Fahrenheit and the average summer high temperature is 91.2 degrees Fahrenheit. Lytle Creek is one of the few perennial sources of water in a region that experiences 70% to 80% of sunshine every year.

The Lytle Creek Ranger Station of San Bernardino National Forest, at around 2792 feet elevation, recorded precipitation from 1948 to 2001 and calculated average total monthly precipitation. The record shows that nearly no rain fell on the Lytle Creek watershed from June to August. The greatest amount of precipitation, recorded as average total monthly precipitation, fell on the watershed from January through March, with 8 and 6 inches respectively.

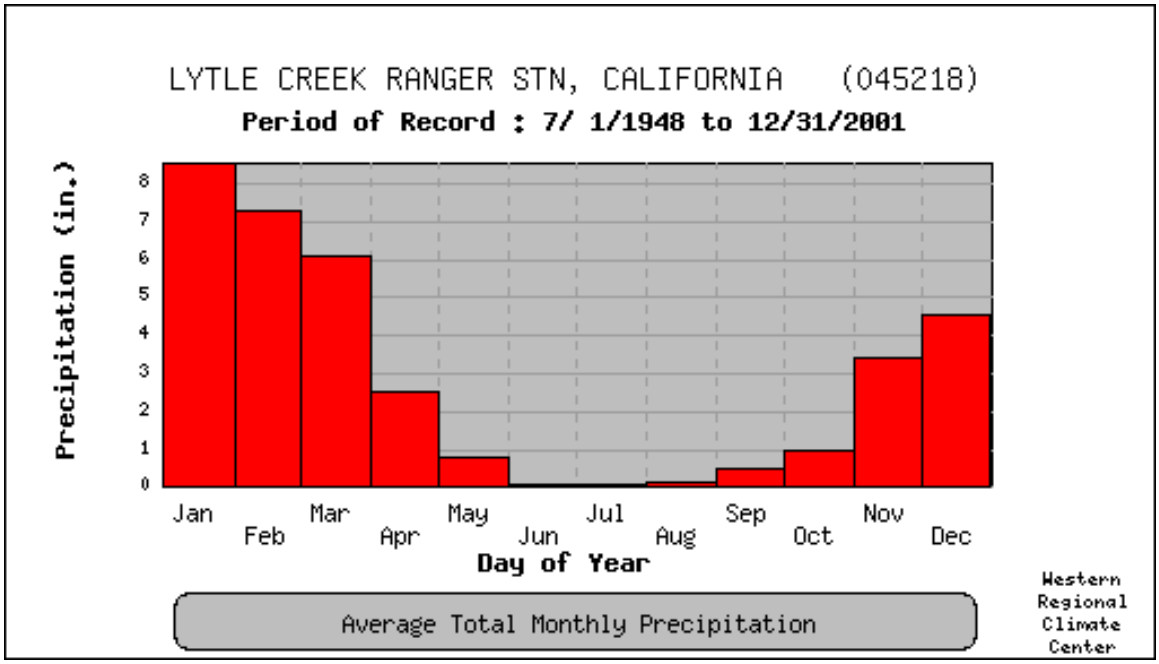


Figure 1http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca5218

The headwaters of Lytle Creek lie immediately south of the Cucamonga Wilderness boundaries, which is located on the eastern flank of the San Gabriel Mountains near Cajon Pass. Adjacent to some of the most densely populated areas of southern California, the Front Country is managed by the San Bernardino National Forest.

Lytle Creek lies at the eastern-most extension of the San Gabriel Mountains. The creek and its tributaries are perennial streams with lush vegetation. The creek runs southeast in the Cajon Pass, south of Hwy 138 and east of I- 15, then continues southward into the San Bernardino City limits. In addition to Lytle Creek, the Cajon Wash joins with Lytle Creek prior to the creek's confluence with the Santa Ana River. The Cajon Wash is not considered in this management plan. In its entirety the Lytle Creek / Cajon Wash watershed encompasses 46,000 acres.

3.3 Geology

Lytle Creek drains out of the San Gabriel Mountains, and is composed of highly fractured crystalline basement rock with steep slopes. The block of ancient crystalline rocks that forms the San Gabriel Mountains rises north of the Los Angeles Basin and the upper Santa Ana River Basin and is bounded by a number of faults. The sides of most canyons are blanketed by unstable hill-slope rock debris that constantly is being stripped away by slope failures and by runoff and washed out to the range fronts, where sediment is deposited on surfaces and channels of alluvial fans.

Most of the crystalline basement rocks that make up the San Gabriel Mountains occur in two packages that are separated by a major geologic structure--the Vincent Thrust, a low-

angle tectonic dislocation that separates upper-plate rocks from lower-plate rocks. Fault movements along this zone may have been several tens of kilometers to bring together the lower and upper packages of rock. The Vincent Thrust was introduced to the area by the dextral displacement of the San Gabriel Fault. The Vincent Thrust is beneath much of southwestern California and is only exposed in regions of intense compression and uplift, thanks to the San Andreas Fault activity. The Vincent Thrust represents a paleo-subduction zone of oceanic crust that was thrust towards the surface between the late Cretaceous and early Tertiary time periods (Wilkins).

Lower-plate rocks beneath the Vincent Thrust are a complex of metamorphosed sedimentary and volcanic rocks known as the Pelona Schist. Made of metamorphosed marine deep-water sand, silt and mud, interlayered with basaltic flows, Pelona Schist is common throughout the Lytle Creek watershed. Upper-plate rocks above the Vincent Thrust include very old metamorphic and plutonic rocks that originally formed part of the ancient North American continental platform. The ancient rocks have been intruded by various Mesozoic plutonic rocks that occur throughout the range, but are most abundant in the western and eastern parts (USGS Geology of the San Gabriel Mountains).

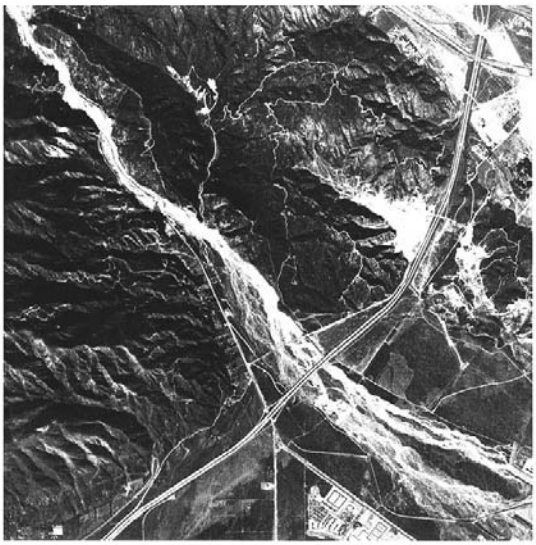
Faults

Like the rest of the eastern San Gabriel Mountains, faults of many different ages and tectonic styles play a major role in the structure of the Lytle Creek watershed. In the Lytle Creek watershed, major left-lateral and right-lateral fault zones intersect. The prominent and widespread occurrence of faults can be seen in every large outcrop (Wilkins). The oldest fault complex is composed of the San Gabriel fault, the Icehouse Canyon fault and the Middle Fork Lytle Creek fault. These three faults are believed to represent an abandoned strand of the San Andreas Fault system that was active between 13 and 4 million years ago. Other faults in the area include the Punchbowl fault, San Jacinto fault, Scotland fault, Sugarloaf Peak fault, Stoddard Canyon fault. The San Jacinto fault appears to be the most recently active fault in the area and the only entirely uninterrupted fault in the watershed area.

Movement of the nearby San Andreas Fault has marked the landscape with landslides and rock outcroppings. The Lytle Creek watershed is composed of Quaternary-aged alluvial, talus and landslide deposits (Wilkins). The canyon bottom is composed of rocks from the surrounding slopes that have settled as alluvium up to 50 meters thick. Hillsides are talus deposits with occasional landslide deposits throughout. Basement rocks can be found along canyon walls, ridgelines, peaks and slopes, poking through the talus deposits (Wilkins).

Alluvial Fan

Erosion from the watershed produces a high yield of very coarse sediment that settles out as unconsolidated alluvial deposits in an alluvial fan with a slope of almost 3 percent. Since the 1940s a series of spur dikes and levees have been built to confine the flows to a narrow corridor along the fan. The current main channel is incised as it leaves the mountains and eventually combines with Cajon Creek before entering the Santa Ana River (CGER 1996).



Aerial photo of Lytle Creek Alluvial Fan

3.4 Hydrology

With a drainage basin of approximately 186 square miles (USGS 1999), the Lytle Creek watershed is one of the two main tributaries to the Santa Ana River watershed, one of the largest stream systems in southern California. With its headwaters high in the San Bernardino Mountains, the Santa Ana River watershed covers over 2,650 square miles as it flows southwesterly to the Pacific Ocean between Newport Beach and Huntington Beach.

Running along the eastern end of the San Gabriel Mountains, Lytle Creek runs in a southeasterly direction to join up with Cajon Creek before flowing into the Santa Ana River near Colton. Combined annual flows for Lytle Creek, as measured at USGS Gage No. 11062001, averaged 43.8 cfs (cubic feet per second). From 1899 to 2000, the maximum peak flow measured at the USGS gage was 25,200 cfs and the mean annual runoff was 31,720 cfs.

The Lytle Creek watershed contributes a significant amount of flow and sediment to the Santa Ana River watershed. In 100-year flood conditions, the Lytle Creek watershed contributes 70,000 cfs, which is at least four times more flow contribution than other tributaries to the Santa Ana River. The 100-year flood event discharge of the Lytle Creek watershed is about 15 times the discharge of the Seven Oaks Dam during a similar flood event (USACE 1988)(USACE 2000a).

The primary sediment sources to the Santa Ana River watershed are tributaries such as the Lytle Creek watershed, Mill Creek, City Creek and Plunge Creek. The Lytle Creek watershed contributes the most sediment to the Santa Ana River, yielding 155 square miles of sediment area, which is an order of magnitude greater sediment yield than the other tributaries (EIP 2004).

Water Supply

Groundwater and Surface Water from the Lytle Basin was assigned as a water supply source to a purveyor using the 2000 Urban Water Management Plan (UQMP) and/or production records.

- Fontana union / WC exporter = purveyor assigned 20,522 cfs from Lytle Creek surface water and Bunker Hill Groundwater
- Groundwater from Lytle Basin was assigned as a source to meet some of the 4,075 cfs demand from Riverside – Highland W.C. (exporter) and some of the 1,780 cfs demand of the Marygold Mutual W.C.
- Groundwater and surface water from Lytle Basin assigned as sources for some of the 20,500 cfs demand from West Valley W.D. and some of the 16,300 cfs demand of the city of Rialto.

The Fontana Water Company supplies most of the water to the City of Fontana, downstream of Lytle Creek. Fontana Water Company produces water from seasonal stream flow from Lytle Creek and from wells in the Lytle Creek Basin, among other basins.

The total available supply of the Fontana Water Company is approximately 92,003 acre-feet per year. Water demand within the FWC service area is projected to increase to 60,767 acre-feet in 2020 from 38,390 in 1999.

The West San Bernardino County Water District is concerned about the extreme fluctuations in Lytle Basin groundwater levels as a key water source reliability consideration. For a water supply back-up for the groundwater and surface flow in the Lytle Basin, the District plans to install additional wells in the Bunker Hill Basin.

Water Conservation Strategy in the City of Fontana:

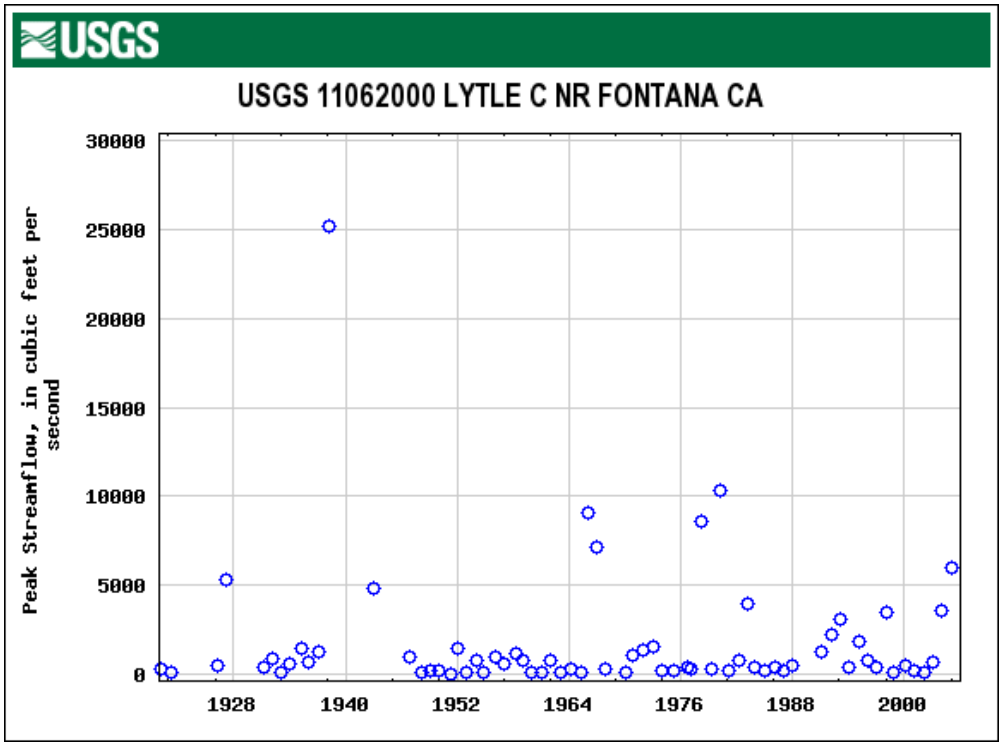
- Efficient allocation of water resources
- Avoidance of water waste (excess irrigation runoff)
- Using recycled water for irrigation
- Water conservation technologies and site planning

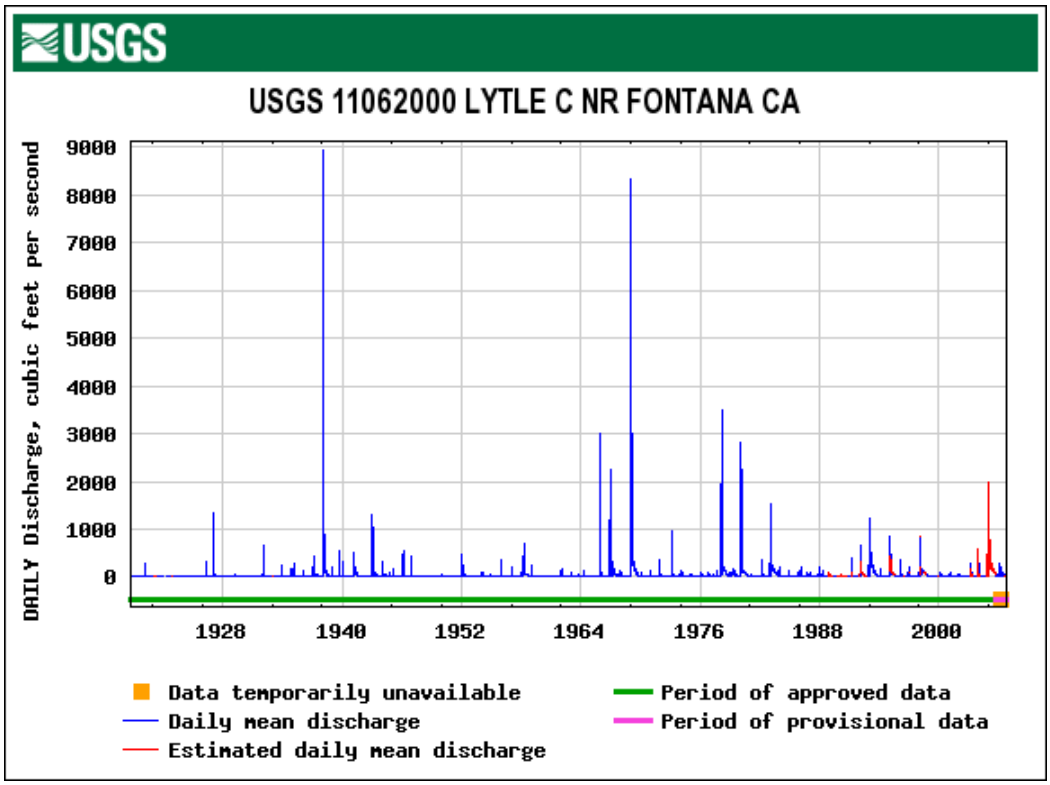
City of Fontana is working on laying the groundwork for building a customer base and facilities to deliver reclaimed water for direct application in irrigation systems, and also to supplement local ground water recharge.

The Fontana Water Company expects to increase the water supply by relying more on groundwater source through drilling of new wells and conservation efforts.

The company's contingency plan during a shortage of water supply is to reduce water consumption thru specific practices, rationing of water supply and penalties. It's a 4 stage action program triggered by various levels of water reduction.

There is limited surface water runoff within the planning area, primarily from canyon drainages in the northern sphere area, and from surface drainages flowing north from the Jurupa Hills, in the southern edge of the planning area. Surface flows from the northern canyons are intercepted by flood control channels, which flow south and ultimately discharge into the Santa Ana River system. Runoff from the southern drainages are also by local storm drainage systems, and conveyed to large channels that ultimately discharge to the Santa Ana River. Given the capture of the surface drainage flows by local and regional drainage facilities, surface water runoff is an insignificant water supply source within the planning area (Fontana).


USGS
USGS 11062000 LYTLE C NR FONTANA CA
Peak Streamflow, in cubic feet per second
30000
25000
20000
15000
10000
5000
0
1928
1940
1952
1964
1976
1988
2000


USGS
USGS 11062000 LYTLE C NR FONTANA CA
DAILY Discharge, cubic feet per second
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
1928
1940
1952
1964
1976
1988
2000
Data temporarily unavailable
Daily mean discharge
Estimated daily mean discharge
Period of approved data
Period of provisional data

Groundwater Basin

a) The Lytle Creek groundwater pipeline (owned by the San Gabriel Valley Municipal Water District) maximum yield = 120 cfs for points west of the Devil Canyon By-pass pipeline
b) There are extreme fluctuations in the Lytle Creek groundwater levels (taken from the West San Bernardino Co. Water District, Water reliability considerations assessment)
c) Water quality
    a. It is not contaminated. Groundwater is and will continue to be the primary water supply source for the entire Santa Ana River watershed, therefore prevention of water pollution is essential in protecting and conserving the critical water source.
    b. The Rialto basin is affected by a perchlorate contamination plume. Perchlorate is toxic and is used in a variety of manufacturing processes that reduced the annual water supply by more than half (right now there is no economical and practical treatment process to remove them from the water).
    c. The Santa Ana River RWQCB together with the impacted water districts and a number of private entities want to investigate the extent of the groundwater contamination and to obtain funding for the expensive treatment system.

The State Water Project water is unreliable, and none would be available during extended drought conditions, therefore the development and conservation of local, reliable and expanded water conservation efforts and programs are of critical importance of the Fontana Planning area and the entire Chino Basin area.

Water Quality

a. It is in better condition at the head water in the upper watershed.
b. The primary water quality concern, at the upper watershed location, is the presence of excessive levels of bacterial indicators from unknown point sources (the stream is in the 303d Water Quality Control Board list). There are proposed projects for “day lighting” the water, process that would remove the bacteria.
c. At the lower parts of the watershed, the water is degraded by runoff from urban development after being used to generate power by the Fontana Water District.

A substantial amount of the runoff flows into the regional flood control channels. San Bernardino’s storm drainage system intercepts the urban runoff that occurs in the planning area, the storm drainage system flows into the County Flood Control facilities, mainly the San Sevaine and Declez Channels, and from them the water discharges into the Santa Ana River.

The water runoff contains pollutants, such as: elevated levels of pathogens, sediments, trash, fertilizers, pesticides, heavy metals and petroleum products.

Pollution prevention and water conservation
The County of San Bernardino Flood Control District, the county itself and other incorporated cities need to obtain permits for the Area Wide Urban Storm water permit with the Santa Ana River WQCB. The cities have to adopt a municipal storm water management plan which consists of prohibition or regulation of specific type of discharges, inspections, avoidance of sewage spills, **public education**, controls on new developments and redevelopments, site maintenance practice and construction site management practices.

New development projects are also required to submit and obtain approval of a storm water quality management plan that specifies water pollution control BMP's (best management practices) such as control of impervious runoff, common area **efficient irrigation and runoff minimization**. Non structural BMP's include education materials, activity restrictions and area catch basin inspections.

Water Source Reliability
The imported water supplies available to Southern California are increasingly uncertain; therefore, the development and conservation of local, reliable water supplies and expanded water conservation programs are of critical importance to the future of the Fontana Planning area and the entire Chino Basin (Fontana).

Erosion/Sedimentation
Alluvial fans are gently sloping, fan-shaped landforms common at the base of mountain ranges in arid and semiarid regions such as the American West. Floods on alluvial fans, although characterized by relatively shallow depths, strike with little if any warning, can travel at extremely high velocities, and can carry a tremendous amount of sediment and debris (Alluvial Fan Flooding).

A USGS map of the showing the alluvial history of Lytle Creek can be found at:
http://geopubs.wr.usgs.gov/open-file/of01-173/devre_map.pdf
Lytle Creek is a very erosive watershed. It carries a lot of sediment during flood events. These sediments have historically been deposited in an alluvial fan at the base of the mountains.

With urban development the watercourse has been confined and the ability for the watercourse to fan out has been reduced. Eventually the watercourse will break the confinement barriers and significant damage from flooding and debris flow will occur within the urban area.

The image below shows the watercourse becoming increasingly confined as it travels downstream. The direction of the flow is from the upper left to the lower right.

3.5 Biology

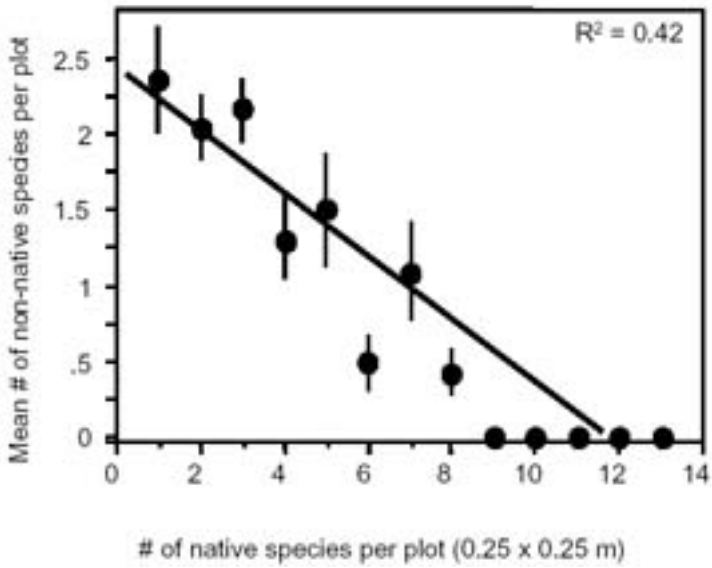
Endangered species
The extreme landscape of the Lytle Creek Watershed, from Mount Baldy to the alluvial plain, fosters diverse habitats, wildlife and vegetation. The steep slopes around Mount San Antonio (also known as Mount Baldy) and in the upper forks of Lytle Creek are important habitat for Nelson's bighorn sheep. The remoteness of these upper watershed areas is critical to the continued existence of bighorn sheep in the San Gabriel Mountains. Altered fire regimes also may be changing the distribution and availability of some habitat types that are important to bighorn sheep. The recently discovered San Gabriel Mountain slender salamander also occurs in this area.

The low-elevation alluvial fans of Lytle and Cajon Creeks (the washes and uplands) contain coastal sage scrub habitat with its associated plants such as buckwheat (*Eriogonum fasciculaturn*), open chamise (*Adenostorna fasciculaturn*), laurel sumac (*Malosrna laurina*), Prunus, and Yucca whipplei, that supports numerous endangered species that are rare on national forest land. The San Bernardino kangaroo rat (*Dipodomys merriami parvus*), California gnatcatcher (*Polioptila californica*), slender-horned spineflower (*Dodecahema leptoceras*), and Santa Ana woollystar (*Eriastrum densifolium sanctorum*) occur in the washes of Lytle and Cajon creeks, and the area historically contained the Los Angeles pocket mouse (*Perognathus longimembris brevinasus*), San Diego black-tailed jackrabbit (*Lepus californicus bennettii*), and America badger (*Taxidea taxus*).

Recently impacted by development is the San Bernardino kangaroo rat, a small, nocturnal burrowing animal that prefers alluvial scrub habitat on gravelly and sandy soils near rivers and streams and on alluvial fans. Although they once had a range of 300,000 acres within the Inland Empire, their habitat has been reduced to about 3,240 acres, divided among seven widely separated locations. This remaining habitat is threatened by urban development, such as housing and roads, sand and gravel mining, flood control projects and seasonal flooding. Due to highway construction, 40-60 kangaroo rats were trapped and relocated to an undisclosed location.

Increased demand for recreation developments in this area threatens the remote character and some of the species in the Lytle Creek Watershed, but of more concern is the continued construction in the coastal sage scrub area, including the alluvial plain.

Threats to natural resources
Introduction With the loss of more and more habitat, it is essential to protect and conserve the integrity of the habitat we have. Lytle Creek watershed has had certain habitats destroyed and impacted by gravel mining and home and highway construction. The following graph indicates the presence on invasive species.



(from serc.si.edu)

Global warming

Introduction to uncertainties Different models of climate change show different results from increasing temperatures and carbon dioxide. Despite the uncertainty of how this change in weather patterns and atmosphere will effect the environment, preparations should be made for the potential changes in fire frequency, and other changes in forest and habitat structure.

3.6 Recreation

San Bernardino National Forest is located within 50 miles of a population of over a million people and has corresponding recreation, habitat and management challenges. These challenges include, but are not limited to (from Chavez 2001):

- Intense year-round recreation use, day-use activities, and competition for open space.
- Concentrated legal use, such as picnicking and illegal use, such as nocturnal teenage parties.
- A forest used more as a regional park, with wild lands opportunities.
- Urban development adjacent to the forest boundaries, complicating fire management, land use, and community recreations.
- Urban social problems migrating to the forest: crime, vandalism, arson, and traffic congestion.
- High-use wilderness areas.
- Complex information strategies due to language, cultural, and class diversity.
- User expectations often based upon cultural experience gained in other countries. The proportion of users who are recent immigrants is high. User behaviors, resource ethics, and past experiences are not necessarily based upon traditional Forest Service values. User population is very diverse,

and representation is significant: from several to many cultural and ethnic groups.
- Newest recreation activity fads on forest, such as paintball games. Administration is complicated because management guidelines do not yet exist.
- Public safety.

'The mission of the USDA Forest Service is to sustain the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations.' (Forest Service webpage) As set forth in law, the mission is to achieve quality land management under the sustainable multiple-use management concept to meet the diverse needs of people, as long as the uses, such as recreation are compatible with conserving the land for future generations.

Hiking

Hiking is one of America's fastest growing recreational activities. In the year 2002, 73.3 million people, almost one-third of Americans, went hiking. (Outdoor Industry Association, Outdoor Recreation Participation Study 5th edition, http://www.outdoorindustry.org, 2003). The USDA Forest Service is predicting steep increases in participation in backpacking and hiking, including an 80 percent increase in hiking in the Southern and Pacific Coast areas, over the next 50 years. Hiking is often associated with backcountry recreation and camping, but as trail use grows and more trails are developed near population centers, communities are recognizing the economic, social and health benefits of trails and hiking.

The hiking trails are found through out the National Forest but, with the exception of Bonita Falls which has its own handout and map describing the hike, hikers are not directed preferentially to go on any hiking trail over any other. Current hiking opportunities in the Lytle Creek Watershed are described by hand-outs and books in English available for purchase at the Lytle Creek Ranger Station. Hiking trails within the Lytle Creek area are maintained sporadically by volunteer groups, if at all. Some challenges to having well-maintained trails for users include fire damage, lack of staff and vandalism.

Recreation Challenges

Litter is a major issue in the Lytle Creek Watershed. Dispersed picnicking by large groups by the creek bed creates large amounts of litter, which is then swept down the watershed, distracting from the aesthetic quality of the creek and impacting downstream users by clogging storm drains and increasing flooding. Trash can be consumed by wildlife. Glass and metal can present a hazard for users within the Lytle Creek watershed, since swimming and picnicking on the banks are major recreation uses of the National Forest.

4 Goals and Objectives

For the areas of focus described in Section 3, Existing Conditions, the Project Team defined broad goals for three areas: multi-purpose use of the watershed, public awareness, and water resource management. For each of these goals, objectives related to recreation, safety and connectivity were established. Implementation policies and actions, contained in Section 5, were established to move towards accomplishment of the objectives and their overarching goals.

- **Goal: Manage natural areas for multiple purposes such as recreation, habitat conservation, water quality protection, and water supply protection**
  - Objectives:
    - Expand/increase recreational areas and opportunities.
    - Implement stream hydrological modifications in order to promote safety and multi-use opportunities.
    - Implement water quality monitoring program.
    - Reflect habitat, recreation and community connectivity needs in the watershed's activities.

- **Goal: Raise public awareness of the inter-relationships of economic, environmental and social activities in Lytle Creek**
  - Objectives:
    - Establish educational programs to cover the broad range of resource opportunities and user communities.
    - Establish programs in order to establish possible risks and safe behavior.
    - Develop trails and connections from local communities.
    - Develop a habitat connectivity strategy.
    - Create outdoor education opportunities and education programs.

- **Goal: Introduce water management practices for to address water quality and sedimentation concerns**
  - Objectives:
    - Promote social behavior changes in order to create respect for the watershed.
    - Explore stream grading and sedimentation alternatives.
    - Evaluate environmental policies in order to encourage greater connectivity between urban and non-urban areas.

5 Recommended Actions & Success Evaluation

Purpose of the Implementation Plan

The purpose of the Lytle Creek Watershed Implementation Plan (LCWIP) is to provide a guidance document for local watershed planning groups that will assist them in the development of a comprehensive implementation plan for the watershed. The LCWIP will provide local watershed planning groups with specific information referencing the watershed community, identifying resources, sources and causes of pollutants, and specify the implementation strategies for protection and restoration of Lytle Creek. It will address water quality issues to which stakeholder groups can propose strategic project proposal for implementation.

Parameters and Processes for the Implementation

The process for implementation of the LCWIP will be structured for to foster participation of all of the stakeholder participants. The partnerships that evolve will be vital to the implementation, monitoring and update of this document. Projects which have been selected by stakeholder mentioned within this document shall promote conservation, restoration and protection of water and land use resources.

5.1 Governance and Community Participation

Historically, Lytle Creek watershed has been since its beginnings a recreational destination for families since the late 1800's. This watershed community is unique due to its increasing relationship with temporary weekend guests who frequent the area escaping from urban life. These issues present a delicate relationship with local residences and place a strain upon the capacity of local authorities (i.e., Sheriff Department and US Forestry Service) who maintain facilities and the security of the residence population. Other issues (i.e., preservation of water and land use within the creek) would involve interest groups focused on protecting these natural resources, such as the Sierra Club, the Mountain and Rivers Conservancy, and REI, Inc.

Governance

A joint powers authority could be formed to oversee the maintenance and future of the project. This authority could consist of the federal, state, county, and local authorities. A corporation could be formed to oversee the management and fundraising in conjunction with a local foundation that would contribute input from local non-profits, schools, church groups, etc.

Stakeholder Involvement Plan

1. All interested local community groups will be invited to participate.
2. Assure that the plan reflects local needs, promotes the formation of partnerships, and encourages coordination with state and federal agencies.

   a. Facilitate communication and collaboration.
   b. Involve elected officials and their staff, governmental, regulatory and infrastructure agencies.
3. Reach out to communities and stakeholders through:
   a. Local Community Workshops
      i. Focuses on community needs and review of the DRAFT plan
      ii. Reach out for participation from disadvantaged communities
   b. Steering Committee
      i. A forum for more detailed discussion of issues related to development of the Plan and for input on issues considered by the Leadership Committee, including prioritization of projects.
   c. Leadership Committee
      i. Meet once per month or more, as needed, to provide direction for the plan development process, make formal decisions regarding administration of the Plan, and determine project priorities.
   d. Website
      i. Develop website to facilitate the distribution of project information to stakeholders.
   e. E-Mail Communications
      i. Use this tool for maintaining a high level of stakeholder communication
      ii. For announcing all meetings and workshops.
   f. Local publications
      i. For announcing all meetings and workshops
      ii. For updating the community on the progress of the plan
   g. Individual briefings to watershed stakeholder groups
   h. Celebrations that invite local community members to participate
      i. Opportunity to celebrate milestones.
      ii. Opportunity for public education
4. Partner with existing local programs
5. Develop a collaborative strategy to finance implementation of the Plan

5.2 Water Quality and Hydrology

Increase flood protection through watershed management:
As more berms are being constructed along the edges of the Lytle Creek wash to protect new developments in the Lytle Creek wash, water flow will be more constricted, which can increase channel scouring, water velocity and flooding. Instead of building higher berms on each side of the wash to protect the developments beyond, an alternative management scheme may involve slowing down the velocity of the water with energy dissipaters and sediment catchment pools upstream. Below Santa Ana Speckled dace habitat, it may be possible to widen some of the creek's natural pools to catch sediment flowing downstream. Diverting some of the peakflow into ponds may also help increase infiltration into groundwater at times when flooding can threaten homes. These ponds can be periodically dredged and the decomposed granite material may be used for firescaping or sandbag fill. Reducing the velocity of the Lytle Creek channel will also

reduce the tendency of the alluvial fan to grow and threaten existing development downstream.

Storm Water Pollution Prevention

1. 44% of river pollution comes from the action of individuals, instead of industrial sources as thought.
2. Non-point source pollution is the largest source of water quality problems for rivers.
3. Storm water dumping or clogging of storm drains is illegal in Riverside County.
4. Buy non-toxic cleaners and use only what you need.
5. Properly store all toxic products including cleaners, solvents, and paints. Share leftovers with a neighborhood.
6. Take household hazardous wastes to a hazardous material collection center.
7. Use kitty litter or other absorbent material to clean up spills. Dispose of used absorbent with household trash, or if absorbent was used to clean up a hazardous material, dispose at a hazardous materials collection center.
8. Clean up water-based paints in a sink, not the gutter. Filter and reuse paint thinner and brush cleaners.
9. Recycle reusable materials. Recycle, recycle.
10. Keep trash container lids tightly shut to prevent foraging by animals.
11. Control erosion at construction and landscape sites to prevent dirt and debris from entering the storm drains. Sweep dirt and waste from the gutter. Do not hose down until after you have swept.
12. Sweep dirt and waste from the gutter. Hose down ONLY after you have swept.
13. Use pesticides, herbicides, and fertilizers in accordance with label instructions. Do not apply pesticides outdoors if rain is predicted within 48 hours. Take unused pesticides to your hazardous materials collection center for disposal.
14. Use a broom or blower, rather than a water hose, to clean up landscape maintenance debris. Put debris in a trash container, or better still, compost debris to produce mulch.
15. Position sprinklers to water only your landscape areas, not sidewalks, driveways or streets.
16. Divert rainspouts from paved surfaces onto turf areas or planters, to allow water to filter through the soil. Caution! Do not use this suggested action in areas with steep slopes or landslide potential.
17. Pick up animal waste and dispose in a trash container.
18. take used motor oil and antifreeze to facilities that accept recyclable automobile fluids, such as selected auto parts retail stores, gas stations, or auto repair shops, or to a hazardous materials collection center.
19. Have your vehicles maintained regularly to prevent oil, antifreeze and other fluids leaks.
20. Conserve water when washing cars or trucks and use biodegradable cleaners. Clean engines at a “Do it yourself” where the drainage is not collected to the storm drain.
21. Do not dispose of water containing soap or any other type of cleaning agent into a storm drain or water body. This is a direct violation of state and or local

regulations. Be also aware that soapy wash water may damage landscapes. Residual wash water may remain on paved surfaces to evaporate. Residues should be swept up and disposed of.

22. Use biodegradable/phosphate-free cleaners. Although the use of non toxi agents is encouraged, understand that these products can degrade water quality. The discharge of these products into the street, gutters, storm drain system or waterways is prohibited by local ordinances and the State Water Code.
23. Avoid use of petroleum-based cleaning products.
24. Scoop up pet waste and flush it down the toilet.
25. Never dump pet waste into a storm drain or catch basin.
26. Use the complementary bags or mutt mitts offered in dispensers at local parks.
27. Carry extra bags when walking your dog and make them available to other pet owners. Chlorine and other swimming pool chemicals should never be allowed to flow into the gutter or the storm drain system.
28. Store chlorine and other chemicals in a covered area to prevent runoff.
29. Inspect your septic system every 3 years and pump your tank as necessary (every 3 to 5 years).
30. Provide cover over fueling stations and design or retrofit facilities to spill containment.
31. Install and maintain oil/water separators.

Water Conservation from Irrigated Landscape Areas

1. Select flow water demand type of vegetation to install in green recreational areas.
2. Zoning of plants with same water requirements.
3. Select different irrigation system types depending on the plants water demand (zoning areas).
4. Select different irrigation system types depending on soil type (low water application systems on clay texture soils).
5. Select different irrigation system types considering the landscape sloe (steep slopes require low water application system type, like rotors).
6. Select different irrigation system types depending water and pressure availability.
7. Areas narrower than 5’ across should not be irrigated (turf areas).
8. Sprayers should only be used on sandy soils, flat terrain and for short irrigation sets, 10 minutes or so.
9. New irrigation systems should have a minimum of 85% DU (distribution uniformity). The sprinkler type, nozzle size, distance between heads and pressure should be chosen accordingly.
10. Irrigation systems should be designed by certified professionals (Irrigation Association certification programs).
11. Systems should keep the original hardware, brands, nozzle sizes and sprinkler heads types.
12. Gardeners and irrigators should be provided with catalogs of all hardware, in the people’s original language, most of the time it is Spanish.
13. Install rain gage devices that will automatically turn irrigation systems off in case of rain.

14. Heads should be properly adjust to avoid watering the side walks and paved areas adjacent to turf areas.
15. The installation angle of irrigation heads should be adjusted to avoid irrigating too high into the air or too low to the soil.
16. The grass around the heads should be kept low enough to allow the heads to pop-up over the grass for proper watering of turf areas.
17. The sprinkler heads should be properly adjusted to assure "head to head" water coverage of turf areas.
18. Drip irrigation systems should be maintained properly to avoid leaks, plugging and pressure differences.
19. If runoff is detected, some of the above recommended hardware adjustments should be considered.
20. Do not irrigate when the soil surface is still wet.
21. Irrigation scheduling and duration should be calculating by either using local evapotranspiration data from a CIMIS station (California Irrigation Management Information System) adjusted by a grass-turf coefficient, moisture sensor devices installed underground or manual observation of the soils moisture retention.
22. Don't sprinkler irrigate under high wind conditions, the best in that case would be to irrigate at night.
23. During winter or cold conditions all plants require less water than during the hot, summer weather.
24. Irrigation scheduling controllers should be explained to the field workers and irrigators properly so they can make adjustments to the schedule when it is required.

Reducing Pollution from Turf Irrigated Areas

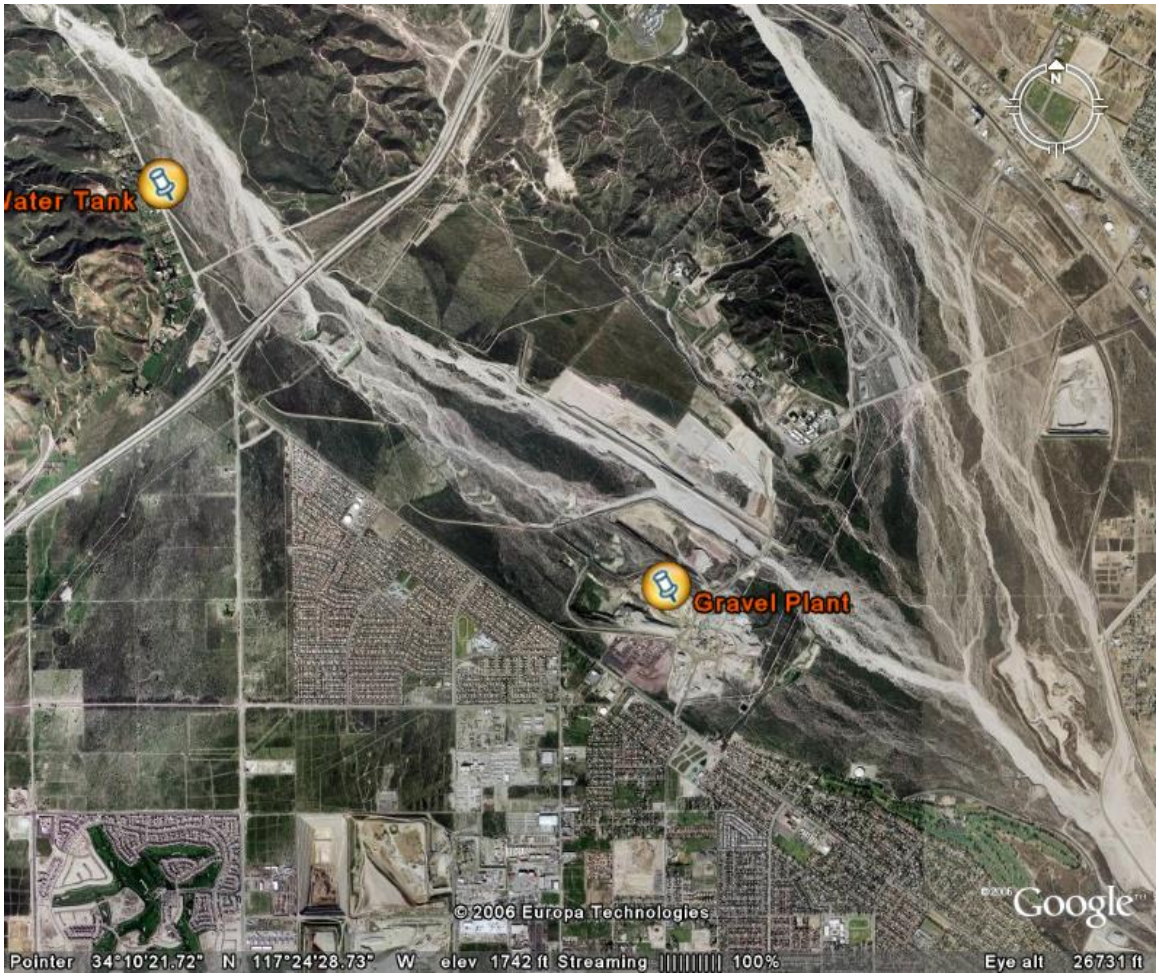
1. Nitrogen fertilization of the lawn should never exceed a maximum of 8 pounds of nitrogen fertilizer per 1,000 square feet per year. Don't apply fertilizers when the soil is extremely dry, because most of the nitrogen will be volatilized into the air. Don't irrigate excessively after fertilizing the lawn because most of the nitrate would move out of the root zone profile dissolved in the water.

5.3 Erosion/Flood Hazard

Erosion Study: The watershed management plan would benefit from more information about the extent and rate of erosion in the watershed. An erosion study can determine the extent of gravel accumulation in the wash, which reduces the wash's cross sectional area and capacity to carry runoff during peakflow events without jumping the banks and flooding adjacent developments. If the study finds excess gravel and rock accumulation in the wash, alternatives for removal could be identified. One possibility is to market gravel and cobbles removed from the wash on a local scale for drought and fire-friendly landscaping, while increasing storm water infiltration into the groundwater.

A project should be undertaken that will reduce likelihood of flooding and associated damages. Strategically placed sediment basins could slow the velocity of the water and

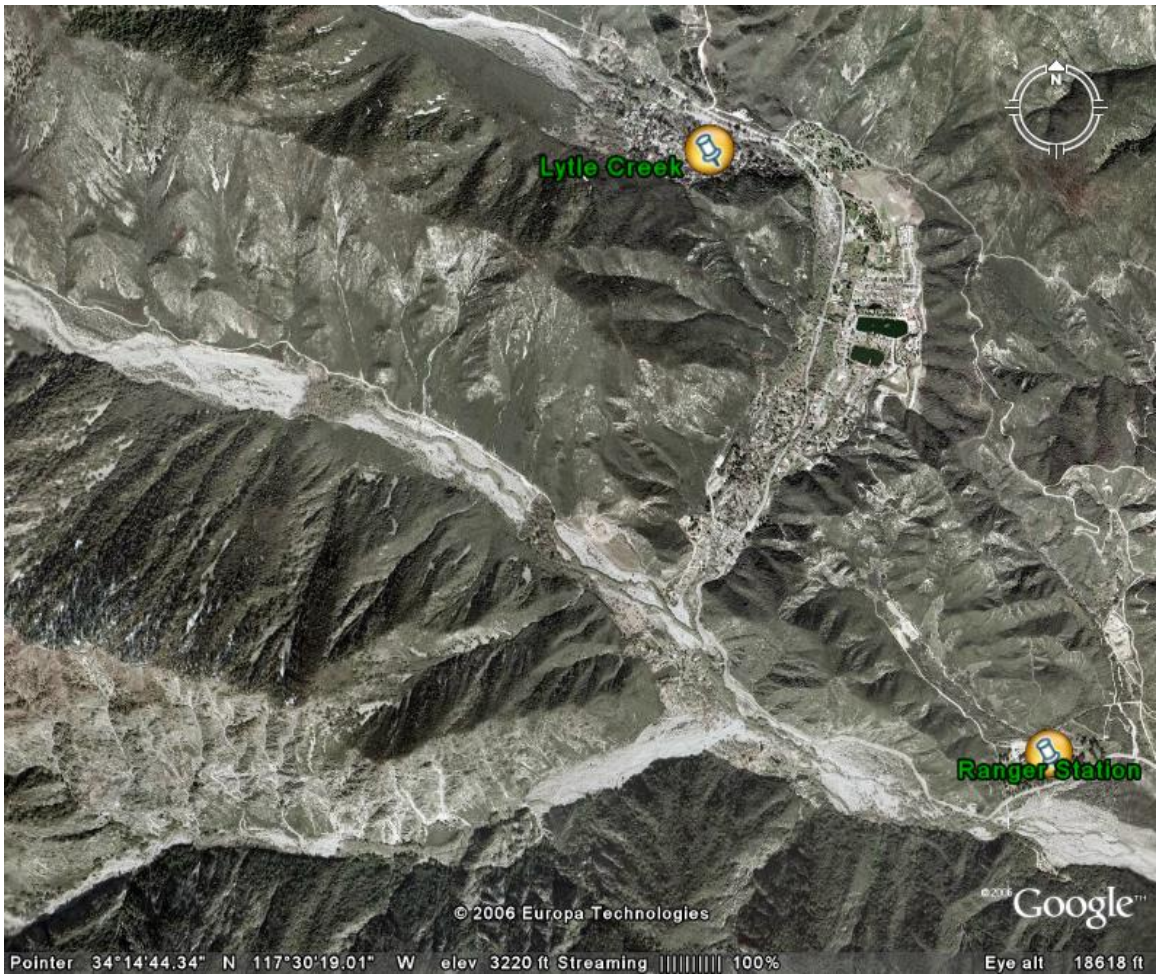
allow some of the sediments to drop out. These basins may also act as ground water recharge basins. The basin would have to be constructed by removing the material from the transport and sedimentation area of the watercourse. This would create a depression as opposed to a dam. The depression will fill in and have to be cleaned out periodically. When the basin is filled in by sediment during an event the water will flow over the top with less chance of extensive debris movement than a dam that has filled in. A dam would fail at some point and the material would be transported downstream. Below is an image of Lytle Creek with some reference points.



In the two pictures above, the area between the water tank and the gravel plant appear to have opportunities for sedimentation/recharge basins. There are also opportunities downstream of the gravel plant. The area around and down stream of the gravel plant is where the urban development is at a high risk of flooding.

The area immediately to the south of the USFS Ranger Station is also a potential area for a basin. The last event following the fire deposited sand and gravel around the station. Since this material has not been removed the next event may do more damage.

The picture below shows areas where material was deposited between the town of Lytle Creek and the Ranger Station. These locations should be considered for sedimentation/recharge basins.



The area around the Shooting Range may also have some opportunities for basins.

If the water can be slowed by these basin and the sediments allowed to drop out the entire volume of the flow will be reduced. Any water that is percolated into the ground would also reduce the flow and the ability of the watercourse to transport sediment. These basin could become a new recreational opportunity if the retain water during the summer months.

5.4 Fuel reduction

The USFS San Bernardino National Forest and the California Department of Forestry and Fire Protection(CDF) San Bernardino Unit have extensive plans for fire protection and wildland fuel reduction. Segments of a few of these plans are included in this document. This document is intended to conform to the existing fire risk criteria as developed by the USFS and CDF.

The upper portion of the Lytle Creek watershed is a heavily used recreational area that contains the small residential community of Lytle creek. To provide the residents and users of Lytle Creek a safe escape route in the event of wildfire within the watershed fuel reduction watershed fuel treatment projects should be undertaken. Fuels along the road should be treated to reduce fire intensity and allow for safe ingress and egress. These fuel treatments would consist of a series of projects including the use of prescribed fire, prescribed herbivory and mechanical and hand treatments.

A two hundred foot wide shaded fuel break along the road which reduces fuel load to achieved flame lengths of four feet or less would accomplish this objective. The fuel break could be maintained for a significant time period through the used of prescribed herbivory using sheep, goats, cattle or other animals to control the vegetation. The selection of grazer and timing of grazing should be managed to encourage desirable vegetation and discourage undesirable vegetation.

Controlling the type of livestock, number of animals and timing of treatment can reduce not only fuel but also some invasive species, the result of which can be improved wildlife habitat.

The wildfire causes damage to wildlife habitat, increased erosion and loss of life and property. Managing the roadside fuels would make it safer for citizens to get out of the drainage in the event of a wildfire. It would also make it safer for firefighters to get go in and fight the fire.

Some information form the San Bernardino National Forest and the CDF San Bernardino Unit on the local fire plans and the importance of fuel reduction projects and damage caused by wildfire is shown Appendix 1.

5.5 Vegetation and Habitat

Mitigation can not replace a connected landscape and more education is needed for home and business owners on how to improve their landscape for habitat.

One way to improve even the most developed landscape for habitat and water conservation is the planting of native vegetation.

1. Requirement of development, through regulations and standard conditions of approval for any development project that has probability of impacting habitat
2. Educate homeowners within the Lytle Creek Watershed about different plants they can plant in their gardens. Have giveaways of popular and easy to grow native plants.
3. Improve the aesthetic quality of the native plant garden at the Lytle Creek ranger station.
4. Allow native plants societies to have yearly plant sales at the Lytle Creek ranger station as a fundraiser and an educational demonstration.
5. Increase the number of municipal government buildings using native vegetation and native plant gardens at schools.

A second action to improve, conserve and where appropriate, preserve habitat is to increase scientific knowledge. Partner with local universities to increase knowledge of endangered species through research, create a list of directed questions that need to be answered for interested undergraduate and graduate students to create more ideas. For example, one question that would be appropriate for a graduate student would be, "Is the disjunct population of dace in Lytle Creek genetically in danger from in-breeding and is reconnecting the populations through physical transport necessary?"

As a third possible action, Wild and Scenic River designation would recognize the Middle and South Forks of Lytle River as unique places nationally and preserve the character of the rivers, while still leaving them available for use by stakeholders. Any development allowed would need to ensure the river's free flow and protect its outstanding remarkable resources, such as, in the case of the Middle Fork, wild trout. Such designation, if done with the involvement and approval of the stakeholders, could bring pride and appreciation to the area, especially considering that only 14 rivers in California have received this designation (compared to 42 in Oregon, for comparison) (http://www.nps.gov/rivers/wildriverslist.html#ca).

While they do not provide financial assistance, technical assistance in getting the Middle and South Forks of Lytle River designated could be applied for from the National Park Service Rivers, Trails, and Conservation Assistance Program (http://www.nps.gov/ncrc/programs/rtca/contactus/cu_apply.html)
To address the water conservation efforts to meet the water demands for 2020, to educate the public about storm water pollution prevention, to develop education materials for new developments storm water quality management BMP's, we are recommending educational activities that will increase public awareness about how to keep healthy water bodies, connectivity between surface and groundwater and water pollution prevention as well as considering the community needs of recreation and safety.

Invasive Species
Create invasive species management plan to create a list of priorities for eradication.
An increase of invasive species can increase fire risk, as non-native species of grass allow the rapid movement of fire throughout the system.

Increase local knowledge of the perils of invasives and what they look like. Don't plant a pest! Don't release a pet!

5.6 Recreation Amenities

Trails
Improving trails could have economic, maintenance, and stewardship benefits for the National Forest and the communities within the Lytle Creek Watershed. Well-managed trails running through communities can foster substantial, sustainable economic activity through business development and tourism. Day hiking trails can be used to introduce new populations to hiking and foster appreciation of nature for visitors. Well-maintained trails can reduce destruction of other areas and simplify clean up for maintenance crews and volunteer groups. Specific actions may include:

a. Creation of a short marked well-maintained trail from the Applewhite Picnic Area. A hiking trail could introduce a new generation to hiking as a form of recreation. If interpretive signage is not possible due to costs associated with vandalism, a limited number of brochures should be made available at the trailhead, along with a registry to keep track of use.
b. Creation of a hiking trail and parking area near the town of Lytle Creek. The Lytle Creek Community Plan lists as one of its goals 'Promote economic development that is compatible with the rural mountain character of the Lytle Creek Community' while recognizing the concerns of residents or potential increases in noise and traffic associated with increased activities. A hiking trail outside of town with a parking area and toilet could help alleviate some of the parking pressure on the town, while supplying recreation activities that could be used by residents and visitors alike. Permanent protective barriers to the trail from town would allow safe passage for residents to the trail and discourage parking within town. A registry could help track the number of visitors and keep track of heavy use days by hikers which may not correspond with other usage, such as picnickers. Also, proximity to town could encourage ownership and volunteering by local residents for trail maintenance.

Interpretive trail of geology of Lytle Creek canyon – with profiles of the geologic landscape and identification of faults, basement rocks, and areas of erosion concern (landslides). Similar to signs at Yosemite with a profile of the topography.

Hunting and other wilderness backcountry use
Limited staffing and the large area to be covered keeps rangers and other employees of the National Forest from being able to track and prevent the invasion of invasive species. Hunters and backpackers are required to get permits before entering the backcountry and could be required to undergo a casual training before receiving a permit. These trainings could be relatively short (15-20 mins) and could include information on which invasive species are of concern and a brochure with photos of these species. After the backcountry recreation user returned, they could either be asked to complete a short survey or debriefed by a forest service employee who could fill out the information for them.

Trout streams and fishers
Fishermen have a vested interest in having clean water and can be advocates for the rivers and creeks they fish. Possible implementation actions include:

a. Tournaments combined with education, such as trash pick up awards for the kids while the adults fish? Encourage the removal of mono-filament.
b. Funding: more fish partnership fund (http://www.nfwf.org/programs/morefish/partnership_fund_rfp.cfm) and Fish America Foundation http://www.fishamerica.org/grants/. Matching funds could be derived from volunteer hours.
c. Include local native fish conservation, invasive species and flood control information and curricula to be distributed when children do fish releases.

Picnicking
Create new innovative picnic areas for visitors. Even if conventional large-scale picnicking facilities are not possible due to the lack of space for a parking lot and an area to properly site toilets, the creation of alternative low-impact areas may be useful, such as the use of composting toilets. This will focus visitation to a managed area, relieve pressure on Lytle Creek and disperse picnicking areas and will improve volunteer experiences.

Education
Creative ways to educate the users and reduce the amount of trash include:

1. Creating signs for garbage cans in English and Spanish along with free garbage bags for collecting litter created near the stream.
2. Give prizes for trash collection as part of Junior Ranger program
3. Encourage a YMCA group or similar group to 'adopt' heavy use areas, such as picnic areas to decrease amount of trash
4. Decrease graffiti and vandalism to local environment
    a. Give outlet to redirect graffitt, such as blank walls.
    b. Introduce playing fields, such as volleyball courts or soccer area to encourage outdoor activity by youth who are presumably causing the bulk of the vandalism (chavez 2002)
    c. Introduce activities such as nature walks and interpretive programs to help introduce 'more to do' while fostering interest in the environment.
5. Increase research into uses of park and various stakeholders
6. Use passive tracking sensors to count number of users
7. Combine with surveys
    a. Surveys of uses at ranger station
    b. Survey at front gate during heavy use periods
8. Collaborate with downstream agencies, outside the watershed. This would allow the National Forest Service to:
    a. Educate upstream users about downstream effects for a net decrease in pollution and water use.

b. Share resources and personnel for materials, such as watershed to waves educational materials illustrating the entire watershed.
c. Apply for larger grants that individual organizations may not be eligible for such as the Targeted Watersheds grant which must require a variety of stakeholder groups throughout the watershed. Targeted Watersheds Grant Program at http://www.epa.gov/twg/.
d. If offered next year, apply for the Cooperative Conservation Partnership Initiative (CCPI) is a voluntary program established to foster conservation partnerships that focus technical and financial resources on conservation priorities in watersheds and air sheds of special significance. The relatively pristine nature of the Lytle Creek Watershed and its closeness to a major metropolitan area makes it a good candidate for this award (http://www.nrcs.usda.gov/programs/ccpi/index.html).

9. Find an education partner/concessionaire to create a summer camp to increase local knowledge of the environment
   a. Work with existing church and summer camps to include environmental curricula
   b. Give a concession to specifically a non-profit natural resource stewardship summer camp
10. Encourage demonstration projects, such as proper fire management, stormwater runoff and flood control, at ranger station.

General Outreach

Provide meeting space for conservation and 'friends of' groups to encourage use of Lytle Creek by groups who are interested in help maintaining the Forest, such as a large outdoor covered area at the ranger station. Sponsor trainings on endangered species for interested groups, night walks, tracking groups and training for public staff.

1. Increase outreach to non-English populations, to encourage stewardship and ownership of resources and decrease misuse. While traditionally, the management of natural resources has been focused on serving a white rural population, due to this population being the largest users of the resources, urban users from diverse cultural and racial/ethnic background are growing in Southern California. There are approximately 12 million Latinos in California (about one-third the population (as cited by Bear Facts, as cited by Chavez, 2005)) and it is expected to grow to 21 million Latinos by the year 2025 (about 40% of California's population).
2. Latinos and other non-white groups often use resources and have different expectations of resource availability than whites. Surveyed Latinos (82% of the visitors in 1998) have requested facilities for larger family groups and, in addition to enjoying picnicking facilities, often want to recreate on sports fields. Benefits to changing and offering different recreation opportunities for diverse groups includes attracting a growing population and an advocate group for the watershed but also encouraging people to use managed areas and focusing park staff's efforts in a more defined area. For example, picnicking at San Bernardino

National Forest has changed in recent from a one-to-two hour event to an all-day activity. This has changed needs, such as shaded and comfortable spots for all-day picnicing and a change in configuration of picnic tables to support larger groups.

3. Increasing outreach to these groups can also be used opportunisitcally to increase knowledge of the connection between the natural and urban community. Studies have shown that Latinos prefer interpersonal communication (Chavez 2005), therefore outreach efforts should initially be focused there.
    a. On busiest days, have bilingual volunteers and professional rangers educate the public on the impacts of trash and pollution. This may include citations of warnings of people witnessed trashing the environment, especially in unmanaged areas.
    b. Professionally translate all documents to Spanish and perhaps Korean, one of the new larger user groups on the scene.
    c. Encourage bilingual high school and local college students to intern
    d. Have yearly conference and ongoing communication with local leaders, such as church leaders, to encourage use and introduce more information into the populationTours from the National Forest picnic areas

1. Programmed for Saturdays and Sundays (or one of those) for about 1 hour
    a. Ideally in English and Spanish but primarily in Spanish with a Latino tour guide (required)
    b. The tour would stop at 3 locations within the watershed which are:
        i. Upper areas of Lytle Creek were the surface water is clean and clear
        ii. Areas within the National Forest were surface water infiltrates and recharges groundwater
        iii. Dam were power is generated
        iv. Water treatment plant to show the income and outcome water
        v. Channels along the creek were storm water system releases water into the creek channel
        vi. Open channels along the creek, storm water channels, were the water is filthy and green and were people's damping of trash are disposed into the channels
2. Schools and parents involvement
    a. Contact teachers and ask them to give a watershed volunteer 5 minutes to speak at parents after they finish with the teacher-parents meeting, especially within the Spanish community, with a Spanish native language volunteer. They idea is to let them know about the program, talk to them about water conservation and pollution prevention. The goal here is to recruit volunteers, mainly parents, to eventually participate during the National Forest tours and start organizing them for future community outreach and education programs.

3. Contact all the water districts and environmental entities
    a. To develop a community outreach master plan program, mainly in Spanish. Offering classes once per month (may be more or less depending

on demand and assistance) to teach them about keeping the water bodies healthy, water conservation and water quality.

4. New development companies
    a. Mandatory 12 hours classes, required for people involved in the communal irrigation system designs and maintenance of irrigation systems. Classes also required for gardeners and irrigators in English and Spanish about water conservation BMP's.

8. **Citizen Monitoring Program for NPS pollutants** (i.e. lead from shooting range & sediment load: TSS or turbidity) for educational and trend monitoring. Citizens from Lytle Creek and Fontana, including school groups may be useful targets for volunteer citizen monitors.

5.7 Funding

Essential for any increase in outreach or recreation activities is a corresponding increase in funding. However, before looking for outside sources of funding, the possibility of shifting existing resources to outreach should be investigated, provided that the mandates of the National Forest can still be met.

Funding for stakeholder projects will be identified base on types of projects recommended within the plan. Agencies that could provide financial assistance are CalFed Bay Delta Program, Caltrans, Water Board, Metropolitan Water District, Public Utilities, Department of Interior, Department of Fish and Wildlife, Office of Emergency Services, etc. The following state bond measures are potential funding sources for stakeholder-driven projects within the Lytle Creek watershed:

- Proposition 50
- Proposition 84
- Proposition 40

Appendix 1 – California Fire Plan Excerpt

"CALIFORNIA STATE WATERSHED HEALTH INITIATIVE" (CDF Fire Plan)

STATEMENT OF PROBLEM

California's privately owned urbanizing native forests and watersheds have been protected rather than managed. This has created unhealthy forests and watersheds susceptible to destructive fires, insect infestations and diseases. The state's privately owned forests are largely overstocked and subject to stress resulting from the typical drought cycles associated with a mediterranean climate. Combined with the additional impacts of urban development, the health of our state's privately owned forests and watersheds is rapidly deteriorating and threatens the future existence of communities, local natural resources, water quality and the economy of the state of california.

PROPOSED SOLUTION

Based upon values at risk and liabilities, caused by unmanaged forests and watersheds, enforceable regulatory standards which recognize standards for the promotion of a healthy fire resistant forest and watersheds are needed. This proposal focuses on the relationships between the number trees per acre, forest land productivity and the reduction of ladder fuels which promote forest fires and the impacts of development in watersheds.

The uniform fire code (ufc) and the uniform building codes (ubc) provide minimum fire safe standards for new construction. The public resources code (prc) contains language for such minimum building standards as road widths, turning radii, water flow, and addressing. Additionally the prc and local weed abatement ordinances establish minimum residential weed clearance standards. These standards have been created to protect life and property.

Unmanaged forests are increasingly susceptible to destructive fires, insect infestations and forest diseases…

This proposal is also intended to create language within the public resources code which would set minimum standards for development within watershed lands, including those contained wholly or in part within incorporated city limits, which would ensure the vitality, health and functionality of those lands as watersheds.

Housing, commercial and retail development may be limited based on criteria such as degree of slope, vulnerability to loss from wildland fire, water quality and drainage impacts as well as other negative impacts on watershed functions. Paving limitations or permeable paving alternatives could also be required to ensure that adequate watershed function will be maintained and that stormwater, debris and flooding will be minimized.

CONSEQUENCE OF INACTION

Inaction will see the continued build-up of unmanaged forest fuels in state responsibility area forests and watersheds throughout the state. The result will be the perpetuation of overstocked, stressed forests and watersheds that are susceptible to destructive and increasingly expensive

wildfires, insect infestations, and diseases, which affect public safety and watershed resource values. The lack of minimal state wide development standards in watersheds have allowed cities and counties to approve development in areas of the state without adequate protection of watersheds increasing costs for firefighting and significant impacts to the state's water quality and supply. The fiscal impact of these decisions is borne by taxpayers statewide.

ALTERNATIVE

California Department of Forestry and Fire Protection (CDF) and its cooperators historically have pursued public education efforts to achieve public support for forest management on private forest lands of all sizes. These efforts have had limited success. The continued urbanization of California forest land and watersheds requires immediate action. There are no other methods to address this expanding problem and its impacts on state responsibility area watersheds. Legislation is required. Education and regulatory enforcement provided by cdf and its cooperators is required to affect long term change and reduce the cost of the consequences of imperiled forests and catastrophic fire.

Ensuring the health and vitality of California's forests and watersheds will result in more natural and fire resistive forests and watersheds. Appropriate land management and building standards will reduce human and property loss to wildfire with resultant savings in the cost of fighting wildfires.

OTHERS AFFECTED

Cities and counties, planning agencies, code enforcement and local fire protection agencies, water agencies and districts and watershed groups and authorities.

HISTORY

Our national and state fire policies were largely established following the large life and property loss fires that occurred in the late 1800's to 1910. These policies established the goal of suppressing all wildfires at ten acres or less. This has resulted in the exclusion of the beneficial effects of wildfire in forests and watersheds contributing to the overstocking of these lands and their susceptibility to drought impacts. Additionally, land management and planning decisions in these lands have been made by local government without adequate consideration of the impacts on watershed functions. "The state, as a quasi sovereign, has a right to protect a waterway from the impacts of private property owners." Oliver Wendell Holmes. Land use decisions in watersheds, by local governments, have negatively impacted the citizens of California living outside the local government's jurisdiction. Those impacts have been reduced water quality and supply, soil erosion, flooding and the increased costs of wildland fire suppression.

FISCAL AND ECONOMIC IMPACTS

The costs of wildland fire suppression have been increasing in California on an annual basis driven largely by the increased efforts required to protect lives and property as development has encroached into the wildland areas of the state. Other fire impact costs, which have not been calculated on a statewide basis, include among others availability and cost of property insurance, flood control impacts, water quality and water supply as well as species habitat and re-forestation. For example following the 2003 fires in San Bernardino County Water Agencies determined that:

- Total runoff is likely to increase by more than 10% and peak storm flows will increase about 5 times normal.
- Sediment loads carried down stream could be 30 to 50 times normal. This may take years to remove.
- Flood control basins will likely be breached and areas without flood control basins may have catastrophic flood and debris damage.
- Long duration increases in water turbidity including fine sediment may be carried far down stream complicating groundwater discharge.
- A 2-10 fold increase in total dissolved solids (TDS) or salts with increased flows could result in as much as 500,000 tons of added salt in the Santa Ana River and groundwater basins. The runoff water is needed for recharge or consumptive use, significant treatment requirements to remove or mitigate this tds.
- 20,000 tons of nitrates and phosphorous formerly bound in soil and from airborne deposition will be released into the peak storm flows and make its way into groundwater.
- There will be significant transport of uranium and its radiological progeny downstream in surface groundwater increasing the cost of radon and uranium treatment and future monitoring.
- Increases in organic compounds, including toxic and carcinogenic compounds from partial combustion of forest materials will decrease usability of 70% of the Santa Ana region's primary water source.
- Sedimentation of the lands used by the San Bernardino kangaroo rat and the Santa Ana wooly star fish will cause choking turbidity reducing the useable habitat for the Santa Ana sucker fish.
- Estimated costs to mitigate the fire effects in the Santa Ana watershed range from $500,000,000 to $800,000,000.

PROBLEM: The need for private landowners to reduce hazardous fuels within and around the communities in the San Bernardino National Forest (BDF) mountain areas. Educating and instilling ownership in the private landowners of the process of fuel reduction so they can help maintain the dynamic ecosystem of the forest and ultimately reduce their dependency on public funds to maintain a fire safe community in the future.

DESIRED OUTCOME: Fuel reduction on private land by encouraging private landowners to reduce fuels in the short term and to maintain the fuel reduction in the long term. Education of the landowners of the benefits of fuel reduction for fire safety of their property and the community as well as the benefits of a healthy forest.

The overall goal of the San Bernardino Unit Fire Plan is to reduce total costs and losses from wildland fire in the Unit by protecting assets at risk through focused prefire management prescriptions increasing initial attack success and through engaged collaboration with local stakeholders and public agencies.

The San Bernardino Unit Fire Plan has five strategic objectives:

1) To create wildfire protection zones that reduces the risks to citizens and firefighters.

2) To assess all wildland areas, not just the state responsibility areas. The analysis will include all wildland fire service providers - federal, state, local government, and private.

3) To identify and analyze key risks and issues so that recommendations for changes in public policy may occur.

4) To have a strong Unit fiscal policy focus in order to affect the maximum of available funding sources for wildland fire protection projects.

5) To translate these analyses into "on the ground" accomplishments by focused collaboration efforts with public and private partners.

Prefire management. This aspect focuses on evaluating which prefire activities to best protect assets from wildland fires. Specific themes of these activities include the Unit fire prevention collaboration at every opportunity, management of fire-prone vegetation, the management of fire ignition sources, fire prevention enforcement and education, and implementation of fire safe concepts in all existing and planned urban areas at risk from wildfire.

Assets at risk, as identified in the California Fire Plan, are listed in the table below and are considered an integral component of day to day fire protection and resource planning considerations in the CDF San Bernardino Unit:

Asset at Risk	Public Issue Category	Location and ranking methodology
Hydroelectric power	Public welfare	1) Watersheds that feed run of the river power plants, ranked based on plant capacity; 2) cells adjacent to reservoir based plants (Low rank); and 3) cells containing canals and flumes (High rank)

Fire-flood watersheds	Public safety Public welfare	Watersheds with a history of problems or proper conditions for future problems (South Coastal Plain, field/stakeholder input), ranked based on affected downstream population
Soil erosion	Environment	Watersheds ranked based on erosion potential
Water storage	Public welfare	Watershed area up to 20 miles upstream from water storage facility, ranked based on water value and dead storage capacity of facility
Water supply	Public health	1) Watershed area up to 20 miles upstream from water supply facility (High rank); 2) grid cells containing domestic water diversions, ranked based on number of connections; and 3) cells containing ditches that contribute to the water supply system (High rank)
Scenic	Public welfare	Four mile viewshed around Scenic Highways and 1/4 mile viewshed around Wild and Scenic Rivers, ranked based on potential impacts to vegetation types (tree versus non-tree types)
Timber	Public welfare	Timberlands ranked based on value/susceptibility to damage
Range	Public welfare	Rangelands ranked based on potential replacement feed cost by region/owner/vegetation type
Air quality	Public health Environment Public welfare	Potential damages to health, materials, vegetation, and visibility; ranking based on vegetation type and air basin
Historic buildings	Public welfare	Historic buildings ranked based on fire susceptibility
Recreation	Public welfare	Unique recreation areas or areas with potential damage to facilities, ranked based on fire susceptibility
Structures	Public safety Public welfare	Ranking based on housing density and fire susceptibility
Non-game wildlife	Environment Public welfare	Critical habitats and species locations based on input from California Department of Fish and Game and other stakeholders
Game wildlife	Public welfare Environment	Critical habitats and species locations based on input from California Department of Fish and Game and other stakeholders
Infrastructure	Public safety Public welfare	Infrastructure for delivery of emergency and other critical services (e.g. repeater sites, transmission lines)
Ecosystem Health	Environment	Ranking based vegetation type/fuel characteristics

Evacuation clearance will take an estimated three to five years to complete and will be carried out in four phases:

1. Remove dead and dying trees that are in danger of falling on and closing off evacuation routes.

2. Remove all dead and dying trees that are within 200 feet of the centerline of all evacuation routes and removing all vegetation necessary to construct within that 200 feet a shaded fuel break

3. Remove dead and dying trees that are within 400 feet of the centerline of an evacuation route and on a 30% or greater slope and removing all vegetation necessary to construct within that 400 feet a shaded fuel break

4. Remove dead and dying trees that are within 600 feet of the centerline of an evacuation route and within a chimney and removing all vegetation necessary to construct within that 600 feet a shaded fuel break

Prescribed fire can be used to manage natural and activity fuels, maintain areas that have already been treated, aid in meeting resource management objectives, and sustain ecosystem values. Prescribed fire is the preferred method in areas sensitive to impacts from mechanical treatments, such as California spotted owl and northern goshawk protected activity centers, riparian conservation areas, and on slopes greater than 35%. (USFS Prescribed Fire)

Prescribed fire is used only when temperature, humidity, wind speed, and fuel moisture are within the prescribed fire plan objectives. Prescribed fires can be ignited when weather and fuel conditions allow for minimized smoke impact on the public's air quality and public health. The USDA Forest Service works cooperatively with Local Air Pollution Control Districts to implement burn projects under conditions that will minimize smoke in sensitive areas (USFS Prescribed Fire).

Prescribed fire gives us a chance to burn an area at a lower intensity to protect the vegetation and soil. Specific management objectives may be to reduce the fuels and/or create a mosaic pattern in the vegetation to create cover, forage, and browse areas for wildlife. Prescribed fire can also mimic naturally occurring fire, enhance native plant species and create diversity in vegetation structure and distribution (USFS Prescribed Fire).

Benefits of Prescribed Fire

- Reduce the accumulation of dead and down material: needles, brush, and trees.
- Recycle forests nutrients.
- Minimize insect epidemics and the spread of disease in crowded stands.
- Firefighter safety: fires are smaller, less intense.
- Urban Interface: to protect lives and property.

Disadvantages of Prescribed Fire

- Risk of escape
- Smoke reducing the visibility on the roadways and scenic views
- Smoke affecting individuals with allergies and respiratory problems

(USFS Prescribed Fire)

The Need for a National Wildland Fire and Restoration Strategy (USFS Fire Plan 2002)

The need for a 10-Year Comprehensive Strategy to reduce the risk of wildland fire to communities and the environment is the result of:

- A high level of growth in the wildland urban interface that is placing more citizens and property at-risk of wildland fire.
- Increasing ecosystem health problems across the landscape.

- An awareness that many of the past century's traditional approaches to land management, the development of unnaturally dense, diseased or dying forests, and treatment of wildland fire have contributed to more severe wildland fires and created
widespread threats to communities and ecosystems. Millions of acres of land nationwide are presently classified as being at high risk from wildland fire.

Goals and Guiding Principles of the 10-Year Strategy

The four goals of the 10-Year Comprehensive Strategy are:
1. Improve Fire Prevention and Suppression
2. Reduce Hazardous Fuels
3. Restore Fire -Adapted Ecosystems
4. Promote Community Assistance

Its three guiding principles are:
1. Priority setting that emphasizes the protection of communities and other high-priority watersheds at-risk.
2. Collaboration among governments and broadly representative stakeholders
3. Accountability through performance measures and monitoring for results.

Implementation Outcome
Hazardous fuels are treated, using appropriate tools, to reduce the risk of unplanned and unwanted wildland fire to communities and to the environment.

Performance Measures
a) Number of acres treated that are 1) in the Wildland Urban Interface or 2) in condition classes 2 or 3 in fire regimes 1, 2, or 3 outside the wildland urban interface, and are identified as high priority through collaboration consistent with the Implementation Plan, in total, and as a percent of all acres treated.
b) Number of acres treated per million dollars gross investment in Measures a. 1) and a. 2) respectively.
c) Percent of prescribed fires conducted consistent with all Federal, State, Tribal and local smoke management requirements.

Condition Class – Based on coarse scale national data**,** Fire Condition Classes measure general wildfire risk as follows:

Condition Class 1. For the most part, fire regimes in this Fire Condition Class are within historical ranges. Vegetation composition and structure are intact. Thus, the risk of losing key ecosystem components from the occurrence of fire remains relatively low.

Condition Class 2. Fire regimes on these lands have been moderately altered from their historical range by either increased or decreased fire frequency. A moderate risk of losing key ecosystem components has been identified on these lands.

Condition Class 3. Fire regimes on these lands have been significantly altered from their historical return interval. The risk of losing key ecosystem components from fire is high. Fire frequencies have departed from historical ranges by multiple return intervals. Vegetation composition, structure and diversity have been significantly altered. Consequently, these lands verge on the greatest risk of ecological collapse. (*Cohesive Strategy, 2002, in draft)*

Fire Regime – A generalized description of the role fire plays in an ecosystem. It is characterized by fire frequency, predictability, seasonality, intensity, duration, scale (patch size), as well as regularity or variability. Five combinations of fire frequency, expressed as fire return interval in fire severity, are defined:

Groups I and II include fire return intervals in the 0 – 35 year range. Group 1 includes Ponderosa pine, other long needle pine species, and dry site Douglas fir. Group II includes the drier grassland types, tall grass prairie, and some Pacific chaparral ecosystems.

Groups III and IV include fire return intervals in the 35-100+ year range. Group III includes interior dry site shrub communities such as sagebrush and chaparral ecosystems. Group IV includes lodgepole pine and jack pine.

Group V is the long interval (infrequent), stand replacement fire regime and includes temperate rain forest, boreal forest, and high elevation conifer species.

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