TOPANGA CREEK WATERSHED MANAGEMENT PLAN

Compiled by:

THE TOPANGA CREEK WATERSHED COMMITTEE
JULY 1998 – OCTOBER 2001

REVISED MAY 2002

TOPANGA HISTORICAL SOCIETY

ABOUT WATERSHEDS

By Gary Snyder

Taken from:
A Place in Space: Ethics, Aesthetics, and Watersheds
Counterpoint Press, Washington DC 1995

"A watershed is a marvelous thing to consider: this process of rain falling, streams flowing, and oceans evaporating causes every molecule of water on the earth to make the complete trip once every two million years. The surface is carved into watersheds– a kind of familial branching, a chart of relationship, and a definition of place. The watershed is the first and last nation whose boundaries, though subtly shifting, are unarguable. Races of birds, subspecies of trees, and types of hats or rain gear often go by the watershed. For the watershed, cities and dams are ephemeral and of no more account than a boulder that falls in the river or a landslide that temporarily alters the channel. The water will always be there, and it will always find its way down. As constrained and polluted as the Los Angeles River is at the moment, it can also be said that in the larger picture that river is alive and well under the city streets, running in giant culverts. It may be amused by such diversions, but we who live in terms of centuries rather than millions of years must hold the watershed and its communities together, so our children might enjoy the clear water and fresh life of this landscape we have chosen. From the tiniest rivulet at the crest of a ridge to the main trunk of a river approaching the lowlands, the river is all one place and all one land.

The water cycle includes our springs and wells, our Sierra snow pack, our irrigation canals, our car wash, and the spring salmon run. It's the spring peeper in the pond and the acorn woodpecker chattering in a snag. The watershed is beyond dichotomies of orderly/disorderly, for its forms are free, but somehow inevitable. The life that comes to flourish within it constitutes the first kind of community."

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EXECUTIVE SUMMARY

Using the recommendations provided by the Draft Topanga Creek Watershed Management Study 1996 as a starting point, the Topanga Creek Watershed Management Plan seeks to provide an updated version of voluntary guidelines discussed and agreed upon by participating stakeholders. These guidelines provide concerned stakeholders with a road map for implementing a variety of preventative planning strategies and Best Management Practices that reflect our current understanding of the inter-relationships and connectedness of the physical, chemical, biological, economic, and social aspects of the Topanga Creek Watershed. The recommendations are based on the following premises:

- The Topanga Creek Watershed is a diverse area with many uses including residential and business development, infrastructure (roads and utilities), wilderness recreation for an urban population, and important biological habitat. Because of the historical pattern of development in the canyon, many of these uses are concentrated along the major creek channels.
- Land uses throughout the canyon that increase the rate and volume of runoff will have their major impact along the creeks where existing residences, roads, utilities and sensitive riparian habitat occur. Protection of existing life and property, and the riparian habitat, requires an integrated management approach to the entire watershed.
- Natural systems in Topanga are driven in large part by catastrophic events, like floods, earthquakes and wildfires, which can dramatically change the environment. The recommendations presented in this document are an attempt to provide guidance based on our understanding of the system at present. We know that things will change, and that we will need to change with them. The format of this document is designed to allow continuing revisions as the need arises.
- Finally, the process of reviewing the 1996 recommendations revealed how much we have already accomplished! (See Section 10. Looking Back). We note which recommendations have been implemented. We also indicate those that can be voluntarily implemented by the community and those that will require some legal support. Lastly, we also have identified new recommendations that appear to fit into the overall management plan.

A major departure from the 1996 document is the reorganization of the recommendations according to the categories identified by the Topanga Creek Watershed Committee. Thus, we hope to provide an easy to use, educational set of actions that can be voluntarily implemented in order to contribute to the long-term sustainability of Topanga Creek.

We have not yet lost Topanga Creek. It is impossible to say if we are close to the threshold or not. Taking action NOW means that we can actively participate in preserving and protecting the wild and wonderful Topanga Creek that defines our community.

A. WATERSHED DESCRIPTION

The Topanga Creek watershed is the third largest watershed in the Santa Monica Mountains. The watershed is a north-south trending, Y-shaped canyon, that covers approximately 18 square miles with elevations reaching from over 1700 feet to sea level. The 9-mile axis of the main drainage drops an average of 250 feet/mile, creating narrow, steep sided canyons with exposed walls of sedimentary rocks dating from 14-17 million years ago.

Topanga Creek is a geologically young, interrupted stream with perennial pools that are fed by numerous springs and tributaries along its two main branches. The mouth of the creek emerges into Santa Monica Bay through a small estuary, Topanga Lagoon, which historically covered over 30 acres. There is a major surfing beach at Topanga Beach.

Topanga Creek is an important, relatively natural creek within the Santa Monica Mountains, which supports a large diversity of plants and animals, many of which are increasingly rare. Reproducing populations of endangered steelhead trout and tidewater gobies, as well as numerous species of special concern have been documented

Since the early 1900s, a predominantly rural community has expanded to the present population of approximately 12, 000 residents. The community initially developed along the creeks, Old Topanga Canyon Road, and Topanga Canyon Boulevard (State Highway 27), and has more recently expanded into the surrounding hills and ridges. Highway 27 itself has evolved into a major commuter route from the San Fernando Valley to the Westside and the beaches, with approximately 30,000 car trips per day. Close to a million people visit the Topanga Creek Watershed annually, to enjoy the numerous parks of the Santa Monica Mountains National Recreation Area that are located here.

Population changes over time in Topanga

*From The Topanga Story, Topanga Chamber of Commerce, and US Census data

1960: under 3,000	1980: 6,000
1969: 4,500	2000: 12,000

Land Use in the Topanga Creek Watershed, 2002

*Based on GIS data from NPS and SCAG

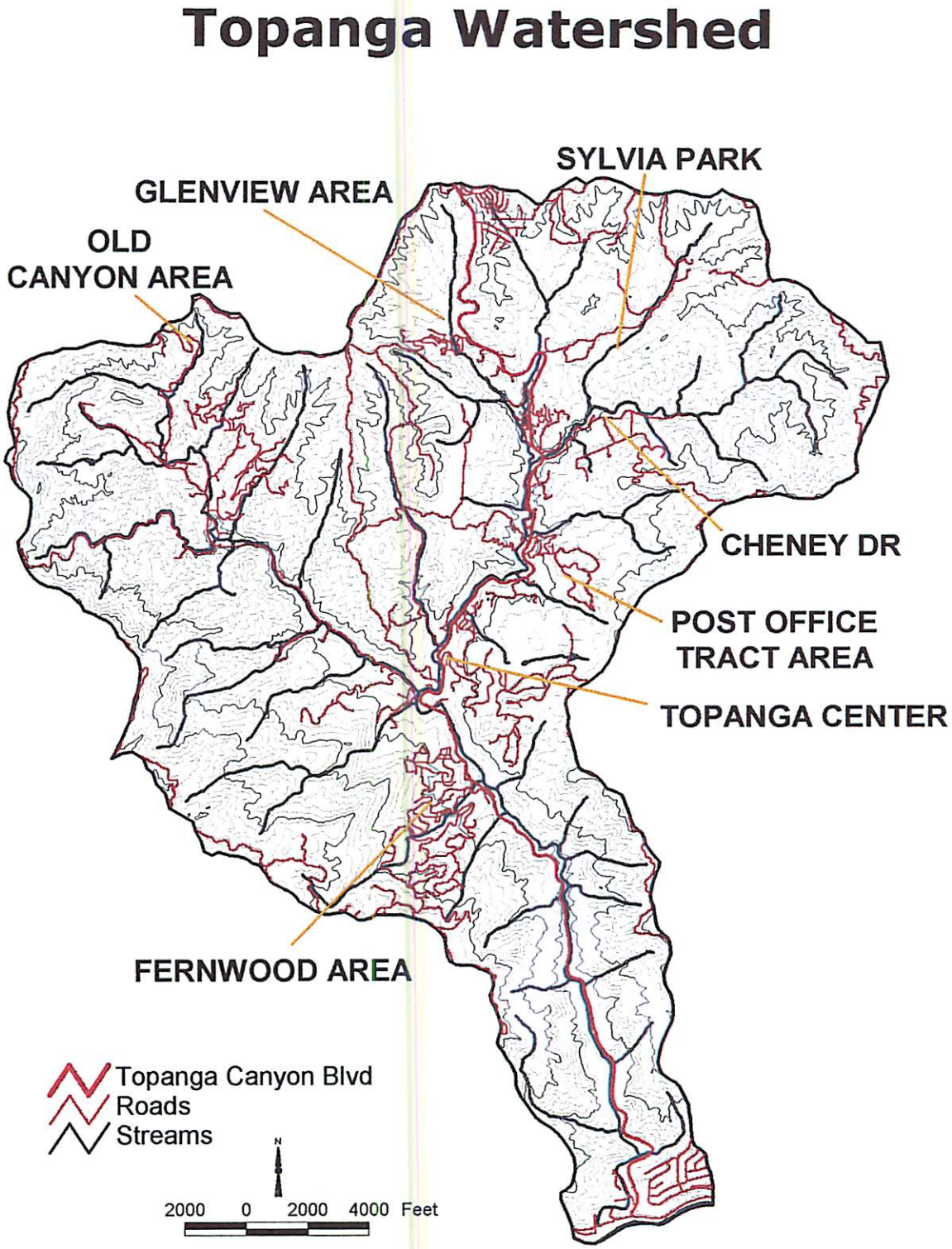
Public Lands: 8,000 acres

Topanga State Park (CA Dept. of Parks and Recreation)	5,628 acres
Santa Monica Mountains Conservancy	1,311 acres
National Park Service	244 acres
Mountains Restoration Trust	402 acres
Other agencies	415 acres

Private Lands: 4,800 acres

Developed private lands	1,718 acres
Undeveloped private lands	3,083 acres

B. Map of the Topanga Creek Watershed



C. TOPANGA CREEK WATERSHED: What makes it so special?

What is a watershed?

A watershed is a geographic area that collects all the rainfall into a series of drainages and creeks, eventually reaching the sea. The water that runs off every roof, every driveway, and every road meanders its way into Topanga Creek. At 18 square miles (12,800 acres), Topanga Creek is the third largest drainage into the Santa Monica Bay. The largest watershed is Malibu Creek (109 square miles) and the second largest is Ballona Creek (88 square miles).

What makes the Topanga Creek Watershed unique?

Think about the community we call Topanga. It is the creek that defines the community on many levels, from placement of the homes, utilities and roads (along the floodplain), to how natural disasters like wildfires and floods impact our lives. The center of town is where the main stems of the Creek meet from Old Topanga and along Topanga Canyon Blvd from the Top of Topanga. Most of the creek banks are held in place by native trees and plants, creating a beautiful landscape. The life of the creek is punctuated with catastrophic events that can change it dramatically.

Topanga Creek has a great diversity of native plants and animals. From endangered steelhead trout and rare western pond turtles, to the majestic coast live oaks and sycamores that frame the creek, the community of Topanga extends a welcome to over 22 amphibian and reptile species, 3 species of native fish, 9 species of bats, numerous rare mammals like ringtail cats and badgers, as well as over 100 resident and migratory birds. Unlike other nearby creeks, only small, isolated populations of exotic animals like crayfish and bullfrogs are found. While invasive plants like Giant Bamboo (Arundo) and Cape Ivy are a problem, they have not yet overwhelmed the natural vegetation.

We have not yet lost our creek

The goal of the Topanga Creek Watershed Committee is to encourage voluntary stewardship efforts that will keep our creek healthy. That is why education is so critical. If all stakeholders in the watershed learn about how their actions can make a real difference, then together we can find the path to living in harmony with our watershed.

What can you do to make a difference?

As caring stakeholders, you can lead the way to greater understanding of how all our actions are directly connected to the long-term sustainability of Topanga Creek. We all live and work somewhere in the watershed, and as the saying goes, everything does move downhill! So each lesson shared with a neighbor, or stewardship action taken on your land, has direct impacts on the health and well being of the entire Topanga Creek Watershed.

Like the ripples of a pebble thrown into the creek, your stewardship efforts spread the understanding of our connectedness throughout the community. With your help, the Topanga Creek Watershed Committee hopes to develop meaningful ways to educate present and future residents of Topanga that translate into direct benefits to not only the human community, but to all the plants and animals that share our home. Thanks so much for your help in this important effort.

D. TOPANGA CREEK WATERSHED: Wet, Wild and Wonderful!

By Rosi Dagit

Reprinted with permission from the *Topanga Messenger*, Vol. 21, No. 18, September 1997
and updated in October 2001 to reflect current knowledge

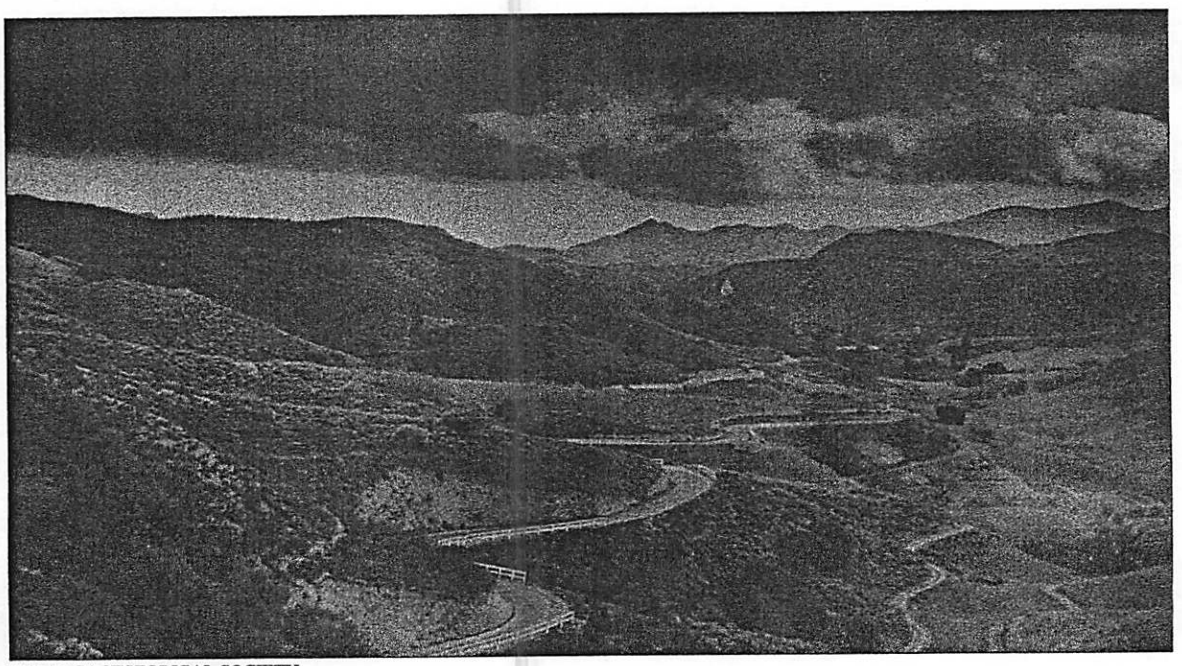
Topanga Canyon folks know where we live. Or do we? We talk about "the Canyon," but what defines our boundaries? Unlike other communities where borders are based on streets and politics, Mother Nature has defined our space.

Imagine a large teardrop bowl, slightly misshapen by the cosmic potter's hand. Saddle Peak, Red Rock, Calabasas Motorway, Henry Ridge, Top of Topanga, Summit Pointe, Viewridge, Santa Maria, the backside of Paradise Lane, Eagle Rock and the Parker Mesa Ridge create the rim. All the rain that falls within this area finds its way into Topanga Creek and to the ocean. The 18 square miles containing 12,400 plus acres have intertwined drainages which become the Topanga Creek Watershed.

What difference does a watershed make? A lot. Either you're in or you're out. The amount of run-off during a storm determines the fate of our roads. Some 200 homeowners along the Creek need to know if floods will endanger their homes. Surfers and swimmers are concerned about water quality down at the beach. Approximately 750,000 people visit Topanga State Beach each summer. We are fortunate to have so many "Topangans in spirit," even if they're not "Topangans in drainage."

Systems of watersheds collectively drain into larger geographic areas. The Santa Monica Bay has 28 different watersheds that supply fresh water to the system. Malibu Creek Watershed at 109 square miles is the largest. Tuna Canyon Watershed at 1.47 square miles is one of the smallest. Each has different characteristics due to steepness, geologic features and vegetation. In some watersheds, the majority of the main creeks and channels are now concrete flues with little biological function left. Just look at what was once the Los Angeles River.

Topanga Creek Watershed is the third largest in the Santa Monica Bay system and one of the least altered. Although some sections of the creek are armored with concrete, old stone walls or piles of boulder riprap, much of our streambeds are still stabilized by trees and shrubs. Upslope development has generally left hillsides intact, only slightly modifying the lay of the land and water flow.



TOPANGA HISTORICAL SOCIETY

Most unique is the amount of protected open space within the watershed. Over 2/3 of the watershed is undeveloped, with close to 8,000 acres contained in local parks. With the 2001 addition of the Lower Topanga Park, and various smaller parcels in the upper watershed, a vast majority of the land is permanently protected. Studies are underway to evaluate the feasibility of restoring the historic Topanga Lagoon, which once covered almost 30 acres at the mouth of the Creek. With this opportunity comes responsibility. Those of us who live or work in the watershed need to be careful stewards in order to ensure the long-term viability of the entire community.

THE WET PART

Much of the process has been shaped by water — how much and how long it flows. The Topanga Creek Watershed is quite young in geologic terms, a baby at 14-18 million years. Young streams are known to be unruly, eventually wearing down even the most stalwart rocks. They don't like confinement and take every opportunity to explore new paths, meandering at will. This is a lively process to watch unless you happen to live in the floodplain. Its not too amusing when the stream leaps over its banks and into your living room — a fairly common occurrence along boisterous young streams in full run.

The more sober minded engineers and hydrologists responsible for keeping people safe have tried many different ways to impose constraints on these rowdy events. First, they examine closely the shape, width and depth of the stream channels. Then using computer models, they calculate how much water could be expected to flow through the channels under specific storm conditions. They are always talking about 2, 5,10, 20, 50 and 100 year storms. These "design storms" refer to modeled predictions of how often storms of different intensities are likely to occur. For example, 1980 was considered an 83-year storm, while 1995 was only a 13-year storm according to LA County Department of Public Works. The El Nino winters of 1982-83 and 1997-98 did not cause a major problem in Topanga, even though they were very wet.

Sometimes the models are not in sync with reality. Stream gages which actually measure creek flow are used to make real world corrections to the models. The gage in Topanga Creek blew out in the 1980 flood, again from 1990 – 1996 and was only recently replaced. The expected "normal" flow is estimated to be roughly 5,000 cubic feet per second during the wet season. LA County Department of Public Works estimates that under 50 year "design storm" conditions, 22,000 cubic feet per second flows down the Topanga Watershed, through the lagoon and into the Bay. This is based on an extremely rare scenario – a 50-year storm event following a fire throughout much of the watershed. Their calculations and hydrologic modeling have been a source of concern to creekside residents.

The current piecemeal approach to problem solving along the creek could be replaced by a more coordinated vision that incorporates downstream impacts. The goal is to eventually manage the watershed as an integrated whole, recognizing that grading and drainage changes at the top of the hills, driveway and roof runoff, stabilizing streambanks, pruning roadside trees and clearing brush all have an effect on how the Creek responds during storm events.

To that end, the Topanga Creek Lagoon and Watershed Restoration Feasibility Study began in 2000 to develop the baseline information needed in order to better understand the complicated interactions between the creek, roads, utilities and homes competing for space along the narrow canyon corridors. Funded by grants from the CA Coastal Conservancy and the Santa Monica Bay Restoration Project, a series of studies began to compile the historic picture of creek flow related to precipitation since 1938, the changes in the creek and lagoon since 1876, impacts from flood events, the background levels of erosion and sediment delivery, and the relationship of present land use and road maintenance practices to the stability of the creek banks.

A comprehensive model of the watershed is being constructed after careful calibration using real storm event data. This information will lead to informed planning to deal with several known problem locations in the watershed, including several landslides, and areas of unstable streambanks. Most importantly, it will provide direction on how restoration of the historic lagoon that used to cover over 30 acres at the mouth of Topanga Creek could be accomplished.

In addition to the amount of water moving through the creek, there is tremendous concern about the quality of the water. The Los Angeles Regional Water Quality Control Board is preparing Total Maximum Daily Load (TMDL) limits for all pollutants of concern that end up in the Santa Monica Bay. Topanga Creek has been listed for lead problems in the upper watershed and for bacteria problems at the beach. In order to learn more about the water quality status, the Topanga Creek Stream Team was formed.

The volunteers of the Topanga Creek Stream Team collected water quality data and samples from 15 locations throughout the watershed each month from July 1999 to June 2001. The results of their efforts have been published as the Topanga Creek Report Card. In summary, it was found that there are no heavy metal or nutrient loading problems in the upper watershed. Several "hot spots" where fecal bacteria counts were consistently high were found, including Entrado Rd., Highvale Rd., Falls Dr. and behind the Topanga Market. Despite these higher than acceptable contributions, when the water reached the bridge 2 miles upstream from the ocean, it was fine, except immediately following big storm events.

It appears that there is no present substantiation for the lead listing, and the data collected should be sufficient to have that listing reconsidered. A closer look at the lagoon/ocean interface indicates that the bacteria problems at Topanga Beach come from a source below the 2-mile bridge. When the sand berm forms each summer, water quality improves. With opening following storm events, the water from the lagoon causes problems at the beach. Further studies are underway or proposed to better understand the possible sources of bacterial contamination of the beach.

THE WILD PART

In addition to being young and feisty, Topanga Creek Watershed embraces diversity of all kinds. Thanks to our streamside woods, and oak- chaparral covered hillsides, there is food and shelter for a huge variety of plants and animals.

Take the creepy crawlies for example. A 1986 survey of reptiles and amphibians found that 22 species make their homes among us. Other large watersheds like Arroyo Sequit, Trancas and Zuma had at most 9 species. But that's just the beginning. In spring 2000 and 2001, local biologists and Topanga Creek Stream Team Volunteers went back to see how many species remain. The final counts are not yet in, but it was reassuring to find dozens of California Newts, Two Striped Garter Snakes, Canyon Tree Frogs and Western Toads. The resurgent population of Western Pond Turtles, with new sightings at 3 locations in the canyon is very encouraging.

Gerry Haigh and the birders of Topanga estimate that at least 111 kinds of our feathered friends either live here or stop in for seasonal visits. Over 35 different species are confirmed breeders. The hawks that we take for granted here are protected by either State or Federal law due to their scarcity in other places. Some 10 different kinds of birds we commonly see really are that rare.

Among the furry folk, we have everything from tiny field mice and opportunistic pack rats, to bats roosting under the bridges. Predators like badgers, ringtail cats, bobcats, coyotes and mountain lions prowl the night, taking advantage of the open spaces and abundance of small yummy meals. Badgers and ringtails are still found in Topanga, even though they are loosing ground in other parts of the Santa Monica Mountains. Even the skunks are still here in number!

We even have several species of plants found in only a few other places. Clusters of endangered Santa Monica Dudleya can be found clutching precariously to the volcanic slopes. Big Leaf Maples, and Cottonwoods still can be found along the creek. Our trees hide the Arboreal Salamander.

Perhaps most exciting is the April 2000 discovery of adult steelhead trout in the Creek. An on-going study indicates that spawning took place and baby trout are trying to make their way through the dry season and out to sea when the rains begin. Another endangered fish, the Tidewater Goby was also documented in Topanga Lagoon. Schools of native Arroyo Chub can be found in every stretch of the Creek. Careful searching indicates that Topanga Creek hosts only native fish species, with few of the introduced exotic predators like crayfish, mosquitofish and bullfrogs that can decimate local species.

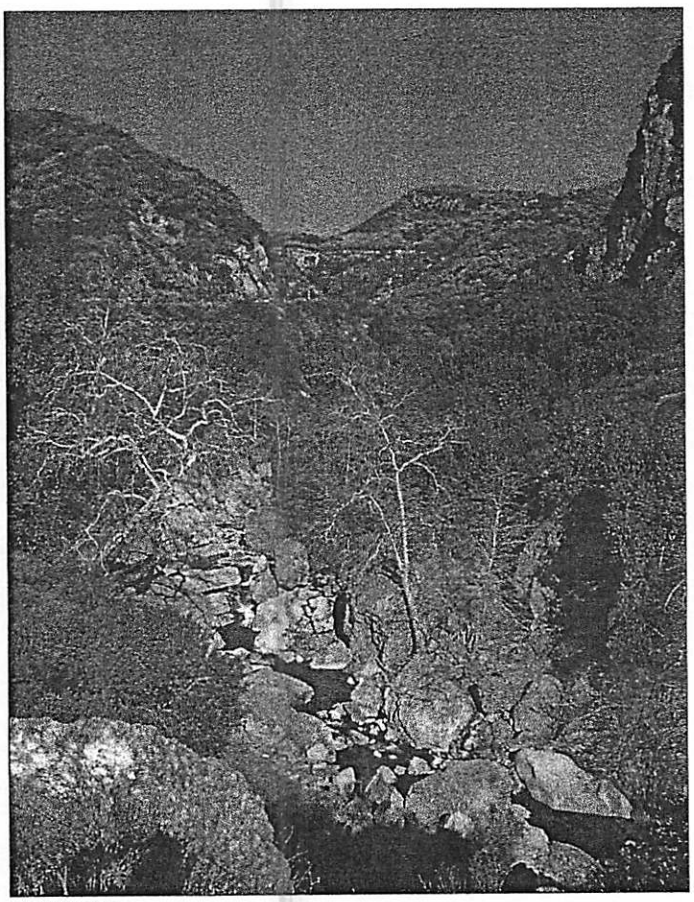
Loss of habitat overall makes the pockets remaining in the Topanga Creek Watershed especially critical. This variety of rare or threatened animal and plant populations makes Topanga one of the more ecologically important watersheds in the Santa Monica Mountains.

THE WONDERFUL PART

Whether you know the boundaries or not, chances are you still appreciate just how wonderful it is to live in the Topanga Creek Watershed. Like our plant and animal neighbors, the human residents of Topanga enjoy the wild nature of the watershed, except when the fires rage, the floods roar and the earth trembles! Or maybe it's because Topangans have survived these forces of nature, that we are trying to live with, rather than exert control over, the world of our Creek. But becoming integrated into the watershed requires a delicate balancing act.

Topangans have a responsibility to think ahead, plan carefully. Everything we do from the ridges down to the Creek adds up. If we want to enjoy the exuberance of our creek, then we need to think before we act. What will happen if the hilltop is leveled? How can we balance the need to protect our homes from fire and still prevent erosion and flooding downslope? How can the trees be pruned to provide line clearance and still hold up the slopes? Being a part of the watershed means asking these questions and more, and seeking realistic answers.

Perhaps we should take our cue from Tao te Ching who said, "The highest motive is to be like water. Water is essential to all living things, yet it demands no pay or recognition. Rather it flows humbly to the lowest level. Nothing is weaker than water, yet for overcoming what is hard and strong, nothing surpasses it."



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E. Mission Statement

Topanga Creek Watershed Committee

The mission of the Topanga Creek Watershed Committee is to coordinate and implement a consensus-based, voluntary, sustainable, Coordinated Resource Management Plan (CRMP), that integrates the needs and concerns of the community, and addresses all aspects of watershed ecology and watershed management.

The Topanga Creek Watershed Committee represents all stakeholders in the watershed and is open to all interested citizens who desire to demonstrate respect for our ecosystem, of which we are a part.

Every resident of Topanga receives the spiritual, aesthetic, ecological, and economic benefits that come from living in a healthy watershed. We wake to the rustling of the oaks and are serenaded to sleep by owls, frogs and coyotes. In return, we each need to recognize the impacts of our actions on this fragile resource, and take responsibility for leaving it viable for generations to come.

F. TOPANGA CREEK WATERSHED COMMITTEE GOALS

Goals of the Topanga Creek Watershed Management Plan (March 2002)

Archeological and Cultural Resources:

- To support preservation of the archeological and cultural resources found within the Topanga Creek Watershed.

Economics:

- Integrate the economic concerns of private citizens (not just Topangans) and those of public agencies.
- Identify and quantify the economic benefits of the natural resources in the Topanga Creek Watershed.

Education and Outreach:

- Promote greater awareness and understanding of the complex relationships between humans and the watershed necessary to preserve native biodiversity and natural processes.
- Coordinate Federal, State and County regulations to provide a comprehensive integrated management plan.
- Encourage agencies and utilities to adhere to the same guidelines and regulations as non-governmental agencies and citizens.
- Develop an outreach program to inform residents of flood and fire hazards and ways to protect themselves.
- Provide a community forum for education regarding Best Management Practices which can reduce the flood and fire hazard.
- Provide a cooperative forum encouraging coordinated voluntary efforts to minimize the flood and fire hazard.
- Evaluate existing risks to public safety and develop programs to address them.

Flood and Fire Hazard Protection:

- Develop an integrated, environmentally sustainable strategy for reducing flood and fire hazards.
- Define the flood hazard problem in terms of potential harm to people, structures and the stream course/riparian habitat.
- Encourage all property owners in the watershed to contribute to flood and fire hazard mitigation.
- Reduce the flood hazard by implementing measures to reduce existing peak flow runoff.
- Ensure that no existing life and property be placed at risk from hazards created by increases in peak flow runoff produced by new development.

Land Use: Grading, Drainage, Erosion Control

- Reduce land use impacts to preserve native biodiversity.
- Regulate new development in the riparian zone to prevent increases in flood hazard.
- Promote the use of "preventative planning" review which incorporates environmental constraints into the site evaluation process to reduce possible impacts or need for mitigation.
- Promote use of Best Management Practices that reduce grading, drainage and erosion control impacts.

Natural Environment:

- Restore and preserve native biodiversity and the natural processes that support it.
- Preserve and rehabilitate the stream channel and floodplains to restore natural channel capacity wherever feasible.
- Protect the riparian habitat which plays a crucial role in intercepting rainfall, reducing stormwater runoff, maintaining slope stability, and allowing for greater groundwater recharge.
- Create a master resource inventory database (or system) and a mechanism for sharing information gathered by federal, state and local agencies.

Recreation:

- Provide opportunities for healthful passive recreation, while minimizing impacts to native biodiversity.

Transportation:

- Preserve integrity and safety of transportation corridors through a sustainable maintenance program that minimizes impacts to native biodiversity and natural processes.

Water Quality:

- Improve water quality.
- Preserve or improve water quality for maximum use and enjoyment by reducing erosion, sedimentation, point and non-point source pollution.

Looking Ahead: Research and Restoration Programs:

- Identify research and restoration actions that are needed to preserve and protect native biodiversity.
- To identify sources of point and non-point pollutants entering the stream; to determine any impacts of these pollutants; and to recommend specific measures to eliminate or mitigate pollution problems.
- To identify specific sites contributing to high levels of sediment and erosion flow into the stream. Evaluate and refine appropriate Best Management Practices.
- To locate areas where slopes are unstable. Evaluate bio-engineering, gabion, and other environmentally sound solutions and recommend appropriate standards for specific sites. Perform a similar study for sites where grouted rip rap has been placed.
- To identify all trees that are within the projected flood zone that maintain streambank stability. Determine possible remedial efforts that could improve existing tree health. Identify locations needing revegetation in order to enhance streambank stability.

- To monitor the biodiversity of the watershed and identify potential indicator species which could alert us to major shifts or losses. To involve the community in maintaining diverse habitats to support the large number of plant and animal species within the riparian zone.
- To identify areas impacted by invasive exotic plants and animals. Establish an eradication program.
- To reestablish a functional lagoon at the mouth of Topanga Creek.

Goals of the Draft Topanga Creek Watershed Management Study (1996)

1. To improve public safety and protect existing life, infrastructure, and property from flood hazards.
2. To establish a Watershed Management Committee as a permanent administrative body to implement, monitor and coordinate the Topanga Creek Watershed Management Plan.
3. To provide a community based educational forum regarding Best Management Practices that reduce flood hazards.
4. To preserve and protect the creek environment.

G. How The Topanga Creek Watershed Committee Evolved

In 1990, the Los Angeles County Department of Public Works proposed to adopt a Floodway Ordinance for the upper portion of Topanga Creek adjoining Topanga Canyon Boulevard. The Floodway Ordinance was intended as a regulatory tool to mitigate potential flood hazards associated with development in, or adjacent to, the Topanga Creek floodplain. Topanga residents reviewed the proposed ordinance and identified a number of significant concerns including the efficacy of the ordinance to protect residents from flood hazard, and the long-term environmental and social impacts that would result from adoption of the ordinance.

In response to their concerns, Los Angeles County Supervisor Ed Edelman asked Topanga residents to prepare an alternative plan to the Floodway Ordinance. In September, 1992, the Topanga Canyon Floodplain Management Citizens' Advisory Committee (TAC) presented their report "An Alternative Plan to the Proposed Topanga Canyon Floodway Ordinance," to the Board of Supervisors. The Board accepted the report and in March, 1993 TAC was directed by the Board of Supervisors to prepare a watershed management study to address flood concerns including means to reduce storm water runoff, control soil erosion, and improve water quality.

With the continued support of Supervisor Zev Yaroslavsky, the Topanga Canyon Floodplain Management Citizens' Advisory Committee completed its study for the Board of Supervisors in April 1996.

The recommendations of the Draft Topanga Creek Watershed Management Study were presented to the Board of Supervisors as a set of action items that will allow integrated management of the flood hazards in Topanga Canyon. The study recognized the need for fiscal austerity at all levels of government and the recommendations are intended as cost effective strategies which will be of benefit to all of Los Angeles County.

A key component of the study was the recommendation to form a Topanga Creek Watershed Committee whose mandate was to develop a set of voluntary, consensus based guidelines to help accomplish not only flood hazard protection, but set a standard of stewardship that recognized the connectivity of all aspects of the watershed.

The Topanga Creek Watershed Committee was started in July 1998, with initial start-up funding from the CA Department of Conservation and sponsorship by the Resource Conservation District of the Santa Monica Mountains. Using the Coordinated Resource Management Plan (CRMP) template, a group of voluntary stakeholders representing all community groups and agencies involved in the watershed convened. The efforts of this committee continue to build upon the solid foundation set by the Topanga Canyon Floodplain Management Citizen's Advisory Committee. The guidelines presented in this document are a result of three years of community review and discussion. The goal is to learn how best to live with and within our watershed in a sustainable way.

H. Summary Of Education and Restoration Actions Of The Topanga Creek Watershed Committee (May 2002)

Since 1998, the Topanga Creek Watershed Committee has been moving forward in implementing actions identified in the Draft Topanga Creek Watershed Management Plan (April 1996) throughout the watershed. These actions have addressed community education, revision of flood control laws, basic research, and on-going efforts to implement restoration plans. The Topanga Creek Watershed Committee is organized according to a Coordinated Resource Management Plan (CRMP), with all stakeholders sharing in the volunteer, consensus based planning process. Information about the Topanga Creek Watershed Committee is regularly reported in the Topanga *Messenger* and minutes are posted on www.TopangaOnline.com.

Community Education Efforts:

July 1998	First meeting held at Topanga Community House in broiling heat! Yearling steelhead trout found in Topanga Creek.
August 1998	TopangaOnline Website (now receiving 55,000 hits a month) posts Watershed Committee information, Sponsored by Topanga Women's Club, Topanga Town Council.
September 1998	Identifying goals and objectives from Draft Plan continued.
October 1998	Identifying goals and objectives from Draft Plan continued. Identified need to involve the community more and to inform all stakeholders on issues pertaining to water quality, flood control, streambank stabilization, grading and drainage.
December 1998	Topanga Watershed Tour visited six sites in the watershed with presentations from Fred Zepeda, LA Athletic Club, Tony Coles, Caltrans, Dave Yamahara and Albert Anidi, Los Angeles County Dept. of Public Works, Dick Sherman, Topanga Underground, Rabyn Blake, Topanga Floodplain Citizen's Advisory Committee, Susan Nissman, Deputy for Sup. Yaroslavsky. (50 participants).
January 1999	Identifying goals and objectives from Draft Plan continued. Larger community meeting planned.
February 1999	Large stakeholder meeting at Topanga Elementary School presented Draft Plan goals and objectives.
March 1999	Large stakeholder meeting at Topanga Elementary School presented Draft Plan goals and objectives.
April 1999	Workshop on Water Quality Issues with presentations from Shirley Birosic, Regional Water Quality Control Board, Mitzy Taggart, Heal the Bay, Dick Sherman and Paul Tantet regarding septic issues. (130 participants).
May 1999	Workshop on septic systems and graywater systems with demonstrations by Dick Sherman, Steve Braeband and Paul Tantet. (40 participants).
June 1999	Clean the Creek day (50 participants, 2 tons of trash removed) Trout Unlimited sponsors web site.
July 1999	Topanga Stream Team Volunteers training session and beginning of water quality data collection.
September 1999	Training session for Topanga Stream Team Volunteers.

October 1999	Watershed Classes for 4th and 5th graders at Topanga Elementary School (120 students participated). Presented results of environmentally sensitive fuel modification study using data collected by over 70 volunteers at the TCEP festival.
November 1999	Presentation on alternative Fire safety measures and environmentally sensitive fuel modification strategies (120 participants).
December 1999	State of the Watershed meeting (200 participants).
February 2000	Watershed Education Classes held for 4th and 5th grade students at Topanga Elementary School, funded by a gift from Trout Unlimited.
March 2000	Streambank and Slope stabilization Workshop (100 participants).
April 2000	Earth Day Creek Clean Up - (90 participants, over 2 tons removed).
May 2000	Joint Watershed and Firesafe Committee meeting on septic regulations and fire safety.
September 2000	Grading and Drainage Best Management Practices Workshop.
	Airlifted 20 wrecked cars and 17 piles of debris from Topanga Creek in Topanga State Park. Funded by Community volunteer efforts and $13,200 from the Urban Stream Restoration Program.
	Topanga Tomorrow Workshop to begin revision of Draft Topanga Creek Watershed Management Plan recommendations held at The Mermaid.
October 2000	Received award from Southern CA Wetlands Recovery Project for creek car clean up project.
January 2001	Prepared and distributed to all residents handbook called *Living Lightly in the Watershed* to answer commonly asked questions. Include information in the 455 Yellow Pages.
March 2001	Topanga Tomorrow Workshop part 2 met to continue revisions of the Draft Topanga Creek Watershed Management Plan recommendations.
April 2001	Final workshop to complete review of revisions.
	Earth Day Creek Clean Up (50 participants, 5 tons of trash removed).
	Received Watershed Body Restoration Award from the Los Angeles Regional Water Quality Control Board for the creek car project.
May 2001	Septic and Graywater workshop (50 participants) Local contractors, plumbers and septic experts shared their stories and provided practical advice.
	Received Dept of Conservation Grant for Topanga Watershed Coordinator and initiated several education projects with local schools. Initiated a sub-committee on Invasive Plants in response to concerns about use of herbicides in the watershed.
June 2001	Report on preliminary restoration possibilities for Topanga Lagoon and Watershed. Invasive Plant sub-committee met and agreed to hold an educational workshop.
July 2001	Provided update on research projects. TetraTech representative spoke to the Committee about repetitive Flood losses and a LA County program. Completed final review of the revised recommendations for the Management Plan.

September 2001	Meeting to decided on format and approach for revised Management Plan. Invasive Plant sub-committee met to discuss workshop details.
October 2001	State of the Watershed Meeting held with representatives of all stakeholder groups sharing their current efforts. CA Dept. of Parks and Recreation discussed timeline and planning process for Interim Plan for Lower Topanga Park. Local designers and architects Cary Gepner, Oscar McGaw, Jannick , Jade Sadderthwaite and Clark Stevens led an informal design charrette to solicit input from the community concerning the park planning issues.
December 2001	Presentation on results of on-going research projects, including the Topanga Creek Watershed and Lagoon Restoration Feasibility Study.
February 2002	Home Away from Home: Non-Natives in Topanga. Workshop on identifying invasive exotic plants and strategies for removal and control.
April 2002	Earth Day Creek Clean Up and Earth Day education celebration at Topanga State Park.
May 2002	Presentation of the Topanga Creek Watershed Management Plan

Research Projects Completed:

Topanga Stream Walks – with NMFS and NPS to GPS locations of endangered plant and animal species, stands of Arundo, wrecked cars, potential steelhead impediments. Documented presence of yearling steelhead in July 1998, 2-3 adult steelhead in April 2000, clusters of endangered Santa Monica Mountains Dudleya. July 1998, May 1999, April 2000

Biological inventory and GIS overlay of sensitive species adjacent to all County infrastructure in the Topanga Watershed. Contract with LA County Dept. of Public Works – $23,000

Evaluation of Environmentally Sensitive Fuel Modification strategies for the Rural/Urban Wildland Interface – grant from CA Dept. Forestry – $14,500
Included preparation of Firewise Landscaping plant list of Santa Monica Mountain native species.

Fire Behavior changes due to implementation of environmentally sensitive fuel modification strategies – grant from CUEREC – $25,000

Water Quality Monitoring in the Topanga Creek Watershed – grant from 205j $53,800

Topanga Stream Team Volunteers trained and began collecting data.

Monitor Bat populations in Topanga Bridges – contract with LA County DPW $6,000, continued by volunteers

Research historical information about the Topanga Lagoon – $800 from the Topanga Watershed Committee

Volunteer Amphibian survey of Topanga Creek – in partnership with National Park Service

CRMP development Grant – funded by Dept. of Conservation $5,500 to initiate and organize Topanga Watershed Committee

Kitty Killers or Killer Kitties – Role of domestic cats as predators and prey in Topanga – Science Fair Project for 6th and 8th grade students Allison and Cody Wheeland

Water Quality Monitoring took place from July, 1999 until June, 2001 at 15 locations within the watershed, then continues until Dec 2001 at Topanga Lagoon and the Topanga Canyon Blvd. Bridge at mile marker 2.2.

Finalized revisions of the Topanga Creek Watershed Management Plan.

Erosion and Sediment Delivery Study began October 2000, funded by a grant from the Santa Monica Bay Restoration Project $58,000

Topanga Lagoon Restoration Feasibility Study began October 2000, funded by grant from Coastal Conservancy $210,000

On-going Research Projects:

CA Dept. of Fish and Game grant started June 2001 to conduct baseline instream habitat and steelhead trout survey of Topanga Creek.($92,000)

April and September 2001 macro-invertebrate sampling project initiated in cooperation with NPS, Heal the Bay and Caltrans to establish biological assessment index.

Work with Caltrans to implement bioengineered solutions to several riprap slopes along the creek, reduce sedimentation and revise road shoulder maintenance practices to protect roadside pocket wetlands, seeps and other sensitive locations.

Develop prioritized restoration plan for specific sites in the watershed.

Research Projects pending:

Population study of Western Pond Turtles in Topanga Creek – funded by Prop 12

Phase II: Topanga Lagoon and Watershed Restoration Study – Develop specific plans for restoring the streambank at the "Narrows," and working with State Parks to develop a plan for restoring Topanga Lagoon – funded by Prop 12

Whose Poo in Topanga Lagoon? Water Quality Monitoring to identify sources of bacterial contamination/viral presence – submitted to 205j State Water Quality Control Board

Coastal Impact Assistance Program – Los Angeles County Department of Public Works proposal to continue water quality monitoring and hydrological analysis of the Topanga Creek Watershed – Submitted to NOAA

Soil Characterization of Topanga Lagoon Restoration Area – Submitted to Southern CA Wetlands Recovery Program

I. History of Flood Hazard and Flood Hazard Management in Topanga Creek

Contributed by Rabyn Blake, (Draft Topanga Creek Watershed Management Study, 1996)

Throughout this century, heavy rains have come once or twice a decade to Topanga Canyon, with major floods recorded in 1938, 1969 and 1980. Heavy downpours on the heels of prolonged periods of wet weather have done damage to the entire watershed, causing inundation and slides in the uplands with destructive erosive flooding of the creek areas. Accounts in *The Topanga Story* (York, 1992) relate the elemental struggles that occurred during the floods with evacuation, procuring food, attempts to reunite families, and tragically, the death of five people in 1969. The experiences of the residents during these emergencies have prompted concerns for a proactive approach to flood hazard reduction.

During major floods, low-lying areas, including Topanga Center and some houses, have experienced minor inundation flooding. The main damage however, has been to roads, primarily Topanga Canyon Boulevard (State Route 27), an important commuter thoroughfare to the Westside. In 1978 the road was closed for two months for flood repairs. In the "worst flood of the century," February 16, 1980, Topanga Canyon Boulevard was altogether gone in two long stretches of up to 200 yards, and it collapsed in half a dozen other locations, requiring a massive engineering repair job. In 1969, the road repairs lasted from February through the following June. The miracle repair of the boulevard in January 1995, when another section of the Boulevard collapsed, took less than a month thanks to the intervention of our new Supervisor Zev Yaroslavsky and the round the clock performance of Caltrans. The Department of Public Works (DPW) clears and repairs County roads with equal dispatch, and the DPW and the Fire Department have always come to the rescue in times of disaster with sandbags and advice to homeowners

Following the 1980 flood, DPW, under contract to FEMA, mapped the Topanga floodplain to comply with requirements of the National Flood Insurance Program (NFIP) using a 100-year storm. The resulting maps, known as the FIRM maps, are used by the Building Department, insurers, and property owners to identify flood hazard locations. DPW has proposed to change from a flood hazard mitigation system based on the FIRM maps, to one based on its own estimate of the extent of the flood hazard. The new maps, based on DPW calculations, portray a much larger zone of flood hazard than was designated on the FIRM map.

It is clear that the old ways of waiting for disaster to happen and then responding with emergency repair funds cannot continue to serve the community's and the County's needs. In this report, we propose that in the 21st century a new concept, that of watershed management, be employed. It is our intent to not only identify the flood hazard, but to develop measures to reduce it, as well as to maintain the natural resources of the stream channel.

J. Topanga Creek Watershed Committee Stakeholders

Community Representatives

Arson Watch
TASC – Topanga Association for Scenic Community
Topanga Chamber of Commerce
TCTC – Topanga Canyon Town Council
Topanga Canyon Floodplain Citizen's Advisory Committee
Topanga Community Club
T-CEP – Topanga Coalition for Emergency Preparedness
Topanga Citizen's Firesafety Committee
Topanga Historical Society
Hillside/Mesa Homeowners Association
Topanga Skyline Homeowners Association
VOICE – Viewridge Owners Involved in the Community and the Environment
Home Owners Association Viewridge Estates
Bonnell Homeowners Association
Top O Topanga Homeowners Association
Lower Topanga Community
Fernwood Homeowners Association
Topanga Creekside Homeowners Association
Santa Monica Mountains Coalition for Alternatives to Toxics
Topanga Cub Scouts and Girl Scouts
Heal the Bay
Surfrider Foundation
Trout Unlimited

Park and Agency Representatives

CA Department of Parks and Recreation
Santa Monica Mountains Conservancy
National Park Service: Santa Monica Mountains National Recreation Area
Resource Conservation District of the Santa Monica Mountains
National Resources Conservation Service
Los Angeles Regional Water Quality Control Board
CA Dept of Fish and Game
National Marine Fisheries Service
Caltrans
Los Angeles County: Watershed Planning Division, Beaches and Harbors, Building and Safety, Health and Environmental Services Hydrology and Water Resources, Fire, Forestry, Regional Planning, Road Maintenance
Santa Monica Bay Restoration Project
Coastal Conservancy Southern California Wetlands Recovery Project
CA Coastal Commission
Southern California Edison
US Fish and Wildlife
US Army Corps of Engineers

Political Representatives

Zev Yaroslavsky, Third District. LA County Board of Supervisors
Sheila Kuehl, District 23, State Senate
Fran Pavley, District 41, State Assembly
Cindy Miscikowski, District 11, Los Angeles City
Brad Sherman, District 24, U.S. House of Representatives
Henry Waxman, District 29, U.S. House of Representatives

K. ACKNOWLEDGEMENTS

The Topanga Creek Watershed Committee owes a great deal to the pioneering efforts of the members of the Topanga Canyon Floodplain Management Citizens' Advisory Committee, who represented several groups.

- Topanga Association for a Scenic Community (TASC),
- Topanga Canyon Town Council (TCTC),
- Topanga Canyon Creekside Homeowners Association (TCCHA),
- Resource Conservation District (RCDSMM),
- and advisory members representing the County of Los Angeles (LACO).

In particular, it is important to recognize the continuing efforts of Rabyn Blake, whose ceaseless energy and concern for Topanga Creek led to the development of the Draft Topanga Creek Watershed Management Study and the formation of the Topanga Creek Watershed Committee.

Committee members included:
Joan Andersson, J.D., TCCHA
Rabyn Blake, M.F.A., TCCHA
John Crawford, P.E., TASC
Phil Chandler, C.E.G., TASC
Rosi Dagit, Conservation Biologist, RCDSMM
Dick Olsen, TCTC
David Phillips, Ph.D., TCCHA
Carl R. Nelson, P.E., LACO
Irving Sherman, P.E., LACO
Marti Witter, Ph.D., TASC

The Revised Topanga Creek Watershed Management Plan received invaluable input from numerous stakeholders, however the following individuals made an extensive commitment to the process and provided critical input over the years.

Revisions were compiled by Rosi Dagit, Topanga Creek Watershed Coordinator, and the Editorial Sub-Committee including: Dona Christianson, Woody Hastings, Michele Johnson, Julie Rosa, Tricia Watts, Jill Waldron and Marti Witter. Dan Irwin designed and contributed the Topanga Creek Watershed logo, as well as supervised the production of the Watershed Management Plan document. Graphics and images were provided courtesy of the Topanga Historical Society, Randy Young, Terry Steinman, Jill Greene, and Ted Gegoux. Cover photograph provided by Rosi Dagit. Cover design by Dan Irwin.

We apologize if we have forgotten anyone!

TOPANGA CREEK WATERSHED MANAGEMENT PLAN REVIEW COMMITTEE

Topanga Residents:	
Rabyn Blake	Andrew Rasmussen
Bill Buerge	Kevin Reed
Phil Chandler	Victor Richards
John Crawford	Julie Rosa
Dona Christianson	Eli Sercarz
David Gottlieb	Irving Sherman
Woody Hastings	Richard Sherman
Craig Houx	John Simons
Michele Johnson	Bill Sloan
Casey Kelley	Pearl Sloan
Dennis King	Clark Stevens
Scott King	Paul Tantet
Jordan Lederer	David Totheroh
John MacNeil	Terry Valente
Pat MacNeil	Ann Christine Von Wetter
Gail McTune	Jill Waldron
Gary Meyer	Penny Ward
Gino Mustari	Tricia Watts
Florence Nishida	Steve Williams
David Phillips	Nelson Yardley
Roger Pugliese	

LA County Representatives:
Larry Charness
Christian Charbonnet
Menerva Daoud
Ron Hoffman
Dean Lehman
Susan Nissman
Dave Yamahara

Agency Representatives:
Shirley Birosic
Paul Caron
Suzanne Goode
Glenn Bailey
Margo Murman
Rosi Dagit
Alfred Ramos
Vern Finney
Mark Cocke
Barbara Marquez
Paul Yamazaki

TOPANGA CREEK WATERSHED MANAGEMENT PLAN

RECOMMENDATIONS

RECOMMENDATIONS

Introduction

HOW TO USE THE TOPANGA CREEK WATERSHED MANAGEMENT PLAN

The Topanga Creek Watershed Management Plan is organized according to categories, with all associated information incorporated under each topic. The categories were selected by the Committee during 3 years of deliberations and reflect our current understanding of the components of the Topanga Creek Watershed Goals. The intention is to update and amend this document as necessary in order to respond to the evolution of our planning process.

SECTIONS:

1. **Archeological and Cultural Resources**
2. **Economics**
3. **Education and Outreach**
4. **Flood and Fire Hazard Protection**
5. **Land Use: Grading, Drainage, Erosion Control**
6. **Natural Environment**
7. **Recreation**
8. **Transportation**
9. **Water Quality**
10. **Looking Ahead: Monitoring, Research and Restoration Programs**
11. **Looking Back: Recommendations implemented by October 2001**

The information is organized as follows under each topic:

- Goals
- Introduction
- **ACTIONS (bold)**
- *Recommendations that require legal or political action (italics)*
- Priority actions or research that still need funding or further investigation (underlined). Not listed in order of importance.
- References
- Supplementary information

Note: Each recommendation is numbered. If a recommendation appears under more than one category, it retains the first number it was assigned and will be in parentheses. A See Also reference will be found at the end of the recommendation to lead readers to other related sections.

HOW WILL WE KNOW IF THE PLAN IS WORKING?

The success of the Topanga Creek Watershed Management Plan will be evaluated every 5 years or more as needed by monitoring the following:

- Protecting life and property from flood, wildfire and earthquake hazards
- Improving water quality at Topanga Beach and in the upper watershed
- Eliminating upper watershed water quality "hot spots"
- Evaluating the effects of implementing recommended Best Management Practices,
- Institutionalizing Best Management Practices for Topanga with local and state agencies,
- Integrating the voluntary land use guidelines for Topanga into local planning documents, such as the Local Coastal Plan and Santa Monica Mountains North Area Plan,
- Maintaining viable populations of native flora and fauna,
- Restoring the population of endangered steelhead trout

WHO SHOULD USE THIS PLAN?

The Topanga Creek Watershed Management Plan provides voluntary guidelines for living sustainably in the watershed. It is meant to provide educational resources for all stakeholders, both residents and agencies.

SECTION 1
ARCHEOLOGICAL AND CULTURAL RESOURCES

SECTION 1
ARCHEOLOGICAL AND CULTURAL RESOURCES

"As long as the sun shines and the waters flow, this land will be here to give life to men and animals. We cannot sell the lives of men and animals; therefore we cannot sell this land. It was put here for us by the Great Spirit, and we cannot sell it because it does not belong to us." – Blackfoot Elder

GOALS:

- To support preservation of the archeological and cultural resources found within the Topanga Creek Watershed.

Introduction

The Topanga Creek Watershed has a long history of human inhabitance. The original residents were members of both the Chumash and the Tongva-Gabrielino tribes. Numerous camping, burial and ceremonial sites have been documented, but the potential for finding additional sites of importance remains. Subsequently, Topanga was claimed by the Spaniards, and more recently by enterprising individualists, who comprise much of the resident population today.

The Topanga Creek Watershed Committee recognizes the efforts of the Topanga Historical Society and local archeologists to keep the importance of these archeological and cultural resources alive.

ACTIONS:

1.1 Report any archeological finds as required by the National Historical Preservation Act.

1.2 Strictly adhere to state standards for archeological monitoring at any potential sites.

1.3 Evaluate the possibility of historic designation for several bridges in Topanga.

1.4 Protect archeological site Lan-8 from erosion, and plan bank stabilization to avoid further site disturbance.

Recommendations which require legal and political changes for implementation: None

References:

Blackburn, Thomas C. editor. 1975. Decembers Child: A Book of Chumash Oral Narratives. University of California press, Berkeley. CA

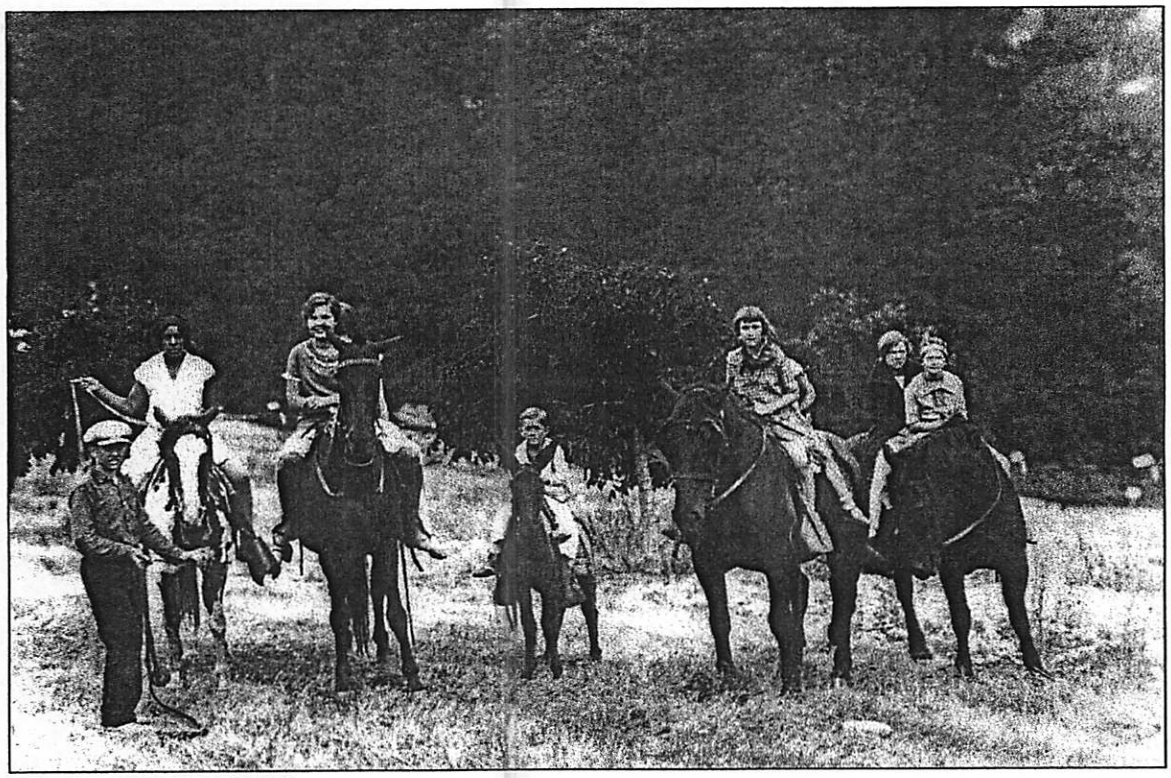
Gibson, Robert O. 1991. The Chumash. Chelsea House Publishers, New York.

McCawley, William. 1996. The First Angelinos: the Gabrielino Indians of Los Angeles. Malki Museum Press, Morongo Indian reservation, Banning, CA

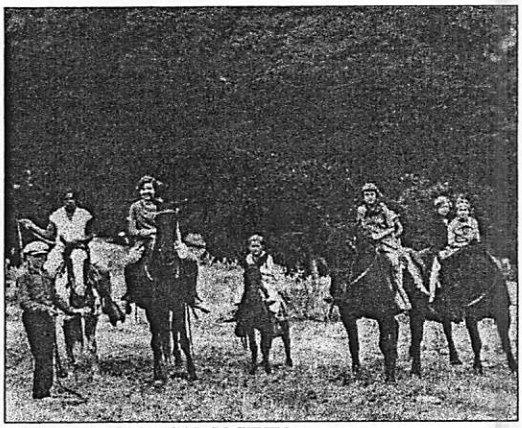
Miller, Bruce W. 1988. Chumash: A Picture of their World. Sand Rivers Press, Los Osos, CA

York, Louise, editor. 1992. The Topanga Story. Topanga Historical Society, Topanga, CA

SECTION 3
EDUCATION AND OUTREACH



TOPANGA HISTORICAL SOCIETY



TOPANGA HISTORICAL SOCIETY

SECTION 3
EDUCATION AND OUTREACH

"If I had influence with the good fairy who is supposed to preside over the christening of all children, I should ask that her gift to each child in the world be a sense of wonder so indestructible that it would last throughout life, as an unfailing antidote against the boredom and disenchantments of later years, the sterile preoccupation with things that are artificial, the alienation from the sources of our strength." – Rachel Carson

GOALS:

- Promote greater awareness and understanding on the complex relationships between humans and the watershed so as to preserve native biodiversity and natural processes.
- Coordinate Federal, State and County regulations to provide a comprehensive, integrated management plan.
- Encourage agencies and utilities to adhere to the same guidelines and regulations as non-governmental agencies and citizens.
- Develop an outreach program to inform residents of flood and fire hazards and ways to protect themselves.
- Provide a community forum for education regarding Best Management Practices which can reduce the flood and fire hazard.
- Provide a cooperative forum encouraging coordinated voluntary efforts to minimize the flood and fire hazard.
- Evaluate existing risks to public safety and develop programs to address them.

Introduction

The key to any voluntary management effort is to provide all the stakeholders with the information they need to make necessary decisions that protect the long-term viability of the watershed. There is an old saying that we love and protect only what we know. From the children to the seniors, from the bulldozer drivers to the policy makers, it is important that each individual knows how important their actions are, and understands how to make choices that sustain the entire community, both human and wild.

ACTIONS:

3.1 Develop watershed consciousness as a rich diverse model of community.

3.2 Publicize that the events/proposals in the Santa Monica Mountains/Topanga affect the health of the local ocean waters and their ability to be utilized for recreation, fishing, etc.

3.3 Reach out to all stakeholders including the people of CA and beyond, since loss of biodiversity, threatened species, and viewshed are regional issues.

3.4 Have experts address community meetings on issues of concern.

3.5 Coordinate with local schools to provide hands-on watershed education and service learning opportunities.

3.6 Disseminate information to all affected property owners as recommended by the Community Rating Service Repetitive Loss Plan including: the design manual for retrofitting flood prone residential structures; information on elevating residential structures; the handbook on flood emergency and residential repair; and information on flood-proofing techniques and systems. Coordinate with T-CEP.

3.7 Prevent illegal dumping by limiting vehicle access, placing appropriate signage, imposing and enforcing penalties (fines, misdemeanor offense). Develop an anti-dumping campaign, focusing on rewards, heightened public education, signage, and a hot-line to reduce this form of pollution. Pursue grant money to fund these efforts. See also Water Quality.

3.8 Coordinate volunteers to provide hands-on implementation of Best Management Practices.

3.9 Identify what agency is to be called when a problem is identified, establish a response time and create a list of agreed upon possible responses.

3.10 Identify, cultivate, and preserve natural foods and medicines.

Recommendations that require legal or political action: None

Priority actions or research that still need funding or further investigation:

3.11 Establish demonstration sites for detention basins and holding ponds.

3.12 Continue watershed education classes at Topanga Elementary School.

3.13 Continue funding for the Topanga Creek Watershed Education Coordinator

3.14 Continue training workshops for road maintenance crews on tree pruning and Best Management Practices.

3.15 Continue workshops on topics of concern for the entire watershed community.

3.16 Continue on-going education efforts with flyers, brochures and other information provided to new and present residents of the watershed.

3.17 Continue to expand the existing early warning system to provide maximum communication to the community during disasters. Comprehensive disaster management including preparation, prevention, planning, warning and response has clear social and economic benefits.

References:

Community Rating Service Repetitive Loss Plan, FEMA. 1990.

Living Lightly in the Watershed Brochure. Topanga Creek Watershed Committee, 2001.

Simple Ways To Clean the Creek, RCD of the Santa Monica Mountains, 1998.

Topanga Creek Watershed Curricula, 2001

www.TopangaOnline.com

www.CREEC.org

Supplementary Information:

The Topanga Creek Watershed Management Plan will require a long-term education and maintenance program of Best Management Practices to be successful. Education efforts need to be directed at responsible agencies, local schools, and property owners in order to be successful. Continued development of community workshops on topics of interest, as well as implementation of the Topanga Creek Watershed Curricula at local schools is needed. Development of additional service learning opportunities is also envisioned.

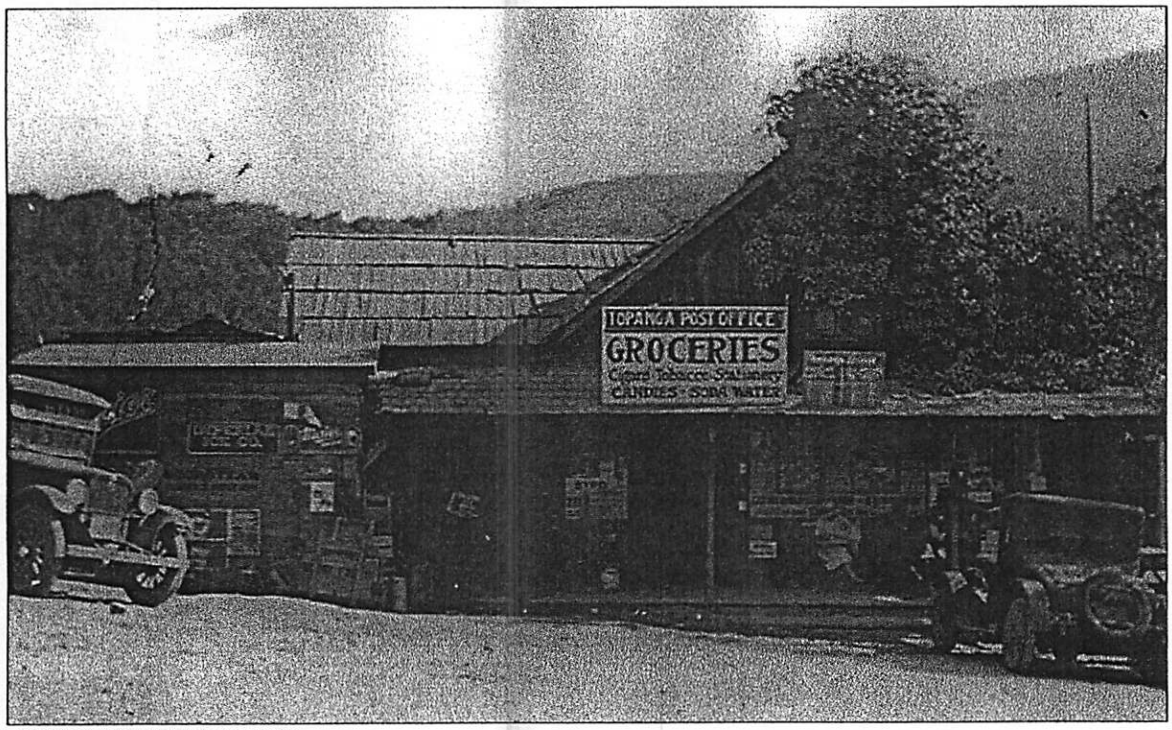
Maintenance is the responsibility of both residents and public agencies. Working together with a common purpose should reduce costs and provide greater protection for sensitive stream resources. Clearly defined methods for conducting maintenance need to be identified and agreed upon by both the residents and public agencies. Maintenance practices which can reduce the flood hazard include those related to: road shoulder, bridge, and stream crossing maintenance; stream bank and channel maintenance; line clearance; protection of riparian vegetation; eradication of channel clogging exotic flora; prevention of illegal dumping; and prescribed burns, efforts to reduce sedimentation and erosion, and to increase infiltration.

Numerous organizations in the Topanga Creek Watershed have undertaken the task of providing important educational materials and opportunities. Coordination of emergency preparedness and disaster response is ongoing. To become more familiar with what you can do to help, please contact:

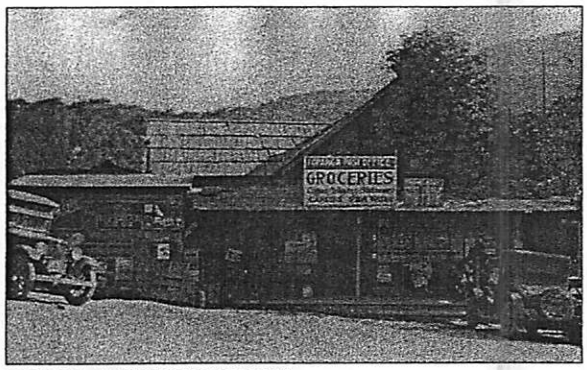
Arson Watch	455-4244
Disaster Response Team	455-1452
Equine Response Team	455-3029
LA County Forestry	818-890-5719
LA County Fuel Modification Program	626-969-5205
Naturalist Training Program, RCDSMM	455-1030
Natural Resources Conservation Service	805-386-4489
T-CEP	455-3000, 4270
Topanga Canyon Docents	310-535-9400
Topanga Creek Watershed Committee	455-1030
Topanga Disaster Medical Team	455-0673

In addition, Los Angeles County Fire Station 69 has a Call Firefighter Volunteer program. To find out more about this program, stop by the Station.

SECTION 2
ECONOMICS



TOPANGA HISTORICAL SOCIETY



TOPANGA HISTORICAL SOCIETY

SECTION 2
ECONOMICS

"We cannot live for ourselves alone. Our lives are connected by a thousand invisible threads and along these sympathetic fibers, our actions run as causes and return to us as results." – Herman Melville

GOALS:

- Integrate the economic concerns of private citizens (not just Topangans), and those of public agencies.
- Ensure that no existing life and property be placed at risk from hazards created by increases in peak flow runoff produced by new development.
- Identify and quantify the economic benefits of the natural resources in the Topanga Creek Watershed.

Introduction:

It is clear that understanding the relationship between long term ecological sustainability and economics is essential to the future of our watershed. Residents and agencies both need to evaluate the short and long term costs of actions taken that will impact the function of the watershed over time. While it is inherently difficult to place a dollar value on a view, or a creek, or a frog, or a tree, progress has been made in assessing the real world economic benefits provided by healthy watersheds in terms of avoided costs for stormwater conveyance, carbon sequestration, air pollution mitigation, energy costs and groundwater protection. The trees and natural vegetation of the watershed provide many of these benefits that can be economically assessed.

The challenge facing us is to identify the value of our "natural capital" and provide incentives for both property owners and agencies to realize the economic benefits of protecting the functional components of the watershed.

ACTIONS:

2.1 Work with existing and new businesses to solicit input in fostering voluntary implementation of watershed management guidelines.

2.2 Involve contractors and agencies in developing strategies for Best Management Practices.

2.3 Evaluate cost of lot retirement versus developing increased infrastructure to serve them.

Recommendations which require legal and political changes for implementation:

2.4 Protect creekside dwellers from "clouds" on property title, or unrealistic rebuilding requirements.

2.5 Support bond acts and other funding for public land acquisition.

Priority actions or research that still need funding or further investigation

2.6 Provide economic assistance to homeowners to upgrade old septics and graywaters to non polluting alternative varieties.

2.7 Identify economic benefits provided by trees and other natural resources so that real costs of projects' impacts can be evaluated.

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SUPPLEMENTARY INFORMATION:

Funding Possibilities

Several possible funding mechanisms exist to finance elements of the Topanga Creek Watershed Management Plan. Among the most common are grants from government agencies, special assessments, bonds, and service charges that can be employed in combination or singly, for various features of the Plan. The methods used are generally selected depending on the scope of the program, the authority available through state or local statutes to impose a funding method, existing local policies and practices, the local political atmosphere, the severity of the flood hazard, and the cost and difficulty of the mitigation. Benefit Assessment Districts are another source of funds that could be specific to the Topanga Creek watershed. Economic and social benefits would include protection for life and property, reduced hazard from peak flow runoff, reduced erosion and sedimentation, improved water quality, improved scenic characteristics, improved recreational resources, and enhancement of water related habitats.

Grants for Homeowners

Funding to assist property owners in implementing recommended Best Management Practices is available through several grant sources, including Partners in Fish and Wildlife (U.S. Fish and Wildlife Service, http://partners.fws.gov) and through the Natural Resource Conservation Service. See Appendix A for more details.

Los Angeles County support

The elements of the Topanga Creek Watershed Management Plan deserve the support of Department of Public Works. This would include development of capital improvements such as construction of detention basins and bridge replacements, implementation of the maintenance BMP's, and design support for the some of the general engineering techniques for streambank stability.

Economic Studies of the Environment

The only study of the economic impacts on the environment in Topanga was done by Rosi Dagit, Senior Conservation Biologist for the Resource Conservation District of the Santa Monica Mountains. Her study entitled, "VALUE OF TREES AND RIPARIAN VEGETATION IN STREAMBANK STABILITY" was published in January 1996 and can be found in the Draft Topanga Creek Watershed Management Study.

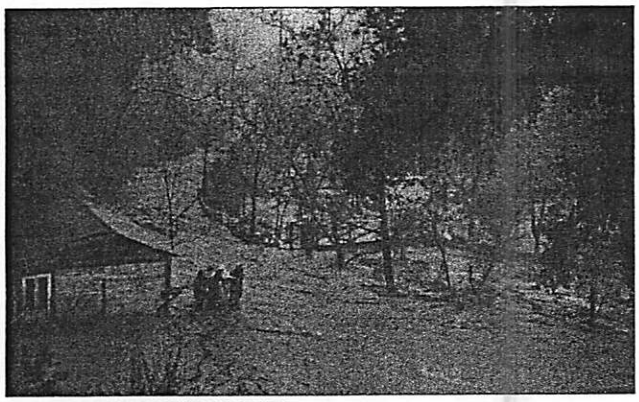
She found that the trees and riparian vegetation serve a critical role in maintaining stream bank integrity, allow for ground water recharge, help dissipate and reduce flow velocity and are an invaluable resource for preserving the environment in the Topanga Watershed. Current management practices disregard common and well-understood industry standards for preserving trees during line clearance and construction activities.

There appear to be few procedures in place that attempt to incorporate engineering, hydrological and ecological concerns into the maintenance of the roads. Hence, Coastal Commission permits are submitted after the fact, the Environmental Review Board is rarely consulted and little effort is made to retain and preserve existing vegetation and minimize the channelization of the stream. Many sites identified as problems are well known. An overall management plan that uses a comprehensive hydrological survey, incorporates environmental constraints and attempts to solve problems drainage wide, rather than piece by piece is warranted. This could be presented as a program Environmental Impact Report and receive approval from both the ERB and Coastal Commission, as well as the community at large. By having a plan in place, emergency procedures could be defined and a long-term management plan be implemented. The economic benefits of this would be substantial.

The economic value of the trees is only partially represented by the International Society of Arboriculture valuation system. In fact, they are worth considerably more. They provide comprehensive slope stability, ground water recharge, velocity reduction and rainfall dissipation at no cost. The amount it costs to retain any portion of the stream channel after the vegetation is removed should also be considered the value of the trees and shrubs. When taken as a whole the value of the trees along the stretch of Old Topanga Canyon surveyed totals over 2.4 million dollars based on their condition in December 1995. Of this amount, the protected oaks contribute $862,398.00. It would cost many times this amount to achieve the same level of stream bank protection as they currently provide.

SECTION 4
FLOOD AND FIRE HAZARD PROTECTION

TOPANGA HISTORICAL SOCIETY



TOPANGA HISTORICAL SOCIETY

SECTION 4
FLOOD AND FIRE HAZARD PROTECTION

"Oh, I've seen fire and I've seen rain.
I've seen sunny days that I thought
would never end." – James Taylor

GOALS:

- Develop an integrated, environmentally sustainable strategy for reducing flood and fire hazards.
- Define the flood hazard problem in terms of potential harm to people, structures and the stream course/riparian habitat.
- Encourage all property owners in the watershed to contribute to flood and fire hazard mitigation.
- Reduce the flood hazard by implementing measures to reduce existing peak flow runoff.

Introduction

The Topanga Creek Watershed is shaped by catastrophic natural events that continue to define the watershed. Earthquakes, fires and floods all contribute to the evolution of the natural and built environment. Learning to live with impending catastrophe is a necessary fact of life for all residents. Taking precautionary measures when the winds are calm and sun shining can mean the difference between life or death.

The entire Topanga Creek Watershed is designated as a High Wildfire Hazard Area. Over 70% of the native vegetation covering the slopes of the watershed are classified as the northern mixed chaparral community, which is one of the most flammable plant communities on the planet. The Mediterranean climate that makes living in Topanga so comfortable, is also one of dry summers and wet winters, with fierce Santa Ana winds that can whip up flames reaching over 200 feet.

Flood events often follow the fires, when even a gentle rainstorm can mobilize the destabilized slopes causing damaging mud and debris slides. Even without a fire, the main roads, utilities and homes in Topanga compete for space in the narrow canyon floodplain. Road flooding and failures are common after a series of storms has saturated the watershed and the creek explodes out of its banks.

Several community organizations like T-CEP, the Topanga Canyon Firesafe Committee and Arson Watch coordinate disaster preparedness training and information. The recommendations in the Watershed Management Plan augments the solid foundation provided by these groups. Since the original Watershed Management effort was initiated with the intention of reducing flood hazards, additional detailed supplementary information can be found in the 1996 Draft Watershed Management Study.

FLOOD HAZARD

ACTIONS:

4.1 Compile annually a list of flood hazards and sites of potential slope failure.

4.2 Establish a twice annual monitoring schedule to identify problems before and after the rainy season. Coordinate with T-CEP.

4.3 Maintain and update annually the list of flood hazards, illegal dumping sites, and sites of potential slope failure. Support continued coordination of this effort between T-CEP, Caltrans, LA County Road Maintenance, etc. See also Streambank Protection and Transportation.

4.4 Identify appropriate solutions to the flood hazards and have the solutions approved by relevant agencies (i.e. Coastal Commission, US Fish and Wildlife, CA Department of Fish and Game, US Army Corps, etc.). Incorporate preferred solutions into County, Caltrans and other necessary procedures and code documents.

4.5 In accordance with County ordinances, remove any large debris that could create a flood hazard by obstructing the creek channel. See also Streambank and Channel Maintenance.

4.6 Establish and implement a cooperative program among all property owners and agencies for clearing stream obstructions. See also Streambank and Channel Maintenance.

4.7 Plan strategic placement of boulders on a stream-wide basis to reduce storm velocity during peak flow, based on hydrologic evaluation and in compliance with accepted Best Management Practices. See also Streambank and Channel Maintenance.

4.8 Monitor federal, state and local regulations to appropriately mitigate unsafe conditions (e.g. repetitive loss or substantially damaged buildings) within the floodplain.

4.9 Develop criteria for the siting and construction of detention basins. The primary purpose of these criteria is to insure that the impact of the basins on the riparian habitat is minimal.

4.10 Employ ponds to mitigate the increase in peak flow runoff and sedimentation engendered by the development of small parcels (e.g. grading a building site, building a house) and additions to existing residences and buildings (e.g. paving). See also Drainage.

4.11 Create a hydrologic watershed model that identifies undersized or poorly located/designed structures and provides guidelines for addressing inadequacies.

4.12 Prepare an inventory of the existing major hydrologic structures so that significant deficiencies can be identified and a plan made for their remediation.

4.13 Develop a set of general designs for embankment stabilization, flood walls, and other devices that may be needed to lessen the flood hazard at a particular location. These designs are to be specifically related to the situations encountered in Topanga, require little maintenance, and be consistent with the protection of the environment. Organize a Best Management Practices and Infrastructure Sub-committee.

4.14 Clearly define what agency is responsible for what actions.

Recommendations that require legal or political action:

4.15 Adopt an environmentally sensitive watershed management approach to flood hazard reduction, which is vital to protect life, property and the riparian habitat.

4.16 Establish practices which make reduction of peak flow runoff an important element in the selection of a grading and brushing procedure. See also Drainage.

4.17 Rescind LA County Designated Floodways in Lower Topanga, Garapito, Red Rock and Santa Maria Creeks and immediately implement the Topanga Creek Watershed Management Plan.

4.18 Ensure that the ability to protect existing property by modest and effective means is preserved through employing structures, such as gabion flood walls, that do not create downstream impacts.

4.19 Adopt the model State Floodplain Ordinance using FEMA minimum standards.

4.20 Flood hazard mitigation regulations should be applied alike to private property owners and public agencies.

4.21 Use a broader range of options in the Community Rating System program to reduce the flood hazard in order to benefit both public and private owners.

4.22 Pre-peak discharges should be evaluated using best estimate models rather than the worst case models currently used. See also Drainage.

4.23 An amendment should be made to the Local Annex to the State Flood Hazard Mitigation Plan to incorporate the Topanga Creek Watershed Management Plan.

4.24 Use a more empirical and holistic approach to define the boundaries of the 100-year floodplain.

4.25 Establish a policy in Los Angeles County of using a broader spectrum of soil conditions, including the existing vegetated condition of the site, to perform runoff comparisons between the developed and undeveloped site conditions proposed. See also Drainage.

4.26 Downstream property should be protected from increases in runoff due to upstream development by on-site retention efforts. See also Drainage.

4.27 All estimates of stream flow characteristics and elevations for watercourses in Topanga Canyon should be performed with hydrologic models that have been validated using data from Topanga Canyon.

4.28 Employ out-of-stream detention basins to reduce peak flow runoff in appropriate locations as determined within a comprehensive hydrologic analysis.

4.29 Ensure that all drainage plans specify that runoff is delivered to a natural drainage channel or public drainage device at non-erosive velocities with the fine sediments retained on-site. See also Drainage.

4.30 For those properties having impervious paving that exceeds the areas given under the following table, any increase in peak flow runoff and sedimentation (i.e. over the unpaved conditions) are to be mitigated on-site. See also Drainage.

4.31 Grading, road building, and any other practice which disturbs an area of soil over the limits specified in the table below, should demonstrate that any additional peak flow runoff and sedimentation (i.e. over the undeveloped condition) is mitigated and retained on site. See also Drainage.

Suggested Criteria which would trigger runoff mitigation measures:

Practice	Criteria
Paving	1000 ft^2, 100 ft^2 per acre
Brushing (clear cutting, disking)	3000 ft^2, 3000 ft^2 per acre
Grading	For volume: 1500 ft^3, 1500 ft^3 per acre For surface area: 1000 ft^2, 1000 ft^2 per acre

4.32 Assign the Topanga Creek Watershed Committee oversight over Caltrans and LA County efforts for insuring that flood hazard protection at one location does not increase the flood hazard at another.

4.33 Allow a lesser standard than the 50-year design storm where site conditions warrant. The need for the lesser standard must be demonstrated by a professional engineer and approved by the County.

4.34 Require that projects which alter the stream flow characteristics document their impact on downstream properties and mitigate any significant increases in flood hazard. See also Drainage.

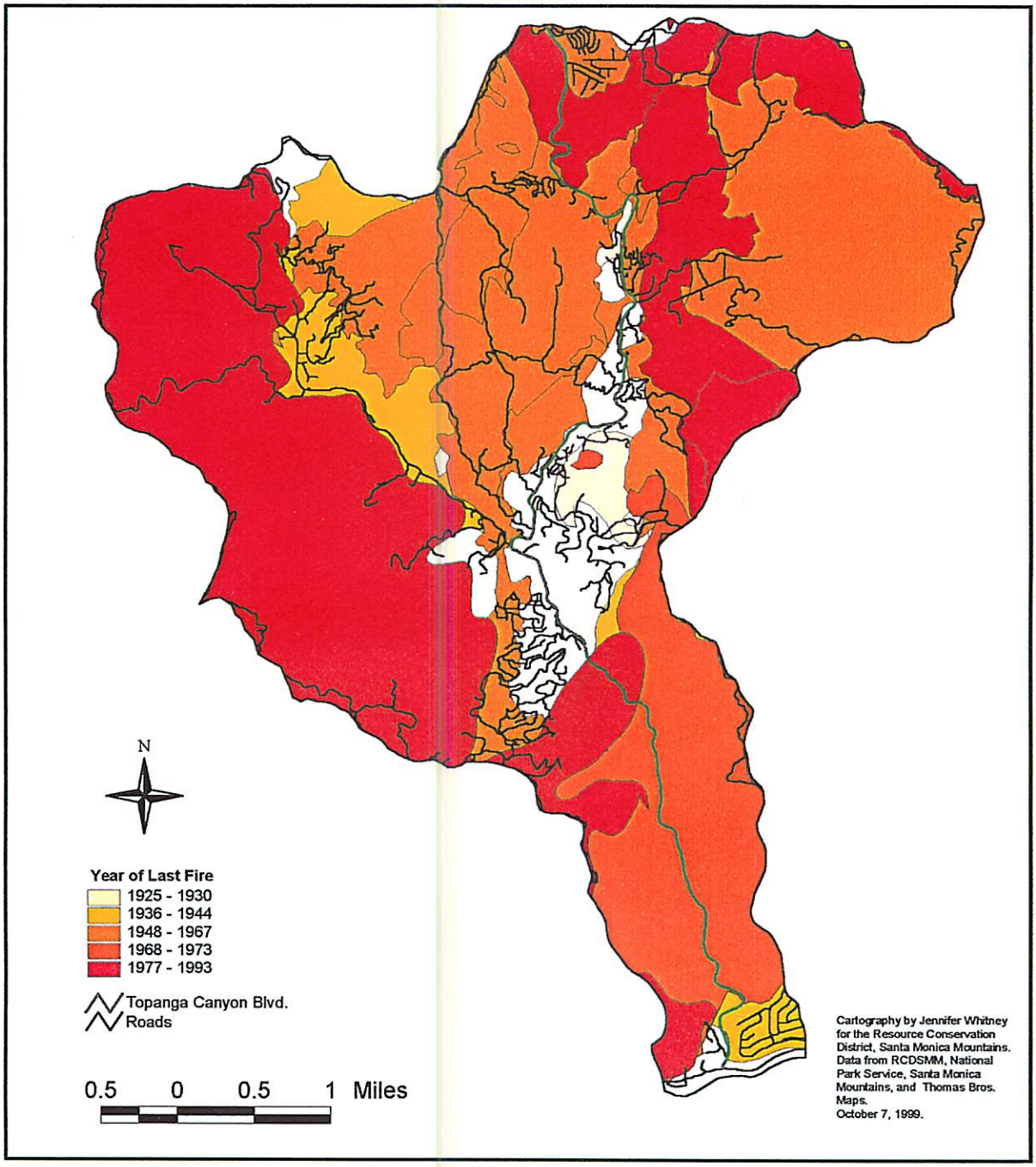
Priority actions or research that still need funding or further investigation:

4.35 Identify a funding mechanism for building detention basins, in accordance with comprehensive hydrologic analysis.

4.36 Assess existing serendipitous detention basins in Topanga (i.e. those formed by road fill of a side canyon) as to their present and long-term potential to act as detention basins. Prioritize the importance of each basin to flood hazard mitigation. Insure that these serendipitous detention basins are not destroyed by culvert upgrades and infilling.

Topanga Watershed

Fire History



FIRE HAZARD:

ACTIONS:

4.37 Reduce fire and flood hazard and catastrophic erosion and sedimentation by carrying out controlled burns, or other environmentally sensitive fuel modification strategies. Coordinate efforts with the Topanga Citizen's Firesafe Committee.

4.38 Continue management of road shoulder brush clearance for fire safety and line-of-sight without the use of herbicides. See also Transportation.

Recommendations that require legal or political action:

4.39 Brush clearance methods should be done so as to minimize soil disturbances by leaving a 4-6 inch stubble, leaving roots in place, and encouraging replacement of flash fuels like grasses with perennial natives which would require less clearance. See also Erosion Control.

4.40 Coordinate with the Topanga Citizen's Firesafe Committee and continue to require that the Fire Dept. review and approve landscape and fuel modification/vegetation management plans for all new developments and major remodels. No fuel modification plans should be approved that require greater than 30 feet vegetation clearance on slopes >3:1 (33%).

4.41 Require that the Fire Dept. and the Regional Planning Dept. evaluate all fire safety factors that affect the ability of a development site in the Santa Monica Mountains to survive a wildfire including: proximity to downhill slopes, time and distance from fire services; and adequate road access to and from the major roads that provide emergency ingress and egress to the site. Coordinate with the Topanga Citizen's Firesafe Committee.

4.42 Provide recommendations on zoning and code changes to the Board of Supervisors to allow comprehensive site evaluation of fire safety by the Planning Dept., to be implemented in conjunction with the fuel modification guidelines.

4.43 Where clear cutting or disking is used to remove brush over an area exceeding the limits specified in Table C-3, any additional runoff and sedimentation, which is generated over that due to hand brushing techniques, is to be mitigated on site.

4.44 Protect from harmful practices, like over- zealous brush clearance, trees and vegetation that reduces runoff and sedimentation, and increases absorption of rainfall.

4.45 Establish sufficient slope setbacks for new structures for fire protection; prohibit ridgetop development; allow only limited vegetation clearance on slopes greater than 3:1 (30 feet or less). All fuel modification and fuel management plans required under Section 11.702(a) of the Fire Code shall comply with these standards. See also Land Use

<u>Priority actions or research that still need funding or further investigation:</u>

4.46 Determine impacts of fire clearance on watershed. Require an Environmental Impact Report to be provided by Fire Dept. regarding impacts of regulations of brush clearance.

4.47 Identify ways to incorporate necessary erosion control with deeply rooted combustible native plant species. See also Erosion Control.

4.48 Determine impact of brush/slope clearance on native and locally sensitive species. See also Riparian Vegetation Protection.

4.49 Encourage CA Fair Plan, Los Angeles County Fire Department and the Topanga community to develop a feasible brush clearance plan that will not cause erosion. See also Erosion Control.

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Dagit, Rosi, J. Whitney, D. Low. 1999. Environmentally Sensitive Fuel Modification Strategies: Evaluating a variety of scenarios. Resource Conservation District of the Santa Monica Mountains. Topanga, CA.

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Supplementary Information:

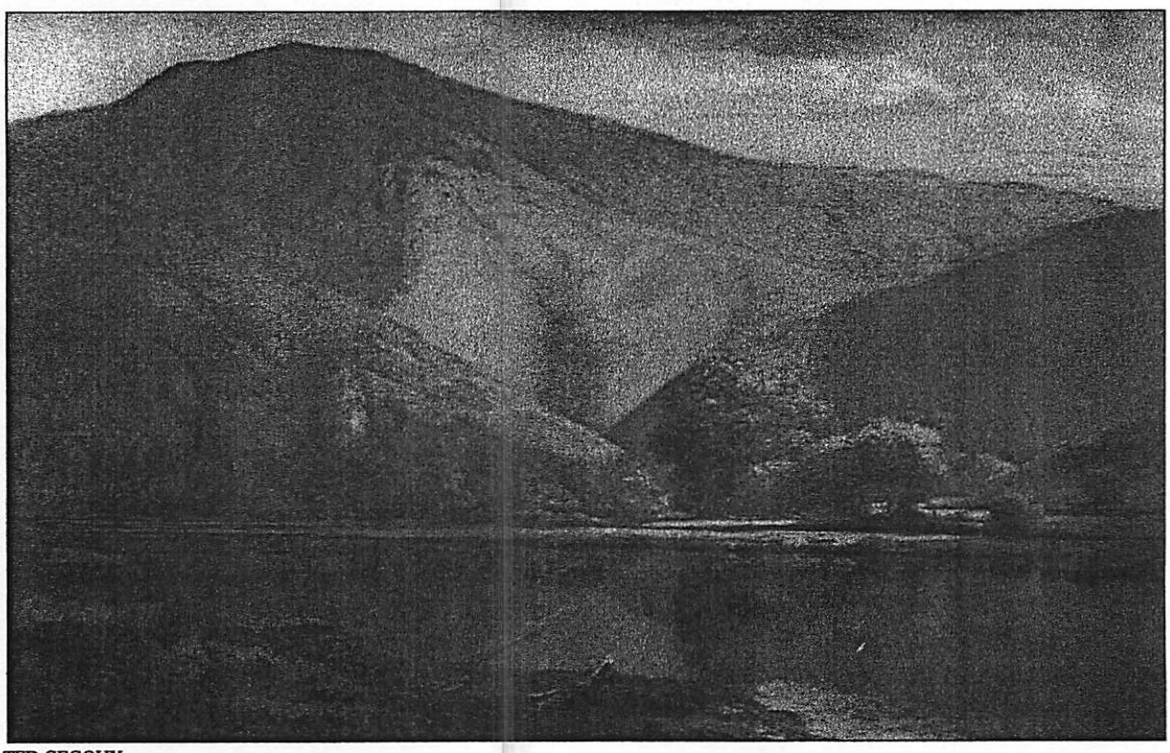
For a more detailed discussion of the information gathered by the Topanga Citizen's Floodplain Management Advisory Group, please refer to the 1996 Draft Topanga Creek Watershed Management Study.

Flood and fire hazard protection are one of main concerns of the Topanga Creek Watershed Management Plan. The impetus for watershed planning came as a result of community recognition that the piecemeal approach of the existing regulatory agencies failed to deal with several important points. First, the approach to floodplain management proposed in 1988 by the LA County Department of Public Works relied upon managing the flood risk by requiring all downstream properties to accept whatever flowed down the creek, without requiring a reduction of runoff at the source. Secondly, the designated floodways increase the risk to creekside properties and infrastructure by failing to regulate reduced inputs and relying solely on removing the infrastructure from the floodway. In Topanga, the largest impacts are on both state and county roads, the majority of which are located within the floodway, Relocating these roads out of the floodway is not possible. The impact to the riparian vegetation and streambank stability is severe. The community clearly saw a need for a different approach.

The 1980 flood highlighted the problems. Millions of dollars worth of roads, bridges, and utilities were damaged. Topanga Canyon Blvd. (State Highway 27) was closed for almost 6 months for repair. Access to homes and businesses in the entire community were threatened. Acres of riparian habitat were damaged. Since 1980, the population in Topanga has doubled, which means that an even greater amount of damage could be expected in the next severe flood event.

The Topanga Creek Watershed Management Plan offers an alternative to designating floodways by providing a blueprint of actions and guidelines that will help reduce the source of peak floods and the impacts that these flood events will have on the community. Implementation of coordinated streambank stabilization which retains a buffer zone of mature riparian vegetation, avoiding and reducing the amount of channelization of the creek, utilization of on-site drainage retention systems, environmentally sensitive fuel modification for fire safety, and installation of mini-detention basins are all ways to reduce the flood hazard that are proposed by the Plan.

SECTION 5
LAND USE:
Grading, Drainage, Erosion Control



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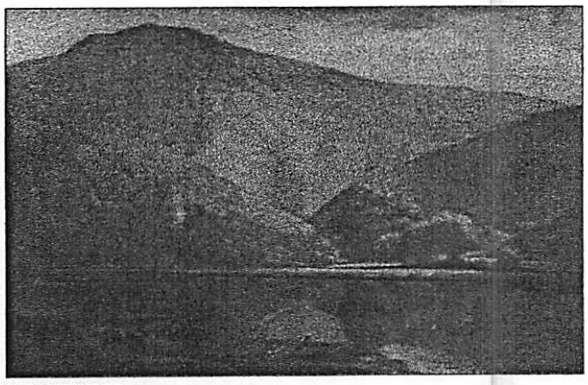


TED GEGOUX

SECTION 5
LAND USE:
Grading, Drainage, Erosion Control

"People create landscapes that reflect their humanity, their morality and their culture, and these landscapes then in turn determine our fate." – Sam Broder

GOALS:

- Reduce land use impacts to preserve native biodiversity.
- Regulate new development in the riparian zone to prevent increases in flood hazard.
- Promote the use of "preventative planning" review which incorporates environmental constraints into the site evaluation process to reduce possible impacts or need for mitigation.
- Promote use of Best Management Practices that reduce grading, drainage and erosion control impacts.

Introduction

Historically, land use planning has been one of the most complex and controversial issues in Los Angeles County, resulting in some of the longest and most expensive real estate development battles in US history. Coordinated land use planning that respects the integrity of the landscape and incorporates sound site design will facilitate sustainable development that works with the environment as much as possible to maximize public safety and preserve quality of life. It is impossible to remove ourselves from dependency on the air we breathe, the water we drink and the land we live on. If our land use practices continue to degrade these essential life elements, then we will pay ever-increasing costs for mitigation and restoration. The entire Santa Monica Mountains, and Topanga in particular provide the "lungs" for all 13 million residents of Los Angeles. Runoff from the mountains has direct impact on the beaches upon which the local economy depends. Sedimentation of creeks and waterways has a devastating impact on the ecological viability of aquatic species, promotes eutrophication and continues a vicious cycle of degradation that becomes ever more difficult and costly to remediate.

It would seem prudent to develop an integrated, preventative planning review process which would identify the environmental constraints and considerations for each property BEFORE any development planning took place. By understanding the limitations of the landscape, and reviewing it within the context of its watershed level impacts, a more realistic assessment of the potential problems is possible.

This also offers the opportunity to assess the benefits that the property provides to the community at large and challenges Los Angeles County to develop ways to recognize the infrastructure costs avoided when development is ecologically sustainable. This would extend to avoided costs for streambank stabilization due to reduced peak flows, the values of air and water pollution reduction, groundwater protection and recharge, as well as avoided energy costs. These real economic benefits to both the property owner and the community at large are substantial.

LAND USE PLANNING

ACTIONS:

5.1 Coordinate the Topanga Creek Watershed Management Plan with the Santa Monica Bay Restoration Plan, National Park Service and CA Dept. of Parks and Recreation general plans, and the Malibu Creek Watershed Council, particularly as they relate to stream protection and land use practices in the Santa Monica Mountains.

5.2 Establish process to address concerns that arise due to proposed remedial actions between interested parties.

5.3 Evaluate adequacy of water supply for increased development.

5.4 Acquire, maintain, restore habitat linkages and wildlife corridors. See also Biological Inventory.

5.5 Protect large blocks of land for core habitat. See also Biological Inventory.

5.6 The services of a consulting biologist/arborist should be sought prior to and during both the design and implementation phases of all projects. Specified monitoring following completion of construction is also recommended. See also Riparian Vegetation Protection.

5.7 Coordinate public input on protection of resources by requiring public agencies and private property owners to notify the community of any proposed projects and their potential impacts. See also Transportation.

Recommendations which require legal and political changes for implementation:

5.8 Adopt the Topanga Creek Watershed Management Plan, which would provide protection for life and property, the existing community and the creek environment.

5.9 Develop clearing/paving restrictions based on lot size.

5.10 Limit future development of remote houses requiring significant infrastructure investments.

5.11 Request that Los Angeles County create lot size overlay to identify areas with small lots.

5.12 Increase ability for lot retirement with reimbursement.

5.13 Enact more restrictive slope development ordinances.

5.14 Adopt the recommendations of the Topanga Creek Watershed Management Plan to implement the policies of the local area plans.

5.15 Move towards developing a Santa Monica Mountains Community Standards District to implement the development standards of the Topanga Creek Watershed Management Plan.

5.16 Require development setbacks from oak and riparian habitats, necessary to provide suitable protection, as per local land use plans.

5.17 Prohibit new development where inadequate road access exits for emergency ingress and egress to the main roadways of PCH, Mulholland Hwy., Topanga Canyon Blvd., and Old Topanga Canyon Rd.

5.18 Land use density in undeveloped area of core habitat should be low, 5-40 acres/unit. Infilling should be allowed in existing developed neighborhoods where infrastructure is adequate. Land use density shall be determined by a development constraints matrix and be consistent with all of the land use policies.

5.19 Require a pre-design constraints analysis to identify site-specific hazard mitigation problems prior to design.

5.20 Design hardscape to preserve and enhance vegetation whenever possible. See also Streambank Protection, Stream Channel Maintenance and Riparian Protection.

(4.45) Establish sufficient slope setbacks for new structures for fire protection; prohibit ridgetop development; allow only limited vegetation clearance on slopes greater than 3:1 (30 feet or less). All fuel modification and fuel management plans required under Section 11.702(a) of the Fire Code shall comply with these standards. See also Fire Hazard.

DRAINAGE

ACTIONS:

5.21 Retain runoff onsite. Store in cisterns or underground containers for irrigation and fire suppression.

5.22 Develop plans to control runoff and sedimentation from roads/driveways. All cut and fill slopes must be replanted with appropriate native vegetation, or retained to prevent slope erosion. See also Erosion Control and Transportation.

Recommendations which require legal and political changes for implementation:

5.23 Assess a proportional fee for new developments generating downslope runoff to fund costs of off-site flood hazard mitigation (e.g. detention basins).

(4.16) Establish practices which make reduction of peak flow runoff an important element in the selection of a grading and brushing procedure. See also Flood Hazard.

(4.25) Establish a policy in Los Angeles County of using a broader spectrum of soil conditions, including the existing vegetated condition of the site, to perform runoff comparisons between the developed and undeveloped site conditions proposed. See also Flood Hazard.

(4.26) Develop regulations that endorse the basic notion that passing whatever runoff a particular property generates downslope to its downstream neighbors is no longer an acceptable practice. See also Flood Hazard.

EROSION CONTROL

ACTIONS:

5.24 Erosion control should be performed only with porous material that allows infiltration of runoff. Energy dissipaters should be used to ensure that water velocities remain low. See also Transportation.

5.25 Utilize appropriate erosion control and streambank stabilization Best Management Practices. See also Transportation.

5.26 Minimize erosion and sedimentation. Maximize sediment and runoff retention on-site. All drainage must be conveyed and released in a non-erosive manner at non-erosive velocities into natural channels or to an approved public drainage device, according to existing regulations. See also Transportation.

(5.22) Develop plans to control runoff and sedimentation from roads/driveways. All cut and fill slopes must be replanted with appropriate native vegetation, or retained to prevent slope erosion. See also Drainage and Transportation.

Recommendations which require legal and political changes for implementation:

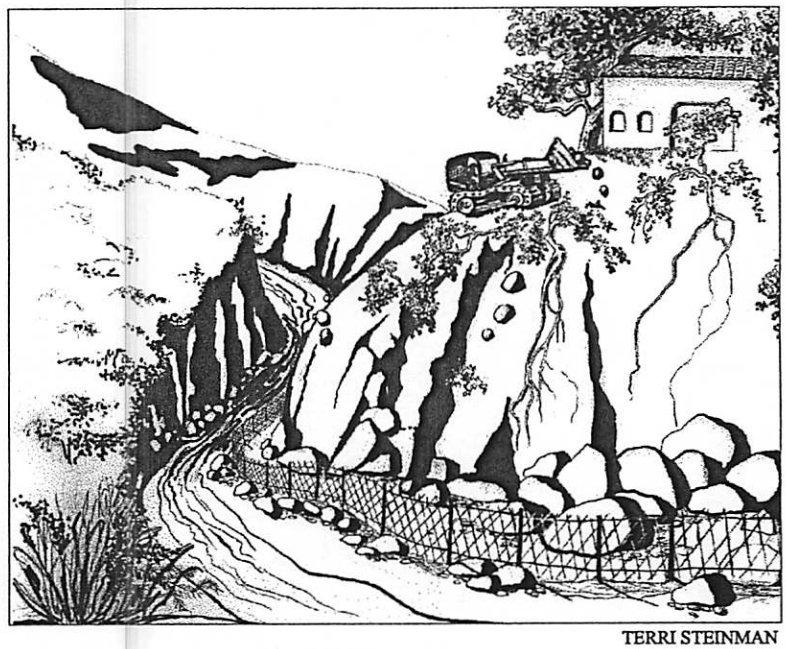
5.27 Provide identification and protection of sites particularly vulnerable to erosion or obstruction in the Topanga Creek Watershed Management Plan.

(4.38) Brush clearance methods should be done so as to minimize soil disturbances by leaving a 4-6 inch stubble, leaving roots in place, and encouraging replacement of flash fuels like grasses with perennial natives which would require less clearance. See also Fire Hazard.

Priority actions or research that still need funding or further investigation:

(4.49) Encourage CA Fair Plan, Los Angeles County Fire Department and the Topanga community to develop a feasible brush clearance plan that will not cause erosion. See also Erosion Control.

GRADING



TERRI STEINMAN

ACTIONS:

5.28 Let the land dictate the use. Minimize grading to the greatest extent possible.

Recommendations which require legal and political changes for implementation:

5.29 Establish maximum limits on the amount of grading allowed.

5.30 Evaluate current grading standards and inspection procedures and develop standards and practices that will effectively prevent any sediment transportation from construction sites.

5.31 Documentation of existing riparian vegetation should be performed prior to any grading activities.

(4.31) Grading, road building, and any other practice which disturbs an area of soil over the limits specified in table below should demonstrate that any additional peak flow runoff and sedimentation (i.e. over the undeveloped condition) is mitigated and retained on site. See also Flood Hazard and Transportation.

Suggested Criteria which would trigger runoff mitigation measures:

Practice	**Criteria**
Paving	1000 ft^2, 100 ft^2 per acre
Brushing (clear cutting, disking)	3000 ft^2, 3000 ft^2 per acre
Grading	For volume: 1500 ft^3, 1500 ft^3 per acre For surface area: 1000 ft^2, 1000 ft^2 per acre

STREAMBANK PROTECTION:

ACTIONS:

5.34 Discourage the use of hardscape in the floodplain and along creek banks. Where grouted riprap exists, replacement with more appropriate bioengineered materials and solutions should be made over time. See also Streambank and Channel Maintenance and Transportation.

5.35 Establish Best Management Practices for any work that impacts stream courses and adjoining habitats. Make available to all residents. See also Streambank and Channel Maintenance and Transportation.

5.36 Use only bio-engineered methods and materials to construct fills, backfills, embankment stabilizations, and road shoulders. See also Streambank and Channel Maintenance and Transportation.

(4.3) Maintain and update annually the list of flood hazards, illegal dumping sites, and sites of potential slope failure. Support continued coordination of this effort between T-CEP, Caltrans, LA County Road Maintenance, etc.

(4.5) In accordance with County ordinances, remove any large debris that could create a flood hazard by obstructing the creek channel. This should be coordinated with T-CEP, LA County and Dept of Fish and Game. See also Flood Hazard.

(4.7) Plan strategic placement of boulders on a stream-wide basis to reduce stream velocity during peak flow, based on hydrologic evaluation and in compliance with Best Management Practices. See also Flood Hazard.

(5.20) Design hardscape to preserve and enhance vegetation whenever possible. See also Erosion Control, and Stream Channel Maintenance.

Recommendations which require legal and political changes for implementation:

5.37 Require that projects which alter the stream flow characteristics document their impact on downstream properties and mitigate any significant increases in flood hazard.

5.38 Prohibit alteration of stream channels or floodplains; prohibit development within floodplains; require development setbacks from streamcourses.

5.39 Prohibit any increase in the rate of peak runoff from new development, in accordance with the RWQCB 3/4 inch storm retention requirement.

5.40 Develop demonstration sites for on-site retention systems to reduce run-off.

5.41 Establish maximum limits on the amount of impervious surface allowed.

5.42 Limit use of grouted concrete rip-rap only to those areas where gabions, bio-engineering efforts, etc. are not possible.

5.43 Removal of understory vegetation, or burying such vegetation under permanent rip-rap or culverts should be prohibited except under exceptional conditions. See also Riparian Vegetation.

5.44 Use of methods encouraging re-establishment of stream vegetation should be preferred over concrete or rip-rap retaining walls. See also Riparian Vegetation.

5.45 Require analysis with the hydrologic model prior to installation of any streambank hardscape to identify any impacts that could alter channel capacity or stream flow dynamics and to identify potential stream impacts.

5.46 Replace caissons, concrete retaining walls, and other support devices in accordance with BMP's to protect stream resource and prevent (down)stream impacts by altering flow dynamics. Use hydrologic model to estimate impacts.

(4.34) Require analysis with the hydrologic model prior to installation of any streambank hardscape to identify any impacts that could alter channel capacity or stream flow dynamics and to identify potential downstream impacts.

5.47 Coordinate information with NPDES permits. See also Stream Channel Maintenance and Water Quality.

5.48 Require that plants and animals be protected during any construction within or adjacent to the stream channel.

References:

Coastal Act

Los Angeles County Department of Building and Safety

Los Angeles County Department of Public Works Interim Flood Hazard Map

Los Angeles County Regional Planning. Santa Monica Mountains North Area Plan

Los Angeles Regional Water Quality Control Board Basin Plan

Malibu Creek Watershed Natural Resources Plan

Local Coastal Plan (undergoing revision)

Santa Monica Bay Restoration Plan

Santa Monica Mountains National Recreation Area General Plan

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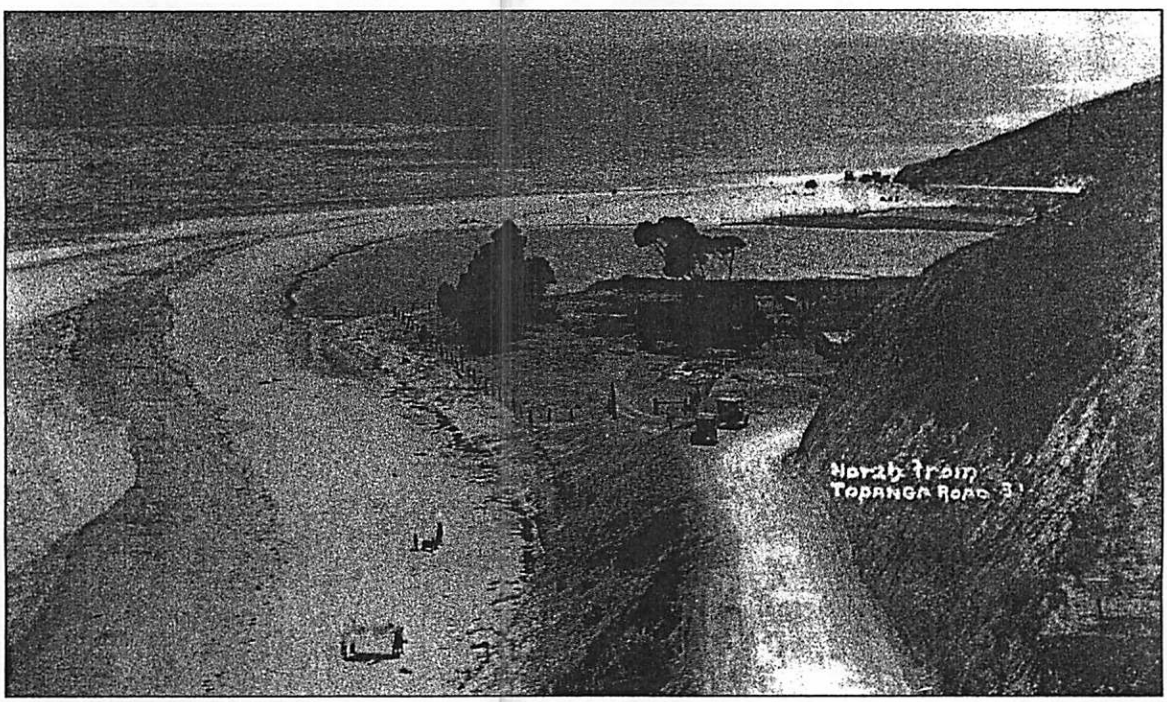
Supplemental Information:

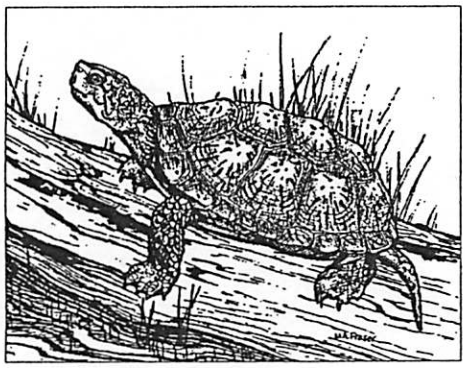
More in depth description of the implications of all the above recommendation can be found in the 1996 Draft Topanga Creek Watershed Management Study. In particular, details regarding sites for possible mini-detention basins using existing culvert infrastructure are provided as well.

Appendix D provides sample designs for cisterns, and other on-site drainage retention systems which can be integrated into a property plan that provides water for fire safety and irrigation as well.

SECTION 6
NATURAL ENVIRONMENT



RANDY YOUNG COLLECTION

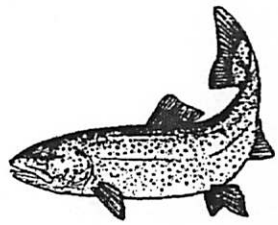


SECTION 6
NATURAL ENVIRONMENT

"There are some who can live without wild things, and some who cannot... Like winds and sunsets, wild things were taken for granted until progress began to do away with them. Now we face the question of whether a still higher 'standard of living' is worth its cost in things natural, wild and free." – Aldo Leopold

GOALS:

- Restore and preserve native biodiversity and the natural processes that support it.
- Preserve and rehabilitate the stream channel and floodplains to restore natural channel capacity wherever feasible.
- Protect the riparian habitat which plays a crucial role in intercepting rainfall, reducing stormwater runoff, maintaining slope stability, and allowing for greater groundwater recharge.
- Create a master database (or system) and a mechanism for sharing information gathered by federal, state and local agencies in regards to resource inventory.



Introduction

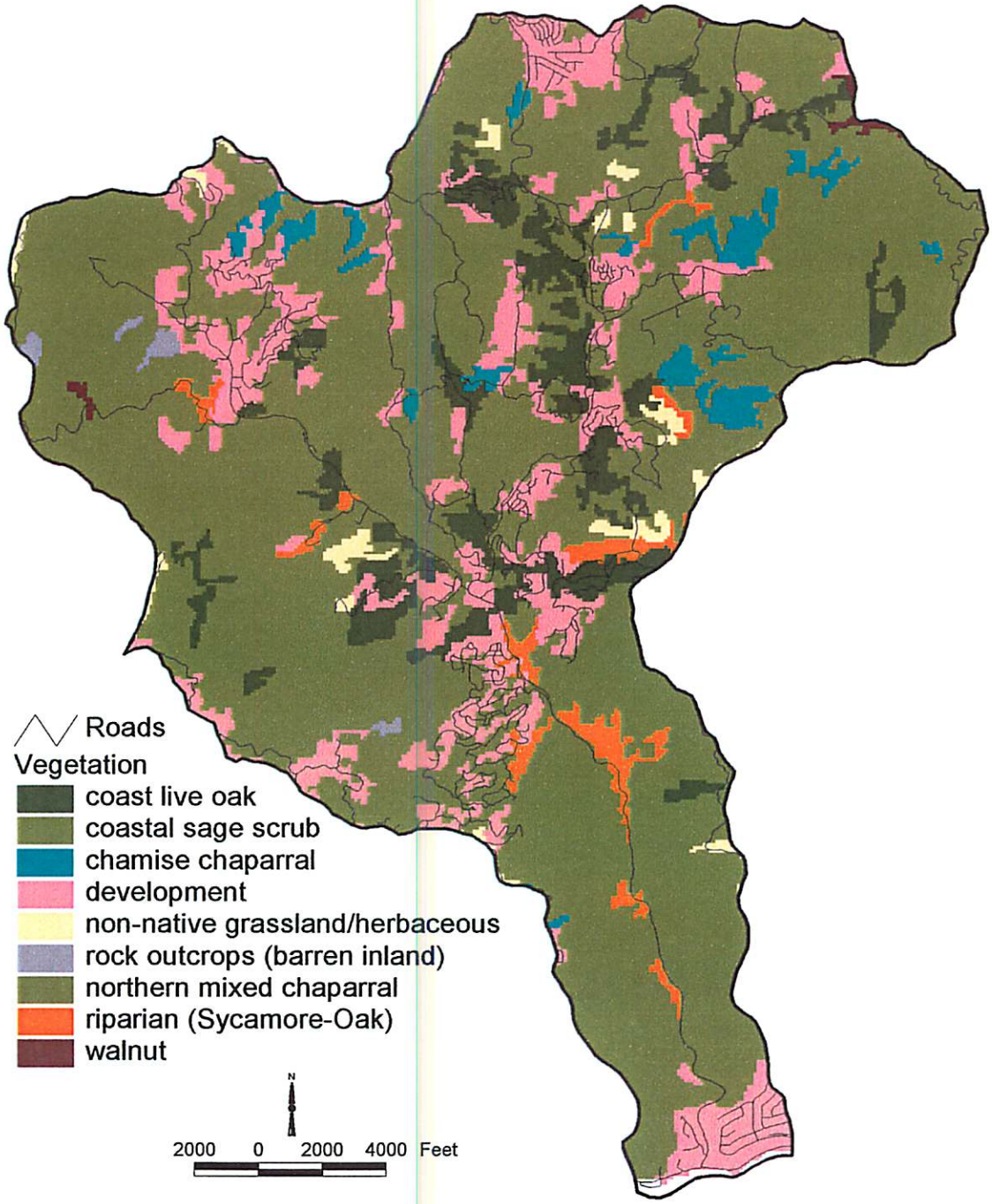
With over two thirds of the Topanga Creek Watershed undeveloped and much of it in public ownership, the natural biodiversity is still impressive. Topanga Creek hosts numerous amphibian and reptile species of special concern, as well as a reproducing population of endangered steelhead trout. Endangered Tidewater gobies swim in Topanga Lagoon. Over 100 species of birds are resident or migrate through the watershed. Large predators like bobcats, badgers and mountain lions roam the hills. Coyotes and fox are frequently seen. We are missing the problematic invasive exotic animals like crayfish, bullfrogs, carp and mosquito fish that can decimate native aquatic populations. The large landholding of Topanga State Park provides core habitat and a critical wildlife movement corridor through the Santa Monica Mountains.

Of the eight plant communities found in Topanga, (using a modified Holland classification system), Southern Coast Live Oak Woodland, Riparian Woodland, and Walnut Woodland, Coastal Sage Scrub and Freshwater marshes are state listed sensitive resources. The complex plant assemblages provides necessary niches for the incredible number of animal species who share the watershed with us. Protecting them from being overwhelmed by invasive exotic plants is a real challenge.

It is the natural condition of the hillsides, canyons and creeks that make Topanga such a wonderful place to live. While pockets of development have caused some fragmentation, much connectivity still exists. Learning to live with the surrounding environment is the cornerstone of sustainable watershed management.

Topanga Watershed

Vegetation



BIOLOGICAL INVENTORY, ASSESSMENT AND MONITORING

ACTIONS:

6.1 Conduct comprehensive survey of flora and fauna, including historic references with the voluntary cooperation of property owners.

6.2 Restore steelhead trout habitat in Topanga.

6.3 Remove barriers to steelhead migration.

6.4 Conduct historic evaluation of creek mouth. Determine former extent of lagoon/wetlands.

6.5 Determine impacts of free ranging cats and dogs on biodiversity.

6.6 Orient outdoor lighting to minimize impacts to wildlife.

(5.4) Acquire, maintain, restore habitat linkages and wildlife corridors. See also Land Use.

(5.5) Protect large blocks of land for core habitat. See also Land Use.

Recommendations which require legal and political changes for implementation:

(5.46) Require that plants and animals be protected during any construction within or adjacent to the stream channel. See also Streambank Protection.

INVASIVE EXOTIC FLORA ERADICATION

ACTIONS:

6.7 Develop a program to eradicate giant cane (*Arundo donax)*, castor bean *(Ricinus communis)*, periwinkle *(Vinca minor)*, tree tobacco *(Nicotania glauca)*, yellow star thistle (*Centurea melitensis*), German ivy *(Senecio mikanioides)*, Algerian ivy *(Hedera sp.)* and Cape ivy *(Delairea ordorata)* without the use of herbicides. Consensus not yet reached on this issue. Instead, a majority vote was taken at the 15 November 2001 meeting.

6.8 Determine impacts of exotic plants and animals on the Creek and entire watershed using existing data, and/or acquire more information as needed.

(4.38) Continue management of road shoulder brush clearance for fire safety and line of sight without the use of herbicides. See also Fire Hazard and Transportation.

Recommendations which require legal and political changes for implementation: None

RIPARIAN VEGETATION PROTECTION

ACTIONS:

6.9 Preserve and enhance the function of the existing riparian vegetation.

6.10 Establish and maintain a revegetation program in order to encourage quick re-establishment of riparian vegetation.

6.11 Create a list of appropriate species for planting under utility wires in order to reduce problems related to tree/utility line interactions.

6.12 Prohibit placement of any materials within the protected zone of a tree, or a minimum of 10 feet from the trunk.

6.13 Tunneling under roots rather than cutting them should be the standard. Any roots exposed during construction should be protected by wet burlap and reburied as soon as possible. Any cuts should be clean and smooth.

6.14 Creation of soil or asphalt berms to direct road runoff should avoid direct contact with tree trunks. See also Transportation.

6.15 In compliance with the Los Angeles County Oak Tree Protection Ordinance, any work done within the protected zone of an oak or any other trees within 50 feet of a stream bank should be done by hand. No stockpiling of dirt or equipment should be permitted within the protected zone of the tree(s).

6.16 Prohibit topping (cutting trees straight across without regard to branch structure).

6.17 Apply directional pruning and crown reduction standards. Use ISA standards for pruning.

6.18 Establish and maintain a *recommended* revegetation program in order to encourage quick re-establishment of riparian vegetation.

6.19 Create a list of appropriate species for planting under utility wires in order to reduce problems related to tree/utility line interactions.

(5.43) Removal of understory vegetation, or burying such vegetation under permanent rip-rap or culverts should be prohibited except under exceptional conditions. See also Streambank Protection.

(5.44) Use of methods encouraging re-establishment of stream vegetation should be preferred over concrete or rip-rap retaining walls. See also Streambank Protection.

Recommendations which require legal and political changes for implementation:

(5.6) The services of a consulting biologist/arborist should be sought prior to and during both the design and implementation phases of all projects. Specified monitoring following completion of construction is also recommended. See also Land Use.

(5.31) Documentation of existing riparian vegetation should be performed prior to any grading activities. See also Grading.

STREAMBANK AND CHANNEL MAINTENANCE

ACTIONS:

(4.5) In accordance with County ordinances, remove any large debris that could create a flood hazard by obstructing the creek channel. This should be coordinated with T-CEP, CA Department of Fish and Game and LA County. See also Flood Hazard.

(4.7) Plan strategic placement of boulders on a stream-wide basis to reduce stream velocity during peak flow, based on hydrologic evaluation and in compliance with accepted Best Management Practices. See also Flood Hazard.

(4.3) Maintain and update annually the list of flood hazards, dumping sites and sites of potential slope failure. Support continued coordination of this effort between T-CEP, LA County and CA Department of Fish and Game. See also Flood Hazard.

(5.20) Design hardscape to preserve and enhance vegetation whenever possible. See also Erosion Control, and Streambank Protection.

(5.40) Limit use of grouted concrete rip rap only to those areas where gabions, bio-engineering efforts, *etc.* are not possible. See also Streambank Protection.

(5.33) Establish Best Management Practices for any work that impacts stream courses and adjoining habitats. Make available to all residents and agencies. See also Streambank Protection and Transportation.

Recommendations which require legal and political changes for implementation:

(4.34) Require analysis with the hydrologic model prior to installation of any streambank hardscape to identify any impacts that could alter channel capacity or stream flow dynamics and to identify potential downstream impacts. See also Flood Hazard and Streambank Protection.

(5.45) Coordinate information with NPDES permits. See also Streambank Protection and Water Quality.

References

DeLisle, H. et al. 1986. The Distribution and Present Status of the Herpetofauna of the Santa Monica Mountains. Southwest Herpetologist Society Special Publication No. 2. Los Angeles, CA

Edelman, Paul. 1990. Critical Wildlife Corridor/Habitat Linkage Areas between the Santa Susanna Mountains, the Simi Hills and the Santa Monica Mountains. Santa Monica Mountains Conservancy, Malibu, CA.

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Lieberstein, Terry. 1989. Reserve Design in the Santa Monica Mountains. CA State University Northridge. (Thesis)

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Mitchell, Martha S. 1998. "Erosion control at the watershed scale: threatened and endangered fish inspire coordination of diverse experts." Erosion Control, March/April 1998, pages 68-78.

Raven, Peter, H. J. Thompson, and B. Prigge. 1986. Flora of the Santa Monica Mountains, California. Southern CA Botanists Special Publication No.2. University of CA, Los Angeles.

Santa Monica Mountains National Recreation Area. 2000. General Management Plan and Environmental Impact Statement.

SUPPLEMENTAL INFORMATION:

Sensitive Plants species found in Topanga thus far include:

Astragalus brawntonii	Braunton's milkvetch
Dudleya cymosa ssp. ovatifolia	Santa Monica Mountains Dudleya
Hemizonia minthornii	Santa Susana Tarplant
Juglans californica	California Walnut

Sensitive Animal Species (state or federally listed, or locally uncommon) documented as of 2001 in Topanga include:

Invertebrates:

Aphonopelmus eutylenum	Tarantula
Zerene eurydice	CA Dogface Butterfly
Danaus plexippus	Monarch Butterfly

Fish:

Oncorhynchus mykiss	Steelhead Trout
Gila orcutti	Arroyo Chub
Eucyclogobius newberryi	Tidewater Goby

Amphibians:

Taricha torosa	CA Newt
Aneides lugubris	Arboreal Salamander

Reptiles:

Clemmys marmorata pallida	Southwestern Pond Turtle
Phrynosoma coronatum blainvillei	San Diego Horned Lizard
Cnemidophorus tigris multiscutatus	Coastal Whiptail
Lampropeltis zonata pulchra	San Diego Mountain Kingsnake
Masticophis flagellum piceus	Red Coachwhip
Salvadora hexalepis virgultea	Coast Patchnose Snake
Thamnophis hammondi hammondi	Two-striped Garter Snake

Birds:

Buteo swainsoni	Swainson's Hawk
Circus cyaneus	Northern Harrier
Accipiter striatus	Sharp-shinned Hawk
Accipiter cooperii	Cooper's Hawk
Elanus caeruleus	Black Shouldered Kite
Buteo lineatus	Red shouldered Hawk
Empidonax traillii	Willow Flycatcher
Lanis ludovicianus	Loggerhead Shrike
Dendroica petechia	Yellow Warbler
Icteria virens	Yellow breasted Chat
Nycticorax nycticorax	Black Crowned Night Heron
Sialia mexicana	Western Bluebird

Mammals:

Antrozous pallidus	Pallid Bat
Eumops perotis	Western Mastiff Bat
Bassariscus astutus	Ringtail Cat
Felis concolor	Mountain Lion
Felis rufus	Bobcat
Taxidea taxus	American Badger

Other sensitive species that are potentially present in Topanga but not currently documented include:

Invertebrates:

Neduba longipennis	Santa Monica Sheildback Katydid
Trimerotropis occidentaloide	Santa Monica Mountain Grasshopper
Satyrium auretorum fumosoum	Santa Monica Mts. Hairstreak Butterfly

Amphibians:

Bufo microscaphus californicus	Arroyo Toad
Rana aurora draytonii	CA Red-legged Frog

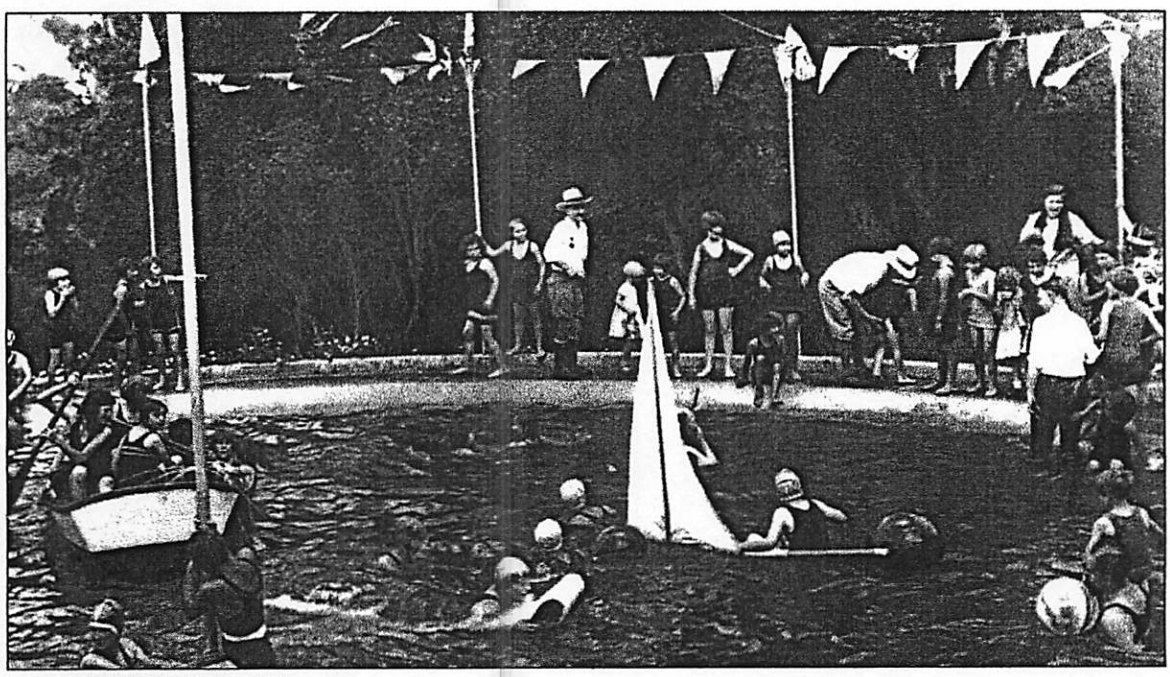
Major Plant Communities found in the Topanga Creek Watershed
*Data based on 1998 Vegetation overlay from NPS

Plant Community	Approximate Number Acres	State Status
Coast Live Oak Woodland	900	
Riparian Woodland	318	Threatened
Walnut Woodland	10	Very Threatened
Coastal Sage Scrub	1700	
Northern Mixed Chaparral	7600	
Chamise Chaparral	300	
Non-native grasslands	169	
Coastal Strand	20	Threatened

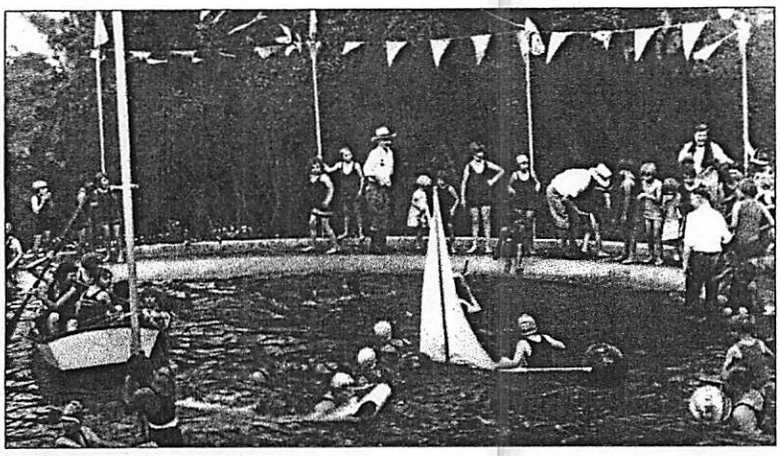
Numbers of Animal Species found in the Topanga Creek Watershed
*Numbers based on data collated and collected by the RCDSMM

Insects – over 600 species reported
Arthropods – 50 species
Fish – 3 species
Amphibians – 7 species
Reptiles – 15 species
Birds – over 111 species noted, 35 species of confirmed breeders
Mammals – over 50 species (including at least 4 bat species)

SECTION 7
RECREATION



TOPANGA HISTORICAL SOCIETY



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SECTION 7
RECREATION

"One of the best paying professions is getting a hold of pieces of country in your mind, learning their smell and moods, sorting out the pieces of a view, deciding what grows there and there and why, how many steps that hill will take, where the creek winds, and where it meets the other one below...which contour lines on a map mean better cliffs or mountains. This is the best kind of ownership, and the most permanent. It feels good to say "I know the Sierra," or "I know Point Reyes." But you don't. What you know better is yourself, and the Sierra and Point Reyes have helped." – Terry and Renny Russell

GOALS:

- Provide opportunities for healthful passive recreation, while minimizing impacts to native biodiversity.

Introduction

The vast open spaces of public land in the Topanga Creek Watershed offer numerous opportunities for hikers, mountain bikers, and equestrians. From the ridgetops in Topanga State Park down to Topanga Beach, many miles of trails and beautiful vistas await visitors from the surrounding urban Los Angeles Region. It is estimated that over 75,000 people visit Topanga Beach and approximately 200,000 people visit the parks in the upper watershed. Given the close proximity of these wildlands to their urban surroundings, numerous management issues arise. Brush clearance adjacent to park/private land boundaries, impacts of dogs and feral animals, trail maintenance to reduce sedimentation and erosion, and making trails available to a variety of users are clearly all challenges. Developing and implementing creative restoration plans and prioritizing needs throughout the watershed benefit from stakeholder input. The Topanga Creek Watershed Management Plan recommendations are meant to serve as a starting point in the on-going dialogue with all the park agencies to develop and implement successful, sustainable recreational use that preserves the ecological integrity of the wildlands.

ACTIONS:

7.1 Encourage recreational use of the watershed.

7.2 Assess the trails within the watershed and evaluate their use levels and impacts. Determine if there are too many trails.

7.3 Solicit input from all stakeholders concerning ways to provide safe access across roads in the watershed in order to preserve and enhance trail connectivity.

Recommendations which require legal and political changes for implementation:

7.4 Educate the public using a variety of methods, including signage, nature walks, etc.

7.5 Evaluate impacts of recreation to fishing, swimming and surfing due to water quality.

7.6 Evaluate trails as source of erosion, spread of exotics, vegetation type conversion and habitat fragmentation.

7.7 Provide forum for input of residents on public use/abuse of trails.

7.8 Enforce ban on motorcycles on public lands.

7.9 Enforce speed control of mountain bikes to promote safe riding.

References

CA Department of Parks and Recreation. 2002. Lower Topanga Acquisition Interim Management Plan and Environmental Impact Report.

CA Department of Parks and Recreation. 1977. Topanga State Park General Plan

McAuley, Milt. 1990. Guide to the Backbone Trail. Canyon Publishing Co., Canoga Park, CA

McAuley, Milt. 1987. Hiking Trails of the Santa Monica Mountains. Canyon Publishing Co., Canoga Park, CA

McKinney, John. 2001. Day Hikers Guide to Southern California. Olympus Press, Santa Barbara, CA.

Santa Monica Mountains National Recreation Area. 2000. General Management Plan and Environmental Impact Statement

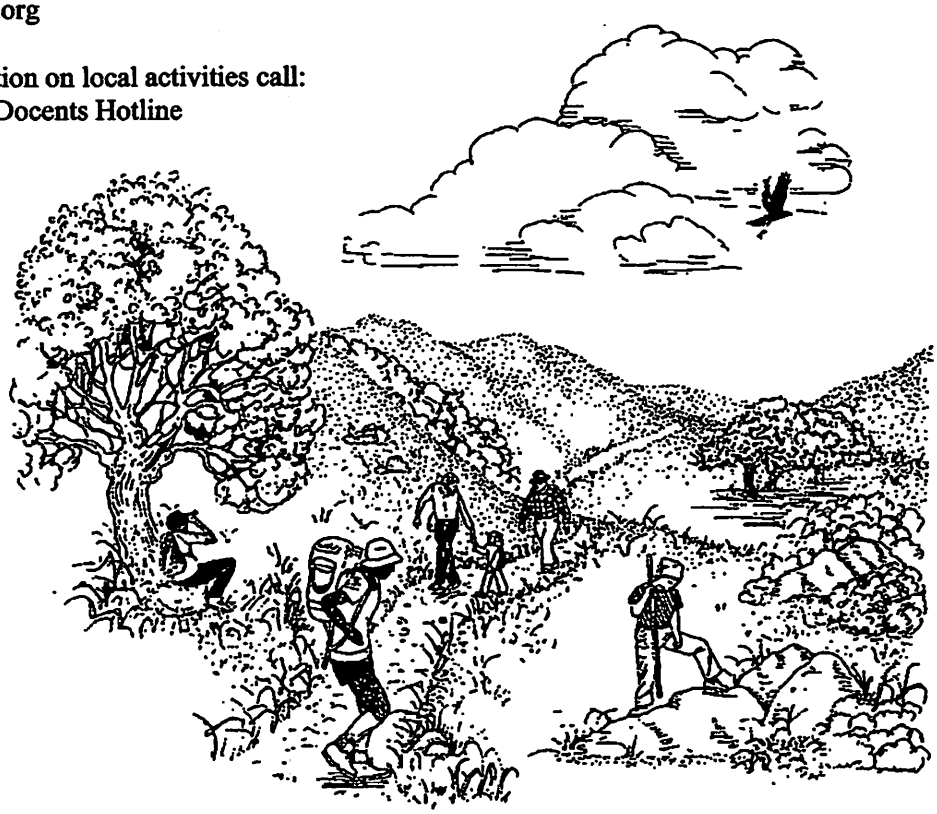
Santa Monica Mountains Trails Council. 1999. SMMART Report.

SUPPLEMENTARY INFORMATION

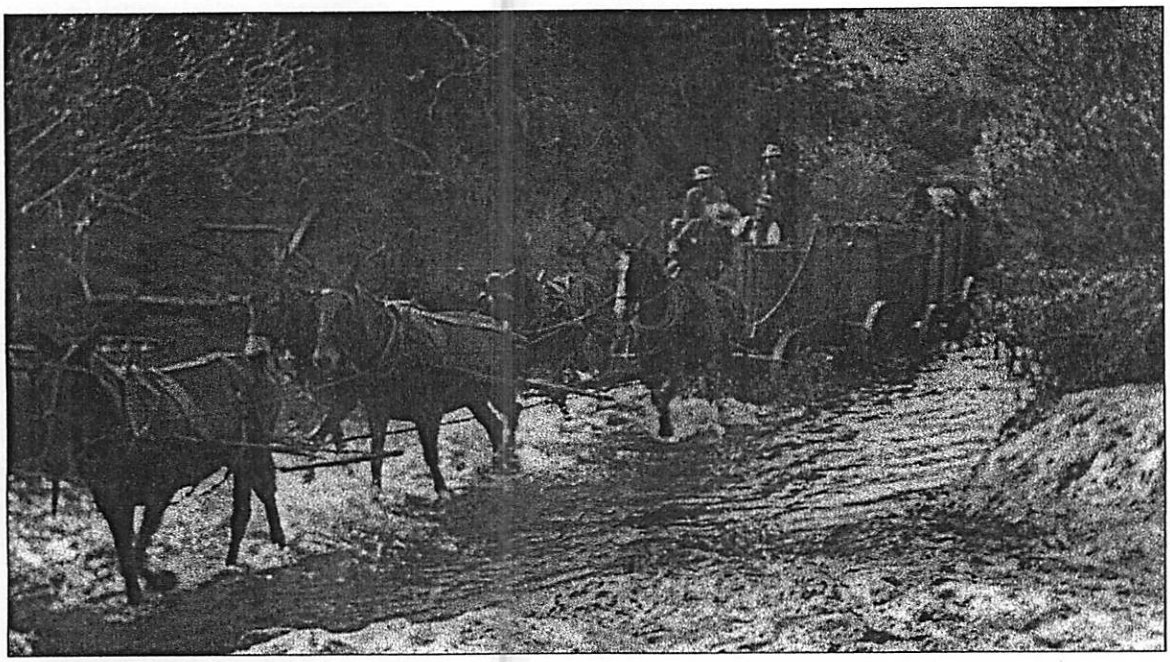
Lists of park activities are published regularly by:

Audubon Society
Sierra Club
Outdoors in the Santa Monica Mountains
Topanga *Messenger*
www.TopangaOnline.com
www.nps.org

For more information on local activities call:
Topanga Canyon Docents Hotline
310-535-9400



SECTION 8
TRANSPORTATION



TOPANGA HISTORICAL SOCIETY

TOPANGA HISTORICAL SOCIETY

SECTION 8
TRANSPORTATION

"When we try to pick out anything by itself, we find it hitched to everything else in the universe."
– John Muir

GOALS:

- Preserve the integrity and safety of transportation corridors through a sustainable maintenance program that minimizes impacts to native biodiversity and natural processes.

Introduction

All the major roads in the Topanga Creek Watershed are immediately adjacent to Topanga Creek for much of their length. As of October 2001, it was estimated that over 30,000 car trips per day use these roads, especially as a cross mountain link from the San Fernando Valley to Santa Monica and the beaches. State Highway 27 (Topanga Canyon Blvd.) is under the jurisdiction of Caltrans, while all other roads are under the care of Los Angeles County Department of Public Works. It is clear that one of the main threats to the long-term ecological function of Topanga Creek are the roads and their related impacts.

Since 1996, members of the Topanga Community have been working closely with both LA County Department of Public Works and Caltrans to resolve long-standing issues concerning road maintenance and repairs in sensitive riparian areas. In Fall 2000, Caltrans embarked upon an Environmental Corridor Study to inventory the sensitive resources and provide guidelines for appropriate best management practices. We eagerly await the results of that study. LA County has redesigned several proposed road protection/streambank stabilization projects in the Old Topanga drainage to incorporate bio-engineered designs that will protect the integrity of the creek. They are also working with the community to design guardrails and other infrastructure that are in keeping with the rural nature of the watershed, while still meeting national highway standards.

More work needs to be done to ensure that these positive steps forward not only continue but get institutionalized, and become the standard of practice, not only in the Topanga Creek Watershed, but in all sensitive resource areas.

Finally, there is the possiblity that some of the bridges (Old Topanga Canyon and Topanga Canyon Blvd., Topanga Canyon Blvd. near Hidden Treasures) might qualify for historical status. Certainly the roads through Topanga Canyon have definite scenic value. Much of the length of Topanga Canyon Blvd. from the Top of Topanga all the way to the beach is surrounded on both sides by public parklands. The community will need to determine if these designations are worth pursuing and would convey additional protection to the watershed.

CULVERTS, BRIDGES AND STREAM CROSSINGS/REPAIRS

ACTIONS:

8.1 Implement proactive attempts to reduce road failures at known problem locations.

8.2 Any bridge repairs or replacements need to address the physical, aesthetic and environmental needs, and be consistent with, the community character.

8.3 Assess flood hazard to the County bridges along Topanga Canyon Blvd. and Old Topanga Canyon Road, and make appropriate emergency plans where required

8.4 LA County and Caltrans shall review proposed repairs to culverts and infrastructure throughtout the watershed with the community prior to final design and contracts.

8.5 Develop a comprehensive management strategy for culverts, bridges, etc. amongst all responsible agencies.

(5.44) Replace caissons, concrete retaining walls, and other support structures in accordance with BMPs to protect stream resources and prevent downstream impacts by altering flow dynamics. Use hydrologic model to estimate impacts. See also Streambank Protection.

Recommendations which require legal and political changes for implementation: None

LINE CLEARANCE/UTILITY MAINTENANCE

ACTIONS:

8.6 Reduce impacts to trees by coordinating line clearance pruning among all concerned agencies.

8.7 Prohibit line clearance pruning between January and April at known nest trees in order to protect nesting raptors.

(6.16) Prohibit topping (cutting trees straight across without regard to branch structure). See also Riparian Vegetation Protection.

(6.17) Apply directional pruning and crown reduction as pruning standards. Use International Society of Arboriculture standards for pruning. See also Riparian Vegetation Protection.

Recommendations which require legal and political changes for implementation:

8.8 Promote installation of underground utilities. Utility lines become hazardous during emergency evacuations.

ROAD SHOULDER AND STREAMBANK MAINTENANCE AND REPAIR

ACTIONS:

8.9 Develop new designs and approaches that preserve the natural setting of the watercourse while providing slope stability.

8.10 Cease the dumping of loose soil over embankments for road maintenance. See also Water Quality.

8.11 Minimize the removal of existing mature vegetation along road shoulders. See also Water Quality.

8.12 Identify sites for stockpiling native soils removed from the roadways during storm events. See also Water Quality.

8.13 Use only non-erodable approved materials to construct fills, backfills, embankment stabilizations, and road shoulders. See also Water Quality.

8.14 Prohibit importation of any fill debris material from outside of the watershed, unless tested and confirmed free of contamination, toxins and exotic invasives. See also Water Quality.

8.15 Develop a road management program for both public and private properties to correct existing adverse conditions at major sites of road induced slope erosion by construction, remedial drainage improvements, slope plantings or retaining structures.

8.16 Identify old roads to be retired.

8.17 Identify "normal" rate of sedimentation and determine whether road maintenance practices increase this process.

8.18 Identify amount and impacts of road spoils on creek habitat.

8.19 Scraping of the road shoulder needs to be done carefully so as not to destabilize slopes by removing the toe, and avoid roots of trees along Topanga Creek.

8.20 Change slope mowing maintenance practices to avoid shredding woody shrubs whose deep roots hold up slopes.

8.21 Require that all new roads with either cut or fill slopes be replanted or retained to prevent erosion.

(4.6) Establish and implement a cooperative program among all property owners and agencies involved for clearing stream obstructions. See also Flood Hazard.

(4.38) Continue management of road shoulder brush clearance for fire safety and line of sight without the use of herbicides. See also Fire Hazard.

(5.24) Erosion control should be performed only with porous material that allow infiltration of runoff. Energy dissipaters should be used to ensure that water velocities remain low. See also Erosion Control.

(5.26) Minimize erosion and sedimentation. Maximize sediment and runoff on-site. All drainage must be conveyed and released in a non-erosive manner at non-erosive velocities into natural channels or to an approved public drainage device, according to existing regulations. See also Erosion Control.

(5.32) Discourage the use of hardscape in the floodplain and along creek banks. Where grouted riprap exists, replacement with more appropriate bioengineered materials and solutions should be made over time. See also Streambank Protection.

(5.34) Use only bio-engineered methods and materials to construct fills, backfills, embankment stabilizations, and road shoulders. See also Streambank Protection and Stream Channel Maintenance.

(6.12) Prohibit placement of any materials within the protected zone of a tree, or a minimum of 10 feet from the trunk. See also Riparian Vegetation Protection.

(6.14) Creation of soil or asphalt berms to direct road runoff should avoid direct contact with tree trunks. See also Riparian Vegetation Protection.

Recommendations which require legal and political changes for implementation: None

TRAFFIC CONTROL AND PUBLIC SAFETY

ACTIONS:

8.22 Assess environmental impacts of increased traffic through canyon.

Recommendations which require legal and political changes for implementation:

8.23 Promote creation of alternative transportation (buses).

8.24 Improve pedestrian, equestrian, and bike safety throughout the watershed

References

Caltrans Roadside Vegetation Management Handbook

Caltrans. 1997. California Roads: A New Perspective

Caltrans Best Management Practices Manual

Caltrans Environmental Corridor Study of Topanga Canyon Blvd. (in progress)

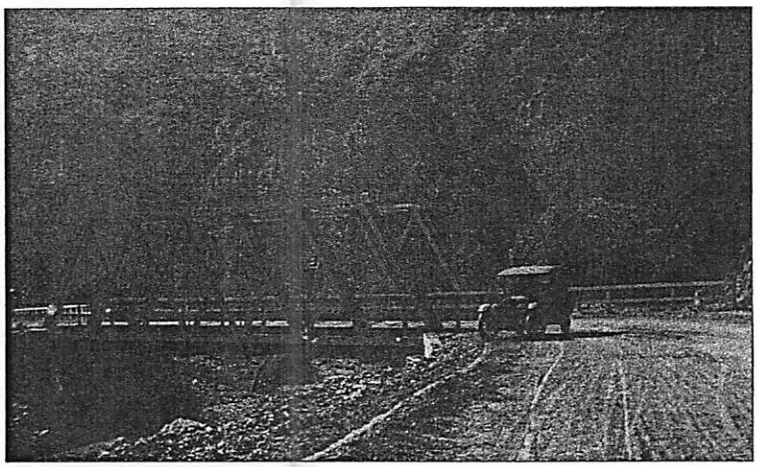
LA County Best Management Practices Manual

RCDSMM. 1999. Sensitive Species Inventory of Culverts and Infrastructure in the Topanga Creek Watershed. Prepared under contract for LA County DPW.

SCAG Transportation Plan for the San Fernando Valley

Supplemental Information

Addressing the environmental impacts of the roads and infrastructure in Topanga is an on-going challenge. Refer to the 1996 Draft Topanga Creek Watershed Management Study for a complete discussion of the history of the problem and the solutions proposed.



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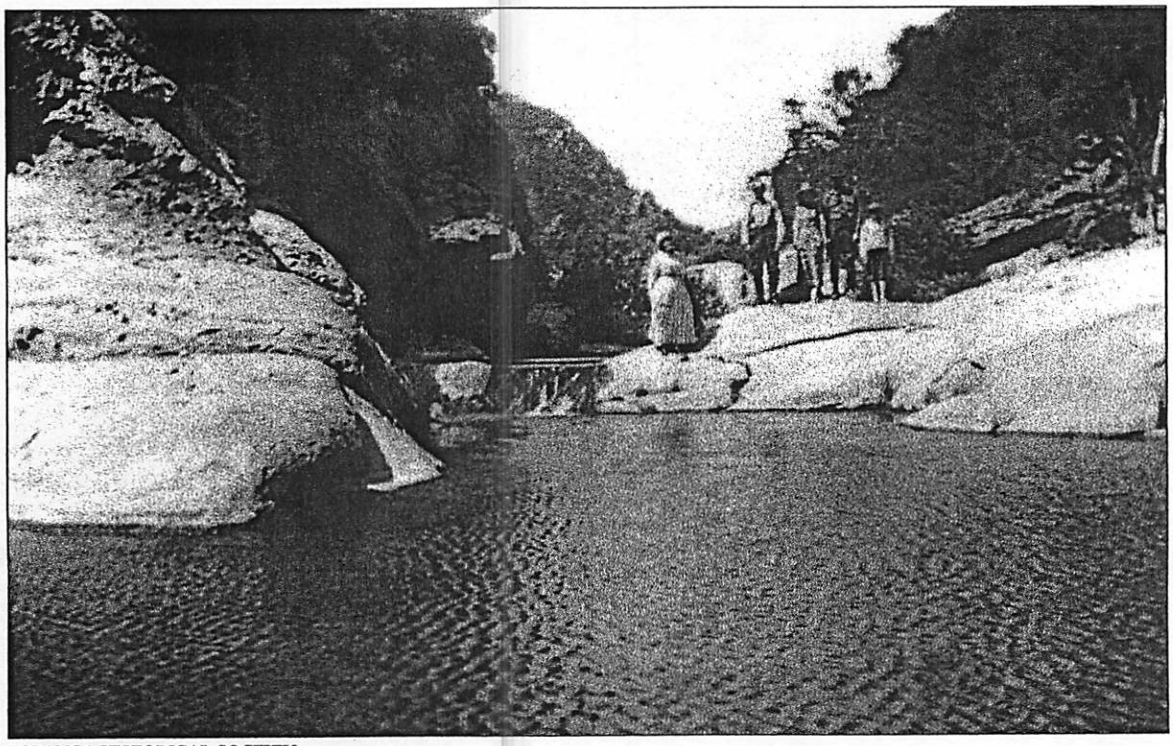
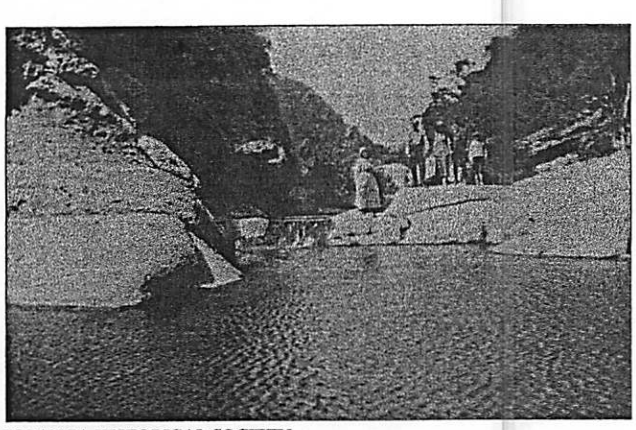
SECTION 9
WATER QUALITY



TOPANGA HISTORICAL SOCIETY



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SECTION 9
WATER QUALITY

"The highest motive is to be like water. Water is essential to all living things, yet it demands no pay or recognition. Rather it flows humbly to the lowest level. Nothing is weaker than water, yet for overcoming what is hard and strong, nothing surpasses it." – Tao te Ching

GOALS:

- Improve water quality.
- Preserve or improve water quality for maximum use and enjoyment.
- Improve and protect water quality by reducing erosion, sedimentation, point and non-point source pollution.

Introduction

Water quality is of paramount concern to the Topanga Creek Watershed. Topanga Creek watershed is becoming increasingly developed without a coherent management approach to water quality. In addition to the obvious pubic health issues associated with both point and non-point source pollution, the future of Topanga Creek is at stake. All of the 3,000 homes and businesses in Topanga rely upon on-site waste disposal. No sewer system exists, nor is one envisioned. The only pocket sewage treatment plant serves the mobile homes at Top O Topanga. Many homes in Topanga also utilize graywater systems for disposing of washing machine and shower water. Therefore, all human generated wastewater is put into the ground, one way or the other. This is a major concern because of the problems associated with pollutants reaching the shallow alluvial aquifer and deeper bedrock water system used by many residents for drinking water. Due to the fractured nature of our geology and the steep slopes covering most of the canyon, any wastewater input into the system eventually reaches Topanga Creek., and from there flows downstream to Topanga Beach and into the Santa Monica Bay.

The Los Angeles Regional Water Quality Control Board 303(d) list shows Topanga as impaired for lead in the upper watershed and for coliform bacteria at Topanga Beach. Bacteria levels at Topanga Beach routinely exceed state standards when the entrance to the lagoon is open to the ocean during the rainy season, but has safe levels when the lagoon entrance is closed during the dry months. In order to confirm if the designations were warranted, a comprehensive water quality study was conducted by the RCDSMM and the volunteer Topanga Creek Stream Team from 1999 to 2001. The results of that study were complied into the Topanga Creek Report Card, which is found at www.TopangaOnline.com or in Appendix G. No detectable levels of lead or any other heavy metal were found. Levels of nutrients also remained low for the duration of the study at most sites. Bacteria levels exceeded state standards at several "hot spots" in the upper watershed, (Entrado Rd., Highvale Rd., behind Topanga Market and Falls Dr.) on several occasions, but in general levels were within standards at the lowest sampling site at the bridge located 2 miles upstream from the ocean. It appears that while there are several problem areas, the pollution input has not yet exceeded the natural filtration capacity of the creek.

Another possible source of non-point source pollution is road runoff. Increased levels of traffic along the roads leads to continuous deposition of pollutants. There are no storm drains per se in the Topanga Creek Watershed, so runoff is directed through culverts and along drainage courses directly into the creek. Non-Point Source Discharge requirements for the roadways are not being met and Best Management Practices have not been uniformly applied throughout the watershed. Continued monitoring and maintenance of all point and non-point sources is needed to ensure that water quality in Topanga Creek remains safe for our children and all living things.

NON-POINT SOURCE PREVENTION

ACTIONS:

9.1 Identify degree and extent of water quality problems by continued monitoring.

9.2 Evaluate water quality problems in groundwater and drinking water wells.

9.3 Develop focused biological and chemical monitoring program to continue learning more about water quality in creek.

9.4 Assess the impacts of poor water quality on recreation (beach and state park).

9.5 Identify sources of sedimentation and stormwater runoff concentrations and implement Best Management Practices to reduce pollution.

(8.10) Cease dumping loose soil over embankments for road maintenance. See also Transportation.

(8.11) Minimize the removal of existing mature vegetation along road shoulders. See also Transportation.

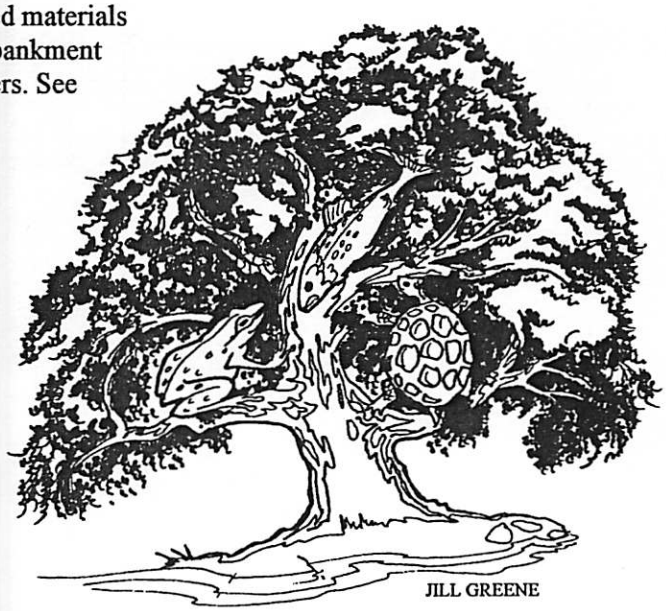
(8.12) Identify sites for stockpiling native soils removed from the roadways during storm events. See also Transportation.

(8.13) Use only non-erodable approved materials to construct fills, backfills, embankment stabilizations, and road shoulders. See also Transportation.

(8.14) Prohibit importation of any fill debris material from outside of the watershed, unless tested and confirmed free of contamination, toxins and exotic invasives. See also Transportation.

Recommendations which require legal and political changes for implementation:

9.6 Identify existing regulations and possible solutions to problematic water quality sites.



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POINT SOURCE PREVENTION


TOPANGA HISTORICAL SOCIETY

ACTIONS:

9.7 Assess septic system functions and impacts on water quality.

9.8 Assess livestock waste/corrals impacts on water quality.

9.9 Assess homeless encampment impacts on water quality.

9.10 Assess graywater disposal impacts on water quality.

9.11 Assess impacts on water quality due to use of detergents, fertilizers, pesticides, herbicides, etc.

9.12 Develop a list of recommended environmentally preferable detergents and other products for alternative graywater systems.

9.13 Establish regular program for hazardous waste disposal (oil, paint, etc.).

(3.7) Prevent illegal dumping by limiting vehicle access, placing appropriate signage, imposing and enforcing penalties (fines, misdemeanor offense). Develop an anti-dumping campaign, focusing on rewards, heightened public education, signage, and a hot-line to reduce this form of pollution. Pursue grant money to fund these efforts. See also Water Quality.

Recommendations which require legal and political changes for implementation:

9.14 Protect water quality by monitoring and regulating the location of septic systems.

9.15 Identify existing regulations and possible solutions to problematic water quality sites.

References

Care and Feeding of your Septic System. 2001. Resource Conservation District of the Santa Monica Mountains, Topanga, CA

Dagit, Rosi. 2001. Topanga Creek Watershed Water Quality Study. Resource Conservation District of the Santa Monica Mountains, Topanga, CA

Heal the Bay Beach Report Card

Los Angeles County Standards for Septic Systems

Los Angeles County Standards for Graywater Systems

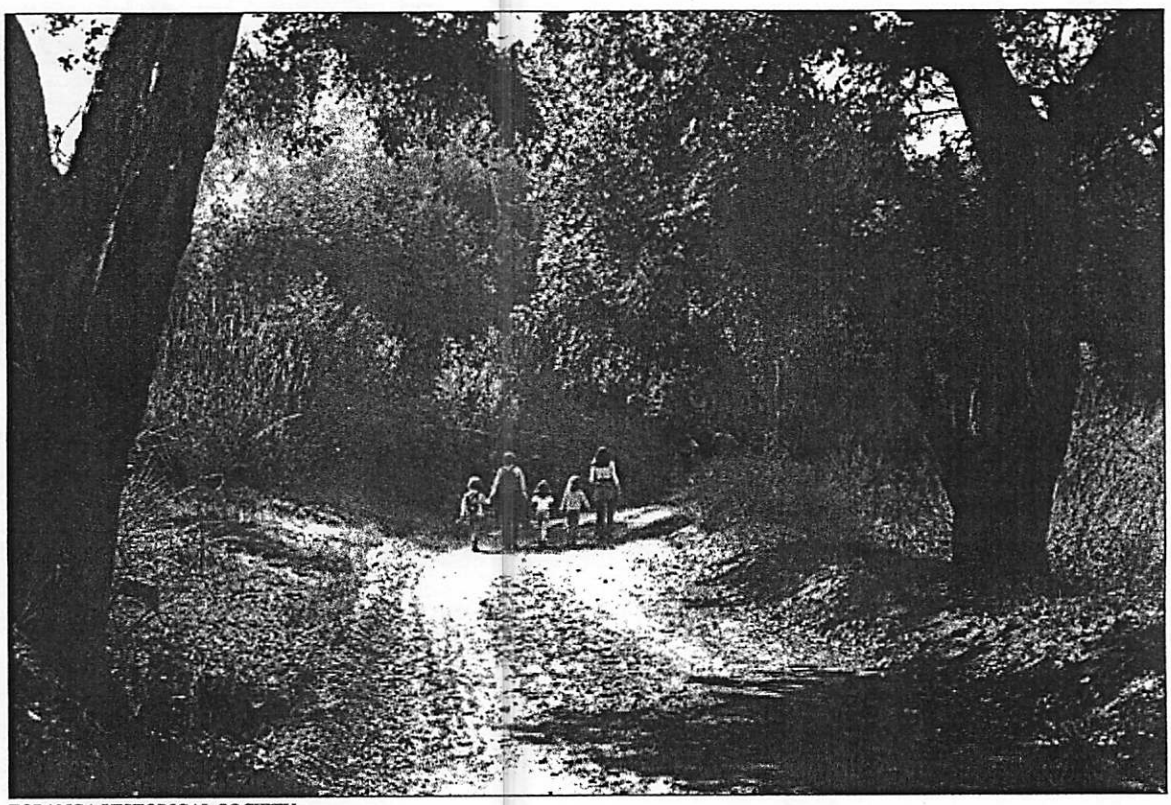
Los Angeles Regional Water Quality Control Board Basin Plan

Topanga Creek Water Quality Report Card, July 1999 — June 2001

Supplemental Information:

Additional information about water quality can be found in Appendix G.

SECTION 10
LOOKING AHEAD:
Monitoring, Research and Restoration Programs



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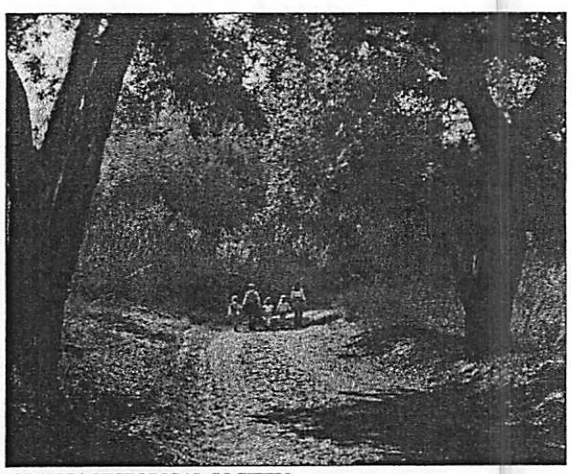


TOPANGA HISTORICAL SOCIETY

SECTION 10
LOOKING AHEAD:
Monitoring, Research and Restoration Programs

"Chance favors the well prepared mind."
– Louis Pasteur

GOALS:

1. To identify sources of point and non-point pollutants entering the stream; to determine any impacts of these pollutants; and to recommend specific measures to eliminate or mitigate pollution problems.
2. To identify specific sites contributing to high levels of sediment and erosion flow into the stream. Evaluate and refine appropriate Best Management Practices.
3. To locate areas where slopes are unstable. Evaluate bio-engineering, gabion, and other environmentally sound solutions and recommend appropriate standards for specific sites. Perform a similar study for sites where grouted rip rap has been placed.
4. To identify all trees that are within the projected flood zone that maintain streambank stability. Determine possible remedial efforts that could improve existing tree health. Identify locations needing revegetation in order to enhance streambank stability.
5. To monitor the biodiversity of the watershed and identify potential indicator species which could alert us to major shifts or losses. To involve the community in maintaining diverse habitats to support the large number of plant and animal species within the riparian zone.
6. To identify areas impacted by invasive exotic plants and animals. Establish an eradication program.
7. To reestablish a functional lagoon at the mouth of Topanga Creek.

Introduction

Even though much research has been accomplished since the 1996 Draft Topanga Creek Watershed Management Study, a number of additional research and restoration programs should be carried out in order to accomplish the goal of thoughtful maintenance and environmental protection. Together, these programs should provide the data needed to make informed decisions about appropriate methods for protecting life and property, maintaining road safety, and preserving stream function and ecology. Funding for these studies will be sought from a variety of sources.

Archeological and Cultural Resources

10.1 Develop guidelines for identifying and preserving archeological and cultural resources within the Topanga Creek Watershed.

Economics

10.2 Develop guidelines for evaluating the real costs and benefits of implementing Best Management Practices that incorporate the values provided by the natural environment.

Flood and Fire Hazard Protection

10.3 Coordinate efforts with LA County Forestry and Fire Department to take next steps to implement and evaluate environmentally sensitive fuel modification strategies.

10.4 Implement a demonstration site of environmentally sensitive fuel modification strategies at Topanga Elementary School.

10.5 Identify possible alarms and warning signals that could be used during emergencies to warn residents of danger from fire or flood. (Work with Arson Watch and T-CEP).

Land Use: Grading, Drainage and Erosion Control

10.5 Install demonstration sites for innovative graywater and septic systems. Monitor effectiveness.

10.6 Install demonstration sites for innovative, integrated site design which maximizes on-site drainage retention, minimizes grading and provides extensive erosion control.

10.7 Evaluate effectiveness of various strategies for controlling erosion of fire roads and trails.

Natural Environment

10.8 Continued monitoring is needed in order to assess the benefits of Best Management Practices implemented and to ensure that natural processes are maintained to the optimal extent feasible.

10.9 Identify sensitive resources locations and strategies for protection.

10.10 Evaluate a variety of strategies for controlling invasive exotic species.

10.11 Evaluate the feasibility of restoring the historic lagoon at the mouth of Topanga Creek.

10.12 Identify and implement steelhead trout and tidewater goby habitat improvements.

Recreation

10.13 Evaluate the impacts of trail use related to erosion. Test a variety of solutions and Best Management Practices.

Transportation

10.14 Develop creative ways to slow down traffic through the watershed.

10.15 Identify road related impacts to Topanga Creek and implement Best Management Practices.

10.16 Develop proactive plans for repairing problem locations that impact creek banks.

Water Quality

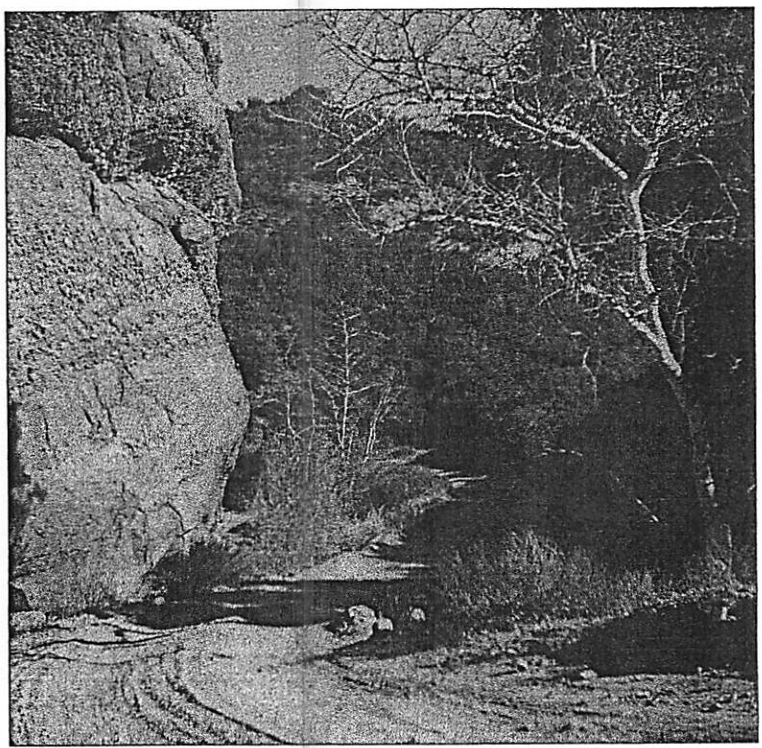
10.17 Identify sources of fecal bacteria using DNA fingerprinting and relate to synoptic studies of pathogenic viruses.

10.18 Implement Best Management Practices to improve water quality throughout the watershed, and especially at Topanga Beach.

MONITORING SUCCESS

The success of the Topanga Creek Watershed Management Plan will be evaluated every 5 years or more as needed by monitoring the following:

- Protecting life and property from flood, wildfire and earthquake hazards;
- Improving water quality at Topanga Beach and in the upper watershed;
- Eliminating upper watershed water quality "hot spots";
- Evaluating the effects of implementing recommended Best Management Practices;
- Institutionalizing Best Management Practices for Topanga with local and state agencies;
- Integrating the voluntary land use guidelines for Topanga into local planning documents;
- Maintaining viable populations of native flora and fauna;
- Restoring the population of endangered steelhead trout.



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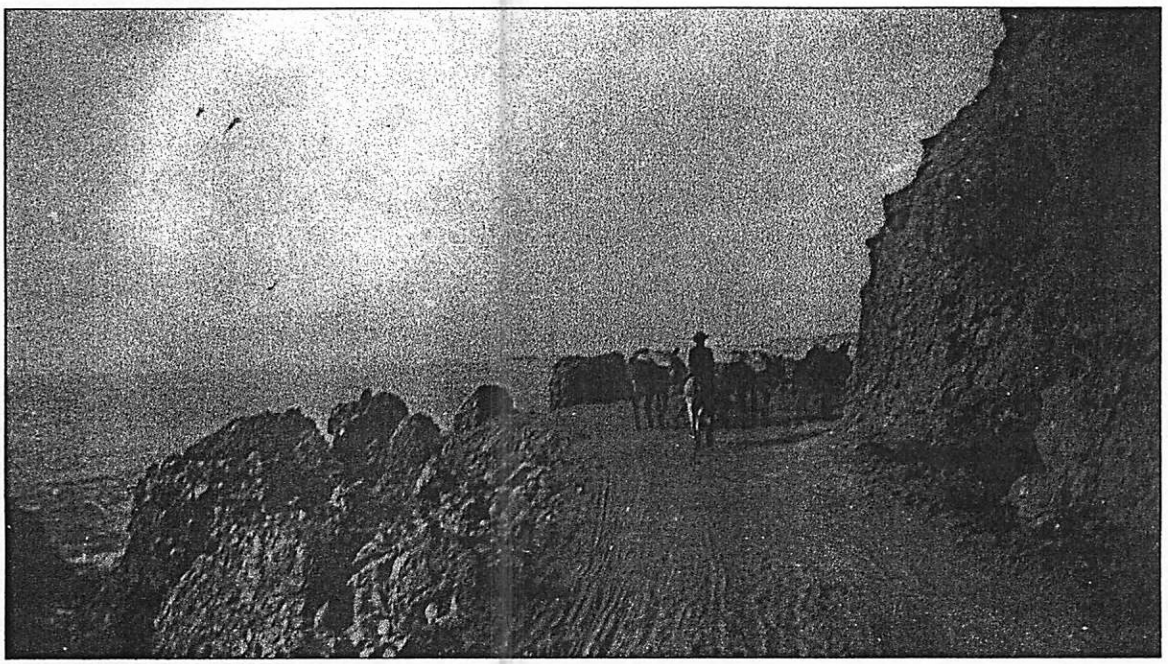
SECTION 11
LOOKING BACK:
Recommendations from the 1996 Draft Topanga Creek Watershed Management Study that have been accomplished



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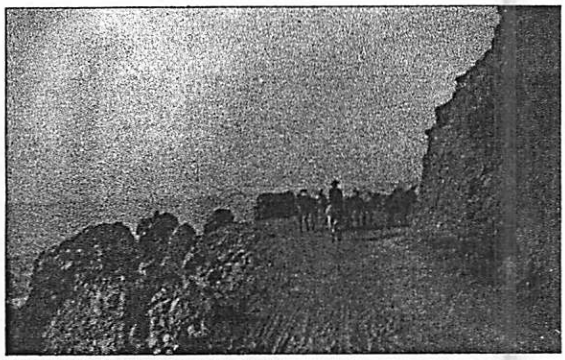

TOPANGA HISTORICAL SOCIETY

SECTION 11
LOOKING BACK:
Recommendations from the 1996 Draft Topanga Creek Watershed Management Study that have been accomplished

The following list of recommendations taken from the 1996 Draft Topanga Creek Watershed Management Study have already been implemented.

Economics

- Community groups (Topanga Chamber of Commerce and the Topanga Canyon Town Council) meet regularly and facilitate discussion on topics of concern, such as traffic management, septic and water quality regulations, etc.

Education and Outreach

- Provide the *Living Lightly in the Watershed* information in the Topanga *Messenger* 455 Yellow pages and as a brochure sent to all residents.
- Provide regular updates on the watershed committee on TopangaOnline web site.
- Create an emergency warning and evacuation system for those bridges and major roadways where a substantial public safety hazard exists. This is especially important for the Topanga Elementary School.
- Hold an annual public meeting to discuss watershed management concerns.
- Distribute brochures with "user friendly" information on water quality, vegetation management, flood hazard reduction, maintenance of slope stability, etc.
- Publish a series of articles in the *Messenger* newspaper on the watershed plan.
- Provide information to new buyers about landscaping with native plants and protecting native habitat available through Realtors, brochures, etc.
- Publish articles in the news whenever possible.
- Coordination with Topanga Elementary School for school/studies projects tied to watershed issues.

Flood and Fire Hazard Protection

- Conduct a research study to understand geomorphologic process effecting sediment transport and loading. (Research in progress Fall 2000–Fall 2001, conducted by RCDSMM).
- Conduct upslope and instream sediment and erosion studies. (Research in progress Fall 2000–Fall 2001, conducted by RCDSMM).

Land Use: Grading, Drainage and Erosion Control

- None

Natural Environment

- The stream gage in Topanga Creek should be re-established by LA County DPW.
- In compliance with the LA County Oak Tree Protection Ordinance, any work done within the protected zone of an oak or any other trees within 50 feet of a stream bank should be done by hand. No stockpiling of dirt or equipment should be permitted within the protected zone.
- Documentation of existing riparian vegetation should be performed prior to any grading activities. Need to continue coordination and codify.
- The services of a consulting biologist/arborist should be sought prior to and during both the design and implementation phases of all projects. Specified monitoring following completion of construction is also recommended.
- Require that plants and animals be protected during any construction within or adjacent to the stream channel.
- Reduce impacts by coordinating line clearance pruning among all concerned agencies. Need to continue coordination and codify.
- Prohibit pruning between January and April in order to protect nesting raptors. Need to continue coordination and codify

Recreation

- None

Transportation

- Environmental Corridor Study of Topanga Canyon Blvd. by Caltrans to develop appropriate management strategies in process. (2000-2001)
- Traffic Study along Topanga Canyon Blvd. in progress.

Water Quality

- Perform a baseline water quality study and monitor changes yearly. (Study conducted from 1999–2001by the RCDSMM and Topanga Creek Stream Team.)
- Identify the major sources of pollution and develop realistic programs to address them.
- Establish a policy that limits stormwater runoff and sedimentation from new development to that which occurs over naturally existing terrain under all conditions.

RECOMMENDATIONS THAT ARE NO LONGER RELEVENT DUE TO CHANGES SINCE 1996

- Require DPW to do a comparative analysis of Community Rating System credit points for the proposed Topanga Creek Watershed Management Plan and the Proposed Topanga Floodway Ordinance.
- DPW should incorporate into its capital improvements program the replacement of undersized bridges. REMOVE RECOMMENDATION.

APPENDIX A

GRANT SOURCES FOR HOMEOWNERS

GRANT SOURCES FOR HOMEOWNERS

1. Partners for Fish and Wildlife, U.S. Fish and Wildlife Service

Topanga is in Region 1

Website: http://partners.fws.gov Contact: 916-414-6462

Goals:

- Implement pro-active, voluntary, on-the-ground habitat restoration projects that benefit Federal trust fish and wildlife species on private and tribal lands.
- Develop partnerships to implement these habitat restoration projects.
- Demonstrate applied technology for habitat restoration projects to help the public understand and participate in fish and wildlife resource conservation.

Funding available: 50:50 cost share
Requirements: Must own the land, must agree to maintain for 10 years

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2. Wildlife Habitat Improvement Program, National Resources Conservation Service

Website: http://www.nhq.nrcs.usda.gov/PROGRAMS/whip/
Contact: Lisa Roberts 805-386-4489

State Priorities:

- Riparian and stream corridor habitat restoration and enhancement that benefit wildlife corridors, water quality improvement, reduction in flood damage, and more.
- Federal or State threatened or endangered species habitat restoration or enhancement.
- Treatment or improvement of habitats in uplands (e.g. restoration of burned areas, oak regeneration projects, etc.)
- Wetland area creation, restoration, enhancement and management.
- Coldwater fisheries habitat restoration and improvement (steelhead and rainbow trout)
- Habitat restoration and enhancement for game and other species (deer, quail, butterflies, etc.)

Funding available: up to $10,000 over 10 years, property owner contributes 25%
Requirements: Must own the land, must agree to maintain for 10 years

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3. Center for Invasive Plant management Grants

Website: cipm@montana.edu Contact: Janet Clark, 406-994-6832

Goals:

- Involving citizens in controlling invasive plants

Funding available: $400–10,000

4. Cost Share and Assistance Programs for California landowners and Indian Tribes
Website: http://ceres.ca.gov/foreststeward/financial.html

List of program goals, types of projects considered, eligibility requirements and contact info.

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5. Catalog of Federal Domestic Assistance
Website: www.cdfa.gov

On-line catalog updated annually contains information on all financial and non-financial assistance programs provided by the Federal government

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6. D.I.R.T Grants from Powerbar
Website: www.powerbar.com/whoWeAre/dirt

Goals:

- Endeavor to increase or maintain access to the outdoors or the size of an outdoor recreational resource.
- Have a regional or local focus.
- Identify a specific land area or waterway that will benefit.
- Have a real potential for success or significant measurable progress over a short term.
- Be quantifiable (i.e. have specific goals, objectives, and action plans) and include a measure for evaluating success.

Funding available: $1,000–5,000
Requirements: see website

APPENDIX B

FEMA/NFIP REGULATIONS, 1999

PART 60—CRITERIA FOR LAND MANAGEMENT AND USE

Subpart A—Requirements for Flood Plain Management Regulations

Sec.
60.1 Purpose of subpart.
60.2 Minimum compliance with flood plain management criteria.
60.3 Flood plain management criteria for flood-prone areas.
60.4 Flood plain management criteria for mudslide (i.e., mudflow)-prone areas.
60.5 Flood plain management criteria for flood-related erosion-prone areas.
60.6 Variances and exceptions.
60.7 Revisions of criteria for flood plain management regulations.
60.8 Definitions.

Subpart B—Requirements for State Flood Plain Management Regulations

60.11 Purpose of this subpart.
60.12 Flood plain management criteria for State-owned properties in special hazard areas.
60.13 Noncompliance.

Subpart C—Additional Considerations in Managing Flood-Prone, Mudslide (i.e., Mudflow)-Prone, and Flood-Related Erosion-Prone Areas

60.21 Purpose of this subpart.
60.22 Planning considerations for flood-prone areas.
60.23 Planning considerations for mudslide (i.e., mudflow)-prone areas.
60.24 Planning considerations for flood-related erosion-prone areas.
60.25 Designation, duties, and responsibilities of State Coordinating Agencies.
60.26 Local coordination.

AUTHORITY: 42 U.S.C. 4001 et seq.; Reorganization Plan No. 3 of 1978, 43 FR 41943, 3 CFR, 1978 Comp., p. 329; E.O. 12127 of Mar. 31, 1979, 44 FR 19367, 3 CFR, 1979 Comp., p. 376.
SOURCE: 41 FR 46975, Oct. 26, 1976, unless otherwise noted. Redesignated at 44 FR 31177, May 31, 1979.

Subpart A—Requirements for Flood Plain Management Regulations

§ 60.1 Purpose of subpart.

(a) The Act provides that flood insurance shall not be sold or renewed under the program within a community, unless the community has adopted adequate flood plain management regulations consistent with Federal criteria. Responsibility for establishing such criteria is delegated to the Administrator.

(b) This subpart sets forth the criteria developed in accordance with the Act by which the Administrator will determine the adequacy of a community's flood plain management regulations. These regulations must be legally- enforceable, applied uniformly throughout the community to all privately and publicly owned land within flood-prone, mudslide (i.e., mudflow) or flood-related erosion areas, and the community must provide that the regulations take precedence over any less restrictive conflicting local laws, ordinances or codes. Except as otherwise provided in § 60.6, the adequacy of such regulations shall be determined on the basis of the standards set forth in § 60.3 for flood-prone areas, § 60.4 for mudslide areas and § 60.5 for flood-related erosion areas.

(c) Nothing in this subpart shall be construed as modifying or replacing the general requirement that all eligible communities must take into account flood, mudslide (i.e., mudflow) and flood-related erosion hazards, to the extent that they are known, in all official actions relating to land management and use.

(d) The criteria set forth in this subpart are minimum standards for the adoption of flood plain management regulations by flood-prone, mudslide (i.e., mudflow)-prone and flood-related erosion-prone communities. Any community may exceed the minimum criteria under this part by adopting more comprehensive flood plain management regulations utilizing the standards such as contained in subpart C of this part. In some instances, community officials may have access to information or knowledge of conditions that require, particularly for human safety, higher standards than the minimum criteria set forth in subpart A of this part. Therefore, any flood plain management regulations adopted by a State or a community which are more restrictive than the criteria set forth in this part are encouraged and shall take precedence.

[41 FR 46975, Oct. 26, 1976. Redesignated at 44 FR 31177, May 31, 1979, as amended at 48 FR 44552, Sept. 29, 1983; 49 FR 4751, Feb. 8, 1984]

§ 60.2 Minimum compliance with flood plain management criteria.

(a) A flood-prone community applying for flood insurance eligibility shall meet the standards of §60.3(a) in order to become eligible if a FHBM has not been issued for the community at the time of application. Thereafter, the community will be given a period of six months from the date the Administrator provides the data set forth in §60.3(b), (c), (d), (e) or (f), in which to meet the requirements of the applicable paragraph. If a community has received a FHBM, but has not yet applied for Program eligibility, the community shall apply for eligibility directly under the standards set forth in §60.3(b). Thereafter, the community will be given a period of six months from the date the Administrator provides the data set forth in §60.3(c), (d), (e) or (f) in which to meet the requirements of the applicable paragraph.

(b) A mudslide (i.e., mudflow)-prone community applying for flood insurance eligibility shall meet the standards of § 60.4(a) to become eligible. Thereafter, the community will be given a period of six months from the date the mudslide (i.e., mudflow) areas having special mudslide hazards are delineated in which to meet the requirements of § 60.4(b).

(c) A flood-related erosion-prone community applying for flood insurance eligibility shall meet the standards of § 60.5(a) to become eligible. Thereafter, the community will be given a period of six months from the date the flood-related erosion areas having special erosion hazards are delineated in which to meet the requirements of § 60.5(b).

(d) Communities identified in part 65 of this subchapter as containing more than one type of hazard (e.g., any combination of special flood, mudslide (i.e., mudflow), and flood-related erosion hazard areas) shall adopt flood plain management regulations for each type of hazard consistent with the requirements of §§ 60.3, 60.4 and 60.5.

(e) Local flood plain management regulations may be submitted to the State Coordinating Agency designated pursuant to § 60.25 for its advice and concurrence. The submission to the State shall clearly describe proposed enforcement procedures.

(f) The community official responsible for submitting annual or biennial reports to the Administrator pursuant to § 59.22(b)(2) of this subchapter shall also submit copies of each annual or biennial report to any State Coordinating Agency.

(g) A community shall assure that its comprehensive plan is consistent with the flood plain management objectives of this part.

(h) The community shall adopt and enforce flood plain management regulations based on data provided by the Administrator. Without prior approval of the Administrator, the community shall not adopt and enforce flood plain management regulations based upon modified data reflecting natural or man-made physical changes.

[41 FR 46975, Oct. 26, 1976. Redesignated at 44 FR 31177, May 31, 1979, as amended at 48 FR 29318, June 24, 1983; 48 FR 44552, Sept. 29, 1983; 49 FR 4751, Feb. 8, 1984; 50 FR 36024, Sept. 4, 1985; 59 FR 53598, Oct. 25, 1994; 62 FR 55716, Oct. 27, 1997]

§ 60.3 Flood plain management criteria for flood-prone areas.

The Administrator will provide the data upon which flood plain management regulations shall be based. If the Administrator has not provided sufficient data to furnish a basis for these regulations in a particular community, the community shall obtain, review and reasonably utilize data available from other Federal, State or other sources pending receipt of data from the Administrator. However, when special flood hazard area designations and water surface elevations have been furnished by the Administrator, they shall apply. The symbols defining such special flood hazard designations are set forth in § 64.3 of this subchapter. In all cases the minimum requirements governing the adequacy of the flood plain management regulations for flood-prone areas adopted by a particular community depend on the amount of technical data formally provided to the community by the Administrator. Minimum standards for communities are as follows:

(a) When the Administrator has not defined the special flood hazard areas within a community, has not provided water surface elevation data, and has not provided sufficient data to identify the floodway or coastal high hazard area, but the community has indicated the presence of such hazards by submitting an application to participate in the Program, the community shall:

(1) Require permits for all proposed construction or other development in the community, including the placement of manufactured homes, so that it may determine whether such construction or other development is proposed within flood-prone areas;

(2) Review proposed development to assure that all necessary permits have been received from those governmental agencies from which approval is required by Federal or State law, including section 404 of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. 1334;

(3) Review all permit applications to determine whether proposed building sites will be reasonably safe from flooding. If a proposed building site is in a flood-prone area, all new construction and substantial improvements shall (i) be designed (or modified) and adequately anchored to prevent flotation, collapse, or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy, (ii) be constructed with materials resistant to flood damage, (iii) be constructed by methods and practices that minimize flood damages, and (iv) be constructed with electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities that are designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

(4) Review subdivision proposals and other proposed new development, including manufactured home parks or subdivisions, to determine whether such proposals will be reasonably safe from flooding. If a subdivision proposal or other proposed new development is in a flood-prone area, any such proposals shall be reviewed to assure that (i) all such proposals are consistent with the need to minimize flood damage within the flood-prone area, (ii) all public utilities and facilities, such as sewer, gas, electrical, and water systems are located and constructed to minimize or eliminate flood damage, and (iii) adequate drainage is provided to reduce exposure to flood hazards;

(5) Require within flood-prone areas new and replacement water supply systems to be designed to minimize or eliminate infiltration of flood waters into the systems; and

(6) Require within flood-prone areas (i) new and replacement sanitary sewage systems to be designed to minimize or eliminate infiltration of flood waters into the systems and discharges from the systems into flood waters and (ii) onsite waste disposal systems to be located to avoid impairment to them or contamination from them during flooding.

(b) When the Administrator has designated areas of special flood hazards (A zones) by the publication of a community's FHBM or FIRM, but has neither produced water surface elevation data nor identified a floodway or coastal high hazard area, the community shall:

(1) Require permits for all proposed construction and other developments including the placement of manufactured homes, within Zone A on the community's FHBM or FIRM;

(2) Require the application of the standards in paragraphs (a) (2), (3), (4), (5) and (6) of this section to development within Zone A on the community's FHBM or FIRM;

(3) Require that all new subdivision proposals and other proposed developments (including proposals for manufactured home parks and subdivisions) greater than 50 lots or 5 acres, whichever is the lesser, include within such proposals base flood elevation data;

(4) Obtain, review and reasonably utilize any base flood elevation and floodway data available from a Federal, State, or other source, including data developed pursuant to paragraph (b)(3) of this section, as criteria for requiring that new construction, substantial improvements, or other development in Zone A on the community's FHBM or FIRM meet the standards in paragraphs (c)(2), (c)(3), (c)(5), (c)(6), (c)(12), (c)(14), (d)(2) and (d)(3) of this section;

(5) Where base flood elevation data are utilized, within Zone A on the community's FHBM or FIRM:

(i) Obtain the elevation (in relation to mean sea level) of the lowest floor (including basement) of all new and substantially improved structures, and

(ii) Obtain, if the structure has been flood-proofed in accordance with paragraph (c)(3)(ii) of this section, the

elevation (in relation to mean sea level) to which the structure was flood-proofed, and

(iii) Maintain a record of all such information with the official designated by the community under § 59.22 (a)(9)(iii);

(6) Notify, in riverine situations, adjacent communities and the State Coordinating Office prior to any alteration or relocation of a watercourse, and submit copies of such notifications to the Administrator;

(7) Assure that the flood carrying capacity within the altered or relocated portion of any watercourse is maintained;

(8) Require that all manufactured homes to be placed within Zone A on a community's FHBM or FIRM shall be installed using methods and practices which minimize flood damage. For the purposes of this requirement, manufactured homes must be elevated and anchored to resist flotation, collapse, or lateral movement. Methods of anchoring may include, but are not to be limited to, use of over-the-top or frame ties to ground anchors. This requirement is in addition to applicable State and local anchoring requirements for resisting wind forces.

(c) When the Administrator has provided a notice of final flood elevations for one or more special flood hazard areas on the community's FIRM and, if appropriate, has designated other special flood hazard areas without base flood elevations on the community's FIRM, but has not identified a regulatory floodway or coastal high hazard area, the community shall:

(1) Require the standards of paragraph (b) of this section within all A1– 30 zones, AE zones, A zones, AH zones, and AO zones, on the community's FIRM;

(2) Require that all new construction and substantial improvements of residential structures within Zones A1–30, AE and AH zones on the community's FIRM have the lowest floor (including basement) elevated to or above the base flood level, unless the community is granted an exception by the Administrator for the allowance of basements in accordance with § 60.6 (b) or (c);

(3) Require that all new construction and substantial improvements of non-residential structures within Zones A1– 30, AE and AH zones on the community's firm (i) have the lowest floor (including basement) elevated to or above the base flood level or, (ii) together with attendant utility and sanitary facilities, be designed so that below the base flood level the structure is water-tight with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy;

(4) Provide that where a non-residential structure is intended to be made watertight below the base flood level, (i) a registered professional engineer or architect shall develop and/or review structural design, specifications, and plans for the construction, and shall certify that the design and methods of construction are in accordance with accepted standards of practice for meeting the applicable provisions of paragraph (c)(3)(ii) or (c)(8)(ii) of this section, and (ii) a record of such certificates which includes the specific elevation (in relation to mean sea level) to which such structures are flood-proofed shall be maintained with the official designated by the community under §59.22(a)(9)(iii);

(5) Require, for all new construction and substantial improvements, that fully enclosed areas below the lowest floor that are usable solely for parking of vehicles, building access or storage in an area other than a basement and which are subject to flooding shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement must either be certified by a registered professional engineer or architect or meet or exceed the following minimum criteria: A minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding shall be provided. The bottom of all openings shall be no higher than one foot above grade. Openings may be equipped with screens, louvers, valves, or other coverings or devices provided that they permit the automatic entry and exit of floodwaters.

(6) Require that manufactured homes that are placed or substantially improved within Zones A1–30, AH, and AE on the community's FIRM on sites

(i) Outside of a manufactured home park or subdivision,

(ii) In a new manufactured home park or subdivision,

(iii) In an expansion to an existing manufactured home park or subdivision, or

(iv) In an existing manufactured home park or subdivision on which a manufactured home has incurred "substantial damage" as the result of a flood, be elevated on a permanent foundation such that the lowest floor of the manufactured home is elevated to or above the base flood elevation and be securely anchored to an adequately anchored foundation system to resist floatation collapse and lateral movement.

(7) Require within any AO zone on the community's FIRM that all new construction and substantial improvements of residential structures have the lowest floor (including basement) elevated above the highest adjacent grade at least as high as the depth number specified in feet on the community's FIRM (at least two feet if no depth number is specified);

(8) Require within any AO zone on the community's FIRM that all new construction and substantial improvements of nonresidential structures (i) have the lowest floor (including basement) elevated above the highest adjacent grade at least as high as the depth number specified in feet on the community's FIRM (at least two feet if no depth number is specified), or (ii) together with attendant utility and sanitary facilities be completely flood-proofed to that level to meet the flood-proofing standard specified in § 60.3(c)(3)(ii);

(9) Require within any A99 zones on a community's FIRM the standards of paragraphs (a)(1) through (a)(4)(i) and (b)(5) through (b)(9) of this section;

(10) Require until a regulatory floodway is designated, that no new construction, substantial improvements, or other development (including fill) shall be permitted within Zones A1–30 and AE on the community's FIRM, unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point within the community.

(11) Require within Zones AH and AO, adequate drainage paths around structures on slopes, to guide floodwaters around and away from proposed structures.

(12) Require that manufactured homes to be placed or substantially improved on sites in an existing manufactured home park or subdivision within Zones A–1–30, AH, and AE on the community's FIRM that are not subject to the provisions of paragraph (c)(6) of this section be elevated so that either

(i) The lowest floor of the manufactured home is at or above the base flood elevation, or

(ii) The manufactured home chassis is supported by reinforced piers or other foundation elements of at least equivalent strength that are no less than 36 inches in height above grade and be securely anchored to an adequately anchored foundation system to resist floatation, collapse, and lateral movement.

(13) Notwithstanding any other provisions of § 60.3, a community may approve certain development in Zones Al– 30, AE, and AH, on the community's FIRM which increase the water surface elevation of the base flood by more than one foot, provided that the community first applies for a conditional FIRM revision, fulfills the requirements for such a revision as established under the provisions of § 65.12, and receives the approval of the Administrator.

(14) Require that recreational vehicles placed on sites within Zones A1–30, AH, and AE on the community's FIRM either

(i) Be on the site for fewer than 180 consecutive days,

(ii) Be fully licensed and ready for highway use, or

(iii) Meet the permit requirements of paragraph (b)(1) of this section and the elevation and anchoring requirements for "manufactured homes" in paragraph (c)(6) of this section.

A recreational vehicle is ready for highway use if it is on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and security devices, and has no permanently attached additions.

(d) When the Administrator has provided a notice of final base flood elevations within Zones A1–30 and/or AE on the community's FIRM and, if appropriate, has designated AO zones, AH zones, A99 zones, and A zones on the community's FIRM, and has provided data from which the community shall designate its regulatory floodway, the community shall:

(1) Meet the requirements of paragraphs (c) (1) through (14) of this section;

(2) Select and adopt a regulatory floodway based on the principle that the area chosen for the regulatory floodway must be designed to carry the waters of the base flood, without increasing the water surface elevation of that flood more than one foot at any point;

(3) Prohibit encroachments, including fill, new construction, substantial improvements, and other development within the adopted regulatory floodway unless it has been demonstrated through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the proposed encroachment would not result in any increase in flood levels within the community during the occurrence of the base flood discharge;

(4) Notwithstanding any other provisions of § 60.3, a community may permit encroachments within the adopted regulatory floodway that would result in an increase in base flood elevations, provided that the community first applies for a conditional FIRM and floodway revision, fulfills the requirements for such revisions as established under the provisions of § 65.12, and receives the approval of the Administrator.

(e) When the Administrator has provided a notice of final base flood elevations within Zones A1–30 and/or AE on the community's FIRM and, if appropriate, has designated AH zones, AO zones, A99 zones, and A zones on the community's FIRM, and has identified on the community's FIRM coastal high hazard areas by designating Zones V1– 30, VE, and/or V, the community shall:

(1) Meet the requirements of paragraphs (c)(1) through (14) of this section;

(2) Within Zones V1–30, VE, and V on a community's FIRM, (i) obtain the elevation (in relation to mean sea level) of the bottom of the lowest structural member of the lowest floor (excluding pilings and columns) of all new and substantially improved structures, and whether or not such structures contain a basement, and (ii) maintain a record of all such information with the official designated by the community under § 59.22(a)(9)(iii);

(3) Provide that all new construction within Zones V1–30, VE, and V on the community's FIRM is located landward of the reach of mean high tide;

(4) Provide that all new construction and substantial improvements in Zones V1–30 and VE, and also Zone V if base flood elevation data is available, on the community's FIRM, are elevated on pilings and columns so that (i) the bottom of the lowest horizontal structural member of the lowest floor (excluding the pilings or columns) is elevated to or above the base flood level; and (ii) the pile or column foundation and structure attached thereto is anchored to resist flotation, collapse and lateral movement due to the effects of wind and water loads acting simultaneously on all building components. Water loading values used shall be those associated with the base flood. Wind loading values used shall be those required by applicable State or local building standards. A registered professional engineer or architect shall develop or review the structural design, specifications and plans for the construction, and shall certify that the design and methods of construction to be used are in accordance with accepted standards of practice for meeting the provisions of paragraphs (e)(4) (i) and (ii) of this section.

(5) Provide that all new construction and substantial improvements within Zones V1–30, VE, and V on the community's FIRM have the space below the lowest floor either free of obstruction or constructed with non-supporting breakaway walls, open wood lattice-work, or insect screening intended to collapse under wind and water loads without causing collapse, displacement, or other structural damage to the elevated portion of the building or supporting foundation system. For the purposes of this section, a breakway wall shall have a design safe loading resistance of not less than 10 and no more than 20 pounds per square foot. Use of breakway walls which exceed a design safe loading resistance of 20 pounds per square foot (either by design or when so required by local or State codes) may be permitted only if a registered professional engineer or architect certifies that the designs proposed meet the following conditions:

(i) Breakaway wall collapse shall result from a water load less than that which would occur during the base flood; and,

(ii) The elevated portion of the building and supporting foundation system shall not be subject to collapse, displacement, or other structural damage due to the effects of wind and water loads acting simultaneously on all building components (structural and non-structural). Water loading values used shall be those associated with the base flood. Wind loading values used shall be those required by applicable State or local building standards. Such enclosed space shall be useable solely for parking of vehicles, building access, or storage.

(6) Prohibit the use of fill for structural support of buildings within Zones V1–30, VE, and V on the community's FIRM;

(7) Prohibit man-made alteration of sand dunes and mangrove stands with-in Zones V1–30, VE, and V on

the community's FIRM which would increase potential flood damage.

(8) Require that manufactured homes placed or substantially improved with-in Zones V1–30, V, and VE on the community's FIRM on sites

(i) Outside of a manufactured home park or subdivision,

(ii) In a new manufactured home park or subdivision,

(iii) In an expansion to an existing manufactured home park or subdivision, or

(iv) In an existing manufactured home park or subdivision on which a manufactured home has incurred "substantial damage" as the result of a flood, meet the standards of paragraphs (e)(2) through (7) of this section and that manufactured homes placed or substantially improved on other sites in an existing manufactured home park or subdivision within Zones VI–30, V, and VE on the community's FIRM meet the requirements of paragraph (c)(12) of this section.

(9) Require that recreational vehicles placed on sites within Zones V1–30, V, and VE on the community's FIRM either

(i) Be on the site for fewer than 180 consecutive days,

(ii) Be fully licensed and ready for highway use, or

(iii) Meet the requirements in paragraphs (b)(1) and (e) (2) through (7) of this section.

A recreational vehicle is ready for highway use if it is on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and security devices, and has no permanently attached additions.

(f) When the Administrator has provided a notice of final base flood elevations within Zones A1–30 or AE on the community's FIRM, and, if appropriate, has designated AH zones, AO zones, A99 zones, and A zones on the community's FIRM, and has identified flood protection restoration areas by designating Zones AR, AR/A1–30, AR/ AE, AR/AH, AR/AO, or AR/A, the community shall:

(1) Meet the requirements of paragraphs (c)(1) through (14) and (d)(1) through (4) of this section.

(2) Adopt the official map or legal description of those areas within Zones AR, AR/A1–30, AR/AE, AR/AH, AR/A, or AR/AO that are designated developed areas as defined in §59.1 in accordance with the eligibility procedures under §65.14.

(3) For all new construction of structures in areas within Zone AR that are designated as developed areas and in other areas within Zone AR where the AR flood depth is 5 feet or less:

(i) Determine the lower of either the AR base flood elevation or the elevation that is 3 feet above highest adjacent grade; and

(ii) Using this elevation, require the standards of paragraphs (c)(1) through (14) of this section.

(4) For all new construction of structures in those areas within Zone AR that are not designated as developed areas where the AR flood depth is greater than 5 feet:

(i) Determine the AR base flood elevation; and

(ii) Using that elevation require the standards of paragraphs (c)(1) through (14) of this section.

(5) For all new construction of structures in areas within Zone AR/A1–30, AR/AE, AR/AH, AR/AO, and AR/A:

(i) Determine the applicable elevation for Zone AR from paragraphs (a)(3) and (4) of this section;

(ii) Determine the base flood elevation or flood depth for the underlying A1–30, AE, AH, AO and A Zone; and

(iii) Using the higher elevation from paragraphs (a)(5)(i) and (ii) of this section require the standards of paragraphs (c)(1) through (14) of this section.

(6) For all substantial improvements to existing construction within Zones AR/A1–30, AR/AE, AR/AH, AR/AO, and AR/A:

(i) Determine the A1–30 or AE, AH, AO, or A Zone base flood elevation; and

(ii) Using this elevation apply the requirements of paragraphs (c)(1) through (14) of this section.

(7) Notify the permit applicant that the area has been designated as an AR, AR/A1–30, AR/AE, AR/AH, AR/AO, or AR/A Zone and whether the structure will be elevated or protected to or above the AR base flood elevation.

[41 FR 46975, Oct. 26, 1976]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting § 60.3, see the List of Sections Affected in the Finding Aids section of this volume.

§ 60.4 Flood plain management criteria for mudslide (i.e., mudflow)-prone areas.

The Administrator will provide the data upon which flood plain management regulations shall be based. If the Administrator has not provided sufficient data to furnish a basis for these regulations in a particular community, the community shall obtain, review, and reasonably utilize data available from other Federal, State or other sources pending receipt of data from the Administrator. However, when special mudslide (i.e., mudflow) hazard area designations have been furnished by the Administrator, they shall apply.

The symbols defining such special mudslide (i.e., mudflow) hazard designations are set forth in § 64.3 of this subchapter. In all cases, the minimum requirements for mudslide (i.e., mud-flow)- prone areas adopted by a particular community depend on the amount of technical data provided to the community by the Administrator. Minimum standards for communities are as follows:

(a) When the Administrator has not yet identified any area within the community as an area having special mudslide (i.e., mudflow) hazards, but the community has indicated the presence of such hazards by submitting an application to participate in the Program, the community shall

(1) Require permits for all proposed construction or other development in the community so that it may determine whether development is proposed within mudslide (i.e., mudflow)-prone areas;

(2) Require review of each permit application to determine whether the proposed site and improvements will be reasonably safe from mudslides (i.e., mudflows). Factors to be considered in making such a determination should include but not be limited to (i) the type and quality of soils, (ii) any evidence of ground water or surface water problems, (iii) the depth and quality of any fill, (iv) the overall slope of the site, and (v) the weight that any proposed structure will impose on the slope;

(3) Require, if a proposed site and improvements are in a location that may have mudslide (i.e., mudflow) hazards, that (i) a site investigation and further review be made by persons qualified in geology and soils engineering, (ii) the proposed grading, excavations, new construction, and substantial improvements are adequately designed and protected against mudslide (i.e., mudflow) damages, (iii) the proposed grading, excavations, new construction and substantial improvements do not aggravate the existing hazard by creating either on-site or off-site disturbances, and (iv) drainage, planting, watering, and maintenance be such as

not to endanger slope stability.

(b) When the Administrator has delineated Zone M on the community's FIRM, the community shall:

(1) Meet the requirements of paragraph (a) of this section; and

(2) Adopt and enforce a grading ordinance or regulation in accordance with data supplied by the Administrator which (i) regulates the location of foundation systems and utility systems of new construction and substantial improvements, (ii) regulates the location, drainage and maintenance of all excavations, cuts and fills and planted slopes, (iii) provides special requirements for protective measures including but not necessarily limited to retaining walls, buttress fills, sub-drains, diverter terraces, benchings, etc., and (iv) requires engineering drawings and specifications to be submitted for all corrective measures, accompanied by supporting soils engineering and geology reports. Guidance may be obtained from the provisions of the 1973 edition and any subsequent edition of the Uniform Building Code, sections 7001 through 7006, and 7008 through 7015. The Uniform Building Code is published by the International Conference of Building Officials, 50 South Los Robles, Pasadena, California 91101.

[41 FR 46975, Oct. 26, 1976. Redesignated at 44 FR 31177, May 31, 1979, as amended at 48 FR 44552, Sept. 29, 1983; 49 FR 4751, Feb. 8, 1984].

§ 60.5 Flood plain management criteria for flood-related erosion-prone areas.

The Administrator will provide the data upon which flood plain management regulations for flood-related erosion-prone areas shall be based. If the Administrator has not provided sufficient data to furnish a basis for these regulations in a particular community, the community shall obtain, review, and reasonably utilize data available from other Federal, State or other sources, pending receipt of data from the Administrator. However, when special flood-related erosion hazard area designations have been furnished by the Administrator they shall apply. The symbols defining such special flood-related erosion hazard designations are set forth in § 64.3 of this sub-chapter. In all cases the minimum requirements governing the adequacy of the flood plain management regulations for flood-related erosion-prone areas adopted by a particular community depend on the amount of technical data provided to the community by the Administrator. Minimum standards for communities are as follows:

(a) When the Administrator has not yet identified any area within the community as having special flood-related erosion hazards, but the community has indicated the presence of such hazards by submitting an application to participate in the Program, the community shall

(1) Require the issuance of a permit for all proposed construction, or other development in the area of flood-related erosion hazard, as it is known to the community;

(2) Require review of each permit application to determine whether the proposed site alterations and improvements will be reasonably safe from flood-related erosion and will not cause flood-related erosion hazards or otherwise aggravate the existing flood-related erosion hazard; and

(3) If a proposed improvement is found to be in the path of flood-related erosion or to increase the erosion hazard, require the improvement to be relocated or adequate protective measures to be taken which will not aggravate the existing erosion hazard.

(b) When the Administrator has delineated Zone E on the community's FIRM, the community shall

(1) Meet the requirements of paragraph (a) of this section; and

(2) Require a setback for all new development from the ocean, lake, bay, riverfront or other body of water, to create a safety buffer consisting of a natural vegetative or contour strip. This buffer will be designated by the Administrator according to the flood-related erosion hazard and erosion rate, in conjunction with the anticipated "useful life" of structures, and depending upon the geologic, hydrologic, topographic and climatic characteristics of the community's land. The buffer may be used for suitable open space purposes, such as for agricultural, forestry, outdoor recreation and wildlife habitat areas, and for other activities using temporary and portable structures only.

[41 FR 46975, Oct. 26, 1976. Redesignated at 44 FR 31177, May 31, 1979, as amended at 48 FR 44552, Sept. 29, 1983; 49 FR 4751, Feb. 8, 1984]

§ 60.6 Variances and exceptions.

(a) The Administrator does not set forth absolute criteria for granting variances from the criteria set forth in §§ 60.3, 60.4, and 60.5. The issuance of a variance is for flood plain management purposes only. Insurance premium rates are determined by statute according to actuarial risk and will not be modified by the granting of a variance. The community, after examining the applicant's hardships, shall approve or disapprove a request. While the granting of variances generally is limited to a lot size less than one-half acre (as set forth in paragraph (a)(2) of this section), deviations from that limitation may occur. However, as the lot size increases beyond one-half acre, the technical justification required for issuing a variance increases. The Administrator may review a community's findings justifying the granting of variances, and if that review indicates a pattern inconsistent with the objectives of sound flood plain management, the Administrator may take appropriate action under § 59.24(b) of this subchapter. Variances may be issued for the repair or rehabilitation of historic structures upon a determination that the proposed repair or rehabilitation will not preclude the structure's continued designation as a historic structure and the variance is the minimum necessary to preserve the historic character and design of the structure. Procedures for the granting of variances by a community are as follows:

(1) Variances shall not be issued by a community within any designated regulatory floodway if any increase in flood levels during the base flood discharge would result;

(2) Variances may be issued by a community for new construction and substantial improvements to be erected on a lot of one-half acre or less in size contiguous to and surrounded by lots with existing structures constructed below the base flood level, in conformance with the procedures of paragraphs (a) (3), (4), (5) and (6) of this section;

(3) Variances shall only be issued by a community upon (i) a showing of good and sufficient cause, (ii) a determination that failure to grant the variance would result in exceptional hardship to the applicant, and (iii) a determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, create nuisances, cause fraud on or victimization of the public,

or conflict with existing local laws or ordinances;

(4) Variances shall only be issued upon a determination that the variance is the minimum necessary, considering the flood hazard, to afford relief;

(5) A community shall notify the applicant in writing over the signature of a community official that (i) the issuance of a variance to construct a structure below the base flood level will result in increased premium rates for flood insurance up to amounts as high as $25 for $100 of insurance coverage and (ii) such construction below the base flood level increases risks to life and property. Such notification shall be maintained with a record of all variance actions as required in paragraph (a)(6) of this section; and

(6) A community shall (i) maintain a record of all variance actions, including justification for their issuance, and (ii) report such variances issued in its annual or biennial report submitted to the Administrator.

(7) Variances may be issued by a community for new construction and substantial improvements and for other development necessary for the conduct of a functionally dependent use provided that (i) the criteria of paragraphs (a)(1) through (a)(4) of this section are met, and (ii) the structure or other development is protected by methods that minimize flood damages during the base flood and create no additional threats to public safety.

(b)(1) The requirement that each flood-prone, mudslide (i.e., mudflow)-prone, and flood-related erosion prone community must adopt and submit adequate flood plain management regulations as a condition of initial and continued flood insurance eligibility is statutory and cannot be waived, and such regulations shall be adopted by a community within the time periods specified in §§ 60.3, 60.4 or § 60.5. However, certain exceptions from the standards contained in this subpart may be permitted where the Administrator recognizes that, because of extraordinary circumstances, local conditions may render the application of certain standards the cause for severe hardship and gross inequity for a particular community. Consequently, a community proposing the adoption of flood plain management regulations which vary from the standards set forth in §§ 60.3, 60.4, or § 60.5, shall explain in writing to the Administrator the nature and extent of and the reasons for the exception request and shall include sufficient supporting economic, environmental, topographic, hydrologic, and other scientific and technical data, and data with respect to the impact on public safety and the environment.

(2) The Administrator shall prepare a Special Environmental Clearance to determine whether the proposal for an exception under paragraph (b)(1) of this section will have significant impact on the human environment. The decision whether an Environmental Impact Statement or other environmental document will be prepared, will be made in accordance with the procedures set out in 44 CFR part 10. Ninety or more days may be required for an environmental quality clearance if the proposed exception will have significant impact on the human environment thereby requiring an EIS.

(c) A community may propose flood plain management measures which adopt standards for flood-proofed residential basements below the base flood level in zones A1–30, AH, AO, and AE which are not subject to tidal flooding. Notwithstanding the requirements of paragraph (b) of this section the Administrator may approve the proposal provided that:

(1) The community has demonstrated that areas of special flood hazard in which basements will be permitted are subject to shallow and low velocity flooding and that there is adequate flood warning time to ensure that all residents are notified of impending floods. For the purposes of this paragraph flood characteristics must include:

(i) Flood depths that are five feet or less for developable lots that are contiguous to land above the base flood level and three feet or less for other lots;

(ii) Flood velocities that are five feet per second or less; and

(iii) Flood warning times that are 12 hours or greater. Flood warning times of two hours or greater may be approved if the community demonstrates that it has a flood warning system and emergency plan in operation that is adequate to ensure safe evacuation of flood plain residents.

(2) The community has adopted flood plain management measures that require that new construction and substantial improvements of residential structures with basements in zones A1– 30, AH, AO, and AE shall:

(i) Be designed and built so that any basement area, together with attendant utilities and sanitary facilities below the flood-proofed design level, is watertight with walls that are impermeable to the passage of water without human intervention. Basement walls shall be built with the capacity to resist hydrostatic and hydrodynamic loads and the effects of buoyancy resulting from flooding to the flood-proofed design level, and shall be designed so that minimal damage will occur from floods that exceed that level. The flood-proofed design level shall be an elevation one foot above the level of the base flood where the difference between the base flood and the 500-year flood is three feet or less and two feet above the level of the base flood where the difference is greater than three feet.

(ii) Have the top of the floor of any basement area no lower than five feet below the elevation of the base flood;

(iii) Have the area surrounding the structure on all sides filled to or above the elevation of the base flood. Fill must be compacted with slopes protected by vegetative cover;

(iv) Have a registered professional engineer or architect develop or review the building's structural design, specifications, and plans, including consideration of the depth, velocity, and duration of flooding and type and permeability of soils at the building site, and certify that the basement design and methods of construction proposed are in accordance with accepted standards of practice for meeting the provisions of this paragraph;

(v) Be inspected by the building inspector or other authorized representative of the community to verify that the structure is built according to its design and those provisions of this section which are verifiable.

[41 FR 46975, Oct. 26, 1976. Redesignated at 44 FR 31177, May 31, 1979, as amended at 48 FR 44543 and 44552, Sept. 29, 1983; 49 FR 4751, Feb. 8, 1984; 50 FR 36025, Sept. 4, 1985; 51 FR 30308, Aug. 25, 1986; 54 FR 33550, Aug. 15, 1989]

§ 60.7 Revisions of criteria for flood plain management regulations.

From time to time part 60 may be revised as experience is acquired under the Program and new information becomes available. Communities will be given six months from the effective date of any new regulation to revise their flood plain management regulations to comply with any such changes.

§ 60.8 Definitions.

The definitions set forth in part 59 of this subchapter are applicable to this part.

Subpart B—Requirements for State Flood Plain Management Regulations

§ 60.11 Purpose of this subpart.

(a) A State is considered a "community" pursuant to § 59.1 of this subchapter; and, accordingly, the Act provides that flood insurance shall not be sold or renewed under the Program unless a community has adopted adequate flood plain management regulations consistent with criteria established by the Administrator.

(b) This subpart sets forth the flood plain management criteria required for State-owned properties located within special hazard areas identified by the Administrator. A State shall satisfy such criteria as a condition to the purchase of a Standard Flood Insurance Policy for a State-owned structure or its contents, or as a condition to the approval by the Administrator, pursuant to part 75 of this subchapter, of its plan of self-insurance.

[41 FR 46975, Oct. 26, 1976. Redesignated at 44 FR 31177, May 31, 1979, as amended at 48 FR 44552, Sept. 29, 1983; 49 FR 4751, Feb. 8, 1984]

§ 60.12 Flood plain management criteria for State-owned properties in special hazard areas.

(a) The State shall comply with the minimum flood plain management criteria set forth in §§ 60.3, 60.4, and 60.5. A State either shall:

(1) Comply with the flood plain management requirements of all local communities participating in the program in which State-owned properties are located; or

(2) Establish and enforce flood plain management regulations which, at a minimum, satisfy the criteria set forth in §§ 60.3, 60.4, and 60.5.

(b) The procedures by which a state government adopts and administers flood plain management regulations satisfying the criteria set forth in §§ 60.3, 60.4 and 60.5 may vary from the procedures by which local governments satisfy the criteria.

(c) If any State-owned property is located in a non-participating local community, then the State shall comply with the requirements of paragraph (a)(2) of this section for the property.

§ 60.13 Noncompliance.

If a State fails to submit adequate flood plain management regulations applicable to State-owned properties pursuant to § 60.12 within six months of the effective date of this regulation, or fails to adequately enforce such regulations, the State shall be subject to suspensive action pursuant to § 59.24. Where the State fails to adequately enforce its flood plain management regulations, the Administrator shall conduct a hearing before initiating such suspensive action.

[41 FR 46975, Oct. 26, 1976. Redesignated at 44 FR 31177, May 31, 1979, as amended at 48 FR 44552, Sept. 29, 1983; 49 FR 4751, Feb. 8, 1984]

Subpart C—Additional Considerations in Managing Flood-Prone, Mudslide (i.e., Mud-flow)-Prone and Flood-Related Erosion-Prone Areas

§ 60.21 Purpose of this subpart.

The purpose of this subpart is to encourage the formation and adoption of overall comprehensive management plans for flood-prone, mudslide (i.e., mudflow)-prone and flood-related erosion- prone areas. While adoption by a community of the standards in this subpart is not mandatory, the community shall completely evaluate these standards.

§ 60.22 Planning considerations for flood-prone areas.

(a) The flood plain management regulations adopted by a community for flood-prone areas should:

(1) Permit only that development of flood-prone areas which (i) is appropriate in light of the probability of flood damage and the need to reduce flood losses, (ii) is an acceptable social and economic use of the land in relation to the hazards involved, and (iii) does not increase the danger to human life;

(2) Prohibit nonessential or improper installation of public utilities and public facilities in flood-prone areas.

(b) In formulating community development goals after the occurrence of a flood disaster, each community shall consider—

(1) Preservation of the flood-prone areas for open space purposes;

(2) Relocation of occupants away from flood-prone areas;

(3) Acquisition of land or land development rights for public purposes consistent with a policy of minimization of future property losses;

(4) Acquisition of frequently flood-damaged structures;

(c) In formulating community development goals and in adopting flood plain management regulations, each community shall consider at least the following factors—

(1) Human safety;

(2) Diversion of development to areas safe from flooding in light of the need to reduce flood damages and in light of the need to prevent environmentally incompatible flood plain use;

(3) Full disclosure to all prospective and interested parties (including but not limited to purchasers and renters) that (i) certain structures are located within flood-prone areas, (ii) variances have been granted for certain structures located within flood-prone areas, and (iii) premium rates applied to new structures built at elevations below the base flood substantially increase as the elevation decreases;

(4) Adverse effects of flood plain development on existing development;

(5) Encouragement of flood-proofing to reduce flood damage;

(6) Flood warning and emergency preparedness plans;

(7) Provision for alternative vehicular access and escape routes when normal routes are blocked or destroyed by flooding;

(8) Establishment of minimum flood-proofing and access requirements for schools, hospitals, nursing homes, orphanages, penal institutions, fire stations, police stations, communications centers, water and sewage pumping stations, and other public or quasi-

public facilities already located in the flood-prone area, to enable them to withstand flood damage, and to facilitate emergency operations;

(9) Improvement of local drainage to control increased runoff that might increase the danger of flooding to other properties;

(10) Coordination of plans with neighboring community's flood plain management programs;

(11) The requirement that all new construction and substantial improvements in areas subject to subsidence be elevated above the base flood level equal to expected subsidence for at least a ten year period;

(12) For riverine areas, requiring subdividers to furnish delineations for floodways before approving a subdivision;

(13) Prohibition of any alteration or relocation of a watercourse, except as part of an overall drainage basin plan. In the event of an overall drainage basin plan, provide that the flood carrying capacity within the altered or relocated portion of the watercourse is maintained;

(14) Requirement of setbacks for new construction within Zones V1–30, VE, and V on a community's FIRM;

(15) Requirement of additional elevation above the base flood level for all new construction and substantial improvements within Zones A1–30, AE, V1–30, and VE on the community's FIRM to protect against such occurrences as wave wash and floating debris, to provide an added margin of safety against floods having a magnitude greater than the base flood, or to compensate for future urban development;

(16) Requirement of consistency between state, regional and local comprehensive plans and flood plain management programs;

(17) Requirement of pilings or columns rather than fill, for the elevation of structures within flood-prone areas, in order to maintain the storage capacity of the flood plain and to minimize the potential for negative impacts to sensitive ecological areas;

(18) Prohibition, within any floodway or coastal high hazard area, of plants or facilities in which hazardous substances are manufactured.

(19) Requirement that a plan for evacuating residents of all manufactured home parks or subdivisions located within flood prone areas be developed and filed with and approved by appropriate community emergency management authorities.

[41 FR 46975, Oct. 26, 1976. Redesignated at 44 FR 31177, May 31, 1979, as amended at 50 FR 36025, Sept. 4, 1985; 54 FR 40284, Sept. 29, 1989]

§ 60.23 Planning considerations for mudslide (i.e., mudflow)-prone areas.

The planning process for communities identified under part 65 of this subchapter as containing Zone M, or which indicate in their applications for flood insurance pursuant to § 59.22 of this subchapter that they have mudslide (i.e., mudflow) areas, should include—

(a) The existence and extent of the hazard;

(b) The potential effects of inappropriate hillside development, including

(1) Loss of life and personal injuries, and

(2) Public and private property losses, costs, liabilities, and exposures resulting from potential mudslide (i.e., mudflow) hazards;

(c) The means of avoiding the hazard including the (1) availability of land which is not mudslide (i.e., mudflow)-prone and the feasibility of developing such land instead of further encroaching upon mudslide (i.e., mudflow) areas, (2) possibility of public acquisition of land, easements, and development rights to assure the proper development of hillsides, and (3) advisability of preserving mudslide (i.e., mudflow) areas as open space;

(d) The means of adjusting to the hazard, including the (1) establishment by ordinance of site exploration, investigation, design, grading, construction, filing, compacting, foundation, sewerage, drainage, subdrainage, planting, inspection and maintenance standards and requirements that promote proper land use, and (2) provision for proper drainage and subdrainage on public property and the location of public utilities and service facilities, such as sewer, water, gas and electrical systems and streets in a manner designed to minimize exposure to mudslide (i.e., mudflow) hazards and prevent their aggravation;

(e) Coordination of land use, sewer, and drainage regulations and ordinances with fire prevention, flood plain, mudslide (i.e., mudflow), soil, land, and water regulation in neighboring communities;

(f) Planning subdivisions and other developments in such a manner as to avoid exposure to mudslide (i.e., mudflow) hazards and the control of public facility and utility extension to discourage inappropriate development;

(g) Public facility location and design requirements with higher site stability and access standards for schools, hospitals, nursing homes, orphanages, correctional and other residential institutions, fire and police stations, communication centers, electric power transformers and substations, water and sewer pumping stations and any other public or quasi-public institutions located in the mudslide (i.e., mudflow) area to enable them to withstand mudslide (i.e., mudflow) damage and to facilitate emergency operations; and

(h) Provision for emergencies, including:

(1) Warning, evacuation, abatement, and access procedures in the event of mudslide (i.e., mudflow),

(2) Enactment of public measures and initiation of private procedures to limit danger and damage from continued or future mudslides (i.e., mudflow),

(3) Fire prevention procedures in the event of the rupture of gas or electrical distribution systems by mudslides,

(4) Provisions to avoid contamination of water conduits or deterioration of slope stability by the rupture of such systems,

(5) Similar provisions for sewers which in the event of rupture pose both health and site stability hazards and

(6) Provisions for alternative vehicular access and escape routes when normal routes are blocked or destroyed by mudslides (i.e., mudflow);

(i) The means for assuring consistency between state, area-wide, and local comprehensive plans with the plans developed for mudslide (i.e., mudflow) prone areas;

(j) Deterring the nonessential installation of public utilities and public facilities in mudslide (i.e., mudflow) prone areas.

§ 60.24 Planning considerations for flood-related erosion-prone areas.

The planning process for communities identified under part 65 of this subchapter as containing Zone E or which indicate in their applications for flood insurance coverage pursuant to § 59.22 of this subchapter that they have flood-related erosion areas should include—

(a) The importance of directing future developments to areas not exposed to flood-related erosion;

(b) The possibility of reserving flood-related erosion-prone areas for open space purposes;

(c) The coordination of all planning for the flood-related erosion-prone areas with planning at the State and Regional levels, and with planning at the level of neighboring communities;

(d) Preventive action in E zones, including setbacks, shore protection works, relocating structures in the path of flood-related erosion, and community acquisition of flood-related erosion-prone properties for public purposes;

(e) Consistency of plans for flood-related erosion-prone areas with comprehensive plans at the state, regional and local levels.

§ 60.25 Designation, duties, and responsibilities of State Coordinating Agencies.

(a) States are encouraged to demonstrate a commitment to the minimum flood plain management criteria set forth in §§ 60.3, 60.4, and 60.5 as evidenced by the designation of an agency of State government to be responsible for coordinating the Program aspects of flood plain management in the State.

(b) State participation in furthering the objectives of this part shall include maintaining capability to perform the appropriate duties and responsibilities as follows:

(1) Enact, whenever necessary, legislation enabling counties and municipalities to regulate development within flood-prone areas;

(2) Encourage and assist communities in qualifying for participation in the Program;

(3) Guide and assist county and municipal public bodies and agencies in developing, implementing, and maintaining local flood plain management regulations;

(4) Provide local governments and the general public with Program information on the coordination of local activities with Federal and State requirements for managing flood-prone areas;

(5) Assist communities in disseminating information on minimum elevation requirements for development within flood-prone areas;

(6) Assist in the delineation of riverine and coastal flood-prone areas, whenever possible, and provide all relevant technical information to the Administrator;

(7) Recommend priorities for Federal flood plain management activities in relation to the needs of county and municipal localities within the State;

(8) Provide notification to the Administrator in the event of apparent irreconcilable differences between a community's local flood plain management program and the minimum requirements of the Program;

(9) Establish minimum State flood plain management regulatory standards consistent with those established in this part and in conformance with other Federal and State environmental and water pollution standards for the prevention of pollution during periods of flooding;

(10) Assure coordination and consistency of flood plain management activities with other State, area-wide, and local planning and enforcement agencies;

(11) Assist in the identification and implementation of flood hazard mitigation recommendations which are consistent with the minimum flood plain management criteria for the Program;

(12) Participate in flood plain management training opportunities and other flood hazard preparedness programs whenever practicable.

(c) Other duties and responsibilities, which may be deemed appropriate by the State and which are to be officially designated as being conducted in the capacity of the State Coordinating Agency for the Program, may be carried out with prior notification of the Administrator.

(d) For States which have demonstrated a commitment to and experience in application of the minimum flood plain management criteria set forth in §§ 60.3, 60.4, and 60.5 as evidenced by the establishment and implementation of programs which substantially encompass the activities described in paragraphs (a), (b), and (c) of this section, the Administrator shall take the foregoing into account when:

(1) Considering State recommendations prior to implementing Program activities affecting State communities;

(2) Considering State approval or certifications of local flood plain management regulations as meeting the requirements of this part.

[51 FR 30309, Aug. 25, 1986]

§ 60.26 Local coordination.

(a) Local flood plain, mudslide (i.e., mudflow) and flood-related erosion area management, forecasting, emergency preparedness, and damage abatement programs should be coordinated with relevant Federal, State, and regional programs;

(b) A community adopting flood plain management regulations pursuant to these criteria should coordinate with the appropriate State agency to promote public acceptance and use of effective flood plain, mudslide, (i.e., mudflow) and flood-related erosion regulations;

(c) A community should notify adjacent communities prior to substantial commercial developments and large subdivisions to be undertaken in areas having special flood, mudslide (i.e., mudflow) and/or flood-related erosion hazards.

[Riegle Community Development and Regulatory Improvement Act of 1994]

TITLE V--NATIONAL FLOOD INSURANCE REFORM

National Flood Insurance Reform Act of 1994.

SEC. 501. SHORT TITLE.

42 U.S.C. 4001 note.

This title may be cited as the "National Flood Insurance Reform Act of 1994".

Subtitle A--Definitions

SEC. 511. FLOOD DISASTER PROTECTION ACT OF 1973.

(a) IN GENERAL.-- Section 3(a) of the Flood Disaster Protection Act of 1973 (42 U.S.C. 4003(a)) is amended--

(1) by striking paragraph (5) and inserting the following new paragraph:

"(5) 'Federal entity for lending regulation' means the Board of Governors of the Federal Reserve System, the Federal Deposit Insurance Corporation, the Comptroller of the Currency, the Office of Thrift Supervision, the National Credit Union Administration, and the Farm Credit Administration, and with respect to a particular regulated lending institution means the entity primarily responsible for the supervision of the institution;";

(2) in paragraph (6), by striking the period at the end and inserting a semicolon; and

(3) by inserting after paragraph (6) the following new paragraphs:

"(7) 'Federal agency lender' means a Federal agency that makes direct loans secured by improved real estate or a mobile home, to the extent such agency acts in such capacity;

"(8) the term 'improved real estate' means real estate upon which a building is located;

"(9) 'lender' means a regulated lending institution or Federal agency lender;

"(10) 'regulated lending institution' means any bank, savings and loan association, credit union, farm credit bank, Federal land bank association, production credit association, or similar institution subject to the supervision of a Federal entity for lending regulation; and

"(11) 'servicer' means the person responsible for receiving any scheduled periodic payments from a borrower pursuant to the terms of a loan, including amounts for taxes, insurance premiums, and other charges with respect to the property securing the loan, and making the payments of principal and interest and such other payments with respect to the amounts received from the borrower as may be required pursuant to the terms of the loan.".

Regulations.

(b) CONFORMING AMENDMENT.-- Section 202(b) of the Flood Disaster Protection Act of 1973 (42 U.S.C. 4106(b)) is amended by striking "Federal instrumentality described in such section shall by regulation require the institutions" and inserting "Federal entity for lending regulation shall by regulation require the regulated lending institutions described in such section, and each Federal agency lender shall issue regulations requiring the Federal agency lender,".

SEC. 512. NATIONAL FLOOD INSURANCE ACT OF 1968.

(a) IN GENERAL.-- Section 1370(a) of the National Flood Insurance Act of 1968 (42 U.S.C. 4121(a)) is amended--

(1) in paragraph (5), by striking "and" at the end;

(2) in paragraph (6), by striking the period at the end and inserting a semicolon; and

(3) by inserting after paragraph (6) the following new paragraphs:

"(7) the term 'repetitive loss structure' means a structure covered by a contract for flood insurance under this title that has incurred flood-related damage on 2 occasions during a 10-year period ending on the date of the event for which a second claim is made, in which the cost of repair, on the average, equaled or exceeded 25 percent of the value of the structure at the time of each such flood event;

"(8) the term 'Federal agency lender' means a Federal agency that makes direct loans secured by improved real estate or a mobile home, to the extent such agency acts in such capacity;

"(9) the term 'Federal entity for lending regulation' means the Board of Governors of the Federal Reserve System, the Federal Deposit Insurance Corporation, the Comptroller of the Currency, the Office of Thrift Supervision, the National Credit Union Administration, and the Farm Credit Administration, and with respect to a particular regulated lending institution means the entity primarily responsible for the supervision of the institution;

"(10) the term 'improved real estate' means real estate upon which a building is located;

"(11) the term 'lender' means a regulated lending institution or Federal agency lender;

"(12) the term 'natural and beneficial floodplain functions' means--

"(A) the functions associated with the natural or relatively undisturbed floodplain that (i) moderate flooding, retain flood waters, reduce erosion and sedimentation, and mitigate the effect of waves and storm surge from storms, and (ii) reduce flood related damage; and

"(B) ancillary beneficial functions, including maintenance of water quality and recharge of ground water, that reduce flood related damage;

"(13) the term 'regulated lending institution' means any bank, savings and loan association, credit union, farm credit bank, Federal land bank association, production credit association, or similar institution subject to the supervision of a Federal entity for lending regulation; and

"(14) the term 'servicer' means the person responsible for receiving any scheduled periodic payments from a borrower pursuant to the [2257]

terms of a loan, including amounts for taxes, insurance premiums, and other charges with respect to the property securing the loan, and making the payments of principal and interest and such other payments with respect to the amounts received from the borrower as may be required pursuant to the terms of the loan.".

(b) CONFORMING AMENDMENT.-- Section 1322(d) of the National Flood Insurance Act of 1968 (42 U.S.C. 4029(d)) is amended by striking "federally supervised, approved, regulated or insured financial institution" and inserting "regulated lending institution or Federal agency lender".

Subtitle B--Compliance and Increased Participation

Loans. Real Property.

SEC. 521. NONWAIVER OF FLOOD PURCHASE REQUIREMENT FOR RECIPIENTS OF FEDERAL DISASTER ASSISTANCE.

Section 311(b) of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5154(b)) is amended by adding at the end the following new sentence: "The requirements of this subsection may not be waived under section 301.".

SEC. 522. EXPANDED FLOOD INSURANCE PURCHASE REQUIREMENTS.

(a) IN GENERAL.-- Section 102(b) of the Flood Disaster Protection Act of 1973 (42 U.S.C. 4012a(b)) is amended to read as follows:

"(b) REQUIREMENT FOR MORTGAGE LOANS.--

"(1) REGULATED LENDING INSTITUTIONS.-- Each Federal entity for lending regulation (after consultation and coordination with the Financial Institutions Examination Council established under the Federal Financial Institutions Examination Council Act of 1974) shall by regulation direct regulated lending institutions not to make, increase, extend, or renew any loan secured by improved real estate or a mobile home located or to be located in an area that has been identified by the Director as an area having special flood hazards and in which flood insurance has been made available under the National Flood Insurance Act of 1968, unless the building or mobile home and any personal property securing such loan is covered for the term of the loan by flood insurance in an amount at least equal to the outstanding principal balance of the loan or the maximum limit of coverage made available under the Act with respect to the particular type of property, whichever is less.

"(2) FEDERAL AGENCY LENDERS.-- A Federal agency lender may not make, increase, extend, or renew any loan secured by improved real estate or a mobile home located or to be located in an area that has been identified by the Director as an area having special flood hazards and in which flood insurance has been made available under the National Flood Insurance Act of 1968, unless the building or mobile home and any personal property securing such loan is covered for the term of the loan by flood insurance in the amount provided in paragraph (1). Each Federal agency lender shall issue any regula-tions necessary to carry out this paragraph. Such regulations shall be consistent with and substantially identical to the regulations issued under paragraph (1).

Regulations.

"(3) GOVERNMENT-SPONSORED ENTERPRISES FOR HOUSING.— The Federal National Mortgage Association and the Federal Home Loan Mortgage Corporation shall implement procedures reasonably designed to ensure that, for any loan that is--

"(A) secured by improved real estate or a mobile home located in an area that has been identified, at the time of the origination of the loan or at any time during the term of the loan, by the Director as an area having special flood hazards and in which flood insurance is available under the National Flood Insurance Act of 1968, and

"(B) purchased by such entity,

the building or mobile home and any personal property securing the loan is covered for the term of the loan by flood insurance in the amount provided in paragraph (1).

"(4) APPLICABILITY.--

"(A) EXISTING COVERAGE.-- Except as provided in subparagraph (B), paragraph (1) shall apply on the date of enactment of the Riegle Community Development and Regulatory Improvement Act of 1994.

"(B) NEW COVERAGE.-- Paragraphs (2) and (3) shall apply only with respect to any loan made, increased, extended, or renewed after the expiration of the 1-year period beginning on the date of enactment of the Riegle Community Development and Regulatory Improvement Act of 1994. Paragraph (1) shall apply with respect to any loan made, increased, extended, or renewed by any lender supervised by the Farm Credit Administration only after the expiration of the period under this subparagraph.

"(C) CONTINUED EFFECT OF REGULATIONS.-- Notwithstanding any other provision of this subsection, the regulations to carry out paragraph (1), as in effect immediately before the date of enactment of the Riegle Community Development and Regulatory Improvement Act of 1994, shall continue to apply until the regulations issued to carry out paragraph (1) as amended by section 522(a) of such Act take effect.".

(b) EXEMPTION FOR SMALL LOANS.-- Section 102(c) of the Flood Disaster Protection Act of 1973 (42 U.S.C. 4012a(c)) is amended--

(1) by striking "(c) Notwithstanding" and inserting the following:

"(c) EXCEPTIONS TO PURCHASE REQUIREMENTS.--

"(1) STATE-OWNED PROPERTY.-- Notwithstanding"; and

(2) by adding at the end the following new paragraph:

"(2) SMALL LOANS.-- Notwithstanding any other provision of this section, subsections (a) and (b) shall not apply to any loan having--

"(A) an original outstanding principal balance of $5,000 or less; and

"(B) a repayment term of 1 year or less.".

SEC. 523. ESCROW OF FLOOD INSURANCE PAYMENTS.

Section 102 of the Flood Disaster Protection Act of 1973 (42 U.S.C. 4012a) is amended by adding at the end the following new subsection:

"(d) ESCROW OF FLOOD INSURANCE PAYMENTS.--

"(1) REGULATED LENDING INSTITUTIONS.-- Each Federal entity for lending regulation (after consultation and coordination [2259] with the

Financial Institutions Examination Council) shall by regulation require that, if a regulated lending institution requires the escrowin8g of taxes, insurance premiums, fees, or any other charges for a loan secured by residential improved real estate or a mobile home, then all premiums and fees for flood insurance under the National Flood Insurance Act of 1968 for the real estate or mobile home shall be paid to the regulated lending institution or other servicer for the loan in a manner sufficient to make payments as due for the duration of the loan. Upon receipt of the premiums, the regulated lending institution or servicer of the loan shall deposit the premiums in an escrow account on behalf of the borrower. Upon receipt of a notice from the Director or the provider of the insurance that insurance premiums are due, the regulated lending institution or servicer shall pay from the escrow account to the provider of the insurance the amount of insurance premiums owed.

"(2) FEDERAL AGENCY LENDERS.-- Each Federal agency lender shall by regulation require and provide for escrow and payment of any flood insurance premiums and fees relating to residential improved real estate and mobile homes securing loans made by the Federal agency lender under the circumstances and in the manner provided under paragraph (1). Any regulations issued under this paragraph shall be consistent with and substantially identical to the regulations issued under paragraph (1). Regulations.

"(3) APPLICABILITY OF RESPA.-- Escrow accounts established pursuant to this subsection shall be subject to the provisions of section 10 of the Real Estate Settlement Procedures Act of 1974.

"(4) DEFINITION.-- For purposes of this subsection, the term 'residential improved real estate' means improved real estate for which the improvement is a residential building.

"(5) APPLICABILITY.-- This subsection shall apply only with respect to any loan made, increased, extended, or renewed after the expiration of the 1-year period beginning on the date of enactment of the Riegle Community Development and Regulatory Improvement Act of 1994.".

SEC. 524. PLACEMENT OF FLOOD INSURANCE BY LENDERS.

Section 102 of the Flood Disaster Protection Act of 1973 (42 U.S.C. 4012a), as amended by the preceding provisions of this title, is further amended by adding at the end the following new subsection:

"(e) PLACEMENT OF FLOOD INSURANCE BY LENDER.--

"(1) NOTIFICATION TO BORROWER OF LACK OF COVERAGE.-- If, at the time of origination or at any time during the term of a loan secured by improved real estate or by a mobile home located in an area that has been identified by the Director (at the time of the origination of the loan or at any time during the term of the loan) as an area having special flood hazards and in which flood insurance is available under the National Flood Insurance Act of 1968, the lender or servicer for the loan determines that the building or mobile home and any personal property securing the loan is not covered by flood insurance or is covered by such insurance in an amount less than the amount required for the property pursuant to [2260] paragraph (1), (2), or (3)

of subsection (b), the lender or servicer shall notify the borrower under the loan that the borrower should obtain, at the borrower's expense, an amount of flood insurance for the building or mobile home and such personal property that is not less than the amount under subsection (b)(1), for the term of the loan.

"(2) PURCHASE OF COVERAGE ON BEHALF OF BORROWER.-- If the borrower fails to purchase such flood insurance within 45 days after notification under paragraph (1), the lender or servicer for the loan shall purchase the insurance on behalf of the borrower and may charge the borrower for the cost of premiums and fees incurred by the lender or servicer for the loan in purchasing the insurance.

"(3) REVIEW OF DETERMINATION REGARDING REQUIRED PURCHASE.--

"(A) IN GENERAL.-- The borrower and lender for a loan secured by improved real estate or a mobile home may jointly request the Director to review a determination of whether the building or mobile home is located in an area having special flood hazards. Such request shall be supported by technical information relating to the improved real estate or mobile home. Not later than 45 days after the Director receives the request, the Director shall review the determination and provide to the borrower and the lender with a letter stating whether or not the building or mobile home is in an area having special flood hazards. The determination of the Director shall be final.

"(B) EFFECT OF DETERMINATION.-- Any person to whom a borrower provides a letter issued by the Director pursuant to subparagraph (A), stating that the building or mobile home securing the loan of the borrower is not in an area having special flood hazards, shall have no obligation under this title to require the purchase of flood insurance for such building or mobile home during the period determined by the Director, which shall be specified in the letter and shall begin on the date on which such letter is provided.

"(C) EFFECT OF FAILURE TO RESPOND.-- If a request under subparagraph (A) is made in connection with the origination of a loan and the Director fails to provide a letter under subparagraph (A) before the later of (i) the expiration of the 45-day period under such subparagraph, or (ii) the closing of the loan, no person shall have an obligation under this title to require the purchase of flood insurance for the building or mobile home securing the loan until such letter is provided.

"(4) APPLICABILITY.-- This subsection shall apply to all loans outstanding on or after the date of enactment of the Riegle Community Development and Regulatory Improvement Act of 1994.".

SEC. 525. PENALTIES FOR FAILURE TO REQUIRE FLOOD INSURANCE OR NOTIFY.

Section 102 of the Flood Disaster Protection Act of 1973 (42 U.S.C. 4012a), as amended by the preceding provisions of this title, is further amended by adding at the end the following new subsections:

"(f) CIVIL MONETARY PENALTIES FOR FAILURE TO REQUIRE FLOOD INSURANCE OR NOTIFY.--

"(1) CIVIL MONETARY PENALTIES AGAINST REGULATED LENDERS.-- Any regulated lending institution that is found to have a pattern or practice of committing violations under paragraph (2) shall be assessed a civil penalty by the appropriate Federal entity for lending regulation in the amount provided under paragraph (5).

"(2) LENDER VIOLATIONS.-- The violations referred to in paragraph (1) shall include--

"(A) making, increasing, extending, or renewing loans in violation of--

"(i) the regulations issued pursuant to subsection (b) of this section;

"(ii) the escrow requirements under subsection (d) of this section; or

"(iii) the notice requirements under section 1364 of the National Flood Insurance Act of 1968; or

"(B) failure to provide notice or purchase flood insurance coverage in violation of subsection (e) of this section.

"(3) CIVIL MONETARY PENALTIES AGAINST GSE'S.--

"(A) IN GENERAL.-- If the Federal National Mortgage Association or the Federal Home Loan Mortgage Corporation is found by the Director of the Office of Federal Housing Enterprise Oversight of the Department of Housing and Urban Development to have a pattern or practice of purchasing loans in violation of the procedures established pursuant to subsection (b)(3), the Director of such Office shall assess a civil penalty against such enterprise in the amount provided under paragraph (5) of this subsection.

"(B) DEFINITION.-- For purposes of this subsection, the term 'enterprise' means the Federal National Mortgage Association or the Federal Home Loan Mortgage Corporation.

"(4) NOTICE AND HEARING.-- A penalty under this subsection may be issued only after notice and an opportunity for a hearing on the record.

"(5) AMOUNT.-- A civil monetary penalty under this subsection may not exceed $350 for each violation under paragraph (2) or paragraph (3). The total amount of penalties assessed under this subsection against any single regulated lending institution or enterprise during any calendar year may not exceed $100,000.

"(6) LENDER COMPLIANCE.-- Notwithstanding any State or local law, for purposes of this subsection, any regulated lending institution that purchases flood insurance or renews a contract for flood insurance on behalf of or as an agent of a borrower of a loan for which flood insurance is required shall be considered to have complied with the regulations issued under subsection (b).

"(7) EFFECT OF TRANSFER ON LIABILITY.-- Any sale or other transfer of a loan by a regulated lending institution that has committed a violation under paragraph (1), that occurs subsequent to the violation, shall not affect the liability of the transferring lender with respect to any penalty under this subsection. A lender shall not be liable for any violations relating [2262] to a

loan committed by another regulated lending institution that previously held the loan

"(8) DEPOSIT OF PENALTIES.-- Any penalties collected under this subsection shall be paid into the National Flood Mitigation Fund under section 1367 of the National Flood Insurance Act of 1968.

"(9) ADDITIONAL PENALTIES.-- Any penalty under this subsection shall be in addition to any civil remedy or criminal penalty otherwise available.

"(10) STATUTE OF LIMITATIONS.-- No penalty may be imposed under this subsection after the expiration of the 4-year period beginning on the date of the occurrence of the violation for which the penalty is authorized under this subsection.

"(g) OTHER ACTIONS TO REMEDY PATTERN OF NONCOMPLIANCE.--

"(1) AUTHORITY OF FEDERAL ENTITIES FOR LENDING REGULATION.-- A Federal entity for lending regulation may require a regulated lending institution to take such remedial actions as are necessary to ensure that the regulated lending institution complies with the requirements of the national flood insurance program if the Federal agency for lending regulation makes a determination under paragraph (2) regarding the regulated lending institution.

"(2) DETERMINATION OF VIOLATIONS.-- A determination under this paragraph shall be a finding that--

"(A) the regulated lending institution has engaged in a pattern and practice of noncompliance in violation of the regulations issued pursuant to subsection (b), (d), or (e) or the notice requirements under section 1364 of the National Flood Insurance Act of 1968; and

"(B) the regulated lending institution has not demonstrated measurable improvement in compliance despite the assessment of civil monetary penalties under subsection (f).".

SEC. 526. FEES FOR DETERMINING APPLICABILITY OF FLOOD INSURANCE PURCHASE REQUIREMENTS.

Section 102 of the Flood Disaster Protection Act of 1973 (42 U.S.C. 4012a) as amended by the preceding provisions of this title, is further amended by adding at the end the following new subsection:

"(h) FEE FOR DETERMINING LOCATION.-- Notwithstanding any other Federal or State law, any person who makes a loan secured by improved real estate or a mobile home or any servicer for such a loan may charge a reasonable fee for the costs of determining whether the building or mobile home securing the loan is located in an area having special flood hazards, but only in accordance with the following requirements:

"(1) BORROWER FEE.-- The borrower under such a loan may be charged the fee, but only if the determination--

"(A) is made pursuant to the making, increasing, extending, or renewing of the loan that is initiated by the borrower;

"(B) is made pursuant to a revision or updating under section 1360(f) of the floodplain areas and flood-risk zones or

publication of a notice or compendia under subsection [2263] (h) or (i) of section 1360 that affects the area in which the improved real estate or mobile home securing the loan is located or that, in the determination of the Director, may reasonably be considered to require a determination under this subsection; or

"(C) results in the purchase of flood insurance coverage pursuant to the requirement under subsection (e)(2).

"(2) PURCHASER OR TRANSFEREE FEE.-- The purchaser or transferee of such a loan may be charged the fee in the case of sale or transfer of the loan.".

SEC. 527. NOTICE REQUIREMENTS.

Section 1364 of the National Flood Insurance Act of 1968 (42 U.S.C. 4104a) is amended to read as follows:

"NOTICE REQUIREMENTS

"SEC. 1364. (a) NOTIFICATION OF SPECIAL FLOOD HAZARDS.--

"(1) REGULATED LENDING INSTITUTIONS.-- Each Federal entity for lending regulation (after consultation and coordination with the Financial Institutions Examination Council) shall by regulation require regulated lending institutions, as a condition of making, increasing, extending, or renewing any loan secured by improved real estate or a mobile home that the regulated lending institution determines is located or is to be located in an area that has been identified by the Director under this title or the Flood Disaster Protection Act of 1973 as an area having special flood hazards, to notify the purchaser or lessee (or obtain satisfactory assurances that the seller or lessor has notified the purchaser or lessee) and the servicer of the loan of such special flood hazards, in writing, a reasonable period in advance of the signing of the purchase agreement, lease, or other documents involved in the transaction. The regulations shall also require that the regulated lending institution retain a record of the receipt of the notices by the purchaser or lessee and the servicer. Records.

"(2) FEDERAL AGENCY LENDERS.-- Each Federal agency lender shall by regulation require notification in the manner provided under paragraph (1) with respect to any loan that is made by the Federal agency lender and secured by improved real estate or a mobile home located or to be located in an area that has been identified by the Director under this title or the Flood Disaster Protection Act of 1973 as an area having special flood hazards. Any regulations issued under this paragraph shall be consistent with and substantially identical to the regulations issued under paragraph (1). Regulations.

"(3) CONTENTS OF NOTICE.-- Written notification required under this subsection shall include--

"(A) a warning, in a form to be established by the Director, stating that the building on the improved real estate securing the loan is located, or the mobile home securing the loan is or is to be located, in an area having special flood hazards;

"(B) a description of the flood insurance purchase requirements under section 102(b) of the Flood Disaster Protection Act of 1973;

APPENDIX C

VEGETATION MANAGEMENT INFORMATION

LANDSCAPING FOR FIRESAFETY: Plants Native to the Santa Monica Mountains October 1999

This list of native plants useful in firewise landscaping was prepared in an effort to sustain local biodiversity, reduce erosion, sedimentation and slope failure, and still reduce fuel loads around structures in the Urban/Wildland Interface zone.

The plants listed include some more flammable species that are important for their role in stabilizing slopes. Spacing of these more flammable plants, and maintenance to reduce accumulated deadwood is required. Breaking the continuity of the fuel should be the guiding principle of your landscaping.

Environmentally sensitive fuel modification includes not only reduction of flammable vegetation around a house, but also a thoughtful plan for long-term management. It is possible to reduce the need for yearly brush clearance by converting slopes of flash fuels like grasses, to less demanding mosaics of native perennials and shrubs.

Mulch placed on a slope or around trees and shrubs can suppress weeds, decrease erosion, maintain favorable soil temperature and moisture and increase the health of the plants. A layer of medium size chips up to 6 inches deep is recommended.

Additional native plant species that have the following desirable characteristics would also be appropriate.

- extensive root systems for controlling erosion and holding slopes
- ability to store water in leaves and stems, can withstand drought
- produce limited dead material and can withstand severe pruning
- low levels of volatile oils or resins, and can resprout after a fire.

The following list has been compiled from several sources of plants recommended for firesafe landscaping. For more information see:

Beall, Fred. 1999. Defensible Space Landscaping in the Urban/Wildland Interface. UC Berkeley Forest Products Laboratory.

County of Los Angeles Fire Department. 1998. Fuel Modification Plan Guidelines for Projects located in Fire Zone 4 or Very high Fire Hazard Severity Zones.

County of Los Angeles Fire Department. 1998. Firewise Landscaping.

CNPS. 1992. Landscaping Plants for Use in the Santa Monica Mountains.

LANDSCAPING FOR FIRESAFETY: Plants Native to the Santa Monica Mountains

GROUNDCOVERS

Common Name	Scientific Name	Flammability	Habitat	Exposure
CA fuchsia	*Epilobium californica*	low	Oak wood, chap	sun, part shade
CA poppy	*Eschscholzia californica*	med	chap	sun
Catalina perfume*	*Ribes viburnifolium*	med	chap	sun, part sun
Cinquefoil	*Potentilla glandulosa*	med	chap	sun
Coreopsis	*Coreopsis gigantea*	low-med	chap, coast	sun, part sun
Coyote brush	*Baccharis pilularis*	low	chap	sun
Evening primrose	*Oenethera elata*	low-med	chap	sun, part sun
Fleabane	*Erigeron foliosus*	low	chap	sun
Live forever	*Dudleya sp.*	low	rock faces	sun
Mahonia	*Mahonia repens*	low	riparian	shade
Manzanita*	*Artcostaphylos sp.*	low-med	chap	sun, part sun
Rockrose*	*Cistus sp.*	low	open	sun
Sagebrush*(prostate)	*Artemesia californica*	low-med	oak wood, chap	sun
Shrubby butterweed	*Senecio douglasii*	low	oak, wood, chap	sun
Yarrow	*Achillea millifolium*	low	rock faces	sun, part shade

css=coastal sage scrub

PERENNIAL HERBS

Common Name	Scientific Name	Flammability	Habitat	Exposure
Beach suncups	*Cammisonia cheiranthifolia*	low	coastal dunes	sun
Bladderpod	*Isomeris arborea*	low-med	css	sun
Blue eyed grass	*Sisyrinchium bellum*	low	open	sun
Butterfly bush	*Buddleia davidii*	low-med	css, oak wood	sun, part sun
CA blackberry	*Rubus ursinus*	med	chap, riparian	shade, part sun
CA rose	*Rosa californica*	low	chap, riparian	part sun, sun
Chaparral curranat	*Ribes malvaceum*	med	chap	sun
Chaparral honeysuckle	*Lonicera subspicata*	low-med	chap, oak wood	shade
Coast sunflower	*Encelia californica*	med	css, chap	sun
Fuchia flowering gooseberry	*Ribes speciosum*	med	chap, riparian	part sun, shade
Giant Wild rye	*Leymus condensatus*	med	chap, riparian	sun, part sun
Golden currant	*Ribes aureum*	med	chap, oak wood	part sun
Golden eyed grass	*Sisyrinchium californicum*	low	open	sun
Gum plant	*Grindelia robusta*	low	chap, css	sun
Heart-leaved penstamon	*Keckellia cordifolia*	low-med	css, chap	sun, part sun
Hummingbird sage	*Salvia spathacea*	low	oak wood, chap	shade
Iris	*Iris douglasiana*	low	riparian	sun, part sun
Lupines	*Lupinus sp.*	low-med	css, chap	sun, part sun
Mahonia	*Mahonia pinnata*	med	riparian	shade
Matilija poppy	*Rommneya coulteri*	med	css, chap	sun
Meadow rue	*Thalicatrum fendleri*	low	oak wood, riparian	shade
Monkey flowers	*Mimulus sp.*	low-med	chap, oak wood	sun, part sun
Nightshade	*Solanum sp.*	low	chap, oak wood	sun, part shade
Our Lord's candle	*Yucca whipplei*	med	chap, css	sun

css=coastal sage scrub

PERENNIAL HERBS (cont.)

Common Name	Scientific Name	Flammability	Habitat	Exposure
Rush	*Juncus textilis*	low-med	riparian	shade, part sun
Scarlet larkspur	*Delphinium cardinale*	low	chap, css	sun, part shade
Sea lavander	*Limonium californicum*	low	css	sun,part sun
Snowberry	*Symphoricarpos mollis*	low	chap, oak wood	shade
St. Catherine's Lace	*Eriognum giganteum*	med	css	sun
Wild grape	*Vitus girdiana*	low	riparian	shade, part sun
Wooly blue curls	*Trichostema lanatum*	med	chap, oak wood	sun
Yerba santa	*Eriodictyon crassifolium*	low	chap, css	sun

css=coastal sage scrub

TREES AND SHRUBS

Common Name	Scientific Name	Flammability	Height	Spread
Alder	*Alnus rhombifolia*	low	50-90	40+
Ash	*Fraxinus velutina*	med	20-50	30-50
Big Leaf Maple	*Acer macrophyllum*	med	30-95	30-95
Big-pod Ceanothus	*Ceanothus megacarpus*	high	<15	10-May
Box Elder*	*Acer negundo californicum*	med	<60	<60
Buck-brush	*Ceanothus cuneatus*	high	<51	10-May
Buckeye*	*Aesculus californica*	low-med	20+	30+
CA Bay	*Umbellularia californica*	low-med	30-75	30-75
CA Walnut	*Junglans californica*	low-med	25-35	30-40
Coast Live Oak	*Quercus agrifolia*	low	30-70	70+
Coffeeberry	*Rhamnus californica*	med	<15	<15
Cottonwood	*Populus fremontii*	low	40-60	40-60
Elderberry	*Sambucus mexicana*	low/med	<20	<20
Flannelbush*	*Fremontedendron sp.*	low	<20	<10
Greenbark Ceanothus	*Ceanothus spinosus*	high	<15	<15
Hairy-leaved Ceanothus	*Ceanothus oliganthus*	high	<15	<15
Hoary-leaved Ceanothus	*Ceanothus crassifolius*	high	<15	<15
Holly leaf Cherry	*Prunus ilicifolia*	low-med	<20	<15
Laurel Sumac	*Malosma laurina*	high	<20	<20
Lemonade Berry	*Rhus integrifolia*	med high	<15	<15
Manzanita	*Arctostaphylos glauca*	med high	<15	<15
Mountain mahagany	*Cercocarpus betuloides*	med -high	<15	<15
Prickly pear cactus	*Opuntia littoralis*	low	<15	<15
Quailbush	*Atriplex lentiformis*	low	<15	<15
Redbud*	*Cercis occidentalis*	low	<20	<20
Scrub Oak	*Quercus berberidifolia*	low-med	<20	<20
Sugarbush	*Rhus ovata*	med high	<20	<20
Sycamore	*Platanus racemosa*	low	50-100	50-100
Toyon	*Heteromeles arbutifolia*	low-med	15-30	15-30
Tree Mallow	*Lavatera assurgentiflora*	low	<15	<15
Valley Oak	*Quercus lobata*	low	70+	70+
Willows	*Salix sp.*	low	20-40	20-30

NATIVE PLANTS FOR SLOPE STABILIZATION AND EROSION CONTROL

Scientific Name	Common Name	slope grade	exposure sun	exposure part-sun	exposure shade	soil type	height/width feet
GRASSES							
Bromus carinatus	Ca. Brome	all	X	X		all	2/1
Leymus condersatus	Giant Wild Rye	all	X	X	X	all	4/10
Muhlenbergia rigens	Deergrass	gentle/mod		X	X	all	5/6
Stipa pulchra	Needlegrass	all slopes	X			wide range	2-3/2
Sisyrinchium bellum	Blue-eye grass	gentle/mod.	X	X		heavy, sandy	1/1
Sisyrinchium californicum	Golden eye grass	gentle/mod	X	X		heavy, sandy	1/1
GROUND COVERS							
Arctostaphylos sp.	"Point Reyes"	all	X	X		all	1/4
Baccharis pilularis	Coyotebush	all	X	X		all	2/10
Ceanothus sp.	"Pt. Reyes"	all	X	X		heavy, sandy	2/6
	"Carmel Creeper"	all	X	X		heavy, sandy	2/6
Cistus sp.	Rockrose	all	X	X		well drained	3/3
Eriophyllum lanatum	Golden Yarrow	all	X	X		well drained	1/2
Fragaria californica	Ca. Strawberry	gentle/mod.			X	heavy, sandy	4"/flat
Heuchera sp.	Alum Root	moderate	X	X		heavy, sandy	2/1
Leptodactylon californica	Prickly phlox	all	X	X	X	sandy	2/1
Ribes viburnifolium	Evergreen currant	all	X	X	X	all	5/3
Salvia sonomensis	Creeping sage	gentle/mod.	X	X		heavy, sandy, alkaline	flat/2
Sedum sp.	Stonecrop	gentle/mod.	X	X		well drained, poor	flat/1
Zauschneria californica	Ca. Fuschia	gentle/mod.	X	X		heavy, sandy, alkaline	2/4

NATIVE PLANTS FOR SLOPE STABILIZATION AND EROSION CONTROL (cont.)

Scientific Name	Common Name	slope grade	sun	exposure part-sun	shade	soil type	height/width feet
SHRUBS							
Arctostphylos glauca	Big bay Manzanita	med/steep	X			heavy, sandy	15/10
Artemisia californica	Sagebrush	med./steep	X			heavy, sandy	4/3
Ceanothus sp.	"Joyce Coulter"	all	X	X		sandy, well drained	5/8
Heteromeles arbutifolia	Toyon	all	X	X		all	10-15/8
Lavantera assurgentiflora	Lavantera	all	X			all	6/6
Lonicera sp.	Honeysuckle	all	X	X		all	6/3
Malacothamnus fascifulatus	Bush mallow	all	X	X		all	10/6
Malosma laurina	Laurel sumac	all	X	X		heavy, sandy	15/10
Prunus ilicifolia	Holly leaf Cherry	all	X	X		all	15/12
Rhamnus ilicifolia	Hollyleaf Redberry	all	X			all	6/5
Rhus sp.	Sugar Bush	all	X	X		all	10/10
Yucca whippili	Our Lords Candle	all	X	X		all	3/3
TREES							
Cercis occidentalis	Redbud	all		X	X	all	20/15
Fremontodendron sp.	Flannel bush	all	X			heavy, sandy	15/10
Juglans californica	Ca. Walnut	all	X	X		all	30/20
Juniperus californicum	Ca. Juniper	all	X			dry, well drained	35/15
Populus fremontii	Fremont Cottonwood	all	X	X		riparian	50/20
Quercus agrifolia	Ca. Live Oak	all	X	X		all	50/40
Quercus lobota	Valley Oak	all	X			well drained	75/40
Sambucus mexicana	Elderberry	all	X	X		all	15/10

A Few Tips For Working With Natives:

- Most of these plants require watering to get them established. Usually once or twice a month is best. Too much water makes for leggy plants and can lead to disease problems.
- It is important to remove all weeds from your planting site before putting in natives. The natives do best when they don't have to compete with the weeds to get established.
- A mixture of groundcovers, shrubs and trees is the best combination for erosion control and slope stabilization. The various root depths really do a great job holding up a slope.

Critical areas for stabilization are gullies, cuts, fills, streambanks, bare soil, areas of disturbed soils, land denuded by fire or flood. Erosion is not always seen. Many more tons of soil erode from a bare hillside than from a huge gully without the hillside showing signs of erosion. Why? Five tons of soil lost from an acre is only about the thickness of four sheets of paper. the only time we notice this kind of erosion is when storm waters deposit the soil on our streets or yards.

We can't completely stop erosion, but often we can reduce it considerably by proper planting or structural measures designed to promote slope stability. A combination of both often is the best solution to problems on extremely steep slopes or along streambanks. Some structural measures to consider would include:

drainage ditches terracing check dams gabions

Used together stabilization can prevent slope failure, minimize streambank erosion and failure and protect downslope or downstream structures. The Resource Conservation District would be happy to help you determine what would work best for your situation. Become a cooperator today! Forms available from the **Resource Conservation District of the Santa Monica Mountains, 122 N. Topanga Canyon Blvd., Topanga, 310-455-1030.**

PRUNING GUIDELINES

You know you've done a good job when you've removed 15% or less living wood and it's difficult to tell the tree has been pruned.

Why should you prune?

- To reduce fuel available to fire.
- To limit size of the plant. (Best to plant the right tree in the right spot so that this is minimal)
- To enhance plant health.
- To enhance plant structure. (Remove crowded, crossed branches, weak branch crotch angles, establish main leader)
- To remove suckers or watersprouts. (But why are they present? Possibly due to previous poor pruning or disease. Check first for problems)
- To improve or maintain flowering and fruiting.
- For safety—branches overhanging walkways, obstruct vision, low hanging.
- To retrain tree that has been poorly pruned previously.

When should you prune?

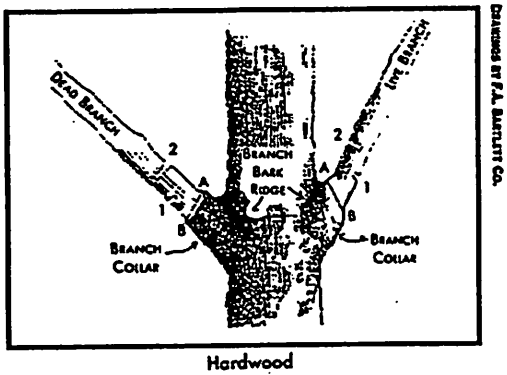
- Deadwood can be removed at any time.
- For deciduous trees, its best to prune before the new leaves emerge, after tree
- is in full leaf or during dormant period.
- For conifers, timing is not crucial, although sap run is less during winter months before new candles (shoots) appear.
- For flowering trees, prune in spring following blooming.
- Fruit trees are best pruned either just prior to flowering/leafing out or just after fruit sets.

What should you prune?

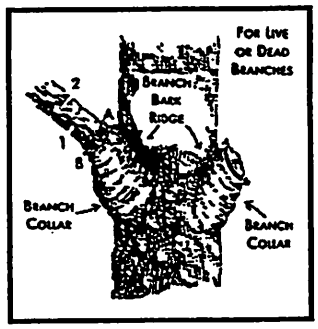
- Deadwood
- Branches that cross each other.
- Broken or damaged branches.
- Branches rubbing against other trees or structures. (The Fire Dept. requires a 10' clearance from all structures, especially chimneys!)
- Diseased branches. (However, be sure to clean your clippers in solution of 1-gallon water with 3 tbs. Clorox between cuts so as not to spread disease.)

How should you prune?

- For large branches, especially those that cannot be reached from the ground, it is usually best to call a professional.
- For smaller, accessible branches, use sharp tools and make cuts according to the diagrams below. (Taken from Pruning Techniques, Brooklyn Botanic Gardens)
- A permit is required to prune living limbs larger than 2" diameter from California Oak trees.
- (Obtained from LA Co. Regional Planning (213-974-6411), fee starts at $308)
- LA Co. Foresters may waive fee in some situations, i.e. if tree presents a hazard.
- Call them when in doubt if you qualify. (818-222-1108)



Hardwood



Conifer

CHOOSING A PROFESSIONAL TO PRUNE YOUR TREE

Trees may add as much as 20% to the value of your property. They live a long time if properly cared for. Most trees require minimum pruning or other maintenance when it's done correctly. They enhance your environment by moderating temperatures, preventing run-off and erosion, providing wildlife habitat and aesthetic enjoyment to your surroundings.

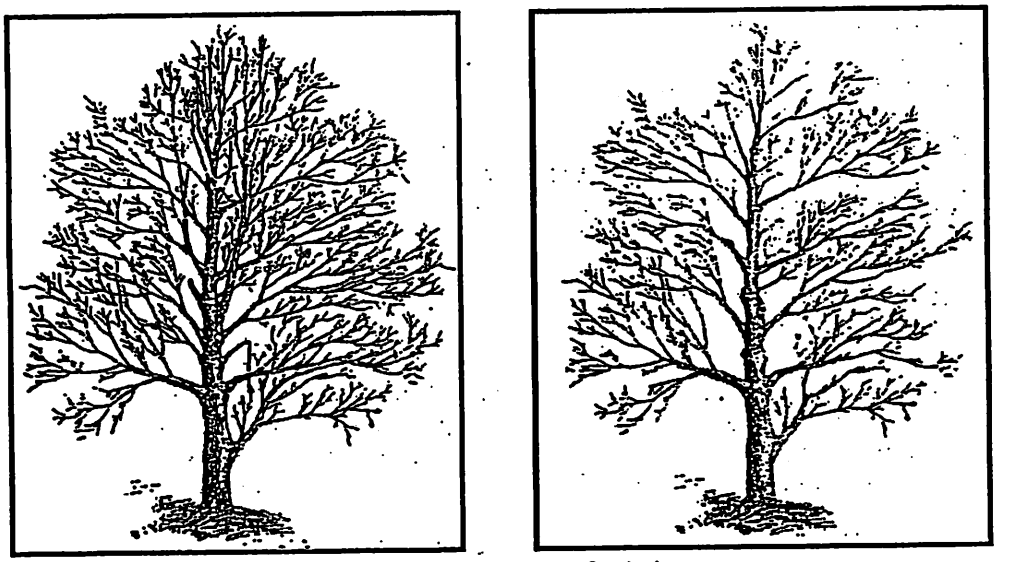
Remember, you get what you pay for! Experienced tree care professionals cost more than a gardener with a chainsaw because they know more!

Be sure to:

- ask for evidence of contractors licence, certificate of insurance and workmans compensation. (CA law requires that arborists doing tree work worth more than $350.00 have a contractors licence and insurance.)
- arborist certification and training (International Society of Arboriculture or National Arborist Association membership)
- clarify in writing what specific work will be done, how cleanup will be dealt with, fee for services.

Beware of:

- climbing with spikes—this is only done when a tree is to be removed
- topping—this can kill your tree, create a hazard by encouraging weakly attached shoots, and looks terrible!
- poorly equipped personel—safety while climbing trees is critical! Pros have proper saddles and ropes, a person on the ground and wear appropriate protective clothing when handling chainsaws or chemicals.



(Diagrams taken from Pruning Techniques, Brooklyn Botanic Garden)

For more information:

PRUNING TECHNIQUES. 1991. Brooklyn Botanic Garden Record. 96 pgs.

WESTERN GARDEN BOOK. 1995. Sunset Press

ISA PRUNING STANDARDS. International Society of Arboriculture.

MODERN ARBORICULTURE. 1991. Alex Shigo. 423 pgs.

Provided as a courtesy by the Resource Conservation District of the Santa Monica Mountains.

COMPATIBLE NATIVE PLANTS AROUND OAKS IN THE SANTA MONICA MOUNTAINS

Recommended by the California Native Plant Society

TREES	
Cercis occidentalis	Western Redbud
Heteromeles arbutifolia	Toyon
Juglans californica	California Walnut
Quercus agrifolia	Coast Live Oak
Quercus lobata	Valley Oak
Sambucus mexicana	Mexican Elderberry+
Umbellularia californica	CA Bay

SHRUBS	
Adenostoma fasciculatum	Chamise
Amorpha californica	False Indigo
Artemisia californica	California Sagebrush
Baccharis pilularis consanguina	Coyote Bush*
Baccharis salicifolia	Summer Holly
Ceanothus sp.	California Lilac
Cercocarpus bettuloides	Mountain Mahogany
Diplacus (Mimulus) longiflorus	So. Bush Monkey Flower
Erigonium fasciculatum	California Buckwheat*
Isomeris arborea	Bladder-pod
Malosma laurina	Laurel Sumac
Prunis ilicifolia	Holly-leaf Cherry
Quercus dumosa	Scrub Oak
Quercus wizlizenii	Interior Live Oak
Rhamnus californica	California Coffeeberry
Rhamnus crocea	Redberry
Rhus ovata	Sugar Bush
Rhus trilobata	Squaw Bush
Ribes aureum	Golden Current
Ribes californicum	Hillside Current
Ribes malvaceum	Chaparral Current+
Ribes speciosum	Fuchsia-flowering Gooseberry
Salvia apiana	White Sage
Salvia mellifera	Black Sage
Symphoricarpus mollis	Snowberry

* = ground cover + = unusual and colorful fruits

COMPATIBLE NATIVE PLANTS AROUND OAKS IN THE SANTA MONICA MOUNTAINS (cont.)

PERENNIALS	
Achillea millefolium	Yarrow
Asclepias eriocarpa	Indian Milkweed
Asclepias fascicularis	Narrow-leaved Milkweed
Delphinium parryi	Blue Larkspur
Delphinium patens	Blue Larkspur
Dodecatheon clevelandii	Shooting Star
Dudleya cymosa	Lax Dudleya
Dudleya lanceolata	Lance Live Forever
Dudleya pulverulenta	Chalk Dudleya
Encelia californica	California Bush Sunflower
Erigonium elongatum	Wand Buckwheat
Eschscholzia californicum	California Poppy
Gnaphalium californicum	California Everlasting
Grindelia robusta	Gum Plant
Keckiella (Penstemon) cordifolia	Climbing Penstemon
Lupinus longiflorus	Bush Lupine
Penstemon centranthifolius	Scarlet Bugler
Penstemon heterophyllus	Foothill Penstemon
Potentilia glandulosa	Sticky Cinquefoil
Salvia spathacea	Hummingbird Sage*
Satureja douglasii	Yerba Buena
Scophularia californica	California Figwort
Scutellaria tuberosa	Skull Cap
Sidalcea malvaeflora	Common Checkerbloom
Sisyrinchium bellum	Blue-eyed Grass
Solanum xantii	Purple Nightshade
Thalictrum polycarpum	Meadow Rue*
Viola pedunculata	Johnny Jump Up
Zauschneria californica	California Fuschia*

ANNUALS	
Calandrina ciliata menziesii	Red Maids
Clarkia bottae	Clarkia
Clarkia unguiculata	Elegant Clarkia
Collinsia heterophylla	Chinese Houses
Eschscholzia caespitosa	Collarless Poppy
Lasthenia chrysostoma	Gold Fields
Layia platyglossa campenstris	Tidy Tips
Lupinus succulentus	Succulent Lupine
Nemophilia menziesii	Baby Blue Eyes
Orthocarpus densiflorus	Owls Clover
Orthocarpus purpurascens	Owls Clover
Platystemon californicum	Cream Cups
Salvia columbariae	Chia

* = ground cover + = unusual and colorful fruits

COMPATIBLE NATIVE PLANTS AROUND OAKS IN THE SANTA MONICA MOUNTAINS (cont.)

BULBS	
Bloomeria crocea	Golden Stars
Brodiaea (Dichelostemma) pulchella	Blue Dicks
Calochortus albus	White Globe Lily
Calochortus catalinae	Catalina Mariposa Lily
Calochortus clavatus	Yellow Mariposa
Zigadenus fremontii	Star Lily
FERNS	
Dryopteris arguta	Downy Wood Fern
Pellaea mucronata	Bird's Foot Fern
Pityrogramma triangularis	Goldback Fern
Polypody californicum	California Polypody
PERENNIAL GRASSES	
Agrostis diegoensii	San Diego Bent Grass
Bromus carinatus	California Brome
Bromus pseudolaevipes	Woodland Brome
Elymus condensatus	Giant Wild Rye
Elymus glaucus	Western Rye Grass
Elymus triticoides	Creeping Wild Rye
Melica imperfecta	Chaparral Melica
Muhlenbergia rigens	Showy Deer Grass
Stipa cernua	Spear Grass
Stipa lepida	Needlegrass
Stipa pulchra	Purple Needlegrass
VINES	
Lathyrus laetiflorus	Wild Sweet Pea

* = ground cover + = unusual and colorful fruits

NATIVE PLANT GARDENING TIPS

1. Design garden in "area" according to site conditions:
    a. Shade plants under oaks and other trees
    b. Plants for full sun
    c. Plants that will have water (either irrigation or wet spots)
    d. Plants for dry areas with no irrigation/water

2. Check size of mature plant and space the planting accoringly! Many native plants spread!

3. Plant in Fall to take advantage of winter rains and cool temperatures for root establishment. Seeds in particular benefit from the rainy season.

4. Cut back matilija poppies, mugwort, CA sagebrush and CA fuchsia in the fall to maintain more manicured garden look. Some sages also benefit from some pruning.

5. Gather seeds from your own garden to share with others and spread further. Some native annuals like elegent clarkia, monkey flower, poppies and lupine grow really well from seed.

6. Some natives are dormant in the dry season, but not dead! Be sure to look carefully before removing a plant to be sure you are taking one that is truly dead, not just dormant!

7. Try the plants that spread with rhizomes like hummingbird sage, snowberry and boykinias. One plant can eventually cover a whole hillside.

8. Don't be frustrated when the plants take time to spread. Natives can be slow to start, but the payoff in the long run is fantastic!

9. Don't miss the fall California native Plant Sale for great plants and help from the pros.

SOURCES OF NATIVE PLANTS AND SEEDS FOR EROSION CONTROL IN TOPANGA

PLANTS

Matilija Nursery
8225 Waters Rd
Moorpark, CA 93021
805-484-0551

Las Pilatas Nursery
Las Pilatas Road
Santa Margarita, CA 93453
805-684-0436

Sperling Nursery
Calabasas Road
Calabasas, CA 91302
805-682-4726

Theodore Payne Foundation
10459 Tuxford Street
Sun Valley, CA 91352
818-768-1802

Tree of Life Nursery
33201 Ortega Highway
San Juan Capistrano, CA 92693
949-728-0685

SEEDS

Albrights Seed
487 Dawson Drive
Camarrillo, CA 93012

S & S Seeds
P.O. Box 1275
Carpenteria, CA 93013

Santa Barbara Botanic Garden
1212 Mission Canyon Rd
Santa Barbara, CA 93105

APPENDIX D

DRAINAGE AND EROSION CONTROL

On-Site Drainage Retention Strategies

For years the prevailing way of handling drainage on a property was to direct it downhill and off-site through a variety of methods. As the number of buildings and the amount of impervious surfaces grew, so did the problem with the stormwater runoff. The runoff from the built environment caused a dramatic increase in the amount of water flowing into the drainages, thus accelerating erosion and scouring in the creek channels. The quality of the stormwater was also a problem, as runoff from storm events carried with it everything from car oil, to septic wastes.

In 2001, the Los Angeles Regional Water Quality Control Board ruled that retaining the runoff from the first 3/4-inch rainstorm on-site would substantially reduce non-point source pollution in our waters. This reflects a general trend in recognizing that management of drainage from the built environment could provide numerous benefits when integrated with a thoughtful site design. The Permaculture movement, as well as many sustainable design processes has numerous plans to draw from. This document is merely meant to get you started in thinking about how to capture and use the stormwater runoff from your property more productively.

Integrated Site Design

Fire Protection
In Topanga, fire protection is a real concern. Collecting rainwater and storing it on site in cisterns, old septic tanks, water features like ponds and pools, provides a ready source of water to fight a fire. The addition of a small generator, pump or even one of the foam or gel systems can significantly increase the protection of a property.

Irrigation
Depending on the size of the collection and storage areas, it could be possible to provide supplemental landscape irrigation from rainwater.

Landscaping
The use of ponds and pools in the landscape can add tremendously to the aesthetics of a property. In addition to providing visual benefits, these resources could also be used during a fire. The use of infiltration basins and green berms to capture driveway or road runoff is another great idea that enhances groundwater recharge.

Storage Ideas:

Cisterns – both above and below ground
Septic tanks – old systems no longer in active use
Plastic inflatable bladders used for pickup trucks
Rain barrels or trash cans

Remember that ponded water can attract nuisance insects like mosquitoes if not covered!

PLANTS THAT HOLD UP SLOPES

Presented by Rosi Dagit, Senior Conservation Biologist, RCDSMM
4 March 2000, Streambank and Slope Stabilization Workshop, Topanga, CA

Background Thoughts:

Use of plant materials to stabilize slopes is as old as agriculture. Historically, civilizations have prospered or failed along with their natural resources, specifically their watersheds. At the dawn of the 21st century, we should think carefully about how best to repair the damage done to our watersheds to ensure that we, along with the landscape, prosper in the years ahead.

First it is necessary to define the role of plants in a streambank or slope stabilization project.

- Is this project solely designed to be functionally stable?
- Are there opportunities to enhance or restore degraded habitat?
- Is the goal to create a managed garden or a functional habitat?
- How do plants fit into the context of the whole stream/slope?

Important to evaluate every project within the context of the whole.
Piecemeal efforts at streambank or slope protection often fail if they do not clearly identify the underlying problems and seek to solve them within the context of up and down stream/ slope constraints.

Streambank and slope repairs provide numerous opportunities for restoring some of the habitat lost to development. Providing a variety of features (sun/shade, vegetation height, substrates from sand to boulder, runs, riffles and pools, etc.) will support more critters!

Think big! Look at the problem not only from the specific site scale, but also include adjoining property or the whole stream reach if necessary. Most project failures are due to incomplete problem analysis, followed by faulty installation!

Streamside Plants:

Along streambanks, vegetation is critical. Preserving existing trees and understory plants will enhance stream complexity and prevents further downcutting or bank failures downstream if done properly.

Narrow channels can pose special problems that especially need to be integrated into a comprehensive hydrologic picture. It is sometimes possible or necessary to use rocks to stabilize the toe of a slope/bank, and then utilize vegetation to stabilize the upper areas.

Shade is often a problem in establishing willows, since they require sun to get going. Need to be cautious about removing large trees, since they provide important structural stability. Careful pruning may allow adequate light.

Be aware of roots during the construction phase. It is best to be flexible to work with them, rather than cut or remove them.

Trees with exposed roots can be shored up using a number of different strategies. Pick the plan that fits into an integrated stream context, not just because it is a quick fix.

Remember that trees stabilize the banks for free, and add tremendous habitat value, moderate stream temperatures and soften impacts of stormwater runoff. It costs hundreds to thousands of dollars to replace their benefits.

***Important to install a project so that it is able to withstand a design storm immediately, with long term benefits of plantings filling in over time.

Be sure to use appropriate native species for maximum habitat value.

Non-native invasive species like Giant Bamboo (Arundo donax), German Ivy and Vinca deplete the water table and out compete the native species. The ivy and vinca root to approximately 12 inches and smother the roots of oaks, bays and sycamores nearby. Arundo spreads by rhizomes or rooting of small fingernail size pieces. Once established, it is extremely difficult to remove. Arundo does not bend like native willows, and has been known to cause severe erosion problems during flooding. Get rid of these pests!

Slope Planting:

Critical to carefully understand the site conditions including:

- drainage, soil type, water table depth and fluctuation, exposure, orientation

Roots cannot grow in soils compacted to more than 85%.

Subsoils on cut slopes pose even greater problems since all organic matter is gone. May be necessary to do stratified planting starting with pioneer species, using mychorrhyzal innoculants or replacing lost topsoils, followed by more permanent planting after soil is rejuvenated.

Irrigation often needed in order to get drought tolerant plants established but needs to be used with great care since saturated slopes will fail.

Be sure to integrate the planting plan with fuel modification for firesafety needs.

Mosaics of plants that have different rooting depths is more effective at holding a slope than use of a single ground cover. Native shrubs are particularly deep rooted, fire adapted and have dense canopies that are good for dispersing rain and reducing runoff.

Planting is best done in fall to take advantage of winter rainy season.

Drainage swales on long steep slopes can be planted to reduce runoff problems.

Usually need to install some type of mechanical slope protection (jute netting, rice straw or other mulch, geotextile fabrics) first, so that slope holds until plants generate sufficient cover.

A mix of locally collected seeds, and appropriate small container plants is a good way to start.

Be sure to group plantings according to irrigation needs! Trees like a long slow soaking with intermediate drier periods. Grasses and low shrubs need more frequent watering.

Don't underestimate the magic of mulch! A layer 2-6 inches deep can suppress weeds, modify soil temperatures, conserve water, and provide a wonderful habitat for beneficial soil organisms. Plants grow better in mulch!

See attached specifications for more details about particular techniques.

Stream specialist Ann Riley proposed some questions to ask when thinking about these kinds of projects:

1. Whose land or what structures are being protected by the project, and who is paying for the project?
2. Can the structures in danger be moved or relocated to at a lower cost than that for stabilizing the stream bank?
3. What is the cause of the "destabilization"? Is there a bridge abutment, existing bank protection or other feature that might be modified to prevent the problem?
4. Will the stabilization works cause bank erosion on the opposite downstream bank? Will it potentially cause erosion upstream or downstream of the bank protection?
5. Will the project require removal of the native vegetation and ongoing maintenance to keep the vegetation from returning? What are the typical long-term maintenance costs for similar projects?
6. Will the project require the use of herbicides?
7. Will the stabilization project reduce aquatic habitat and riparian wildlife habitat, or will it enhance those habitats?
8. Have the dynamics of the stream been studied so that potential reactions of the stream to the project have been considered? Do potential reactions include the stream forming unwanted cutoffs through meanders or change of gradient?
9. Are the project and the costs being compared with potentially less costly stabilization methods?
10. Have soil bioengineering techniques (using live or dead plant materials) been evaluated as a project alternative?
11. How have similar projects on this stream or in the region performed on a long-term basis?
12. What social, historical, environmental, and economic impacts could result from this project? Will we be gaining or losing opportunities for enhancing the community's identity, aesthetics, and economic welfare as a result of this project?

BIOENGINEERING METHODS FOR SLOPE STABILIZATION

By Robbin Sotir, Soil Bioengineering Consultant

1. SOIL BIOENGINEERING

Soil bioengineering is an integrated technology that uses sound engineering practices in conjunction with integrated ecological principles to assess, design, construct and maintain living vegetation systems to repair damage caused by erosion and failures in the land and to protect and enhance healthy functioning systems (Sotir 2001). This is achieved frequently in association with inert materials such as rock, wood, geosynthetics and geocomposites.

Appropriately applied, soil bioengineering offers a cost-effective and attractive approach for stabilizing stream banks and slopes against surface erosion, seepage conditions and shallow mass movement, capitalizing on the benefits and advantages that vegetation offers. Woody vegetation improves the hydrology and mechanical stability of slopes through root reinforcement and surface protection. The biological and mechanical elements must be analyzed and designed to work together in an integrated and complementary manner to achieve the required project goals. In addition to using engineering principles to analyze and design the slope stabilization systems, plant science and horticulture are needed to select and establish the appropriate vegetation for root reinforcement, erosion control, aesthetics and the environment. Numerous areas of expertise integrate to provide the knowledge required for success.

2. WHEN TO USE SOIL BIOENGINEERING

It is important to understand what soil bioengineering can offer over conventional methods alone, and if this offering is the required and an appropriate choice for the project. Soil bioengineering methods may have numerous advantages over conventional engineering methods for a particular project. Typically, we look at a number of multi-objective goals and requirements such as ecological, aesthetic, economic and educational. Essentially, if any of these goals cannot be fully met using conventional methods alone then soil bioengineering is justified.

Soil bioengineering performs far more than erosion control, re-vegetation and rehabilitation. Once soil bioengineering is designated as the required appropriate approach. The next step is to choose the correct measure(s) to eliminate the damage.

Table 1 illustrates the use of soil bioengineering methods to satisfy different soil and site conditions on stream corridors and upland slopes. It indicates the suitability of a system design to control particular factors or failure processes as well as the intensity or types of condition. In the case of stream systems, toe areas may also require additional protection against scour. Typically, several factors, failure processes and conditions may be found on a particular site, requiring stabilization and restoration.

In addition to reducing surface erosion, functioning as drainage features and improving streambank slope stability, woody plants also provide a host of environmental benefits for aquatic, riparian and upland wildlife. Soil bioengineering methods that use woody vegetation to restore upland and stream areas offer many advantages (see Tables 2 & 3). These tables offer guidance in meeting environmental and recreational goals. Beginning with site assessment and a clear understanding of the problem and future needs, it is important to select the appropriate soil bioengineering foundation system in the initial installation to ensure that it becomes part of the complex relationships that will serve to not only connect land, water, plant and animal life, but to integrate their function. When this occurs, other plants typically invade, creating a rich, diverse community that offers long-term site protection and enhancement.

TABLE 1

Suitability of Different Soil Bioengineering Methods For Stream Corridors & Upland Slopes Based on Soil & Site Conditions

Factor or Failure Process	Intensity or Type of Condition	Soil Bioengineering Methods						
		Live Staking	Live Fascine	Brush-layering	Branch-packing	Live Cribwall	Live Siltation Construction	VRSS
Slope Gradient	*Steep*		✔	✔	n/a	✔	✔	✔
	Moderate		✔	✔	n/a	✔	✔	✔
	Gentle	✔	✔	n/a	n/a	✔	✔	
Slope Height	*High*	✔	✔	✔	n/a		✔	✔
	Low	✔	✔	✔	n/a	✔	✔	✔
Soil Depth	*Deep*	✔	✔	✔	✔	n/a	✔	✔
	Shallow		✔			n/a		
Soil Erodibility	*High*		✔	✔		n/a	✔	✔
	Moderate		✔	✔	✔	n/a	✔	✔
	Low	✔	✔		✔	n/a	✔	✔
Soil Strength	*Moderate*	✔	✔	✔	n/a	n/a	✔	n/a
	Low	n/a	✔	✔	n/a	n/a	✔	n/a
Slope Type	*Cut*	✔	✔	✔	✔		✔	
	Fill	✔	✔	✔	✔	✔		✔
Surficial Erosion		✔	✔		✔		✔	
Mass Movement	*Shallow*	✔		✔	✔	✔		
	Moderate			✔				✔

Revised Sotir 2002;
Adapted from Gray & Sotir 1996

TABLE 2
Environmental Enhancement For Upland Slopes

Method	Enhancements			
	Surface Cover/ Canopy	Natural Invasion	Upland Habitat	Litter Layer Development
Live Staking	fair - v. good[1]	fair	fair - good	fair
Live Fascines	fair - v. good	good - excellent	good	good
Brushlayer (cut)	good - excellent	good - excellent	good - excellent	good - excellent
Brushlayer (fill)	good - excellent	v. good - excellent	good - excellent	v. good - excellent
Brushpacking	negligible	fair	negligible - fair	negligible
VRSS[2]	good - excellent	good - v. good	good - v. good	fair - good
Live Cribwall	negligible	fair	fair	fair
Conventional Vegetation	fair - v. good[1]	negligible - fair	fair	fair

Sotir 2002

[1]Takes years to develop
[2]Vegetated Reinforced Soil Slope

TABLE 3

Soil Bioengineering Relative Environmental Benefits For Stream Restoration

Methods	Create or Preserve Scour Holes	Shade & Overhang Cover	Riparian Habitat
VRSS[1]	good	excellent	low - good
Live Cribwall	fair[2]	excellent	low - fair
Live Siltation Construction	n/a	fair - good	fair - good
Brushmattress	n/a	fair - good	low - v. good
Live Fascine	low - fair[2]	good - v. good	low - v. good
Joint Planting	n/a	good - v. good	low - good
Live Stake	n/a	fair - good	good - v. good

Sotir 2002

[1]Vegetated Reinforced Soil Slope

[2]Varies with materials & geometry of toe stabilization

3. STREAM & RIVER SYSTEMS

Slopes along streams and rivers have special problems due to erosion and scour by flowing water. Geotechnical failures associated with surface and groundwater seepage often add complexity to the problem. As velocities increase so do the erosive powers of the flowing water. Vegetation is able to reduce erosion via the branches that bend over and protect the bank face during floods and reduce the velocities along the near bank. The roots physically hold the soil particles together and increase the bank strength.

4. BENEFITS OF WOODY VEGETATION

Vegetation can be an excellent choice in reducing surface erosion. However, the main benefits of woody vegetation on the mass stability of slopes and streambanks are root reinforcement, soil moisture depletion, buttressing and arching and surcharge. While there can be adverse effects, most of these such as windthrow and surcharge can largely be eliminated through the appropriate vegetation selection; slope design and selective pruning.

The use of woody plant materials, purposely arranged and imbedded during construction offers:

- Immediate erosion control for slopes; streambanks and shorelines;
- Improved face stability through mechanical reinforcement by roots;
- Reduced maintenance costs;
- Modification of soil moisture regimes through improved drainage and depletion of soil moisture and increase of soil suction by root uptake and transpiration;
- Enhanced wildlife habitat and ecological diversity;
- Improved aesthetic quality and naturalization; and
- Additional environmental benefits including air and water quality improvements via:
  - Cleansing, filters out pollutants
  - temperature modification
  - noise absorption due to the soil mass
  - *reduction in quantity and time of runoff improving stormwater management*

5. VEGETATION

5.1 Selection

The vegetation used in the soil bioengineering system is typically in the form of live woody branch cuttings from species that root adventitiously, bare root, tublings and/or container plants. Plant materials may be selected for a variety of tolerances including drought, salt, flooding, fire, deposition, and shade. They may be chosen for their environmental wildlife value, water cleansing capabilities, flowers, branches and leaf color or fruits. Other interests for selection may include size, form, and rooting rate of growth characteristics and ease of propagation. The decision to use natives, naturalized or ornamental species is also an important consideration. Time of year for construction of a soil bioengineering system also plays a critical role in plant selection.

5.2 Placement

The plant materials are placed on terraces, in trenches or directly installed via tamping. The process of plant installation is best and least expensive when it occurs simultaneously with the conventional construction activities, but may be incorporated later.

5.3 Development

Typically, soil bioengineering systems offer immediate results from the surface erosion control structural/mechanical and hydraulic perspectives. Over time, (generally within the first year) they develop substantial top and root growth further enhancing those benefits, and providing aesthetic, recreational and environmental values (See Figures 1, 2 and 3).

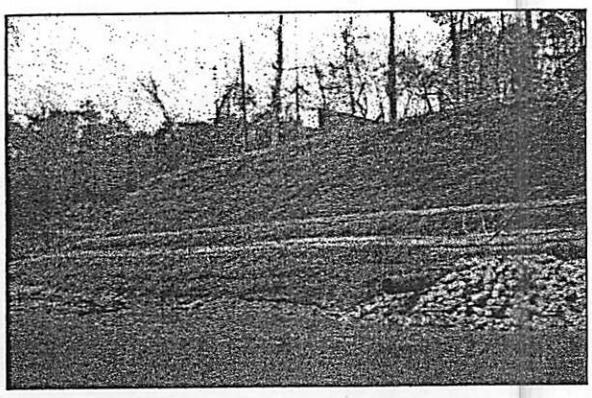


Figure 1. Soil bioengineering streambank immediately after construction

Figure 2. Early in the first growing season

Figure 3. The streambank 5 years after construction

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE SPECIFICATION

484 – MULCHING

I. SCOPE

The work shall consist of furnishing all materials and placing them on all exposed, disturbed, or barren areas within the field or project area to the limits as shown on the drawings, or as staked in the field.

II. MATERIALS

Straw

Straw shall be new straw derived from rice, wheat, oats, or barley. Clearance shall be obtained from the County Agricultural Commissioner, as required by law, before straw obtained outside the county in which it is to be used is delivered to the site.

Wood Fiber

Wood fiber shall be a wood cellulose fiber that contains no germination nor growth inhibiting factors. The wood fiber shall be produced from nonrecycled wood such as wood chips or similar wood materials and shall have the property to be evenly dispersed and suspended when agitated in water. It shall be colored with a nontoxic water-soluble green dye to provide a proper gauge for metering of material over ground surfaces.

The wood fiber mulch may also be produced from the following materials:

a. recycled wood fiber, such as wood chips or similar wood materials
b. a combination of recycled newsprint and cardboard materials that contain at least 50 percent cardboard, or
c. a combination of recycled newsprint and non-recycled wood fiber or recycled wood fiber materials that does not contain more than 50 percent newsprint

Tackifier

Tackifier material shall be one of the following or other material specified on the Practice Requirements sheet and shall have the property to be evenly dispersed and suspended in water when agitated: M-Binder, Sentinel, Ecotak-SAT, Fish-STIK, and Soil Master WR.

Other Materials

Other mulch materials shall be used when specified on the Practice Requirements sheet.

III. MULCHING DATE

Mulching shall be performed prior to November 15th unless otherwise specified on the Practice Requirements sheet.

IV. SITE PREPARATION

The area to be mulched shall be weed free and have a uniform surface. No implement shall be used that will create an excessive amount of downward movement of clods on sloping areas.

Rocks larger than 6 inches in diameter, trash, weeds and other debris that will interfere with mulching or maintenance shall be removed.

Site preparation shall be suspended when soil moisture conditions are not suitable for obtaining a satisfactory surface.

V. APPLYING THE MULCH

Use one of the following methods of application as specified on the Practice Requirements sheet.

Mulching with Straw

A straw covering shall be distributed uniformly over the area at the rate of 2 tons per acre unless a different amount is specified on the Practice Requirements sheet. The straw shall be applied by hand, blower, or other suitable equipment. If straw is applied by blower, it shall not be chopped in lengths less than 6 inches.

Mulching with Wood Fiber

A wood fiber covering shall be distributed uniformly over the area in a water slurry by hydroseeder.

The slurry shall contain wood fiber at the rate of 2,000 pounds per acre with a tackifier unless a different amount is specified on the Practice Requirements sheet.

Application rates for wood fiber mulch products that have moisture contents greater than 15 percent shall be increased by the following factor, c:

$$c: = \frac{85 \text{ percent}}{\text{percent fiber (solids) in product}}$$

The application rate of the tackifier shall be:

Tackifier	Rate	Wood Fiber Mulch
M-Binder	100lbs	1,500 to 2,000lbs
Sentinel	100lbs	1,500 to 2,000lbs
Ecotak-SAT	100lbs	1,500 to 2,000lbs
Fish-STIK	100lbs	1,500 to 2,000lbs
Soil Master WR	100gal	2,000 to 2,500lbs

The hydroseeder shall be equipped with a built-in continuous agitation system of sufficient operating capacity to produce a homogenous slurry and a discharge system that will apply the slurry to the slopes at a continuous and uniform rate.

The materials shall not remain in the slurry longer than two (2) hours. Water used shall be potable water or Class 1 or 2 agricultural irrigation water.

Mulching with Gravel

A gravel covering or covering of other inorganic material specified on the Practice Requirements sheet shall be distributed uniformly over the area at the rate specified on the Practice Requirements sheet to provide 100 percent ground cover.

Mulching with Other Materials

The material(s) specified on the Practice Requirements sheet shall be distributed uniformly over the area at the rate specified on the Practice Requirements sheet to provide at least 80 percent ground cover unless otherwise specified on the Practice Requirements sheet.

Anchoring the Mulch

When specified on the Practice Requirements sheet, the straw mulch shall be anchored in place. Anchoring process may include hand tools, mulching rollers, disks, or similar types of suitable equipment alone or in combination with a hydro-mulch material and shall be performed in a satisfactory manner. When specified on the Practice Requirements sheet, hydro-mulch material alone may be used.

The hydro-mulch material shall be applied uniformly over the straw in a water slurry by hydroseeder within 48 hours following mulching. Unless otherwise specified on the Practice Requirements sheet, the hydo-mulch shall be wood fiber mulch, a tackifier, and water in the following portions per acre:

Tackifier	Rate	Wood Fiber Mulch	Water
M-Binder	100 lbs	150 lbs	700 gal
Ecotak-SAT	100 lbs	150 lbs	700 gal
Sentinel	100 lbs	500 lbs	2,000 gal
Fish-STIK	60 lbs	500 lbs	3,000 gal
Soil Master WR	100 gal	250 lbs	1,000 gal

Application rates for wood fiber mulch products that have moisture contents greater than 15 percent shall be increased by the following factor, c:

$$c: = \frac{85 \text{ percent}}{\text{percent fiber (solids) in product}}$$

The hydroseeder shall be equipped with a built-in continuous agitation system of sufficient operating capacity to produce a homogenous slurry and a discharge system that will apply the slurry to the slopes at a continuous and uniform rate.

The materials shall not remain in the slurry longer than two (2) hours. Water used shall be potable water or Class 1 or 2 agricultural irrigation water.

The slurry shall be continuously mixed and shall be mixed for at least five (5) minutes after the last addition before application starts.

The slurry shall be applied uniformly over the site at a rate that is nonerosive and minimizes runoff.

VI. OTHER REQUIREMENTS

Operations shall be done in such a manner that soil erosion and air and water pollution are minimized and held within legal limits.

The owner, operator, contractor, and other persons shall conduct all work and operations in accordance with proper safety codes for the type of equipment and operations being performed with due regards to the safety of all persons and property.

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE SPECIFICATION

342B - CRITICAL PLANTING AREA - HYDRO MULCH

I. SCOPE

The work shall consist of furnishing all materials and placing them on all exposed, disturbed, or barren areas within the project area or site to the limits as show on the drawings or as staked in the field.

II. MATERIALS

Seed

All seed shall be delivered to the site tagged and labeled in accordance with the California Agricultural Code, and shall be acceptable to the County Agricultural Commissioner.

Bag tag figures will be evidence of purity and germination. Time since date of seed test shall not exceed 9 months.

Seed shall be of a quality that weed seed shall not exceed 0.5 percent of the aggregate of pure live seed (PLS) (percent germination x percent purity) and other material.

Fertilizer

Unless otherwise specified on the Practice Requirements sheet, all fertilizer shall be Ammonium Phosphate Sulfate containing a minimum of 16 percent Nitrogen, 20 percent available phosphoric acid and 0 percent water soluble potash and be uniform in composition, dry and free flowing, pelleted or granular.

All fertilizer shall be labeled in accordance with applicable state regulations and bear the warranty of the producer for the grade furnished.

Inoculants

The inoculant for treating legume seeds shall be a pure culture of Nitrogen fixing bacteria prepared specifically for the plant species and shall not be used later than the date indicated on the container. A mixing medium, as recommended by the manufacturer or approved substitute, shall be used to bond the inoculant to the seed. For nonpellet inoculated seed, two times the amount of the inoculant recommended by the manufacturer shall be used and seed shall be sown with 24 hours.

For pellet inoculated seed, at least 30 pounds of inoculant shall be used per 1,000 pounds of raw seed and the seed shall be labeled to show the Lot Number, Expiration Date, and Percent Coat of the finished product. Pellet inoculated seed shall be kept cool and sown within 180 days.

Wood Fiber

Wood fiber shall be a wood cellulose fiber that contains no germination nor growth inhibiting factors. The wood fiber shall be produced from nonrecycled wood such as wood chips or similar wood materials and shall have the property to be evenly dispersed and suspended when agitated in water. It shall be colored with a nontoxic water soluble green dye to provide a proper gauge for metering of material over ground surfaces.

The wood fiber mulch may also be produced from the following materials:

a. recycled wood fiber, such as wood chips or similar wood materials

b. a combination of recycled newsprint and cardboard materials that contain at least 50 percent cardboard, or

c. a combination of recycled newsprint and non-recycled wood fiber or recycled wood fiber materials that does not contain more than 50 percent newsprint

Tackifier

Tackifier material shall be one of the following or other material specified on the Practice Requirements sheet and shall have the property to be evenly dispersed and suspended in water when agitated: M-Binder, Sentinel, Ecotak-SAT, Fish-STIK, and Soil Master WR.

III. SEEDING MIXTURE AND PLANTING DATE

The seed(s) and rate(s) specified on the Practice Requirements sheet shall be used. The seeding rate(s) shall be the weight exclusive of any coating material. Any legume seed used shall be inoculated. Based on bag tags, seeding rates shall be adjusted to insure the required amounts of pure live seed.

Planting shall be performed after final grading is completed unless otherwise specified on the Practice Requirements sheet.

IV. SEEDBED PREPARATION

The area to be planted shall be weed free and have a firm seedbed which has previously been roughened by scarifying, disking, harrowing, chiseling, or otherwise worked to a depth of 2 to 4 inches. No implement shall be used that will create an excessive amount of downward movement of clods on sloping areas. Seedbed may be prepared at time of completion of earth moving work.

Rocks larger than 6 inches in diameter, trash, weeds, and other debris that will interfere with seeding or maintenance shall be removed.

Seedbed preparation shall be suspended when soil moisture conditions are not suitable for obtaining a satisfactory seedbed.

V. FERTILIZING, SEEDING, MULCHING

Fertilizing

Fertilizer shall be distributed uniformly over the seedbed at the rate of 500 pounds per acre unless a different amount is specified on the Practice Requirements sheet.

Fertilizer shall be applied hydraulically by hydroseeder in the form of a slurry that also contains the required seed. Fertilizer shall not remain in the slurry longer than two (2) hours.

Seeding and Mulching

Seed shall be distributed uniformly in a water slurry by hydroseeder.

The hydroseeder shall be equipped with a built-in continuous agitation system of sufficient operating capacity to produce a homogeneous slurry and a discharge system which will apply the slurry to the slopes at a continuous and uniform rate.

Seed shall not remain in the slurry longer than thirty (30) minutes. The slurry shall also contain wood fiber at the rate of 1500 pounds per acre, tackifier, and the required fertilizer unless otherwise specified on the Practice Requirements sheet. The wood fiber shall not remain in the slurry longer than two (2) hours. Water used shall be potable water or Class 1 or 2 agricultural irrigation water.

Application rates for wood fiber mulch products that have moisture contents greater than 15 percent shall be increased by the following factor, c:

$$c: = \frac{85 \text{ percent}}{\text{percent fiber (solids) in product}}$$

The application rate of the tackifier shall be:

Tackifier	Rate	Wood Fiber Mulch
M-Binder	100lbs	1,500 to 2,000lbs
Sentinel	100lbs	1,500 to 2,000lbs
Ecotak-SAT	100lbs	1,500 to 2,000lbs
Fish-STIK	100lbs	1,500 to 2,000lbs
Soil Master WR	100gal	2,000 to 2,500lbs

The slurry shall be continuously mixed and shall be mixed for at least five (5) minutes after the last addition before application starts. The slurry shall be applied uniformly over the site at a rate that is nonerosive and minimizes runoff.

VI. IRRIGATION

When specified, irrigation water shall be applied at the times and rates as listed on the Practice Requirements sheet.

VII. SPECIAL MEASURES

Measures and methods that enhance fish and wildlife values, protect visual resources, and maintain key shade, food, and den trees shall be performed when specified on the Practice Requirements sheet.

VIII. OTHER REQUIREMENTS

Other details for the establishment and maintenance of the plants including, but not limited to, the need for livestock and traffic control shall be applied when specified on the Practice Requirements sheet.

Operations shall be done in such a manner that erosion and air and water pollution are minimized and held with legal limits.

The owner, operator, contractor, or other persons shall conduct all work and operations in accordance with proper safety codes for the type of equipment and operations being performed with due regards to the safety of all persons and property.

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE SPECIFICATION

342C - CRITICAL AREA PLANTING - SPLIT HYDRO MULCH

I. SCOPE

The work shall consist of furnishing all materials and placing them on all exposed, disturbed, or barren areas within the project area or site to the limits as shown on the drawings, or as staked in the field.

II. MATERIALS

Seed

All seed shall be delivered to the site tagged and labeled in accordance with the California Agricultural Code, and shall be acceptable to the Country Agricultural Commissioner.

Bag tag figures will be evidence of purity and germination. Time since date of seed test shall not exceed 9 months.

Seed shall be of a quality that weed seed shall not exceed 0.5 percent of the aggregate of pure live seed (PLS) (percent germination x percent purity) and other material.

Fertilizer

Unless otherwise specified on the Practice Requirements sheet, all fertilizer shall be Ammonium Phosphate Sulfate containing a minimum of 16 percent Nitrogen, 20 percent available phosphoric acid and 0 percent water soluble potash and be uniform in composition, dry and free flowing, pelleted or granular.

All fertilizer shall be labeled in accordance with applicable state regulations and bear the warranty of the producer for the grade furnished.

Inoculants

The inoculant for treating legume seeds shall be a pure culture of Nitrogen fixing bacteria prepared specifically for the plant species and shall not be used later than the date indicated on the container. A mixing medium, as recommended by the manufacturer or approved substitute, shall be used to bond the inoculant to the seed. For nonpellet inoculated seed, two times the amount of the inoculant recommended by the manufacturer shall be used and seed shall be sown within 24 hours.

For pellet inoculated seed, at least 30 pounds of inoculant shall be used per 1,000 pounds of raw seed and the seed shall be labeled to show the Lot Number, Expiration Date, and Percent Coat of the finished product. Pellet inoculated seed shall be kept cool and sown within 180 days.

Wood Fiber

Wood fiber shall be a wood cellulose fiber that contains neither germination nor growth inhibiting factors. The wood fiber shall be produced from nonrecycled wood such as wood chips or similar wood materials and shall have the property to be evenly dispersed and suspended when agitated in water. It shall be colored with a nontoxic water-soluble green dye to provide a proper gauge for metering of material over ground surfaces.

The wood fiber mulch may also be produced from the following materials:

a. recycled wood fiber, such as wood chips or similar wood materials
b. a combination of recycled newsprint and cardboard materials that contain at least 50 percent cardboard, or
c. a combination of recycled newsprint and non-recycled wood fiber or recycled wood fiber materials that does not contain more than 50 percent newsprint

Tackifier

Tackifier material shall be one of the following or other material specified on the Practice Requirements sheet and shall have the property to be evenly dispersed and suspended in water when agitated: M-Binder, Sentinel, Ecotak-SAT, Fish-STIK, and Soil Master WR.

III. SEEDING MIXTURE AND PLANTING DATE

The seed(s) and rate(s) specified on the Practice Requirements sheet shall be used.

The seeding rate(s) shall be the weight exclusive of any coating material. Any legume seed used shall be inoculated. Based on bag tags, seeding rates shall be adjusted to insure the required amounts of pure live seed.

Planting shall be performed after final grading is completed unless otherwise specified on the Practice Requirements sheet.

IV. SEEDBED PREPARATION

The area to be planted shall be weed free and have a firm seedbed which has previously been roughened by scarifying, disking, harrowing, chiseling, or otherwise worked to a depth of 2 to 4 inches. No implement shall be used that will create an excessive amount of downward movement of clods on sloping areas. Seedbed may be prepared at time of completion of earth moving work.

Rocks larger than 6 inches in diameter, trash, weeds, and other debris that will interfere with seeding or maintenance shall be removed.

Seedbed preparation shall be suspended when soil moisture conditions are not suitable for obtaining a satisfactory seedbed.

V. FERTILIZING, SEEDING, MULCHING

Fertilizing

Fertilizer shall be distributed uniformly over the seedbed at the rate of 500 pounds per acre unless a different amount is specified on the Practice Requirements sheet.

Fertilizer shall be applied hydraulically by hydroseeder in the form of a slurry that also contains the required seed. Fertilizer shall not remain in the slurry longer than two (2) hours.

Seeding

Seed shall be distributed uniformly in a water slurry by hydroseeder.

The hydroseeder shall be equipped with a built-in continuous agitation system of sufficient operating capacity to produce a homogeneous slurry and a discharge system that will apply the slurry to the slopes at a continuous and uniform rate.

Seed shall not remain in the slurry longer than thirty (30) minutes. The slurry shall also contain wood fiber at the rate of 500 pounds per acre and the required fertilizer. The wood fiber shall not remain in the slurry longer than two (2) hours. Water used shall be potable water or Class I or 2 agricultural irrigation water.

Application rates for wood fiber mulch products that have moisture contents greater than 15 percent shall be increased by the following factor, c:

$$c: = \frac{85 \text{ percent}}{\text{percent fiber (solids) in product}}$$

The slurry shall be continuously mixed and shall be mixed for at least five (5) minutes after the last addition before application starts. The slurry shall be applied uniformly over the site at a rate that is nonerosive and minimizes runoff.

Mulching

Wood fiber with tackifier shall be distributed uniformly over the seeded area in a water slurry by hydroseeder. Application shall be made within 48 hours following seeding.

The hydroseeder shall be equipped with a built-in continuous agitation system of sufficient operating capacity to produce a homogeneous slurry and a discharge system that will apply the slurry to the slopes at a continuous and uniform rate.

The slurry shall contain wood fiber at the rate of 1500 pounds per acre and tackifier unless otherwise specified on the Practice Requirement sheet. The wood fiber shall not remain in the slurry longer than two (2) hours. Water used shall be potable water or Class 1 or 2 agricultural irrigation water.

Application rates for wood fiber mulch products that have moisture contents greater than 15 percent shall be increased by the following factor, c:

$$c: = \frac{85 \text{ percent}}{\text{percent fiber (solids) in product}}$$

The application rate for the tackifier shall be:

Tackifier	Rate	Wood Fiber Mulch
M-Binder	100lbs	1,500 to 2,000lbs
Sentinel	100lbs	1,500 to 2,000lbs
Ecotak-SAT	100lbs	1,500 to 2,000lbs
Fish-STIK	100lbs	1,500 to 2,000lbs
Soil Master WR	100gal	2,000 to 2,500lbs

The slurry shall be continuously mixed and shall be mixed for at least five (5) minutes after the last addition before application starts. The slurry shall be applied uniformly over the site at a rate that is nonerosive and minimizes runoff.

VI. IRRIGATION

When specified, irrigation water shall be applied at the times and rates as listed on the Practice Requirements sheet.

VII. SPECIAL MEASURES

Measures and methods that enhance fish and wildlife values, protect visual resources, and maintain key shade, food, and den trees shall be performed when specified on the Practice Requirements sheet.

VIII. OTHER REQUIREMENTS

Other details for the establishment and maintenance of the plants including, but not limited to, the need for livestock and traffic control shall be applied when specified on the practice Requirements sheet.

Operations shall be done in such a manner that erosion and air and water pollution are minimized and held within legal limits.

The owner, operator, contractor, or other persons shall conduct all work and operations in accordance with proper safety codes for the type of equipment and operations being performed with due regards to the safety of all persons and property.

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE SPECIFICATION

342E - CRITICAL AREA PLANTING - EROSION CONTROL BLANKET

I. SCOPE

The work shall consist of furnishing all materials and placing them on all exposed, disturbed, or barren areas within the project area or site to the limits as shown on the drawings, or as staked in the field.

II. MATERIALS

Seed

All seed shall be delivered to the site tagged and labeled in accordance with the California Agricultural Code, and shall be acceptable to the County Agricultural Commissioner.

Bag tag figures will be evidence of purity and germination. Time since date of seed test shall not exceed 9 months.

Seed shall be of a quality that weed seed shall not exceed 0.5 percent of the aggregate of pure live seed (PLS) (percent germination x percent purity) and other material.

Fertilizer

Unless otherwise specified on the Practice Requirements sheet, all fertilizer shall be Ammonium Phosphate Sulfate containing a minimum of 16 percent Nitrogen, 20 percent available phosphoric acid and 0 percent water soluble potash and be uniform in composition, dry and free flowing, pelleted or granular.

All fertilizer shall be labeled in accordance with applicable state regulations and bear the warranty of the producer for the grade furnished.

Inoculants

The inoculant for treating legume seeds shall be a pure culture of Nitrogen fixing bacteria prepared specifically for the plant species and shall not be used later than the date indicated on the container. A mixing medium, as recommended by the manufacturer or approved substitute, shall be used to bond the inoculant to the seed. For nonpellet inoculated seed, two times the amount of the inoculant recommended by the manufacturer shall be used and seed shall be sown within 24 hours.

For pellet inoculated seed, at least 30 pounds of inoculant shall be used per 1,000 pounds of raw seed and the seed shall be labeled to show the Lot Number, Expiration Date, and Percent Coat of the finished product. Pellet inoculated seed shall be kept cool and sown within 180 days.

Wood Fiber

Wood fiber shall be a wood cellulose fiber that contains neither germination nor growth inhibiting factors. The wood fiber shall be produced from nonrecycled wood such as wood chips or similar wood materials and shall have the property to be evenly dispersed and suspended when agitated in water. It shall be colored with a nontoxic water-soluble green dye to provide a proper gauge for metering of material over ground surfaces.

The wood fiber mulch may also be produced from the following materials:

a. recycled wood fiber, such as wood chips or similar wood materials

b. a combination of recycled newsprint and cardboard materials that contain at least 50 percent cardboard, or

c. a combination of recycled newsprint and non-recycled wood fiber or recycled wood fiber materials that does not contain more than 50 percent newsprint

Erosion Control Blanket

The erosion control blanket shall consist of a machine-produced mat of wood excelsior fiber with consistent thickness and fiber evenly distributed over the entire area of the blanket. At least 70- percent of the fibers shall be six (6) inches or longer in length. The topside of each blanket shall be covered with biodegradable extruded plastic mesh with openings not exceeding two inches by two inches.

Erosion control blankets may also be machine produced mats of 70 percent wheat straw and 30 percent coconut fiber or 100 percent coconut fiber with consistent thickness and fiber evenly distributed over the entire area of the blanket. These blankets shall have a minimum density of 0.5 pounds per square yard and be enclosed in netting material.

Staples

Staples shall be "U" shaped with legs at least ten (10) inches in length and have a two (2) inch crown and shall be made of eleven (ll) gauge or heavier wire.

III. SEEDING MIXTURE AND PLANTING DATE

The seed(s) and rate(s) specified on the Practice Requirements sheet shall be used. The seeding rate(s) shall be the weight exclusive of any coating material. Any legume seed used shall be inoculated. Based on bag tags, the seeding rates shall be adjusted to insure the required amounts of pure live seed.

Planting shall be performed after final grading is completed unless otherwise specified on the Practice Requirements sheet.

IV. SEEDBED PREPARATION

The area to be planted shall be weed free and have a firm seedbed which has previously been roughened by scarifying, disking, harrowing, chiseling, or otherwise worked to a depth of 2 to 4 inches. No implement shall be used that will create an excessive amount of downward movement of clods on sloping areas. Seedbed may be prepared at time of completion of earth moving work.

Rocks larger than 6 inches in diameter, trash, weeds, and other debris that will interfere with seeding or maintenance shall be removed.

Seedbed preparation shall be suspended when soil moisture conditions are not suitable for obtaining a satisfactory seedbed.

V. FERTILIZING, SEEDING, MULCHING

Fertilizing

Fertilizer shall be distributed uniformly over the seedbed at the rate of 500 pounds per acre unless a different amount is specified on the Practice Requirements sheet.

Fertilizer shall be applied in any way that will result in uniform distribution. When specified on the Practice Requirements sheet, fertilizer shall be incorporated into the soil as part of the seedbed preparation or as part of the seeding operation.

Fertilizer shall be applied hydraulically by hydroseeder in the form of a slurry that also contains the required seed. Fertilizer shall not remain in the slurry longer than two (2) hours.

Seeding

Seed shall be drilled, broadcast, or distributed uniformly in a water slurry by hydroseeder. When specified on the Practice Requirements sheet, seed shall be incorporated into the soil but not more than the specified depth.

The hydroseeder shall be equipped with a built-in continuous agitation system of sufficient operating capacity to produce a homogeneous slurry and a discharge system that will apply the slurry to the slopes at a continuous and uniform rate.

Seed shall not remain in the slurry longer than thirty (30) minutes. The slurry shall also contain wood fiber at the rate of 500 pounds per acre and the required fertilizer. The wood fiber shall not remain in the slurry longer than two (2) hours. Water used shall be potable water or Class 1 or 2 agricultural irrigation water.

Application rates for wood fiber mulch products that have moisture contents greater than 15 percent shall be increased by the following factor, c:

$$c: = \frac{85 \text{ percent}}{\text{percent fiber (solids) in product}}$$

The slurry shall be continuously mixed and shall be mixed for at least five (5) minutes after the last addition before application starts. The slurry shall be applied uniformly over the site at a rate that is nonerosive and minimizes runoff.

Mulching

Erosion control blankets shall be distributed uniformly over the surface of the seeded area within 48 hours following seeding. The blankets shall be started on the backside three (3) feet below the crest of the treated slope and installed vertically down the treated slope. The netting shall be on top and the fibers in contact with the soil. The edges shall overlap at least four (4) inches onto adjoining blankets.

Anchoring the Mulch

Staples shall be driven vertically into the ground with reference to the slope. Four (4) staples shall be uniformly spaced across the start and end of each roll and placed four (4) inches from the starting edge at the crest of the slope and two (2) inches from the end of each roll.

Staples shall also be uniformly spaced down both sides of each roll at six (6) foot intervals and two (2) inches from the edge. Staples shall also be spaced down the center of each roll at six (6) foot intervals and alternately spaced with respect to the staples on each side.

VI. IRRIGATION

When specified, irrigation water shall be applied at the times and rates as listed on the Practice Requirements sheet.

VII. SPECIAL MEASURES

Measures and methods that enhance fish and wildlife values, protect visual resources, and maintain key shade, food, and den trees shall be performed when specified on the Practice Requirements sheet.

VIII. OTHER REQUIREMENTS

Other details for the establishment and maintenance of the plants including, but not limited to, the need for livestock and traffic control shall be applied when specified on the Practice Requirements sheet.

Operations shall be done in such a manner that erosion and air and water pollution are minimized and held with legal limits.

The owner, operator, contractor, and other persons shall conduct all work and operations in accordance with proper safety codes for the type of equipment and operations being performed with due regards to the safety of all persons and property.

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE SPECIFICATION

342G - CRITICAL AREA PLANTING - WOODY CUTTINGS

I. SCOPE

The work shall consist of furnishing all materials and placing them within the project area or site to the limits as shown on the drawings, or as staked in the field.

II. MATERIALS

Woody cuttings shall be made from healthy green plants during the dormant season. No more than 2/3ds of each plant will be removed. Select cuttings with leaf buds near the top of each cut.

Stem or branch cuttings of soft wood, hard wood or firm wood should be taken whenever possible from plants that are native to the locality or grown on similar sites.

Cuts shall be made clean with sharp tools. The butt end of the stem shall be a slant cut and the tip end shall be cut square across the stem.

Size:

Slips: The diameter of the cutting shall not be more than 1-1/2 inches at the butt end nor smaller than 1/4 inch at the tip. Cuttings shall have a minimum length of 2 feet and a maximum length of 4 feet unless otherwise specified on the Practice Requirements Sheet.

Poles: The diameter of the cutting shall not be more than 4 inches nor smaller than 1 inch at the butt end and 1/2 inch at the tip. Cuttings shall have a minimum length of the depth to the water table plus 3 feet unless otherwise specified on the Practice Requirements Sheet.

Cuttings shall not be allowed to dry and shall not be more than 7 days old when planted unless otherwise specified on the Practice Requirements sheet.

III. PLANT MATERIALS AND PLANTING DATE

The kinds of cuttings specified on the Practice Requirement sheet shall be used.

Planting shall be performed after final grading is completed unless otherwise specified on the Practice Requirements sheet.

IV. SITE PREPARATION

The area to be planted shall be weed free and have a uniform surface. No implement shall be used that will create an excessive amount of downward movement of clods on sloping areas. The site may be prepared at time of completion of earth moving work.

Trash, weeds, and other debris that will interfere with planting or maintenance shall be removed.

V. PLANTING REQUIREMENTS

Cuttings shall be planted in one or more rows as shown on the drawing(s) as vertical as possible. Cuttings shall be spaced 3 feet apart in the row and in multiple row plantings, spacing between rows shall be 3 feet. Cuttings shall be staggered with respect to those in adjacent rows unless otherwise specified on the Practice Requirement sheet.

Cuttings shall be planted in prepared holes or "V" furrows to avoid stripping the bark, especially in rocky or hard soils. Cuttings may be pushed into soil if the soil is saturated with moisture. Cuttings shall be placed in the soil with the butt end in a downward position

All cuttings shall have 6 inches to a maximum of 1-foot including at least two nodes above the ground level.

Cuttings shall be placed into the soil to a depth specified on the Practice Requirements sheet. If however, due to some physical condition in the soil this planting depth cannot be attained, the cuttings shall be set with 3/4 of its length in the soil upon approval of the NRCS technician. At a minimum they must be placed into the soil 18 inches.

Poles: Plant in adequately sized, sod-free holes. Auger a hole to the water table. Place materials in the augured hole one-half foot above the growing season water table.

After planting, pack the soil firmly around each pole to eliminate air pockets. "Mudding" by filling the hole with water and then adding more soil to make a slurry can remove air pockets.

VI. IRRIGATION

When specified, irrigation water shall be applied at the times and rates as listed on the Practice Requirements sheet to keep the soil in the lower two feet of the planted cutting moist.

VII. SPECIAL MEASURES

Measures and methods that enhance fish and wildlife values, protect visual resources, and maintain key shade, food, and den trees shall be performed when specified on the Practice Requirements sheet.

VIII. OTHER REQUIREMENTS

Other details for the establishment and maintenance of the plants including, but not limited to, the need for livestock and traffic control shall be applied when specified on the Practice Requirements sheet.

Operations shall be done in such a manner that erosion and air and water pollution are minimized and held within legal limits.

The owner, operator, contractor, and other persons shall conduct all work and operations in accordance with proper safety codes for the type of equipment and operations being performed with due regards to the safety of all persons and property.

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE SPECIFICATION

342H - CRITICAL AREA PLANTING - CONTAINER PLANTS

I. SCOPE

The work shall consist of furnishing all materials and placing them on areas within the project area or site to the limits as shown on the drawings, or as staked in the field.

II. MATERIALS

Plants

Plants shall be healthy, shapely, and well rooted, with roots showing no evidence of having been damaged, restricted, or deformed. Plants found to be root or pot bound will not be acceptable. Plants shall be vigorous and free of disease, insect pests, eggs or larvae and shall be subject to inspection and approval at the place of growth or upon delivery. Plants shall not be allowed to freeze or dry.

Unless otherwise noted, all plant material shall be grown in nurseries which have been inspected by the State Department of Food and Agriculture and have complied with the regulations thereof. Clearance shall be obtained from the County Agricultural Commissioner, as required by law, before planting plants delivered from outside the county in which they are to be planted.

All specified one-quart and one-gallon plant stock shall be of the standard one-quart and one-gallon size and shall be delivered to the site in one-quart and one-gallon containers or equivalent. All specified five-gallon plant stock shall be of the standard five-gallon size and shall be delivered to the site in five-gallon containers. All specified 15-gallon plant stock shall be of the standard 15-gallon size and shall be delivered to the site in 15-gallon containers.

Manure

Manure shall be well composted, weed free, pulverized, sterilized, and may be furnished in bulk.

Commercial Fertilizer

Commercial fertilizer for trees and shrubs shall be a compressed long lasting slow release tablet form containing a minimum of 20 percent nitrogen, 10 percent available phosphoric acid, and 5 percent water soluble potash with each tablet approximately 21 grams in weight unless otherwise specified on the Practice Requirements sheet.

Commercial fertilizer for flat size plants shall contain a minimum of 10 percent nitrogen, 8 percent available phosphoric acid and 4 percent water soluble potash unless otherwise specified on the Practice Requirements sheet.

All fertilizer shall be delivered in original, unopened factory packaging, shall be free of lumps or other moisture damage, and shall be labeled in accordance with applicable state regulations and bear the warranty of the producer for the grade furnished.

Sand

Sand shall be clean, sharp, silica sand, uniform in size and irregular in shape.

Stakes

Stakes shall be straight and sound heart grade redwood, and shall be two inches by two inches and length as shown on the plans.

Flexible Rods

Flexible rods shall be 1/4-inch diameter steel for five-gallon plants and 3/8-inch diameter for 15-gallon plants and length as shown in plans.

Ties

Ties shall be heavy-duty vinyl, minimum .010 inches thick, or approved flexible rubberized cloth webbing, 1-inch width.

Steel Straps

Straps shall be 1/16-inch by 1-inch mild steel nailed to stakes with 8d box nails.

Mulch

Mulch shall consist of medium ground redwood, fir, cedar, or pine bark chips, 3/8-inch to 1-1/4 inch in size.

III. PLANT MATERIALS AND PLANTING DATE

The plant varieties shown on the drawings and specified on the Practice Requirements sheet shall be used.

Planting shall be performed after final grading is completed and during the period specified on the Practice Requirements sheet.

IV. SITE PREPARATION

All planting areas shall be cultivated and raked to remove any and all weeds or weed clumps and stones or other foreign material exceeding 2-inch diameter to a depth of 8 inches. No planting will be allowed in soil that, in the opinion of the NRCS technician is too wet, too dry, or otherwise improperly conditioned.

Plants shall be the varieties and arranged as shown on the plans. The locations of plants shall be marked for approval by the NRCS technician prior to excavating the plant holes. The locations shall be marked by flags or other approved means. Two days notice shall be given prior to the date desired for inspection by the NRCS technician.

Holes for trees and shrubs shall be excavated to minimum diameters and depths as follows:

Container Size	Hole Diameter	Hole Depth
One quart	12"	12"
One gallon	12"	12"
Five gallon	20"	20"
Fifteen gallon	32"	24"

The sides of the hole shall be vertical, lightly scarified and the bottom of the hole shall be loosened to a minimum additional depth of six inches.

V. PLANTING, FERTILIZING, MULCHING

Planting Trees and Shrubs

Partially backfill planting hole with planting mixture consisting of 50 percent native soil, 25 percent sand, and 25 percent manure by volume, unless otherwise specified on the Practice Requirements sheet, that has been uniformly mixed and is free of clods or lumps and blend planting mix into top two inches of soil in bottom of hole.

Plants shall be removed from the containers in such a manner that the ball of earth surrounding the roots is not broken, except for root bound plants that need their roots pruned, and shall be planted immediately. Cans shall be cut on at least two sides.

Set plants in center of pits, adjusting so that after settlement the crown of the plant will stand one or two inches above finish grade as shown on the plans.

Backfill with planting mixture to one-half root ball height, place one fertilizer tablet per foot of plant height two inches out from root ball and water thoroughly. Backfill rest of hole with

planting mixture. Firm down, eliminating all air pockets, do not pack. Build a four-inch high berm around edge of root ball to form a basin for holding water. The bottom of the basin shall be at surrounding finish grade.

Fill basin with water immediately after planting, being careful not to break down the berm, gouge out holes in the backfill, or expose plant roots with hose stream. Settled plants shall be reset to proper grade position and planting basin restored.

No more plants shall be distributed or cans cut than can be planted and watered on that day.

Planting - Flat Size Plants

The 10-8-4 fertilizer shall be distributed uniformly over the areas to be planted to flat size plants at the rate of 20 pounds per 1000 square feet. Fertilizer may be applied in any way that will result in uniform distribution. The fertilizer shall be incorporated into the soil prior to planting. If fertilizing is performed as part of Section IV, Site Preparation, it shall not be accomplished more than (15) days prior to planting.

Prior to planting flat size plants, the areas shall also be watered thoroughly to insure optimum soil moisture to a minimum depth of 8 inches.

Flat size plants shall be planted at spacing specified on plans. Cultivate immediately after completion of planting and water lightly, but thoroughly, taking care to avoid erosion.

Planting -Tree Seedlings

Planting holes shall be made using the Western planting tool, mattock, or other suitable tool. The hole shall have one flat vertical side and be deeper than the plant container.

A single plant shall be immediately placed against the flat vertical side of the hole with roots straight and vertical and the hole carefully backfilled with excavated soil without damaging the roots. Plants in biodegradable containers shall be planted in their container. Plants in nonbiodegradable containers shall be removed from their container at time of planting. The soil around the plant shall be firmed by tamping to eliminate all air pockets, without packing the soil, and the ground line on the plant shall correspond to the adjacent ground line.

A 15 foot radius around each plant shall be cleared of any living grasses, legumes, and forbs.

Planting operations shall not create an excessive amount of downward movement of soil or clods on sloping areas and shall not damage newly placed plants, existing trees or tree seedlings. All plants that show damage or improper planting as determined by the NRCS Technician shall be replaced.

Mulching

Mulch shall be applied around each tree and shrub covering the bottom of the basin to a depth of two inches.

Pruning

Plants shall not be pruned prior to planting and after planting only at the direction of the NRCS Technician.

Staking

All 5-gallon and 15-gallon size trees installed shall be supported by three stakes plus ties as shown on the drawings within 48 hours after planting. Spindly trees shall also be supported by a flexible rod plus ties and the three stakes shall be held by a steel strap as shown on the plans. The type of support used for each tree shall be subject to the approval of the NRCS Technician.

VI. IRRIGATION

All trees, shrubs, and flat size plants shall be watered immediately after planting and thereafter as necessary to keep the soil reasonably moist throughout the root system during the first and second growing seasons unless otherwise specified on the Practice Requirements sheet.

Water shall be intermittently applied in a moderate stream that does not displace the mulch or soil around the plant until the surrounding soil is thoroughly saturated. Damage, erosion or slippage of the soil caused by watering shall be repaired by the Contractor at his expense

When specified, irrigation water shall be applied at the times and rates as listed on the Practice Requirements sheet.

VII. SPECIAL MEASURES

Measures and methods that enhance fish and wildlife values, protect visual resources, and maintain key shade, food, and den trees shall be performed when specified on the Practice Requirements sheet.

VIII. OTHER REQUIREMENTS

For the first two growing seasons all plants and planting areas shall be maintained weed and pest free and shall be protected against animal depredation and other hazards that will adversely affect the plants. All plants that show damage or indicate failure to grow will be replaced. Papers, trash, debris, and surplus earth which accumulate in the planted areas shall be removed and disposed of away from the site and the planted areas shall be cared for as to present a neat and clean condition at all times. Basins, basin walls and other earth areas shall be kept well formed or graded.

Weeding shall be by hand or with a herbicide. When pulled by hand they shall be pulled before they exceed four inches in height or with a herbicide before they exceed two inches in height, unless otherwise specified on the Practice Requirements sheet. When any insecticide or herbicide is used, all manufacturer's label directions and Sate and Federal regulations shall be followed.

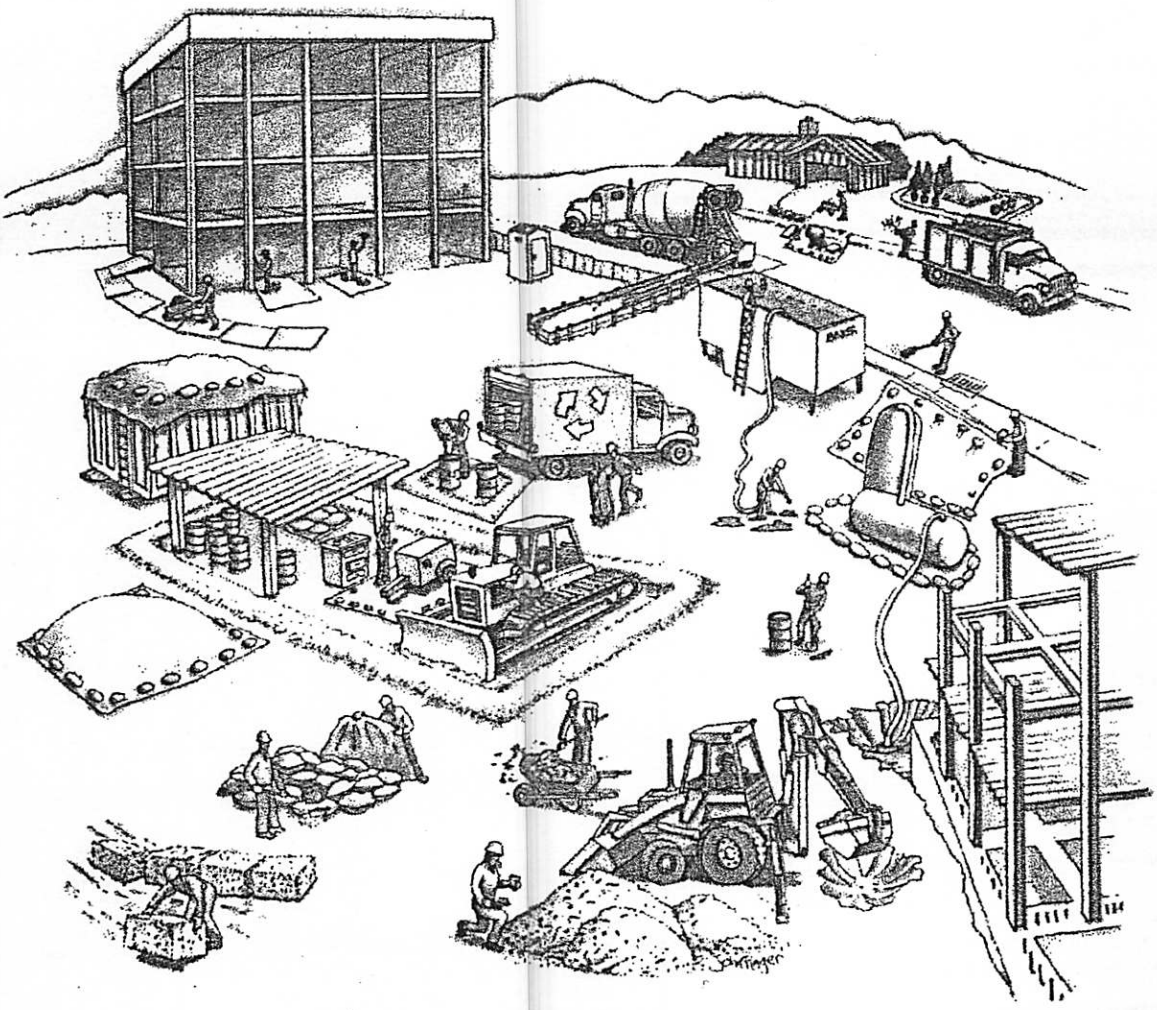
No herbicide may be used within 30 days of planting and shall be applied with a photosensitive dye, unless otherwise specified on the Practice Requirements sheet, which will produce a color when sprayed upon the ground. The color shall disappear within two or three days after being applied and shall not stain concrete, nor be injurious to plant or animal life when applied at the manufacturers recommended application rate.

Other details for the establishment and maintenance of the plants including, but not limited to rodent protection and livestock and traffic control shall be applied when specified on the Practice Requirements sheet.

Operations shall be done in such a manner that erosion and air and water pollution are minimized and held within legal limits. All work and operations shall be conducted in accordance with proper safety codes for the type of equipment and operations being performed with due regards to the safety of all persons and property.

Blueprint For A Clean Ocean

Best Management Practices to Prevent Stormwater Pollution from Construction-Related Activities



This booklet has been developed as a resource for all general contractors, home builders, and subcontractors working on construction sites.

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INTRODUCTION

Stormwater pollution is rapidly growing in importance as a national environmental issue. In California, stormwater pollution is a major source of water pollution. To help combat the problems of stormwater pollution, federal and state governments have developed a program for monitoring and permitting discharges to municipal storm drain systems, creeks, and water bodies such as the Pacific Ocean.

Municipalities in the Los Angeles Area are required by the Clean Water Act to develop stormwater management programs that include requirements for construction activities. Your construction project will need to comply with local municipal requirements. If your construction activity will disturb five acres or more, you must also obtain coverage under the General Construction Activity Permit (see Requirements for Dischargers).

Blueprint for a Clean Ocean is an introductory guide to stormwater quality control on construction sites. It contains several principles and techniques that you can use to help prevent stormwater pollution. This booklet has been developed as a resource for all general contractors, home builders, and subcontractors working on construction sites.

Blueprint for a Clean Ocean is not a design manual or a Stormwater Pollution Prevention Plan (SWPPP) (see Requirements for Dischargers). For more information on the General Permit, designing stormwater quality controls, or producing a Stormwater Pollution Prevention Plan, please refer to the California Storm Water Best Management Practice Handbook for Construction Activity, or consult your local program or the SWRCB (see below). Please note that this booklet is concerned only with the management of construction sites and activities during construction.

STORMWATER POLLUTION

Storm Drain System

Stormwater or runoff from sources like sprinklers and hoses flows over the ground into the storm drain system. In the Los Angeles Area, storm drain systems consist of gutters, storm drains, underground pipes, open channels, culverts, and creeks. Storm drain systems are designed to drain directly to the Pacific Ocean with no treatment.

Pollution From Construction Sites

Stormwater runoff is part of a natural hydrologic process. However, land development and construction activities can significantly alter natural drainage patterns and pollute stormwater runoff. Runoff picks up pollutants as it flows over the ground or paved areas and carries these pollutants into the storm drain system. Common sources of pollutants from construction sites include: sediments from soil erosion; construction materials and waste (e.g., paint, solvents, concrete, drywall); landscaping runoff containing fertilizers and pesticides; and spilled oil, fuel, and other fluids from construction vehicles and heavy equipment.

Adverse Effects from Stormwater Pollution

Stormwater pollution is a major source of water pollution in California. It can cause declines in fisheries, disrupt habitats, and limit water recreation activities. Even more importantly, stormwater pollution poses a serious threat to the overall health of the ecosystem.

For more information on stormwater requirements, call the State Water Resources Control Board's Stormwater Information Line at (916) 657-1146 or your local program.

REQUIREMENTS FOR DISCHARGERS

Municipal Stormwater Program

Municipalities in the Los Angeles Area are required by federal regulations to develop programs to control the discharge of pollutants to the storm drain system, including the discharge of pollutants from construction sites and areas of new development or significant redevelopment. As a result, your development and construction projects may be subject to new requirements designed to improve stormwater quality such as, expanded plan check and review, new contract specifications, and increased site inspection. For more information on municipal requirements, please contact the municipal representative listed on the back cover of this booklet.

Projects Equal To Or Greater Than 5 Acres

If your construction activity will disturb five acres or more, you must obtain coverage under the General Construction Activity Storm Water Permit (General Construction Permit) issued by the State Water Resources Control Board (SWRCB) for stormwater discharges associated with construction activity. To obtain coverage under the General Permit, a Notice of Intent (NOI) must be filed with the SWRCB. The General Construction Permit requires you to prepare and carry out a "Stormwater Pollution Prevention Plan" or SWPPP. Your SWPPP must identify appropriate stormwater pollution prevention measures or best management practices (BMPs), like the ones described in this booklet, to reduce pollutants in stormwater discharges from the construction site both during and after construction is completed. A best management practice or BMP is defined as any program, technology, process, practice, operating method, measure, or device which controls, prevents, removes, or reduces pollution.

Projects Less Than 5 Acres

If your project is less than five acres, you may still need to use BMPs to comply with local municipal requirements. Check with the local planning or engineering department for details.

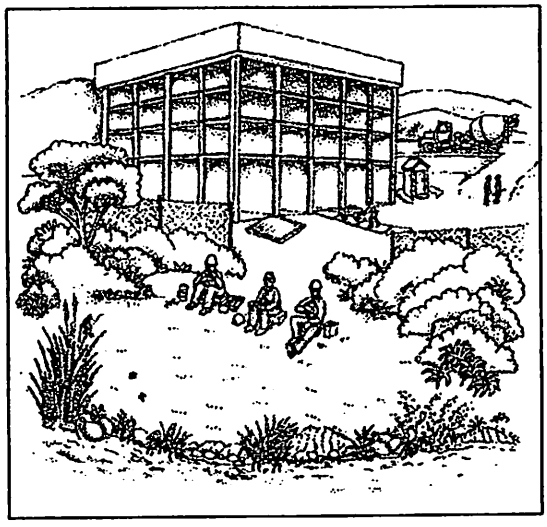
GENERAL BEST MANAGEMENT PRACTICES

The following are some general principles that can significantly reduce pollution from construction activity and help make compliance with stormwater regulations easy:

- Identify all storm drains, drainage swales and creeks located near the construction site and make sure all subcontractors are aware of their locations to prevent pollutants from entering them.
- Clean up leaks, drips, and other spills immediately so they do not contact stormwater.
- Refuel vehicles and heavy equipment in one designated location on the site and take care to clean up spills immediately.
- Wash vehicles at an appropriate off-site facility. If equipment must be washed on-site, do not use soaps, solvents, degreasers, or steam cleaning equipment, and prevent wash water from entering the storm drain. If possible, direct wash water to a low point where it can evaporate and/or infiltrate.
- Never wash down pavement or surfaces where materials have spilled. Use dry cleanup methods whenever possible.

For more information on stormwater requirements, call the State Water Resources Control Board's Stormwater Information Line at (916) 657-1146 or your local program.

- Avoid contaminating clean runoff from areas adjacent to your site by using berms and/or temporary or permanent drainage ditches to divert water flow around the site. Reduce stormwater runoff velocities by constructing temporary check dams and/or berms where appropriate.
- Protect all storm drain inlets using filter fabric cloth or other best management practices to prevent sediments from entering the storm drainage system during construction activities.
- Keep materials out of the rain — prevent runoff pollution at the source. Schedule clearing or heavy earth moving activities for periods of dry weather. Cover exposed piles of soil, construction materials and wastes with plastic sheeting or temporary roofs. Before it rains, sweep and remove materials from surfaces that drain to storm drains, creeks, or channels.
- Keep pollutants off exposed surfaces. Place trash cans around the site to reduce litter. Dispose of non-hazardous construction wastes in covered dumpsters or recycling receptacles.
- Practice source reduction — reduce waste by ordering only the amount you need to finish the job.
- Do not over-apply pesticides or fertilizers and follow manufacturers instructions for mixing and applying materials.
- Recycle leftover materials whenever possible. Materials such as concrete, asphalt, scrap metal, solvents, degreasers, cleared vegetation, paper, rock, and vehicle maintenance materials such as used oil, antifreeze, batteries, and tires are recyclable.



- Dispose of all wastes properly. Materials that cannot be reused or recycled must be taken to an appropriate landfill or disposed of as hazardous waste. Never throw debris into channels, creeks or into wetland areas. Never store or leave debris in the street or near a creek where it may contact runoff.
- Illegal dumping is a violation subject to a fine and/or time in jail. Be sure that trailers carrying your materials are covered during transit. If not, the hauler may be cited and fined.
- Train your employees and inform subcontractors about the stormwater requirements and their own responsibilities.

SPECIFIC BEST MANAGEMENT PRACTICES

Following is a summary of specific best management practices for erosion and sediment control and contractor activities. For more information on erosion and sediment control BMPs and their design, please refer to the California Storm Water Best Management Practice Handbook for Construction Activity (March 1993).

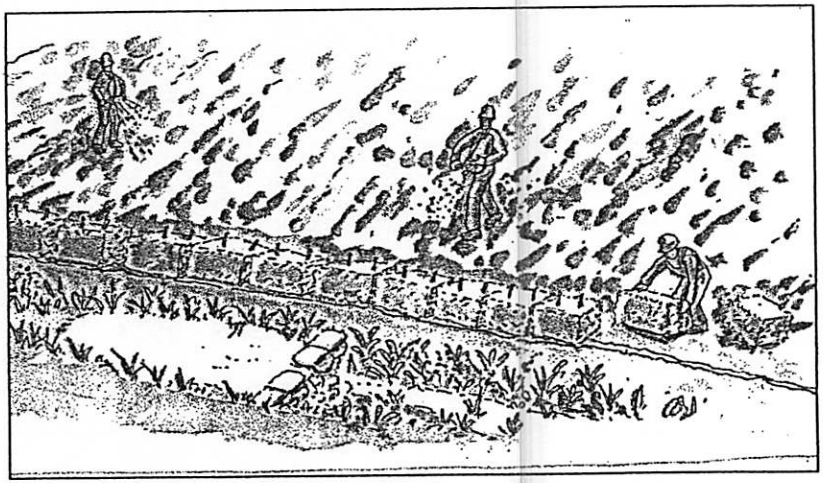
Erosion Prevention and Sediment Control

Prevent erosion

Soil erosion is the process by which soil particles are removed from the land surface, by wind, water and/or gravity. Soil particles removed by stormwater runoff are pollutants that when deposited in local creeks, lakes, and the Pacific Ocean, can have negative impacts on aquatic habitat. Exposed soil after clearing, grading, or excavation is easily eroded by wind or water. The following practices will help prevent erosion from occurring on the construction site:

- Plan the development to fit the topography, soils, drainage pattern and natural vegetation of the site.
- Delineate clearing limits, easements, setbacks, sensitive or critical areas, trees, drainage courses, and buffer zones to prevent excessive or unnecessary disturbances and exposure.
- Phase grading operations to reduce disturbed areas and time of exposure.
- Avoid excavation and grading during wet weather.
- Limit on-site construction routes and stabilize construction entrance(s).
- Remove existing vegetation only when absolutely necessary.
- Construct diversion dikes and drainage swales to channel runoff around the site.
- Use berms and drainage ditches to divert runoff around exposed areas. Place diversion ditches across the top of cut slopes.

The California Storm Water Best Management Practices Handbook for Construction Activity provides specific details and design criteria for erosion and sediment control plans.



Drainage swales channel runoff around a construction site. Planting temporary vegetation on freshly graded areas, and trenching and staking straw bales and/or silt fences downslope are common techniques for preventing erosion and controlling sediment.

- Plant vegetation on exposed slopes. Where replanting is not feasible, use erosion control blankets (e.g., jute or straw matting, glass fiber or excelsior matting, mulch netting).
- Consider slope terracing with cross drains to increase soil stability.
- Cover stockpiled soil and landscaping materials with secured plastic sheeting and divert runoff around them.
- As a back-up measure, protect drainage courses, creeks, or catch basins with straw bales, silt fences and/or temporary drainage swales.
- Once grading is completed, stabilize the disturbed areas using permanent vegetation as soon as possible.
- Conduct routine inspections of erosion control measures especially before and immediately after rainstorms, and repair if necessary.

Control sediment

Sedimentation is defined as the process of depositing sediments picked up by runoff. Sediments consist of soil particles, clays, sands, and other minerals. The purpose of sediment control practices is to remove sediments from stormwater before they are transported off-site or reach a storm drain inlet or nearby creek. The most effective sediment control practices reduce runoff velocity and trap or detain runoff allowing sediments to settle out.

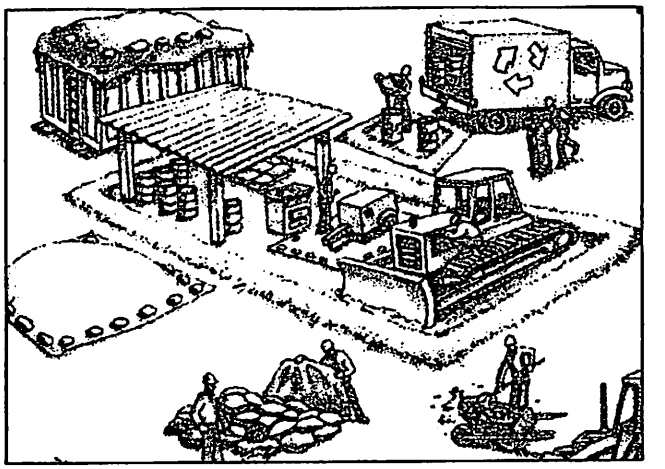
- Use terracing, rip rap, sand bags, rocks, straw bales, and/or temporary vegetation on slopes to reduce runoff velocity and trap sediments. Do not use asphalt rubble or other demolition debris for this purpose.
- Use check dams in temporary drains and swales to reduce runoff velocity and promote sedimentation.
- Protect storm drain inlets from sediment-laden runoff. Storm drain inlet protection devices include sand bag barriers, filter fabric fences, block and gravel filters, and excavated drop inlet sediment traps.
- Collect and detain sediment-laden runoff in sediment traps (an excavated or bermed area or constructed device) to allow sediments to settle out prior to discharge.
- Use sediment controls and filtration to remove sediments from water generated by dewatering.
- Prevent construction vehicle tires from tracking soil onto adjacent streets by constructing a temporary stone pad with a filter fabric underliner near the site exit where dirt and mud can be removed.
- When cleaning sediments from streets, driveways and paved areas on construction sites, use dry sweeping methods where possible. If water must be used to flush pavement, collect runoff to settle out sediments and protect storm drain inlets.

NOTE: Performance of erosion and sediment controls is dependent on proper installation, routine inspections and maintenance of the controls. Most of the BMPs described above are temporary and if left alone can quickly fall into disrepair and/or become ineffective. Routine inspections and maintenance, particularly before and after a storm event, must be part of any erosion and sediment control plan.

General Site Maintenance

Prevent spills and leaks

Poorly maintained vehicles and heavy equipment leaking fuel, oil, antifreeze, or other fluids on the construction site are common sources of stormwater pollution and soil contamination. Construction material spills can also cause serious problems. Careful site planning, preventive maintenance, and good materials handling practices can eliminate most spills and leaks.



Store building materials under cover. Make sure dumpsters are properly covered to keep out rain.

- Maintain all vehicles and heavy equipment. Inspect frequently for and repair leaks.
- Designate specific areas of the construction site, well away from creeks or storm drain inlets, for auto and equipment parking and routine vehicle and equipment maintenance.
- Perform major maintenance, repair jobs and vehicle and equipment washing off-site when feasible, or in designated and controlled areas on-site.
- If you must drain and replace motor oil, radiator coolant, or other fluids on-site, use drip pans or drop cloths to catch drips and spills. Collect all spent fluids, store in labeled separate containers, and recycle whenever possible. Note that in order to be recyclable, such liquids must not be mixed with other fluids. Non-recycled fluids generally must be disposed of as hazardous wastes.

Clean up spills immediately after they happen

When vehicle fluids or materials such as paints or solvents are spilled, cleanup should be immediate, automatic, and routine.

- Sweep up spilled dry materials (e.g., cement, mortar, or fertilizer) immediately. Never attempt to "wash them away" with water, or bury them. Use only minimal water for dust control.
- Clean up liquid spills on paved or impermeable surfaces using "dry" cleanup methods (e.g., absorbent materials like cat litter, sand or rags).
- Clean up spills on dirt areas by digging up and properly disposing of the contaminated soil.
- Report significant spills to the appropriate spill response agencies immediately (See reference list on the back cover of this booklet for more information).

NOTE: Used cleanup rags that have absorbed hazardous materials must either be sent to a certified industrial laundry or dry cleaner, or disposed of through a licensed hazardous waste disposal company.

Store materials under cover

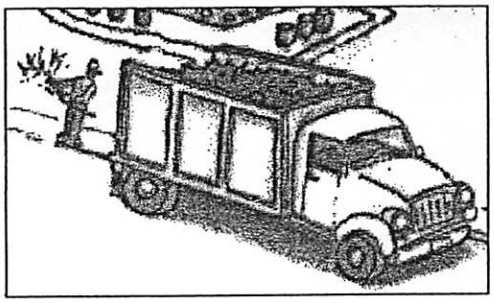
Wet and dry building materials with the potential to pollute runoff should be stored under cover and/or surrounded by berms when rain is forecast or during wet weather.

- Store stockpiled materials and wastes under a temporary roof or secured plastic sheeting or tarp.
- Berm around storage areas to prevent contact with runoff.
- Plaster or other powders can create large quantities of suspended solids in runoff, which may be toxic to aquatic life and cause serious environmental harm even if the materials are inert. Store all such potentially polluting dry materials —especially open bags— under a temporary roof or inside a building, or cover securely with an impermeable tarp. By storing dry materials under a roof, you may also help protect air quality, as well as water quality.
- Store containers of paints, chemicals, solvents, and other hazardous materials in accordance with secondary containment regulations and under cover during rainy periods.

Cover and maintain dumpsters

Open or leaking dumpsters can be a source of stormwater pollution.

- Cover open dumpsters with plastic sheeting or a tarp during rainy weather. Secure the sheeting or tarp around the outside of the dumpster. If your dumpster has a cover, close it.
- If a dumpster is leaking, contain and collect leaking material. Return the dumpster to the leasing company for repair/exchange.
- Do not clean dumpsters on-site. Return to leasing company for periodic cleaning, if necessary.



Recycle yard waste and tree prunings at a landfill that chips and composts plant material.

Collect and properly dispose of paint removal wastes

Paint removal wastes include chemical paint stripping residues, paint chips and dust, sand blasting material and wash water. These wastes contain chemicals that are harmful to the wildlife in our creeks and the water bodies they flow to. Keep all paint wastes away from the gutter, street, and storm drains.

- Non-hazardous paint chips and dust from dry stripping and sand blasting may be swept up or collected in plastic drop cloths and disposed of as trash. Chemical paint stripping residue and chips and dust from marine paints or paints containing lead or tributyl tin must be disposed of as a hazardous waste.
- When stripping or cleaning building exteriors with high-pressure water, cover or berm storm drain inlets. If possible (and allowed by your local wastewater treatment plant), collect (mop or vacuum) building cleaning water and discharge to the sanitary sewer. Alternatively, discharge non-contaminated wash water onto a dirt area and spade into the soil. Be sure to shovel or sweep up any debris that remains in the gutter and dispose of as garbage.

Clean up paints, solvents, adhesives, and cleaning solutions properly

Although many paint materials can and should be recycled, liquid residues from paints, thinners, solvents, glues, and cleaning fluids are hazardous wastes. When they are thoroughly dry, empty paint cans, used brushes, rags, absorbent materials, and drop cloths are no longer hazardous and may be disposed of as garbage.

- Never clean brushes or rinse paint containers into a street, gutter, storm drain, or creek.
- For water-based paints, paint out brushes to the extent possible and rinse to a drain leading to the sanitary sewer (i.e., indoor plumbing).
- For oil-based paints, paint out brushes to the extent possible, and filter and reuse thinners and solvents. Dispose of unusable thinners and residue as hazardous waste.
- Recycle, return to supplier or donate unwanted water-based (latex) paint. You may be able to recycle clean empty dry paint cans as metal.
- Dried latex paint may be disposed of in the garbage.
- Unwanted paint (that is not recycled), thinners, and sludges must be disposed of as hazardous waste.
- More and more paint companies are recycling excess latex paint (See separate list of "Recyclers and Disposal Services" for more information).

DEMOLITION WASTE MANAGEMENT

Keep fresh concrete and cement mortars out of gutters, storm drains, and creeks

Concrete and cement-related mortars that wash into gutters and storm drains are toxic to fish and the aquatic environment.

- Avoid mixing excess amounts of fresh concrete or cement mortar on-site.
- Store dry and wet materials under cover, protected from rainfall and runoff.
- Wash out concrete transit mixers only in designated wash-out areas where the water will flow into settling ponds or onto dirt or stockpiles of aggregate base or sand. Pump water from settling ponds to the sanitary sewer, where allowed. Whenever possible, recycle washout by pumping back into mixers for reuse. Never dispose of washout into the street, storm drains, drainage ditches, or creeks.
- Whenever possible, return contents of mixer barrel to the yard for recycling. Dispose of small amounts of excess concrete, grout, and mortar in the trash.

Service and maintain portable toilets

Leaking portable toilets are a potential health and environmental hazard.

- Inspect portable toilets for leaks.
- Be sure the leasing company adequately maintains, promptly repairs, and replaces units as needed.
- The leasing company must have a permit to dispose of waste to the sanitary sewer.

Dispose of cleared vegetation properly

Cleared vegetation, tree trimmings, and other plant material can cause environmental damage if it gets into creeks. Such "organic" material requires large quantities of oxygen to decompose, which reduces the oxygen available to fishes and other aquatic life.

- Do not dispose of plant material in a creek or drainage facility or leave it in a roadway where it can clog storm drain inlets.
- Avoid disposal of plant material in trash dumpsters or mixing it with other wastes. Compost plant material or take it to a landfill or other facility that composts yard waste.

Make sure all demolition waste is properly disposed of

Demolition debris that is left in the street or pushed over a bank into a creek bed or drainage facility causes serious problems for flood control, storm drain maintenance, and the health of our environment. Different types of materials have different disposal requirements or recycling options.

- Materials that can be recycled from demolition projects include: metal framing, wood, concrete, asphalt, and plate glass.
- Materials that can be salvaged for reuse from old structures include: doors, banisters, floorboards, windows, 2x4s, and other old, dense lumber.
- Unusable, unrecycleable debris should be confined to dumpsters, covered at night and during wet weather, and taken to a landfill for disposal.
- Hazardous debris such as asbestos must be handled in accordance with specific laws and regulations and disposed of as a hazardous waste. For more information of asbestos handling and disposal regulations, contact the South Coast Air Quality Management District.
- Arrange for an adequate debris disposal schedule to insure that dumpsters do not overflow.

ROADWORK AND PAVEMENT CONSTRUCTION

Plan roadwork and pavement construction to avoid stormwater pollution

Road paving, surfacing, and asphalt removal happen right in the street, with numerous opportunities for stormwater pollution from the asphalt mix, saw-cut slurry, or excavated material. Properly proportioned asphalt mix and well-compacted pavement avoid a host of water pollution problems.

- Apply concrete, asphalt, and seal coat during dry weather to prevent contaminants from contacting stormwater runoff.
- Cover storm drain inlets and manholes when paving or applying seal coat, slurry seal, fog seal, etc.
- Always park paving machines over drip pans or absorbent materials, since they tend to drip continuously.
- When making saw-cuts in pavement, use as little water as possible. Cover each catch basin completely with filter fabric during the sawing operation and contain the slurry by placing straw bales, sand bags, or gravel dams around the catch basin. After the liquid drains or evaporates, shovel or vacuum the slurry residue from the pavement or gutter and remove from site.

- Wash down exposed aggregate concrete only when the wash water can: (1) flow onto a dirt area; (2) drain onto a bermed surface from which it can be pumped and disposed of properly; or (3) be vacuumed from a catchment created by blocking a storm drain inlet. If necessary, place straw bales downslope, or divert runoff with temporary berms. Make sure runoff does not reach gutters or storm drains.
- Allow aggregate rinse to settle, and pump the water to the sanitary sewer if allowed by your local wastewater authority.
- Never wash sweepings from exposed aggregate concrete into a street or storm drain. Collect and return to aggregate base stockpile, or dispose with trash.
- Recycle broken concrete and asphalt.

CONTAMINATED PONDED STORMWATER, GROUNDWATER, AND SOIL GUIDANCE

Look for ponded stormwater, groundwater, and/or soil contamination

Ponded stormwater, groundwater and soil may become contaminated if exposed to hazardous materials. If any of the following conditions apply, contaminated ponded stormwater, groundwater, and/or soil may be present and pose a potential health and environmental hazard:

- The project site is in an area of previous commercial/industrial activity;
- There is a history of illegal dumping on the site or adjacent properties;
- The construction site is subject to a Superfund, state, or local cleanup order;
- Ponded stormwater, groundwater and/or water generated by dewatering exhibits an oily-sheen and/or smells of petroleum;
- Soil appears discolored, smells of petroleum and/or exhibits other unusual properties;
- Abandoned underground storage tanks, drums, or other buried debris are encountered during construction activities; or
- Spills have occurred on the site or adjacent properties involving pesticides and herbicides; fertilizers; detergents; plaster and other products; petroleum products such as fuel, oil, and grease; or other hazardous chemicals such as acids, lime, glues, paints, solvents, and curing compounds.

Take appropriate action

Ponded stormwater, groundwater, or water generated by dewatering that is contaminated cannot be discharged to a street, gutter, or storm drain. If contamination is suspected, the water should be contained and held for testing. Call the appropriate local agency and/or the Regional Water Quality Control Board for further guidance (See reference list on the back cover of this booklet for more information).

Remember: The property owner and the contractor share ultimate responsibility for the activities that occur on a construction site. You may be held responsible for any environmental damage caused by your subcontractor or employees.

POLLUTION CONTROL AGENCIES AND SOURCES OF INFORMATION

Storm water quality management program
County of Los Angeles (800) 303-0003

Agencies to call for local construction site requirements
In county unincorporated areas and in the cities of:

Artesia	Lakewood
Bellflower	La Mirada
Bradbury	La Puente
Carson	Lawndale
Cerritos	Lomita
Commerce	Rolling Hills
Duarte	Santa Fe Springs
Industry	Temple City
Irwindale	Westlake Village
La Cañada/Flintridge	

(818) 458-3187

Agencies to call in the event of a spill
You are required by law to report all significant releases or suspected significant releases of hazardous materials, including oil.

To report a spill, call the following agencies:

1. Dial (800) 303-0003 or your local emergency response number.
2. Call the Governor's Office of Emergency Services Warning Center, (800) 852-7550 (24 hours).

For spills of "Federal Reportable Quantities" of oil, chemicals, or other hazardous materials to land, air, or water, notify the National Response Center (800-424-8802). If you are not sure whether the spill is of a "reportable quantity," call the federal Environmental Protection Agency (800) 424-9346 for clarification.

For further information, see *California Hazardous Material Spill/ Release Notification Guidance* (State Office of Emergency Services, Hazardous Materials Division).

Agencies to call if you find or suspect contaminated soil or groundwater
Regional Water Quality Control Board:
Los Angeles Basin (213) 266-7500

California Environmental Protection Agency (Cal EPA), Department of Toxic Substances Control (DTSC) (510) 540-3732

Documents and available resources
From State Water Resources Control Board (SWRCB) (916) 657-1146:
General Construction Activity Storm Water Permit
California Storm Water Best Management Practice Handbook – Construction Activity

From Cal EPA, DTSC (916) 322-3670:
Waste Minimization for the Building Construction Industry – Fact Sheet

APPENDIX E

LIVING LIGHTLY IN OUR WATERSHED

LIVING LIGHTLY IN OUR WATERSHED

A Guide for Topanga Residents 2001

Provided by the

TOPANGA CREEK WATERSHED COMMITTEE

Our Mission

The mission of the Topanga Creek Watershed Committee is to coordinate and implement a consensus-based, voluntary, sustainable, Coordinated Resource Management Plan that integrates the needs and concerns of the community and addresses all aspects of watershed ecology and watershed management. The Topanga Creek Watershed Committee represents all stakeholders in the watershed and is open to all interested citizens who desire to demonstrate respect for our ecosystem of which we are a part.

FREQUENTLY-ASKED QUESTIONS

What is a Watershed?

A watershed is a geographic area that collects all the rainfall into a series of drainages and creeks, eventually reaching the sea. The Topanga Creek Watershed is the third largest watershed draining into the Santa Monica Bay. In addition to approximately 12,000 human residents, our Watershed is home to many species of plants and animals, some of which are rare, threatened or endangered. Our common home ties all of us together.

Why is Our Watershed Important?

Every resident of Topanga receives the spiritual, aesthetic, ecological and economic benefits that come from living in a healthy watershed. We wake up to the rustling of the oaks and are serenaded to sleep by owl, frogs and coyotes. In return, we each need to recognize the impacts of our actions on this fragile resource and take responsibility for leaving it viable for generations to come.

How Can I Help?

There are many ways residents can help preserve our watershed. Below are some suggestions as well as contacts for more information. Please note that the contacts listed are provided for informational purposes only and no endorsement of products or services is implied.

BACKYARD CONSERVATION

In addition to the 12,000 people who call Topanga home, the canyon is home to a robust and diverse ecosystem. You can take part in the protection of this fragile natural environment by practicing conservation on your own property by:

- creating habitats using native plants;
- linking your yard to surrounding wildlands;
- minimizing use of pesticides, herbicides, toxic materials.

Information and Resources:

- National Wildlife Federation Backyard Habitat Program, www.nwf.org
- National Audubon Society, 212-979-3117, www.audubon.org
- Resource Conservation District of the Santa Monica Mountains (RCDSMM) library, 310-455-1030
- Wildlife Habitat Council, 301-588-8994, www.wildlifehc.org
- Fish and Game Department, General information: 562-590-5132,
- Emergency Law Enforcement: 213-620-4700
- Bat Conservation International, www.batcon.org

BRUSH CLEARANCE

Brush clearance is important! It can minimize danger from wildfire, but ground cover and well-established root systems are important in minimizing erosion. The goal is to strike a balance between these two competing purposes. You can help by:

- replacing flammable vegetation with less-flammable within 30 feet of your house;
- mowing before weeds set seeds.

Information and Resources:

- "Landscaping for Fire Safety: Plants Native to the Santa Monica Mountains" available at the Resource Conservation District of the Santa Monica Mountains (RCDSMM), 310-455-1030
- Landscaping consultants available through L.A. County Forestry, 818-890-5719
- Videos available at Resource Conservation District of the Santa Monica Mountains (RCDSMM), 310-455-1030
- Topanga Coalition for Emergency Preparedness (T-CEP), 310-455-3000
- Fire Prevention and Public Safety Bureau, 213-485-5982
- L.A. County Brush Clearance Unit, 818-756-8022
- California FAIR Plan, 213-487-0111

COMPOSTING AND RECYCLING

Yard clippings are now picked up at the curbside in Topanga, but you can also maintain a compost pile of your own to keep organic material in the canyon to enrich the soil for future growth. Here are some suggestions:

- recycle old trashcans into compost bins;
- keep trash can lids closed to prevent unwanted critter guests;
- do not include meats, fats or cheese in your compost pile.

Information and Resources:

- Master Composting Classes, www.mastercomposter.com
- www.smartgardening.com
- California Native Plant Society, 818-348-5910
- Resource Conservation District of the Santa Monica Mountains (RCDSMM), 310-455-1030
- Californians Against Waste, 916-443-5422, www.cawrecycles.org
- Eric Warblowsky, Compost Evangelist, Master Composter, 805-652-1142

- John P. McAndrew, Compost/Bio Dynamic Methods, 310-454-6090
- Harmonious Technologies, www.homecompost.com/
- Beverage Container Recycling Information, 800-732-9253
- Real Goods, 310-455-4645, www.realgoods.com

DRAINAGE CONTROL

Well-designed and maintained drainage systems not only help to minimize siltation and unnecessary erosion but also add to the value of your property. Remember that everything eventually ends up in the creek or the ocean. You can help by:

- identifying sources of surface water (runoff) flowing over and off your property;
- leaving mulch, vegetation & plant roots in areas prone to erosion;
- fitting your roof with gutters and drainspouts, discharging onto non-erodible surfaces (simple systems can really work);
- using an asphalt or compacted earth berm (or sandbag) on the outside edge of a driveway or building pad to direct runoff away from sensitive slopes to an area where it can be released safely;
- creating on-site retention in cisterns, ponds or old septic tanks to use for irrigation and/or fire-fighting.

Information and Resources:

- EcoHome, 323-662-5207
- T.R.E.E.S., www.treepeople.org/trees
- Resource Conservation District of the Santa Monica Mountains (RCDSMM), 310-455-1030
- Public Works Department, Sewer and Storm Drain Maintenance, 310-478-7253
- State Water Resources Control Board, www.swrcb.ca.gov
- Invisible Structures, Inc., 800-233-1510, www.invisiblestructures.com
- Topanga Underground, 310-455-2189
- Bill Wilson Environmental Planning and Design, 310-441-3861

EROSION CONTROL

Are slopes sliding, gullies forming or tree roots hanging out on your property? Every property owner should conduct a survey of his or her property to determine where erosion problems may exist. Once problem areas have been found, appropriate remedies can be applied. Remember that:

- plants on slopes need different rooting depths to hold soil;
- jute netting and erosion control blankets made of biodegradable fiber work better than plastic sheets;
- terraced walls of natural rocks can really help;
- it's important to find and fix drainage problems that cause erosion.

Information and Resources:

- Natural Resource Conservation Service, 805-386-4489
- Resource Conservation District of the Santa Monica Mountains (RCDSMM), 310-455-1030
- L.A. County Building and Safety, 818-880-4150
- Erosion Control Magazine, www.erosioncontrol.com
- International Erosion Control Association, 970-879-3010
- Pathworks Railroad Tie Installation, 310-455-1085

GREYWATER SYSTEMS

Greywater systems are an excellent way to conserve and reuse water, especially during drought conditions. However, improperly designed and maintained systems can cause serious water quality problems on site and downstream. Some suggestions include:

- always discharge greywater subsurface to prevent a health hazard and salt buildup in soil which is highly toxic to plants;
- use detergents low in salts, boron and other chemicals (detergent analysis is available from the RCDSMM below);
- remember that it is illegal for drains to daylight on the surface;
- use greywater systems for irrigating non-edible plants and providing on-site fire protection.

Information and Resources:

- "Create an Oasis with Greywater" by Art Ludwig and "Building Professionals Supplement" from Real Goods Trading Company, 800-762-7325
- "Detergent Composition and Greywater" available at Resource Conservation District of the Santa Monica Mountains (RCDSMM), 310-455-1030
- Biosolutions, 310-457-0808
- EcoHome, 323-662-5207
- Oasis Design, 805-967-9956, www.oasisdesign.net/
- Bill Wilson Environmental Planning and Design, 310-441-3861
- Topanga Underground, 310-455-2189
- Real Goods, 310-455-4645, www.realgoods.com

HORSES AND STABLES

Horse keepers face unique challenges in minimizing impacts on the watershed. Managing large areas of perpetually bare earth and large quantities of manure are two of the biggest problems. It is important to keep manure out of the creek at all times. Some suggestions include:

- composting manures and corralled animal wastes (see RCDSMM manual below);
- using green or gravel filter berms to surround corrals to prevent sedimentation of the creek and help cleanse runoff.

Keep in mind that manure can spread invasive, flammable weeds.

Information and Resources:

- "Corralled Animal Best Management Practices Manual" available at the Resource Conservation District of the Santa Monica Mountains (RCDSMM), 310-455-1030
- Pierce College Agriculture Department, Ron Wechsler, 805-527-2242, 818-710-2980

LANDSCAPING

Landscaping can be carried out with erosion control, water conservation, firesafety, native vegetation, wildlife compatibility and aesthetics in mind and can accommodate each concern without compromising any of the others. Remember to:

- save water, think native;
- minimize irrigation needs by matching plants in each watering zone;
- keep in mind that planting under oaks has special requirements.

Information and Resources:

- Resource Conservation District of the Santa Monica Mountains (RCDSMM), 310-455-1030
- L.A. County Forestry, 818-890-5719
- California Native Plant Society, 818-348-5910
- Theodore Payne Foundation, 818-768-1802
- Topanga Fanatical Botanical Society, 310-455-2292
- Local Landscape Designers / Contractors

RUNOFF CONTROL

Herbicides, pesticides, chemical fertilizers and other household, stable, automotive and business-related toxic or hazardous materials can severely harm flora and fauna in the watershed. Remember, non-point sources of pollution are the single biggest contributors to poor water quality. Think before you pour and remember to:

- dispose of all toxic materials properly at your local recycling center;
- use toxic materials according to directions and only as a last resort;
- wash your car at a car wash that recycles water, or if you must do it at home, use a good biodegradable soap and don't keep the hose running between rinses.

Information and Resources:

- Resource Conservation District of the Santa Monica Mountains (RCDSMM), 310-455-1030
- L.A. County Agricultural Commission, 626-350-7077
- Californians for Pesticide Reform, pests@igc.org
- State Water Resources Control Board, www.swrcb.ca.gov/
- Fire Department Hazardous Materials Section, 213-485-8080
- Spill Response, 213-890-4045
- To report illegal dumping, 800-303-0003
- L.A. County Hazardous Waste Collection Program, 800-238-0173, www.lacsd.org
- Santa Monica City Recycling Center, 2500 Michigan Avenue, in Santa Monica

SEPTIC SYSTEMS

Topanga is not served by a municipal sewer system. Every home in the canyon has its own septic system. Proper care and maintenance of septic systems is critical to keep waters in the creek clean and safe for all. Here are some suggestions:

- use water-conserving fixtures to minimize water flow to disposed area;
- install a greywater system to reuse laundry and shower water for irrigation
- fix leaky toilets immediately;
- be careful not to overuse septic system when hosting large parties;
- use sieves in the kitchen sink to prevent excess food waste from entering septic system;
- install a low-maintenance filter in septic tank to extend life of disposal areas;
- install access risers and lids so that potentially costly problems can be identified and fixed;
- do not use bleaches or anti-bacterial soaps;
- pump only every few years.

Information and Resources:

- Advanced Composting Systems, Phoenix Composting Toilet, www.advancedcomposting.com
- Resource Conservation District of the Santa Monica Mountains (RCDSMM), 310-455-1030
- Biosolutions, 818-991-9997
- Topanga Underground, 310-455-2189
- W.A.S.T.E.C. Pumping, 800-799-2783
- Andrew Rasmussen, 310-455-3578
- Bill Wilson Environmental Planning and Design, 310-441-3861
- Clivus Multrum Composting Toilets, www.clivusmultrum.com

SLOPE STABILIZATION

Steep slopes require special attention in order to keep them from failing. Slope failure can incur catastrophic damage on wildlife habitat, block roads and undermine foundations. For better slope stabilization:

- use a variety of plants with different root depths when planting;
- don't undercut the toe of the slope;
- create a properly-designed and maintained drainage system to prevent problems.

Information and Resources:

- International Erosion Control Association, 970-879-3010, www.ieca.org
- Maccaferri Gabions, Inc., 916-371-5805, www.maccaferri-usa.com
- Resource Conservation District of the Santa Monica Mountains (RCDSMM), 310-455-1030

STREAMBANK STABILIZATION

Properties adjacent to streams are particularly vulnerable to damage from high-volume storm events. Well-designed stabilization systems can mitigate this danger while improving the health of the watershed. Remember:

- natural banks provide excellent habitat;
- trees along banks moderate temperature;
- hard surfaces can cause unexpected downstream problems.

Information and Resources:

- International Erosion Control Association, 970-879-3010, www.ieca.org
- Maccaferri Gabions, Inc., 916-371-5805, www.maccaferri-usa.com
- Resource Conservation District of the Santa Monica Mountains (RCDSMM), 310-455-1030

TREE MAINTENANCE

Trees are figuratively and literally the "anchors" of the ecosystem and the health of the watershed. Proper planting and maintenance of the trees on your property has a long-term impact on the rest of the watershed. Think before you cut and remember:

- leaves provide the food for the tree and removing them is a stress;
- pruning of major limbs should be done in the rainy season.

Information and Resources:

- Resource Conservation District of the Santa Monica Mountains (RCDSMM), 310-455-1030
- Agricultural Commissioner's Office, 818-575-5451
- Los Angeles County Forester's Fire Warden Department, 818-890-5719
- Rosi Dagit, Certified Arborist, 310-455-7528

WATER CONSERVATION/RECYCLING

There are many ways homeowners and renters can help conserve water. Conserving water can reduce erosion and siltation and can reduce your water bill too! Keep in mind that:

- water in your tap traveled 300 miles to get here;
- there is a finite amount of water on the planet;
- resource recycling makes a big difference.

Information and Resources:

- Resource Conservation District of the Santa Monica Mountains (RCDSMM), 310-455-1030
- G.I. Rubbish Co., 805-522-9400

- EcoHome, 323-662-5207
- Oasis Design, 805-967-9956, www.oasisdesign.net/
- T.R.E.E.S., www.treepeople.org/trees
- Real Goods, 310-455-4645, www.realgoods.com

WILDLIFE MANAGEMENT OPTIONS

Topanga is a place where the urban, populated environment interfaces with the natural environment, populated by diverse wildlife. It is important to respect and appreciate the natural environment in which we live and to seek ways to live in harmony with the creatures with which we share the Topanga Watershed. Please try to:

- keep all pet food indoors and trashcans secure to avoid attracting raccoons, coyotes, etc.;
- remove bats and bees from your property instead of killing them.

Information and Resources:

- Resource Conservation District of the Santa Monica Mountains (RCDSMM), 310-455-1030
- Nature of Wildworks, 310-455-0550
- Agoura Hills Animal Shelter, 818-991-0071
- MetaSearch, www.Dogpile.com
- Bat Conservation International, www.batcon.org/

ABOUT US

Since 1998, the **Topanga Creek Watershed Committee** has been moving forward in implementing actions identified in the Draft Topanga Creek Watershed Management Plan (April 1996) throughout the watershed. These actions have addressed community education, revision of flood control laws, basic research and ongoing efforts to implement restoration plans. The **Topanga Creek Watershed Committee** is organized according to a Coordinated Resource Management Plan (CRMP), with all stakeholders sharing in the volunteer, consensus-based planning process.

The **Topanga Creek Watershed Committee** has met regularly and offered several large community meeting forums to discuss areas of concern. All of the work thus far has been supported by a start-up grant from the Department of Conservation ($5,000), which ended in July 1999, plus contributions from the Topanga Canyon Town Council, Topanga Community Woman's Club, Topanga Chamber of Commerce, Supervisor Zev Yaroslavsky, the Resource Conservation District of the Santa Monica Mountains, Trout Unlimited and Topanga Earthday 2000, not to mention lots of volunteer time by many.

We greatly appreciate any help you can provide to either acquire important information or help spread the word throughout the community about the importance of *living lightly in our watershed.*

For more information about our activities, you may contact us at:

Topanga Creek Watershed Committee
c/o Resource Conservation District of the Santa Monica Mountains (RCDSMM)
122 N. Topanga Canyon Blvd.
Topanga, CA 90290
310-455-1030

Visit our website at www.topangaonline.com/twc

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APPENDIX F

COMPANION ANIMALS IN THE CANYON

COMPANION ANIMALS IN THE CANYON 2001

A Guide for Topanga Animal Guardians

Dedicated to: All Creatures Great & Small

CO-EXISTING WITH CANYON WILDLIFE

Topanga is a place where the urban, populated environment interfaces with the natural environment, populated by diverse wildlife. It is important, for the protection of our native wildlife as well as for the safety of our companion animals, to seek ways to live in harmony with the creatures with which we share our environment. When bringing companion animals such as dogs or cats into Topanga, it is important to be aware that they can impact, as well as be impacted by, the indigenous animals that are a part of our canyon ecosystem.

Companion Animals and Predators

Small dogs and puppies, old or injured dogs, cats, rabbits, chickens, ducks, goats and other small animals can be easy prey for canyon predators such as coyotes, bobcats, owls and hawks. Coyotes and bobcats, although excellent hunters of their own natural prey, will not hesitate to kill domestic animals when given the opportunity. Owls, too, can take small animals weighing up to eight pounds, and hawks have been known to prey on small kittens and rabbits. It is our fundamental responsibility as guardians to provide protection to all domestic and companion animals while, at the same time, discouraging predatory animals in a humane and responsible way.

Suggestions:

- Keep your animals indoors, especially at night.
- House outdoor poultry, rabbits or goats in secure, covered enclosures made of heavy mesh wire (not chicken wire).
- Walk your dog on a leash in well-lit areas at night.
- Do not allow dogs or cats to roam from home.
- Keep all outdoor trash can lids securely closed.
- Keep all pet food indoors.
- Adjust the height or depth of fencing to deter coyotes.
- Pick backyard fruit as soon as it ripens and keep rotten fruit off the ground.
- Do not feed predatory wild animals.

Cats, Native Birds and Other Small Animals

Domestic cats are natural hunters. Unfortunately, cats, which are kept outdoors in Topanga, can negatively impact our native songbird, lizard and small rodent populations by preying upon them, thereby upsetting the canyon ecosystem.

Suggestion:

- Keep your cat indoors or in a secure, indoor-outdoor enclosure. This not only protects our local wildlife, but it can have the added benefit of providing your cat a longer, healthier life.

Note: A recent study showed that cats wearing bells actually had a higher kill rate than those without bells.

Dogs in Parks

Dogs allowed to roam on State Park or Santa Monica Mountains Conservancy land can negatively impact our native wildlife by leaving scent trails, which can disturb the territorial claim of coyotes, and by chasing wild animals such as deer, rabbits and other small animals. They can also contract or spread contagious diseases such as parvovirus and distemper. Parkland and wilderness areas are the home of our local wildlife and should incur a minimum of intrusion.

Suggestions:

- Walk your dog on a leash whenever you take him or her off your property.
- Do not allow your dog to roam from home.
- Do not allow your dog to enter State Park property, it is illegal.
- Limit dog walks in Topanga to neighborhood roads and fire roads and be sure to pick up and dispose of all animal wastes.

COMPANION ANIMALS AND POTENTIAL CANYON HAZARDS

Rattlesnakes

Topanga is home to a variety of snakes. It is important to know the difference between potentially dangerous rattlesnakes and harmless and beneficial snakes such as gopher and king snakes. Both dogs and cats, with their natural curiosity, can easily become victims of snakebites. Remember that a rattlesnake bite constitutes a medical emergency and, as such, requires immediate professional help. If a rattlesnake bite does occur:

- Seek immediate veterinary help. Call ahead to make sure the veterinarian has antivenin on hand and is equipped to handle snakebites.
- Keep companion animal still and carry if possible; do not apply tourniquet or cut wound.
- For more information, contact Animal Clinic of Topanga at 310-455-1330. See emergency animal hospital numbers on back page.

Suggestions:

- Keep your yard free of debris piles, wood piles and thick brush.
- Keep your cat indoors.
- Keep dogs out of tall grass and out of wildlife areas, especially during spring and summer months.
- Walk your dog on a leash and do not allow him or her to roam.
- Inspect your home for small openings and entryways and seal them.
- Keep doors and low windows closed at night and anytime you are not at home; install screen doors.
- If you encounter a rattlesnake in your house or yard, call the Topanga Fire Department at 310-455-1766 or John MacNeil at 310-455-2013 to relocate.

Note: Be particularly wary of baby rattlesnakes because their venom is more potent than that of adult snakes, and they release all their venom when biting.

Ticks 

Ticks are common in wooded areas throughout the canyon. Ticks are parasites that feed on mammalian blood and can transmit serious disease, such as Lyme Disease. April through October is considered "tick season" although precaution should be taken year round. Check animals thoroughly after any activity in wooded or brush areas. If a tick is found:

- Remove tick carefully with tweezers grabbing it as close to the skin as possible.
- Do not squeeze tick's body, apply Vaseline, use heat or flame or attempt to clean with alcohol while the tick is still attached. Any of these actions could transmit bacteria that cause disease.

Other Insects

There are other insects in the canyon that can be problematic for animals as well as humans. Among these are bees, yellow jackets, Black Widow and Brown Recluse spiders and scorpions. Reactions to their bites can range from mild to severe, so become familiar with these insects and take precautions to protect yourself and your animals.

Foxtails 

A serious hazard for dogs and cats during the spring and summer months in Topanga are the seed-bearing structures of some kinds of grasses commonly known as "foxtails." Foxtails have sharp points at one end and microscopic barbs, so they can easily become imbedded in an animal's fur, and especially between the toes and armpits. They can work their way into any body opening, particularly the ears, eyes and nostrils, and can penetrate the skin, eventually working their way into the body. Left untreated, foxtails can cause serious infections and even death.

<u>Suggestions:</u>

- If your animal is rubbing or pawing at the ears or eyes, shaking the head, sneezing violently, gagging, licking or biting at any part of the body, or if you notice any signs of skin inflammation, seek veterinary help a.s.a.p.
- For prevention, brush animals daily, check the ears and between the toes. Keep long-haired dogs clipped and avoid dry, weedy areas.

Poison Oak

Poison Oak, a member of the Sumac family, is prevalent throughout the canyon. Since animals' fur protects their skin from the poison oil, they won't get a rash, however, the oil will remain on their fur upon contact and can contaminate you when you touch them. Removal of the oil with an effective cleanser can help. Learn to identify these plants and avoid.

COMPANION ANIMALS AND EMERGENCY PREPAREDNESS

When preparing for a disaster such as fire or earthquake, don't forget to include supplies for your companion animal. Prepare in advance. Make sure his or her I.D. tag is up to date with accurate information including a list of veterinarians and medications.

Emergency supplies should include a sturdy animal carrier, leash, food and water for three days, unbreakable bowl, medications, recent photo of you with your animal companion, copy of vaccination records, blankets, paper towels, portable litter box and litter, trash bags and a basic first aid kit. Keep all emergency supplies in an accessible location.

Suggestions:

- Do not leave animals behind in a disaster. You may not be able to get back to your home for several days or weeks.
- Make a plan with neighbors for evacuation in case you are unable to return home immediately.
- Animals are not allowed in emergency shelters, so make arrangements now with friends or family out of the canyon to take your companion animal in the event of disaster.
- During a disaster, stray animals in Topanga will be received and handled by our T-CEP Pet Disaster Team in conjunction with L.A. County Animal Control. They will be vaccinated at guardian's expense, so have copies of current vaccination records on hand.
- Contact T-CEP's Pet Disaster Team at 310-455-3000.

THE IMPORTANCE OF VACCINATIONS

Rabies, distemper and parvovirus are just a few of the serious diseases that can be transmitted between wild and domestic animals. In addition to keeping domestic animals out of wildlife areas and taking measures to make sure your yard does not attract wild animals such as raccoons and coyotes, it's important to keep all dogs and cats in the canyon vaccinated against these and other contagious diseases. For more information, call Animal Clinic of Topanga at 310-455-1330.

THE CASE FOR SPAYING AND NEUTERING

Statistics show that for every one person that is born, fifteen dogs and forty-five cats are also born. Companion animal overpopulation is a serious problem – only one out of every ten dogs and one out of every twelve cats ever finds a permanent home. Sadly, in Los Angeles County alone, over 150,000 dogs and cats are destroyed each year simply because there are not enough homes.

Have a heart, be smart and have your dog, cat, and even your rabbit, spayed or neutered as soon as he or she is mature enough to do so. Spaying and neutering not only reduces overpopulation, it can reduce the urge to wander, improve behavior in general and increase your animal's life span. For more information, call Animal Clinic of Topanga at 310-455-1330.

LOST ANIMALS

Nothing is more heartbreaking than losing a beloved companion animal. Take precautions. Keep your house and yard secure, do not allow animals to roam away from home and make sure companion animal I.D. tags are kept up to date with accurate information. You may also want to consider having your dog or cat microchipped. If an animal is lost:

- Canvas your neighborhood and surrounding area. Talk with neighbors and show them a picture of the animal if possible.
- Visit and revisit local animal shelters. Sometimes, when someone finds a lost animal, they will keep the animal for a few days before taking them to a shelter. The important thing is to keep checking local shelters in person.
- Check with local park rangers. Often, animals wander into park and wilderness areas (see phone numbers below).
- Post "lost" signs in your neighborhood and on bulletin boards in town with an accurate description and photo of the animal and where and when he or she was last seen. Remove signs when animal has been found.
- Place a "lost animal" ad in our local newspaper, the *Messenger*.
- Go on the Internet. Both Topanga websites, topangaonline.com and topangamessenger.com, have "lost and found animal" sections where you can post and find information.

BEING A GOOD NEIGHBOR

Because Topanga is a semirural area, many people are tempted to allow dogs to roam free in canyon neighborhoods. It□s important to remember that as an unincorporated area of Los Angeles County, Topanga is subject to the same leash laws as other areas in the county. Canine companions should be on a leash and under your supervision whenever taken off your property. For their own safety and that of others, dogs should never be free to chase cars, people or other animals.

IMPORTANT PHONE NUMBERS

Local Animal Shelters:
Agoura Animal Shelter..... 818-991-0071
West Valley Animal Shelter..... 888-452-7381
Santa Monica Animal Shelter 310-458-8594

Animal Health Care and Information:
Animal Clinic of Topanga,
Dr. Holly Scoren..... 310-455-1330
Topanga Animal Care &
Pet Minding, Susan Alice Clark..... 310-455-7268

Emergency Animal Hospitals:
California Animal Hospital..... 310-473-1561
Animal Critical Care 818-887-2262

Disaster Information:
T-CEP Pet Disaster Team 310-455-3000

Snake Relocation:
Topanga Fire Department.....310-455-1766
John MacNeil 310-455-2013

Park Rangers:
Topanga State Park 310-455-2465
Santa Monica Mountains
Conservancy 310-589-3200

Contributors:
Mary Bloom, Susan Clark, Rosi Dagit, Woody Hastings, Holly Scoren, DVM, Peter Wallerstein

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APPENDIX G

WATER QUALITY INFORMATION

GETTING YOUR WATER TESTED

What to test in your well water:

- Metals, nutrients, bacteria, pathogens

What to test in your wastewater or graywater:

- Total and fecal bacteria
- E. coli or Enterococcus (human health pathogens)
- Nutrients: nitrogen, ammonia and phosphates

General notes about collecting water samples;

- Often the lab will provide collecting jars with preservatives in them.
- Clean, sterile jars will also do.
- Most samples need to be kept cold and some have limited time between when you collect and when they need to be tested.

You should call the lab to get specific instructions on how to collect the sample, how long you have to get the sample to the lab and costs.

Local testing labs include:

Montgomery Watson Laboratory, Pasadena 626-568-6449
Fruit Growers Laboratory, Santa Paula 805-659-0910

SIMPLE WAYS YOU CAN HELP CLEAN THE CREEK

Pick up the TRASH! Join us for Creek Clean Up Days each April and September!

Cover trash cans so animals can't spread trash all over and into the creek.

Wash your car at the car wash, or with biodegradable soap. Don't keep the hose running between rinses.

Dispose of oils, gasoline, paints and batteries at the local recycling center.

1 gallon of paint or motor oil can pollute 250,000 gallons of water
1 gallon of gasoline can pollute 750,000 gallons of water

Collect roof run off and rainwater in storage tanks to use for summer irrigation and on-site fire protection.

Collection systems can be really simple, like a covered trash can (keep those mosquitoes out!) to more complex cisterns.

Compost manures and corralled animal wastes.

RCDSMM manual available with ideas.

Irrigate your landscape thoughtfully. Watch those automatic systems that create runoff, spray at mid day, or come on during the rain!

Limit use of herbicides, pesticides, and fertilizers that can runoff your landscape and into the creek. They are usually not target specific. Be sure to read directions carefully and pay attention to dilutions.

Conserve water. 85% of the water you use has traveled over 300 miles to get here!

Graywater Systems can help reduce the amount of water handled by the septic system, but can also pose health risks unless they drain into the ground. No direct outflows!

Think before you Pour!

In Topanga, what goes "down the drain" or down the road/hill eventually turns up in the creek and then at Topanga Beach!

CARE AND FEEDING OF YOUR SEPTIC SYSTEM

- Limit amount of water entering the system simultaneously! Don't overload!
- Fix leaks. A leaky toilet can add 2000 gallons to your system in a day!
- Keep all toxic chemicals out of the system. They destroy the bacteria that keep a system working and can leach into the environment causing further damage.
- Limit amount of non-organic material entering the system. If you didn't eat it, then think twice before putting it into the system!
- Use non-toxic soaps and cleaners. Forget about bleach unless very dilute! It kills all the friendly bacteria that make your system work.
- Compost your veggie waste instead of grinding in garbage disposal. Meat, cheese and all fat leftovers should go to the trash.
- Pour cooking oils and grease into old cans for proper disposal in the trash.
- Keep hair and disposable diapers out of the system!
- Install a low flow toilet.
- Use toilet paper sparingly. Non-bleached are most friendly.
- Septic enzymes are not a good idea. They stimulate a short burst of bacterial activity, cause a bloom and dieback of the critters, which then creates more suspended solids that go into your drain field and clog up the works. Your gut provides sufficient bacteria to keep your system working.
- Add a low maintenance filter to the outlet of the tank. For several hundred dollars you can extend the life of your drain field for a long time.
- Pump out the tank every 6-8 years. Pump when the scum and sludge layers get too thick. Research has shown that it takes 3-5 years for a happy colony of methane decomposing bacteria to get established, and they are the most efficient decomposers.
- Be sure that nothing from the septic system "daylights" or flows directly out on the ground. If it does, you are polluting and need to fix it quick!

WEBSITES AND INFORMATION FOR SUSTAINABLE CLEANING PRODUCTS

Planet Natural
http://www.planetnatural.com/cleaningproducts1.html
On this site you can purchase online the Turbo Plus Laundry Disc, CitraSolv, Papaya Enzyme Brightener, Mildew Stain Away, ChemFree Toilet Bowl Cleaner, Earth Enzymes Drain Opener, Degreaser, Dishwashing detergent, Bathroom Cleaner and Laundry Detergent.

Heathers Naturals
http://www.heathersnaturals.com/
Window Cleaner, Oxygen Bleach Cleanser for sinks and tubs, All Purpose Cleaner, Basin, and Tub & Tile Cleaner. Formulated by an independent woman from Seattle who owned and operated a residential cleaning business.

ECOVER
http://www.ecover.com/
Washing and cleaning products from Belgium distributed worldwide.

Seventh Generation
http://www.seventhgen.com/
Environmentally friendly non-toxic household cleaners, laundry & dish products; 100% recycled, non-chlorine bleached bathroom & facial tissues, paper towels & napkins; plus recycled plastic trash bags & full-spectrum light bulbs.

Earth Friendly
http://www.ecos.com/
non-toxic and plant-based household cleaning products

Bonami Cleanser (Albertson's, Wal-Mart, Hughes, Gelson's, Pavilions, Von's, Ralph's, Lucky, Safeway)

Dr. Bronner's Sal Suds or "Magic Soaps"
http://www.drbronner.com/
Highly concentrated, effective yet mild, biodegradable cleaner

Other products that are sustainable:
Spray and Wash Stain Stick
Life Tree Products
EnviroMan (Bugs'R'Done)
BioKleen

STORES
Whole Foods
Wild Oats
PC Greens
Gaiam/Home and Garden Cleaners http://www.gaiam.com/
Real Goods/Indoor Home http://www.realgoods.com/

Reference Book: (for homemade recipes)
Clean House, Clean Planet by Karen Logan ISBN:0-671-53595-1

Household ingredients that you can make your own cleaning products with:

Baking Soda
Vinegar (white) Heinz
Liquid Soap (Castile)
Essential oils
Lemon Juice
Borax (for tough stains if lemon and baking soda won't work, use sparingly)
Club Soda or distilled water

Tub and Tile Cleaner Recipe:

Mix 1-2/3 cup baking soda with 1/2 cup of liquid soap in a bowl. Dilute with 1/2-cup water. Add 2 tbsp. vinegar last. Stir until lumps are gone. If you can pour it into a 16 oz. container easily, then you have the right consistency. If it is too thick, add more water. Shake well before using again. Use a flip top bottle for storage.

Kitchen Cleanser:

Fill a shaker half full with baking soda. Add 20 drops of pure essential oil. Stir. Fill shaker to the top with more baking soda. Put the lid on and shake it on your counter tops, kitchen sink, floors and pots (except aluminum pots). Wipe with damp sponge.

Toilet Bowl Cleaner:

Mix 1/2-cup liquid soap and 2 cups baking soda together. Dilute with 1/4-cup water and add 2 tsp. vinegar. Add one dropper full of Tea Tree oil or 50 drops. Mix and pour the final solution into a 22 oz. squirt bottle. Shake well.

DO NOT USE the following PRODUCTS:

Tilex or X-14
Old English Red Furniture Polish
Comet
Lysol
Spic and Span
Commercial Air Fresheners
Aerosols
Pesticides
Bleach
Ammonia

MONEY PIT?

Abusing your septic system is like flushing money down the drain

By Blueberry Hennin

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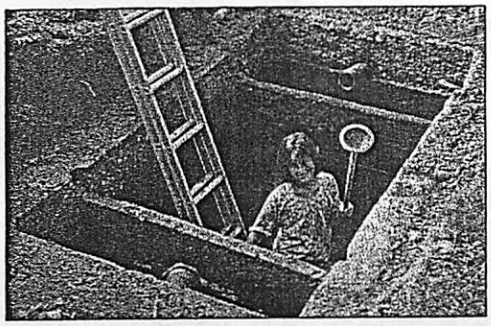


Some people don't to have to deal with septic systems until they grow up and move to the country or buy a vacation home. But I was only 10 when I learned firsthand that you must be careful of what you put into a septic tank.

While this experience left Associate Editor Blueberry Hennin with a healthy respect for septic systems from a young age, we don't recommend it.

My father is a contractor and teaches people how to build and understand their own homes. When the septic tank at our old farmhouse was pumped out one day, it presented an unforgettable photo opportunity for his lectures. He lowered a ladder and had me stand in the middle of the empty tank to show how big it was. (We're trained professionals. Don't try this at home.)

While I posed, plumber's helper in hand, one of my older brothers pulled out the ladder and disappeared in the direction of the house. The next thing I remember was the sound of water rushing down the main sewer line until it dribbled into the tank.

With septic systems—and brothers—out of sight should not mean out of mind. Now, when I go back to the farmhouse and take a shower, flush a toilet or pour anything down a drain, I still remember where everything goes. And I recall my personal lesson: to avoid family strife, be good to the living things down there.

Septic systems are simple, but they can cost up to $25,000 to install or replace. Basically, the sewer pipe slopes from the house toward a large holding tank. Solids settle to the bottom of the tank, where microorganisms help some of the materials decompose. Liquids, meanwhile, are piped to a leachfield, where they soak into the ground.

I read four books and interviewed several experts on septic systems to teach you how to avoid costly problems and disgusting sewage backups. (Don't worry — you don't need a ladder or a small child.) Incidentally, what's good for a septic system is great for a municipal sewage processing plant. If your home's waste line is connected to city sewers, the same practices will reduce the burden at the processing plant.

Breaking it down

Think of what you put into your septic system in three categories: water, solids and chemicals.

Excessive water can flood a septic tank and drain field, causing dangerous bacteria to percolate to the surface or contaminate the water table. It also can cause sewage to back up into the house.

To reduce the amount of water that enters your septic system, focus on toilets, washing machines and showers. Modern toilets require just 1.6 gallons of water to flush, compared with 5 gallons for older toilets. (And unlike early low-flow toilets, they actually work.) Older showerheads use up to 5 gallons of water per minute, while modern low-flow showerheads use 1-1/2 gallons per minute. That reduces wastewater from a 5-minute shower by more than 17 gallons.

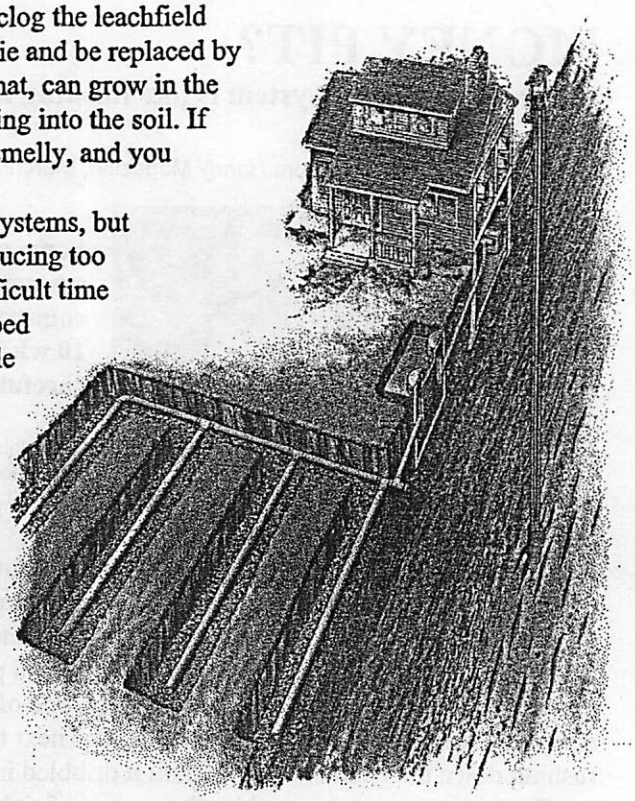
The amount of water you put into a septic system is not the only issue. Homeowners with septic systems also need to avoid creating extreme surges of wastewater, which can overwhelm the septic tank and flush solids and chemicals to the leachfield (see "Septic 101"). If everyone in your family showers in the morning, consider doing laundry in the evening or staggering loads throughout the week. That will give the solids and chemicals in the wastewater time to settle. Also, when shopping for a washing machine or dishwasher, check water usage ratings. They can vary by as much as 30 gallons among comparable models.

If you flood your septic tank, solids can clog the leachfield trenches. Aerobic (air-loving) bacteria will die and be replaced by anaerobic bacteria. Thick sludge, called biomat, can grow in the leachfield, preventing wastewater from soaking into the soil. If that happens, the leachfield will be wet and smelly, and you may have to excavate and replace it.

Excessive solids also are bad for septic systems, but again, you have a choice. If you avoid introducing too many solids or those that bacteria have a difficult time decomposing, you may need your tank pumped only once every several years. Ignore this rule and the tank may require annual cleaning.

According to Lloyd Kahn, a co-author of The Septic System Owner's Manual, a septic system should never be used for things that can be disposed of in other ways. The book says that daily use of a garbage disposer can increase the amount of solids in a septic tank by as much as 50 percent.

Anaerobic bacteria in the septic tank can digest human waste, but food scraps take much longer to decompose. Many specialists suggest the use of filters on outlet pipes. If solids (sludge or scum) are flushed from the tank, the filter will catch them before they damage the leachfield.



The three parts of a septic system are the drainage pipes from the house, the septic tank, and the leachfield.

In recent years, In-Sink-Erator introduced a disposer that injects a squirt of enzymes with each use to help food waste break down faster in the tank. HydroMaid, meanwhile, offers a water-powered disposer that chops food waste into smaller pieces that (unlike ordinary disposer waste) resist floating. The faster the particles sink, the less likely they are to be flushed out to the leachfield.

Although these garbage disposers may be an improvement over ordinary models, they still put food into the septic tank. According to Max Burns, author of Cottage Water Systems, "Things like coffee grounds and mushed-up vegetable products simply add to the sludge content in the septic tank, leaving less room for the system to treat and efficiently break down human waste."

Avoid putting grease and oils into a septic system. They can easily clog waste lines on the way to the septic tank. Once they reach the tank, they float, accumulate and eventually endanger the leachfield.

Burns says keeping your septic system healthy starts at the store. Avoid buying thick, colored or perfumed toilet tissue. It takes longer to break down in septic tanks. If in doubt, he suggests, stick a wad of your present toilet tissue in a covered jar with water and shake it. If the tissue doesn't break into small pieces, switch to a brand that does. Finally, never put paper that is thicker than tissue down a toilet.

Excessive chemicals pose another danger to septic systems. Overuse of bleach, detergent, anti-bacterial soap, chlorine, and other strong cleaning products used to kill bacteria in the home can also kill the microbes that help sewage decompose. If you can't avoid these products, at least limit their use.

Choose phosphate-free detergents to avoid causing heavy plant growth and algae over the leachfield. Phosphates act like fertilizer, causing algae and roots to grow. Roots can clog drain tile and gravel beds.

To avoid flooding your septic system with large amounts of salty water, don't let water softener backwash into the system. This increases wastewater volume, and salt can cause clay soils to harden and reduce their ability to absorb water.

Some septic system owners periodically add baker's yeast or special enzymes to help solids decompose faster. However, in 1992 Burns contacted several wastewater jurisdictions in North America, and all advised against using these products. "Although most of the products do activate bacterial growth in the tank as claimed, adding more sewage does the same thing. Any product that claims to do more — like unclog pipes, for instance — could be very toxic and would certainly shut down the activity of a tank," Burns says.

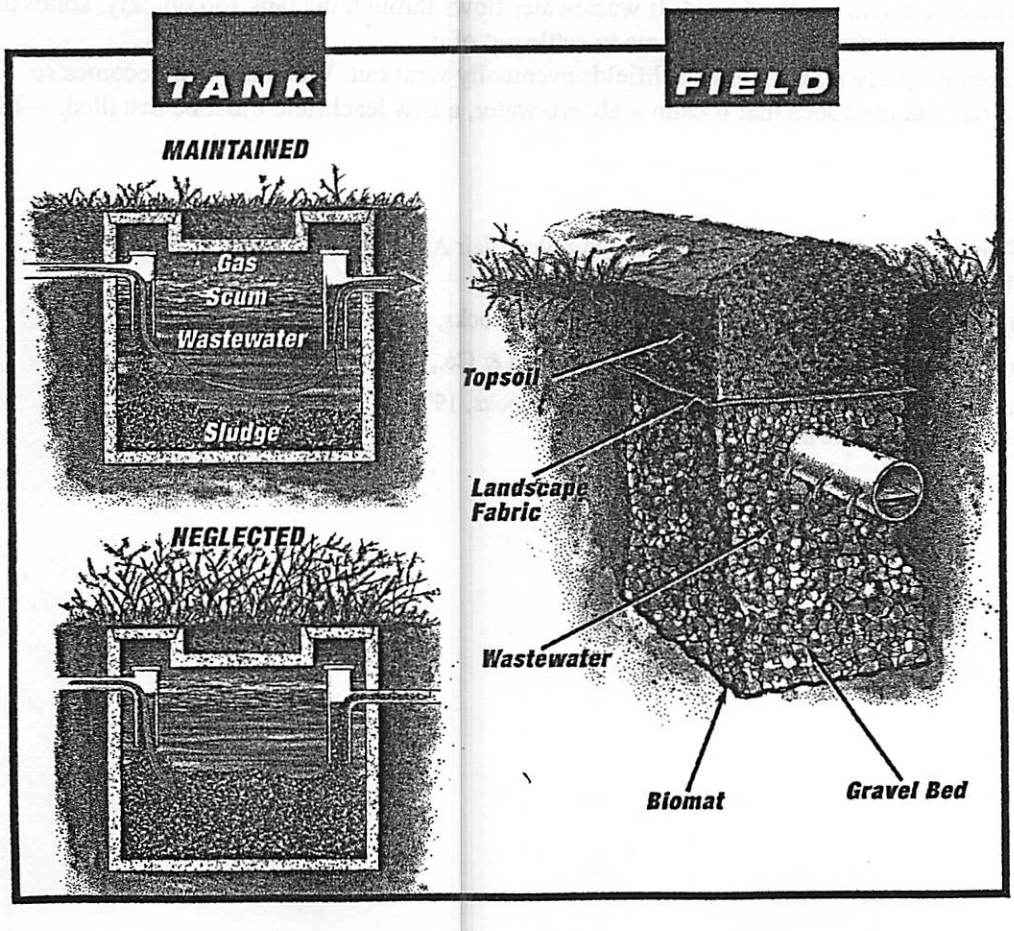
According to Burns, most homeowners turn to enzymes after the damage has been done and it is too late. If you are careful what you put down the drain, your septic system should maintain a natural balance without enzyme additives.

Septic system designs vary, but all work the same way. How much sewage your system can handle is based on the size of the tank and the drain field, the ability of the soil to absorb moisture, and the amount and types of materials you introduce. The best way to avoid a septic system failure is to be sensitive to how it works and to have the tank pumped out regularly.

SEPTIC 101

Residential septic tanks are watertight containers, usually made of precast concrete, fiberglass or plastic. The interior may be a single open chamber or several compartments created by internal walls with openings for waste to flow through. Local plumbing codes determine the minimum tank and leachfield sizes based on the number of bathrooms and bedrooms in the house. Other factors include soil conditions and nearby environmental resources such as lakes, reservoirs, streams and rivers.

When sewage enters the tank, it separates. The denser, heavier materials sink to the bottom, while the lighter materials collect toward the top. This produces three distinct layers: scum, wastewater and sludge. As the waste decomposes, it produces methane gas, which is released into the air through the home's main plumbing vent stack.



The oil, grease, fat and fecal matter form scum. Sludge is the solid waste and silt that sink, and wastewater is composed of the various liquids in the tank. Anaerobic bacteria (which don't need air) digest organic waste. These bacteria are slow compared with aerobic bacteria (which need air) found in the leachfield.

Because decomposition is slower underwater, solid waste accumulates in the tank and eventually must be professionally removed. The Septic System Owner's Manual says tanks should be inspected every three to five years and pumped out as needed. Ken Cotton, a specialist in septic system maintenance, uses a stick to measure the layers of sludge and scum in the tank. If the sludge layer exceeds 10 in. or the scum layer exceeds 6 in., the tank needs to be emptied. Make sure the person who pumps the tank inspects the baffle or filter to ensure that it is intact and functioning properly. If possible, he also should inspect the tank for cracks.

When fresh waste enters the tank, the level of waste rises so that the same volume of wastewater is pushed into the outlet pipe, where gravity carries it to the leachfield. Although a gallon in equals a gallon out, Cotton says an individual drop of water typically takes several days to move through the tank.

The leachfield (soil absorption system) is composed of either a series of underground perforated drainage pipes, plastic or concrete chambers, fabric-wrapped pipe or other proprietary devices set in gravel.

Clarified wastewater leaving the tank should be free of scum and sludge, but it still contains harmful germs, parasites, bacteria and viruses. As wastewater is dispersed into the leachfield, the gravel beds and aerobic bacteria continue to filter it. The wastewater deposits organic material in the trenches and creates biomat. This black, jelly-like material grows between the pieces of gravel along the sidewalls and bottoms of the healthy drainage beds. It feeds on organic material in the water and thickens if the water is not effectively clarified by the septic tank. If biomat becomes too thick, it can prevent wastewater from being absorbed into the soil. The water can surface, making the leachfield soil wet and smelly.

The key to a problem-free septic system is to make sure that only clarified wastewater leaves the tank and enters the leachfield. If wastewater flows through the tank too quickly, solids and other waste particles do not have time to settle out of it.

Even properly maintained leachfields eventually wear out. When the soil becomes so saturated with microbes that it cannot absorb water, a new leachfield must be installed. —BH

Sources

The Septic System Owner's Manual by Lloyd Kahn, Blair Allen and Julie Jones, Shelter Publications, 2000

Cottage Water Systems by Max Burns, Cottage Life Books, 1999

Country Plumbing by Gerry Hartigan, Alan C. Hood & Co., 1984

Septic Tank Practices by Peter Warshall, Anchor Books, 1979
(Out of print, available in public libraries.)

Locations	Jul-99	Aug-99	Sep-99	Oct-99	Nov-99	Dec-99	Jan-00	Feb-00	Mar-00	Apr-00	May-00	Jun-00
Weekly sites												
1. End of Paradise Lane	Excellent	no water	no water	no water	Good*	Good*	Good	Good*	Excellent	Excellent	Excellent	Good
2. Below Cheyney bridge- not sampled												
3. Old Topanga, Backbone Trail	Excellent	no water	no water	no water	no water	no water	Excellent	Excellent	Excellent	Excellent	Excellent	Good
4. Behind Topanga Market	Good*	Good *	Good *	Good *	Problem	Good*	Good*	Good*	Good*	Good*	Problem	Problem
5. Falls Drive, above culvert	Excellent	Excellent	Excellent	Good*	Problem	Good*	Excellent	Problem	Good*	Good*	Good*	Problem
Monthly sites												
6. Topanga Cyn. Blvd. MM2.2	Excellent	Excellent	Excellent	Excellent	Good*	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent
7. Fernwood Pacific Rd, Dix Creek	no water	no water	no water	no water	no water	no water	no water	Excellent	Excellent	Excellent	Excellent	no water
8. Old Topanga Cyn. MM 3.41	no water	no water	no water	no water	no water	no water	no water	Excellent	Excellent	Good*	Good*	Excellent
9. Greenleaf Rd, MM 0.97	no water	no water	no water	no water	Good*	no water	no water	no water	Good*	Excellent	Excellent	Excellent
10. Highvale Rd. culvert pool	Excellent	Excellent	Excellent	Excellent	Good*	Good*	Excellent	Excellent	Excellent	Excellent	Excellent	Good
11. 815 TC Blvd. below maintenance site	no water	no water	no water	no water	no water	no water	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent
12. Santa Maria Rd, near oak at 2980	no water	no water	no water	no water	no water	no water	no water	Excellent	Excellent	Excellent	Good*	Good
13. Santa Maria Rd. and TC Blvd.	no water	no water	no water	no water	Good*	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent
14. Entrado Rd below culvert 0.14	Problem	Excellent	Problem	Good*	Problem	Problem	Good*	Problem	Good*	no data	Problem	Problem
15. Summit Valley Park	no water	no water	no water	no water	no water	no water	no water	Good*	Excellent	no data	no water	no water
16. Topanga Lagoon												
Criteria: Excellent - no problems												
Good - recurrent readings above limits for 1 parameter, other than total coliform												
Problematic - consistently exceeds limits for more than 1 parameter, or for fecal coliform/E. coli												
Topanga State Beach												
Heal the Bay Report Card Grade - dry	A+	A+	A+	A	A-F	D-F	A+	C	A+	B	A-F	A-B
Heal the Bay Report Card Grade -wet	ns	ns	ns	ns	C-A	ns	A+	F	F	F	F	ns
data collected by Hyperion weekly												
Control sites in bold												
* denotes bacteria counts above standards												
Potable drinking water= 0/100mL water												
Primary contact water= <200, <1000												
Secondary contact water= <1000, <5000												
AB411 standards used for beach closure												
Total coliform limit 10,000												
Fecal coliform limit 400												
E.coli limit 400												
Enterococcus limit 106												
Water considered unsafe if exceeds these limits or, the total:fecal ratio is less than 10 with a Total over 10,000												

							2001				
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2. Below Cheyney bridge- not sampled				Good	Excellent	Good*	Good	Problem	Good	Excellent	Problem
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4. Behind Topanga Market	Good*	Good*	Good*	Good*	Good	Good	Good	Problem	Problem	Excellent	Problem
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8. Old Topanga Cyn. MM 3.41	no water	no water	no water	no water	no water	no water	Good*	Problem	Good	Excellent	Excellent
9. Greenleaf Rd, MM 0.97	no water	no water	no water	no water	Excellent	Good	Good	Problem	Excellent	Good*	Problem
10. Highvale Rd. culvert pool	Good	Good	Problem	Problem	Good	Excellent	Excellent	Problem	Problem	Problem	Good*
11. 815 TC Blvd. below maintenance site	no water	no water	no water	no water	Excellent	no water	Good	Problem	Excellent	Problem	Excellent
12. Santa Maria Rd, near oak at 2980	no water	no water	no water	no water	no water	no water	no water	Problem	Problem	Problem	Good*
13. Santa Maria Rd. and TC Blvd.	no water	no water	no water	no water	Excellent	Excellent	Problem	Problem	Excellent	Good*	Good*
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Heal the Bay Report Card Grade -wet	ns	ns	ns	F	C	C	F	F	F	F	ns
data collected by Hyperion weekly											
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DETERGENT COMPOSITION AND GREYWATER

Office of Arid Lands Studies in cooperation with the
Soil, Water and Plant Analysis Laboratory, University of Arizona
Reprinted with permission by Oasis Biocompatible Products (805) 967-3222
—Includes footnotes from Oasis—

This study was prepared for conservation-minded people who would like to use washing machine water (greywater) to irrigate their landscape plants. The list of wash-day products that follows this introduction is presented alphabetically by brand name with no endorsement of any product implied. The numbers cited should be used *only* as a basis of comparison among the products. It is left to the reader to choose the product(s) best suited to his/her needs. The reuse of greywater may be regulated in your area—check with your local government.

Purpose

Before greywater is used to irrigate plants, amounts of constituents potentially harmful to plants and/or soils should be known. Since labeling on detergent and other clothes-washing products often is incomplete, this study was conducted to evaluate certain product characteristics which, when introduced through greywater irrigation, may adversely affect the landscape. The specific characteristics selected for study were alkalinity, boron, conductivity, phosphate, and sodium.

Alkalinity refers to the relative amounts of alkaline chemicals in a solution. Sodium, potassium, and calcium are alkaline chemicals; they often are combined with carbonates, sulfates, or chlorides. Plants do not tolerate high concentrations of alkali salts. In soils, a buildup of alkali salts can severely reduce plant productivity.[1] In soils with high alkali concentrations, sulphur may need to be added to the soil to increase productivity.

Boron is considered a plant micronutrient, which means it is required by plants only in very, very small amounts; these usually are available in most soils. Caution: concentrations only slightly higher than those considered beneficial can cause severe injury or death to plants! The addition of boron to irrigation water should be kept at a minimum.

Conductivity is a simple measure of the amount of dissolved chemicals in a solution. These chemicals can be beneficial or harmful. The higher the conductivity, the more dissolved salts and minerals are present. In general, the higher the concentration of salts and minerals in the water, the greater the potential for adverse impacts on the environment and plant health.[2]

Phosphate is a plant food and is added to soil as a fertilizer to enhance productivity. Soils in the Tucson area typically are low in phosphate; thus, there may be some benefit to plants from the presence of this ingredient in greywater. Since phosphate has various chemical configurations, its form in detergent greywater may not be in a readily usable form to the plants and soil. This source of phosphate, therefore, should not be relied upon to assist in fertilization of plants.[3]

Sodium can act as a plant poison by changing the osmotic concentration relationship between the plant and the surrounding soil. This will reduce the plant's ability to take up water and thus will adversely impact the health of the plant. Too much sodium also destroys the structure of clay soils, making them slick and greasy by removing air spaces and thus preventing good drainage. Once a clay soil is impregnated with sodium, it is difficult to restore it to a viable condition. If soils are damaged, they may require the addition of gypsum and repeated leaching with fresh water to remove the sodium.

Although chlorine in bleach and detergents generally is expended in the washing of clothes and vaporized by the heat of hot water, some may be left in the greywater that reaches plants. If you smell chlorine during the washing process, this means that the chemical is leaving the wash water as vapor. Chlorine is considered a plant and animal poison and should not be used in the garden because it may substitute for similar nutrients, blocking normal metabolic processes. The addition of chlorine to water used for irrigation should be kept to a minimum.

Method of Analysis

All the detergents and related clothes washing products in the list below (e.g., fabric softeners) were purchased during May 1992 from various supermarkets, specialty stores, and other vendors in the Tucson, Arizona, metropolitan area.

The amount of product used in this study was based on the manufacturer's instructions for a cool-to warm-water wash in a top loading machine. The average volume of a top loading machine is 19 gallons, based on data published by Consumer Reports. Each product was dissolved in distilled/deionized water, the "cleanest" water possible, "clean" water having none or only very small amounts of dissolved salts and minerals (see table below). Tap water can contain salts and minerals in widely-varying amounts depending on its source. Using distilled/deionized water avoided addition of salts from tap water.

Discussion

Choose your detergent and clothes-washing products keeping in mind that it is better for your plants and soils to have a low alkalinity, boron, conductivity, and sodium content in the wash water. You may prefer product(s) with a higher level of one or more of these items because your clothes come out of the wash cleaner or because of personal preference.

Sandy soils are less vulnerable to damage than are clay soils because they drain better. In very low rainfall areas, apply fresh water occasionally, instead of greywater, to leach out accumulated salts.[4] Use greywater on salt-

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Oasis Additions:
(these comments are not part of the original paper)
[1] Potassium is a nutrient which is removed by plants, and is thus unlikely to build up.
[2] The majority of the conductivity and alkalinity measured for Oasis is due to Potassium.
[3] According to our plant tests, phosphate in the form used in most detergents is readily available. The amount in Oasis is, however, only a minor supplement.
[4] Rainwater is comparable in quality to deionized water [before it hits the ground] and is ideally suited for leaching.

leach out accumulated salts.[4] Use greywater on salt-tolerant plants such as oleander, Bermuda grass, date palms, and native desert plants. Avoid using greywater on plants that prefer acid conditions, such as:[5]

Ash	Rhododendron
Foxglove	Bleeding Heart
Philodendron	(Dicentra)
Azalea	Hydrangea
Gardenia	Violet
Primrose	Camellia
Begonia	Impatiens
Hibiscus	Xylosma
	Fern
	Oxalis (Wood Sorrel)

The word *biodegradable* means that a complex chemical is broken down into simpler components through biological action. Do not be confused by the word biodegradable which often is used to imply good things. Harmful chemicals as well as beneficial ones may be biodegradable.[6]

Be aware that harmful effects are not always visible immediately and may take one to two years to appear. In any case, you should always pay attention to the health of the plants being irrigated and discontinue irrigation with greywater if signs of stress are observed.

If you choose to use greywater, we strongly recommend that you become aware of the appropriate methods to operate a greywater system and the local regulations regarding its use.

This study was prepared by the Office of Arid Lands Studies in cooperation with the Soil, Water and Plant Analysis Laboratory, University of Arizona, and is based in part on materials previously published by Pima County Cooperative Extension, University of Arizona. The study was sponsored by Tucson Water.

Oasis Additions (these comments are not part of the original paper):

[5]From our chemical analysis, our plant studies and our customer's experience, it appears that the cautions below about specific plants are not a concern if you are using Oasis.

[6]Biocompatible, (a word used in Oasis literature) means that the biodegradation products are beneficial or non-harmful to a particular environment. Biocompatibility varies with the environment. For example, salt doesn't harm the ocean but is harmful for soil, phosphate is harmful for freshwater aquatic ecosystems but beneficial for soil. Most attention to date has been given to biocompatibility of cleaners with freshwater aquatic ecosystems. This study and Oasis's studies are among the first on the biocompatibility of cleaners with soil.

Product Name	Product type	P/L	Conductivity at 25°C (umho/cm)	Alkalinity as CaCO3 (mg/l)	Sodium (mg/l)	Boron (mg/l)	Phosphate (mg/l)
Ajax Ultra	Laundry Det.	P	1130.0	219.0	292.00	0.04	11.20
Alfa Klean		L	25.6	16.8	3.71	<<	<<<
All		P	2030.0	659.0	492.80	0.10	NT
All Regular		L	116.0	29.8	39.30	<<	<<<
Amway		P	939.0	310.0	227.80	<<	4.00
Ariel Ultra		P	1020.0	247.0	280.80	0.03	10.80
Arm and Hammer		P	2450.0	1160.0	572.80	<<	<<<
Bold		L	46.7	68.6	9.74	<<	<<<
Bonnie Hubbard Ultra		P	1560.0	617.8	377.80	0.04	<<<
Cheer Free		L	307.0	80.3	94.70	<<	<<<
Cheer Ultra		P	718.0	149.0	171.80	0.08	<<<
Dash		P	1060.0	482.0	238.80	2.14	<<<
Draft Ultra		P	757.0	328.0	189.80	9.75	<<<
Ecocover		L	132.0	63.7	24.30	<<	<<<
ERS Plus		L	102.0	15.3	26.30	<<	<<<
Fab Ultra		P	1148.0	199.5	443.80	<<	21.70
Fab 1-Shot		Pkt	581.0	108.0	109.80	<<	5.26
Fresh Start		P	510.0	106.0	132.80	0.83	8.28
Gain Ultra		P	792.0	300.0	180.80	8.06	<<<
Greenmark		P	1690.0	568.0	395.80	<<	1.67
Ivory Snow		P	258.0	219.0	70.80	<<	NT
Oasis		L	89.6	16.2	<	<<	<<<
Oxydol Ultra		P	1030.0	501.0	272.80	11.30	<<<
Per All		P	2350.0	431.0	529.80	0.05	2.67
Temperature							
Purex Ultra		P	1010.0	278.0	231.80	<<	<<<
Sears Plus		P	2500.0	1200.0	635.80	<<	<<<
Shaklee		L	19.8	12.1	6.48	<<	<<<
Shaklee Basic L		P	1038.0	285.0	230.80	<<	<<<
Sun Ultra		P	1490.0	653.0	335.80	<<	1.58
Surf Ultra		P	989.0	302.0	249.80	<<	13.70
Tide with Bleach		L	329.0	58.3	95.80	2.30	<<<
Tide Regular		L	291.0	61.2	93.80	0.83	<<<
Tide Ultra		P	959.0	256.0	245.80	0.10	10.70
Total Time		P	1650.0	460.0	371.80	0.83	1.79
White King		P	266.0	165.0	74.80	1.83	NT
White Magic Ultra		P	1140.0	194.0	273.80	0.04	18.50
Wisk Advanced Action		L	221.0	72.4	56.80	7.41	<<<
Wisk Power Scoop		P	1160.0	360.0	319.80	<<	9.77
Woolite		P	1040.0	22.3	259.80	0.17	<<<
Yes		L	42.5	10.3	6.40	<<	<<<
Detergent Average			871.6	281.8	221.14	1.87	8.69
Tap Water	Control	n/a	317.0	118.0	42.70	0.84	<<<
Bi-Mod/Deionized Water	Control	n/a	2.0	3.8	<	<<	<<<
Snuggle Fabric Softener	Fabric Softl.	L	2.6	NT	<	<<	<<<
Downy Fabric Softener	Fabric Softl.	L	6.4	NT	<	<<	<<<
Chlorox 2	Bleach	P	2880.0	1430.0	672.80	11.20	<<<
Calgon Water Softener	Water Softl.	P	1290.0	345.0	359.80	<<	22.90

P: Powder; L: Liquid.
<: Less than the sodium detection limit of 1.0 mg/L
<<: Less than the boron detection limit of 0.025 mg/L
<<<: Less than the phosphate detection limit of 1.2 mg/L
NT: Testing of sample not possible.

APPENDIX G-A [For DWR]

GRAYWATER SYSTEMS FOR SINGLE-FAMILY DWELLINGS

G 1 Graywater Systems (General)

(a) The provisions of this Appendix shall apply to the construction, installation, alteration and repair of graywater systems for subsurface landscape irrigation. The graywater system shall not be connected to any potable water system without an air gap and shall not result in any surfacing of the graywater. Except as otherwise provided for in this Appendix, the provisions of the Uniform Plumbing Code (U.P.C.) shall be applicable to graywater installations.

(b) The type of system shall be determined on the basis of location, soil type and ground water level and shall be designed to accept all graywater connected to the system from the building. The system shall discharge into subsurface irrigation fields and may include surge tank(s) and appurtenances, as required by the Administrative Authority.

(c) No graywater system, or part thereof, shall be located on any lot other than the lot which is the site of the building or structure which discharges the graywater, nor shall any graywater system or part thereof be located at any point having less than the minimum distances indicated in Table G-1.

(d) No permit for any graywater system shall be issued until a plot plan with appropriate data satisfactory to the Administrative Authority has been submitted and approved. When there is insufficient lot area or inappropriate soil conditions for adequate absorption of the graywater, as determined by the Administrative Authority, no graywater system shall be permitted. The Administrative Authority is a city or county.

(e) No permit shall be issued for a graywater system which would adversely impact a geologically sensitive area, as determined by the Administrative Authority.

(f) Private sewage disposal systems existing or to be constructed on the premises shall comply with Appendix I of this Code or applicable local ordinance. When abandoning underground tanks, Section 722.0 of the U.P.C. shall apply. Also, appropriate clearances from graywater systems shall be maintained as provided in Table G-1. The capacity of the private sewage disposal system, including required future areas, shall not be decreased by the existence or proposed installation of a graywater system servicing the premises.

(g) Installers of graywater systems shall provide an operation and maintenance manual, acceptable to the Administrative Authority, to the owner of each system. Graywater systems require regular or periodic maintenance.

(h) The Administrative Authority shall provide the applicant a copy of this Appendix.

G 2 Definitions

Graywater is untreated waste water which has not come into contact with toilet waste. Graywater includes used water from bathtubs, showers, bathroom wash basins, clothes washing machines and laundry tubs or an equivalent discharge as approved by the Administrative Authority. It does not include waste water from kitchen sinks, photo lab sinks, dishwashers or laundry water from soiled diapers.

Surfacing of graywater means the ponding, running off or other release of graywater from the land surface.

G 3 Permit

It shall be unlawful for any person to construct, install or alter, or cause to be constructed, installed or altered, any graywater system in a building or on a premises without first obtaining a permit to do such work from the Administrative Authority.

G 4 Drawings and Specifications

The Administrative Authority may require any or all of the following information to be included with or in the plot plan before a permit is issued for a graywater system:

(a) Plot plan drawn to scale completely dimensioned, showing lot lines and structures, direction and approximate slope of surface, location of all present or proposed retaining walls, drainage channels, water supply lines, wells, paved areas and structures on the plot, number of bedrooms and plumbing fixtures in each structure, location of private sewage disposal system and 100 percent expansion area or building sewer connecting to public sewer, and location of the proposed graywater system.

(b) Details of construction necessary to ensure compliance with the requirements of this Appendix together with a full description of the complete installation, including installation methods, construction and materials as required by the Administrative Authority.

(c) A log of soil formations and ground water level as determined by test holes dug in close proximity to any proposed irrigation area, together with a statement of water absorption characteristics of the soil at the proposed site as determined by approved percolation tests. In lieu of percolation tests, the Administrative Authority may allow the use of Table G-2, an infiltration rate designated by the Administrative Authority, or an infiltration rate determined by a test approved by the Administrative Authority.

(d) A characterization of the graywater for commercial, industrial or institutional systems, based on existing records or testing.

G 5 Inspection and Testing

(a) Inspection

(1) All applicable provisions of this Appendix and of Section 103.5 of the U.P.C. shall be complied with.

(2) System components shall be properly identified as to manufacturer.

(3) Surge tanks shall be installed on dry, level, well-compacted soil if in a drywell, or on a level, 3-inch (76 mm) concrete slab or equivalent, if above ground.

(4) Surge tanks shall be anchored against overturning.

(5) If the irrigation design is predicated on soil tests, the irrigation field shall be installed at the same location and depth as the tested area.

(6) Installation shall conform with the equipment and installation methods identified in the approved plans.

(7) Graywater stub-out plumbing may be allowed for future connection prior to the installation of irrigation lines and landscaping. Stub-out shall be permanently marked GRAYWATER STUB-OUT, DANGER—UNSAFE WATER.

(b) Testing

(1) Surge tanks shall be filled with water to the overflow line prior to and during inspection. All seams and joints shall be left exposed and the tank shall remain watertight.

(2) A flow test shall be performed through the system to the point of graywater irrigation. All lines and components shall be watertight.

G 6 Procedure for Estimating Graywater Discharge

(a) Single Family Dwellings and Multifamily Dwellings

The Administrative Authority may utilize the graywater discharge procedure listed below, water use records, or calculations of local daily per person interior water use:

1. The number of occupants of each dwelling unit shall be calculated as follows:

First bedroom	2 occupants
Each additional bedroom	1 occupant

2. The estimated graywater flows for each occupant shall be calculated as follows:

Showers, bathtubs and wash basins	25 GPD/ occupant
Laundry	15 GPD/ occupant

3. The total number of occupants shall be multiplied by the applicable estimated graywater discharge as provided above and the type of fixtures connected to the graywater system.

(b) Commercial, Industrial and Institutional Projects

The Administrative Authority may utilize the graywater discharge procedure listed below, water use records or other documentation to estimate graywater discharge:

1. The square footage of the building divided by the occupant load factor from U.B.C. Table 10-A equals the number of occupants.

2. The number of occupants times the flow rate per person (minus toilet water and other disallowed sources) from U.P.C. Table I-2 equals the estimated graywater discharge per day.

The graywater system shall be designed to distribute the total amount of estimated graywater discharged daily.

G 7 Required Area of Subsurface Irrigation

Each irrigation zone shall have a minimum effective irrigation area for the type of soil and infiltration rate to distribute all graywater produced daily, pursuant to Section G-6, without surfacing. The required irrigation area shall be based on the estimated graywater discharge, pursuant to Section G-6 of this Appendix, size of surge tank, or a method determined by the Administrative Authority.

If the mini-leachfield irrigation system is used, the required square footage shall be determined from Table G-2, or equivalent, for the type of soil found in the excavation. The area of the irrigation field shall be equal to the aggregate length of the perforated pipe sections within the irrigation zone times the width of the proposed mini-leachfield trench.

No irrigation point shall be within 5 vertical feet (1524 mm) of highest known seasonal groundwater nor where graywater may contaminate the ground water or ocean water. The applicant shall supply evidence of ground water depth to the satisfaction of the Administrative Authority.

G 8 Determination of Irrigation Capacity

(a) In order to determine the absorption quantities of questionable soils other than those listed in Table G-2, the proposed site may be subjected to percolation tests acceptable to the Administrative Authority or determined by the Administrative Authority.

(b) When a percolation test is required, no mini-leachfield system or subsurface drip irrigation system shall be permitted if the test shows the absorption capacity of the soil is less than 60 minutes/inch or more rapid than five minutes/inch, unless otherwise permitted by the Administrative Authority.

(c) The irrigation field size may be computed from Table G-2, or determined by the Administrative Authority or a designee of the Administrative Authority.

G 9 Surge Tank Construction (Figure 1)

(a) Plans for surge tanks shall be submitted to the Administrative Authority for approval. The plans shall show the data required by the Administrative Authority and may include dimensions, structural calculations, and bracing details.

(b) Surge tanks shall be constructed of solid, durable materials, not subject to excessive corrosion or decay, and shall be watertight.

(c) Surge tanks shall be vented as required by Chapter 5 of this Code and shall have a locking, gasketed access opening, or approved equivalent, to allow for inspection and cleaning.

(d) Surge tanks shall have the rated capacity permanently marked on the unit. In addition, GRAYWATER IRRIGATION SYSTEM, DANGER—UNSAFE WATER shall be permanently marked on the surge tank.

(e) Surge tanks installed above ground shall have an overflow, separate from the line connecting the tank with the irrigation fields. The overflow shall have a permanent connection to a sewer or to a septic tank, and shall be protected against sewer line backflow by a backwater valve. The overflow shall not be equipped with a shut-off valve.

(f) The overflow and drain pipes shall not be less in diameter than the inlet pipe. The vent size shall be based on the total graywater fixture units, as outlined in U.P.C. Table 7-5 or local equivalent. Unions or equally effective fittings shall be provided for all piping connected to the surge tank.

(g) Surge tanks shall be structurally designed to withstand anticipated loads. Surge tank covers shall be capable of supporting an earth load of not less than 300 pounds per square foot (14.4 kN/m²) when the tank is designed for underground installation.

(h) Surge tanks may be installed below ground in a dry well on compacted soil, or buried if the tank design is approved by the Administrative Authority. The system shall be designed so that the tank overflow will gravity drain to a sanitary sewer line or septic tank. The tank must be protected against sewer line backflow by a backwater valve.

(i) Materials

(1) Surge tanks shall meet nationally recognized standards for nonpotable water and shall be approved by the Administrative Authority.

(2) Steel surge tanks shall be protected from corrosion, both externally and internally, by an approved coating or by other acceptable means.

G 10 Valves and Piping (Figure 1)

Graywater piping discharging into a surge tank or having a direct connection to a sanitary drain or sewer piping shall be downstream of an approved waterseal-type trap(s). If no such trap(s) exists, an approved vented running trap shall be installed upstream of the connection to protect the building from any possible waste or sewer gases. Vents and venting shall meet the requirements in Chapter 9 of the U.P.C.

All graywater piping shall be marked or shall have a continuous tape marked with the words DANGER—UNSAFE WATER. All valves, including the three-way valve, shall be readily accessible and shall be approved by the Administrative Authority. A backwater valve, installed pursuant to this Appendix, shall be provided on all surge tank drain connections to the sanitary drain or sewer piping.

G 11 Irrigation Field Construction

The Administrative Authority may permit subsurface drip irrigation, mini-leachfield or other equivalent irrigation methods which discharge graywater in a manner which ensures that the graywater does not surface. Design standards for subsurface drip irrigation systems and mini-leachfield irrigation systems follow:

(a) Standards for a subsurface drip irrigation system are:

(1) Minimum 140 mesh (115 micron) filter with a capacity of 25 gallons (94.6 L) per minute, or equivalent, filtration, sized approximately to maintain the filtration rate, shall be used. The filter backwash and flush discharge shall be caught, contained and disposed of to the sewer system, septic tank or, with approval of the Administrative Authority, a separate mini-leachfield sized to accept all the backwash and flush discharge water. Filter backwash water and flush water shall not be used for any purpose. Sanitary procedures shall be followed when handling filter backwash and flush discharge or graywater.

(2) Emitters shall have a minimum flow path of 1,200 microns and shall have a coefficient of manufacturing variation (Cv) of no more than 7 percent. Irrigation system design shall be such that emitter flow variation shall not exceed ± 10 percent. Emitters shall be recommended by the manufacturer for subsurface use and graywater use, and shall have demonstrated resistance root intrusion. For emitter ratings, refer to Irrigation Equipment Performance Report, Drip Emitters and Micro-Sprinklers, Center for Irrigation Technology, California State University, 5730 N. Chestnut Avenue, Fresno, California 93740-0018.

(3) Each irrigation zone shall be designed to include no less than the number of emitters specified in Table G-3, or through a procedure designated by the Administrative Authority. Minimum spacing between emitters is 14 inches (356 mm) in any direction.

(4) The system design shall provide user controls, such as valves, switches, timers and other controllers, as appropriate, to rotate the distribution of graywater between irrigation zones.

(5) All drip irrigation supply lines shall be polyethylene tubing or PVC Class 200 pipe or better and Schedule 40 fittings. All joints shall be properly solvent-cemented, inspected and pressure tested at 40 psi (276 kPa), and shown to be drip tight for five minutes, before burial. All supply lines will be buried at least 8 inches (203 mm) deep. Drip feeder lines can be poly or flexible PVC tubing and shall be covered to a minimum depth of 9 inches (229 mm).

(6) Where pressure at the discharge side of the pump exceeds 20 psi (138 kPa), a pressure-reducing valve able to maintain downstream pressure no greater than 20 psi (138 kPa) shall be installed downstream from the pump and before any emission device.

(7) Each irrigation zone shall include a flush valve/antisiphon valve to prevent back siphonage of water and soil.

(b) Standards for the mini-leachfield system are:

(1) Perforated sections shall be a minimum 1 inch (76 mm) diameter and shall be constructed of perforated high-density polyethylene pipe, perforated ABS pipe, perforated PVC pipe, or other approved materials, provided that sufficient openings are available for distribution of the graywater into the trench area. Material, construction and perforation of the piping shall be in compliance with the appropriate absorption field drainage piping standards and shall be approved by the Administrative Authority.

(2) Clean stone, gravel or similar filter material acceptable to the Administrative Authority, and varying in size between 3/4 inch (19 mm) to 2 1/2 inches (64 mm) shall be placed in the trench to the depth and grade required by this section. Perforated sections shall be laid on the filter material in an approved manner. The perforated sections shall then be covered with filter material to the minimum depth required by this section. The filter material shall then be covered with landscape filter fabric or similar porous material to prevent closure of voids with earth backfill. No earth backfill shall be placed over the filter material cover until after inspections and acceptance.

(3) Irrigation fields shall be constructed as follows:

	Minimum	Maximum
Number of drain lines per valved zone	3	—
Length of each perforated line	—	100 ft. (30840 m m)
Bottom width of trench	6 in. (152 mm)	18 in. (457 m m)
Total depth of trench	17 in. (432 mm)	18 in. (457 mm)
Spacing of lines, center-to-center	4 ft. (1219 mm)	—
Depth of earth cover of lines	9 in. (229 mm)	—
Depth of filter material cover of lines	2 in. (51 mm)	—
Depth of filter material beneath lines	3 in. (76 mm)	—
Grade of perforated lines	level	3 in./100 ft. (76 mm/30 480 mm)

G 12 Special Provisions

(a) Other collection and distribution systems may be approved by the Administrative Authority as allowed by Section 310.0 of the U.P.C.

(b) Nothing contained in this Appendix shall be construed to prevent the Administrative Authority from requiring compliance with stricter requirements than those contained herein, where such stricter requirements are essential in maintaining safe and sanitary conditions or from prohibiting graywater systems. The prohibition of graywater systems or more restrictive standards may be adopted by the Administrative Authority by ordinance after a public hearing.

G 13 Health and Safety

(a) Graywater may contain fecal matter as a result of bathing and/or washing of diapers and undergarments. Water containing fecal matter, if swallowed, can cause illness in a susceptible person.

(b) Graywater shall not include laundry water from soiled diapers.

(c) Graywater shall not be applied above the land surface or allowed to surface and shall not be discharged directly into or reach any storm sewer system or any water of the United States.

(d) Graywater shall be not be contacted by humans, except as required to maintain the graywater treatment and distribution system.

(e) Graywater shall not be used for vegetable gardens.

Table G-1 Location of Graywater System

Minimum Horizontal Distance From	Surge Tank (feet) x 304.8 for mm	Irrigation Field (feet) x 304.8 for mm
Buildings or structures[1]	5[2]	8[3]
Property line adjoining private property	5	5
Water supply wells[4]	50	100
Streams and lakes[4]	50	50
Seepage pits or cesspools	5	5
Disposal field and 100 percent expansion area	5	4[5]
Septic tank	0	5[6]
On-site domestic water service line	5	5[7]
Pressure public water main	10	10[8]
Water ditches	50	50

Notes: When mini-leach fields are installed in sloping ground, the minimum horizontal distance between any part of the distribution system and ground surface shall be 15 feet (4572 mm).

[1]Including porches and steps, whether covered or uncovered, but does not include carports, covered walks, driveways and similar structures.

[2]The distance may be reduced to 0 feet for aboveground tanks if approved by the Administrative Authority.

[3]The distance may be reduced to 2 feet (610 mm).

[4]For subsurface drip irrigation systems, 2 feet (610 mm) from property line.

[5]Where special hazards are involved, the distance may be increased by the Administrative Authority.

[6]Applies to the mini-leachfield type system only. Plus 2 feet (610 mm) for each additional foot of depth in excess of 1 foot (305 mm) below the bottom of the drain line.

[7]Applies to mini-leachfield-type system only.

[8]A 2-foot (610 mm) separation is required for subsurface drip systems.

[9]For parallel construction or for crossings, approval by the Administrative Authority shall be required.

Table G-2 Mini-Leachfield Design Criteria of Six Typical Soils

Type of Soil	Minimum sq. ft. of irrigation area per 100 gallons of estimated graywater discharge per day	Maximum absorption capacity, minutes per inch, of irrigation area for a 24-hour period
1. Coarse sand or gravel	20	5
2. Fine sand	25	12
3. Sandy loam	40	18
4. Sandy clay	60	24
5. Clay with considerable sand or gravel	90	48
6. Clay with small amount of sand or gravel	120	60

Table G-3 Subsurface Drip Design Criteria of Six Typical Soils

Type of Soil	Maximum emitter discharge (gal/day)	Minimum number of emitters per gpd of graywater production
1. Sand	1.8	0.6
2. Sandy loam	1.4	0.7
3. Loam	1.2	0.9
4. Clay loam	0.9	1.1
5. Silty clay	0.8	1.6
6. Clay	0.5	2.0

Use the daily graywater flow calculated in Section G-6 to determine the number of emitters per line.

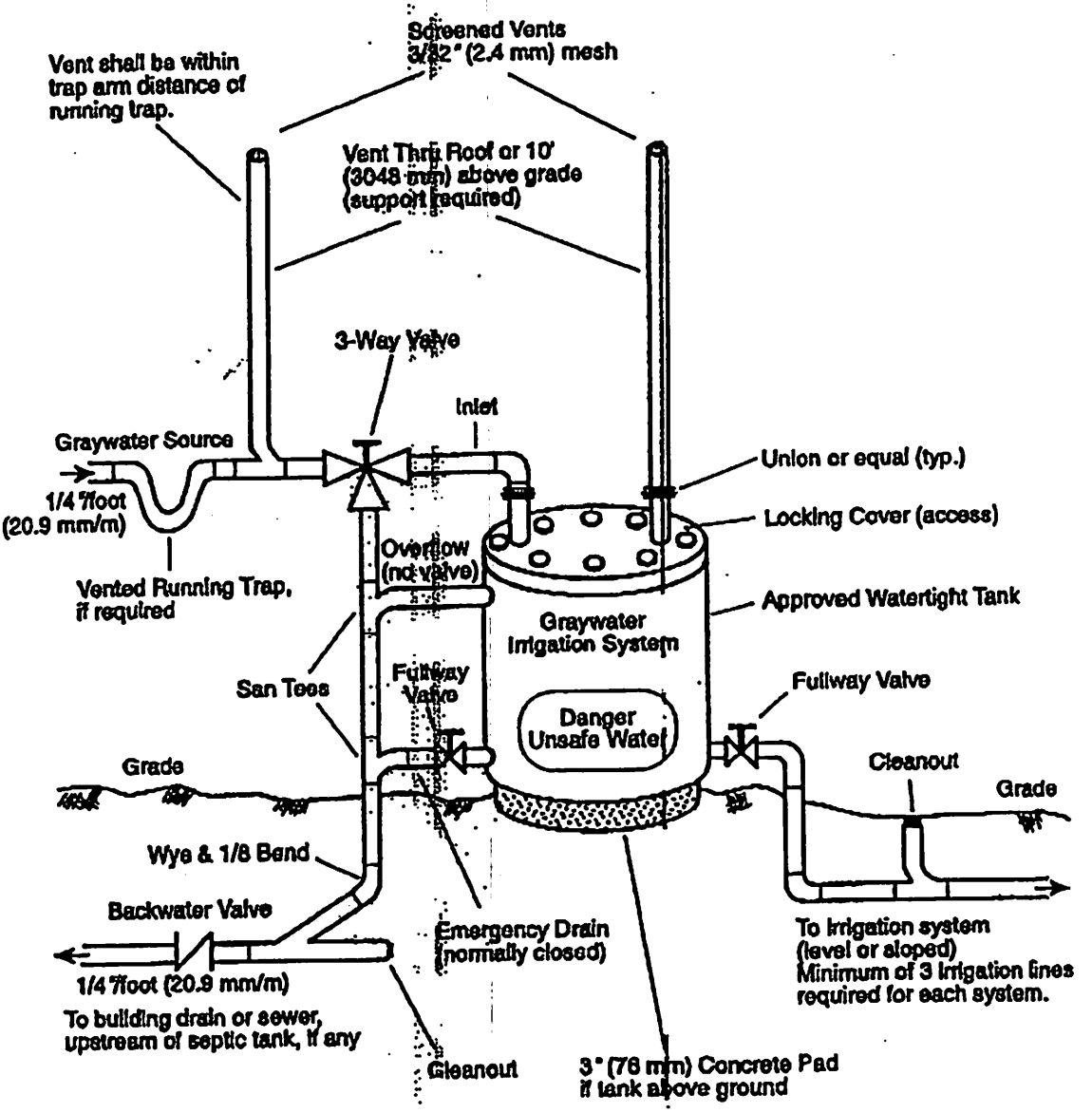


Figure G-1
Graywater system Tank – Gravity (conceptual

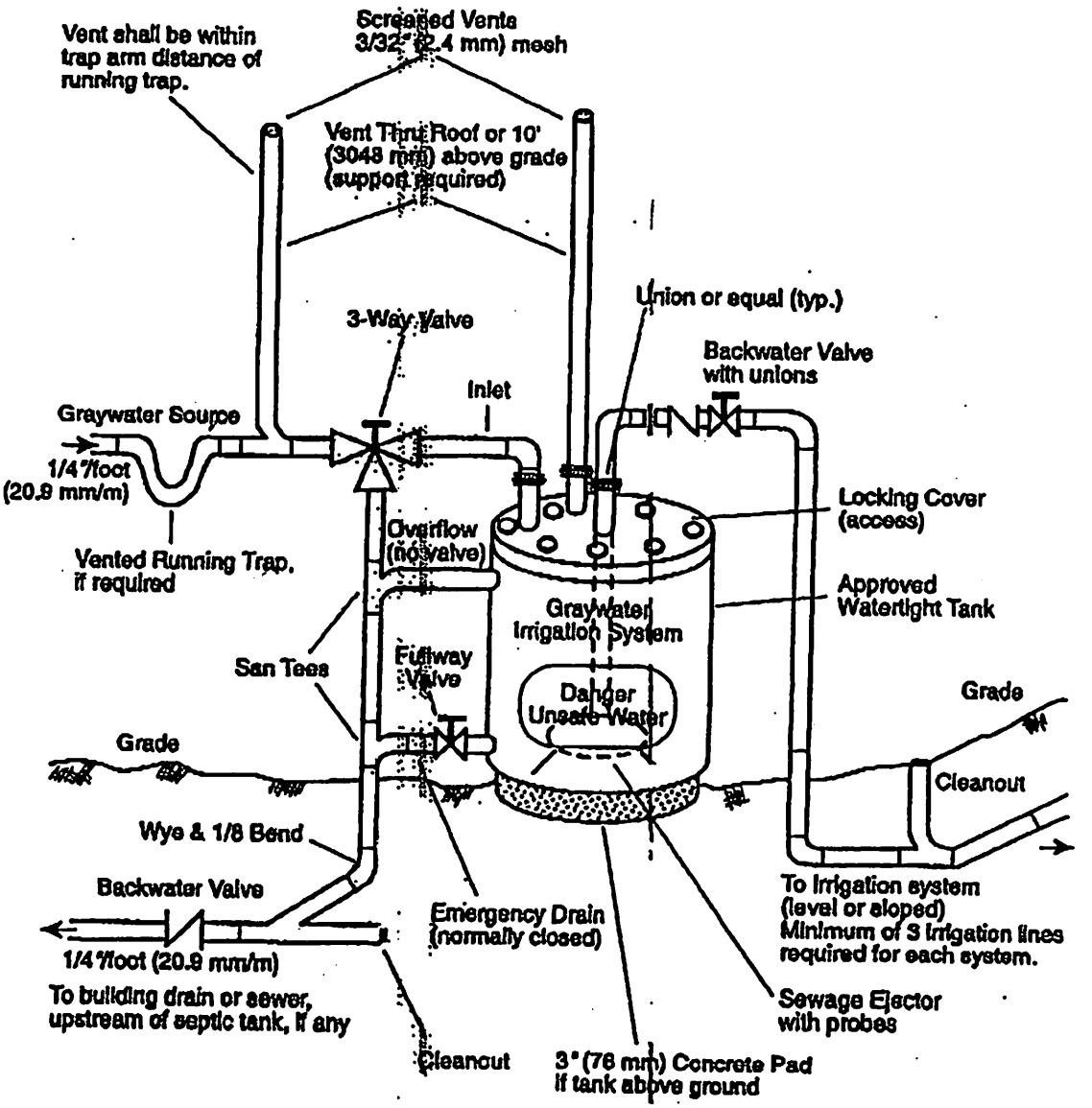


Figure G-2
Graywater System Tank – Pumped (conceptual)

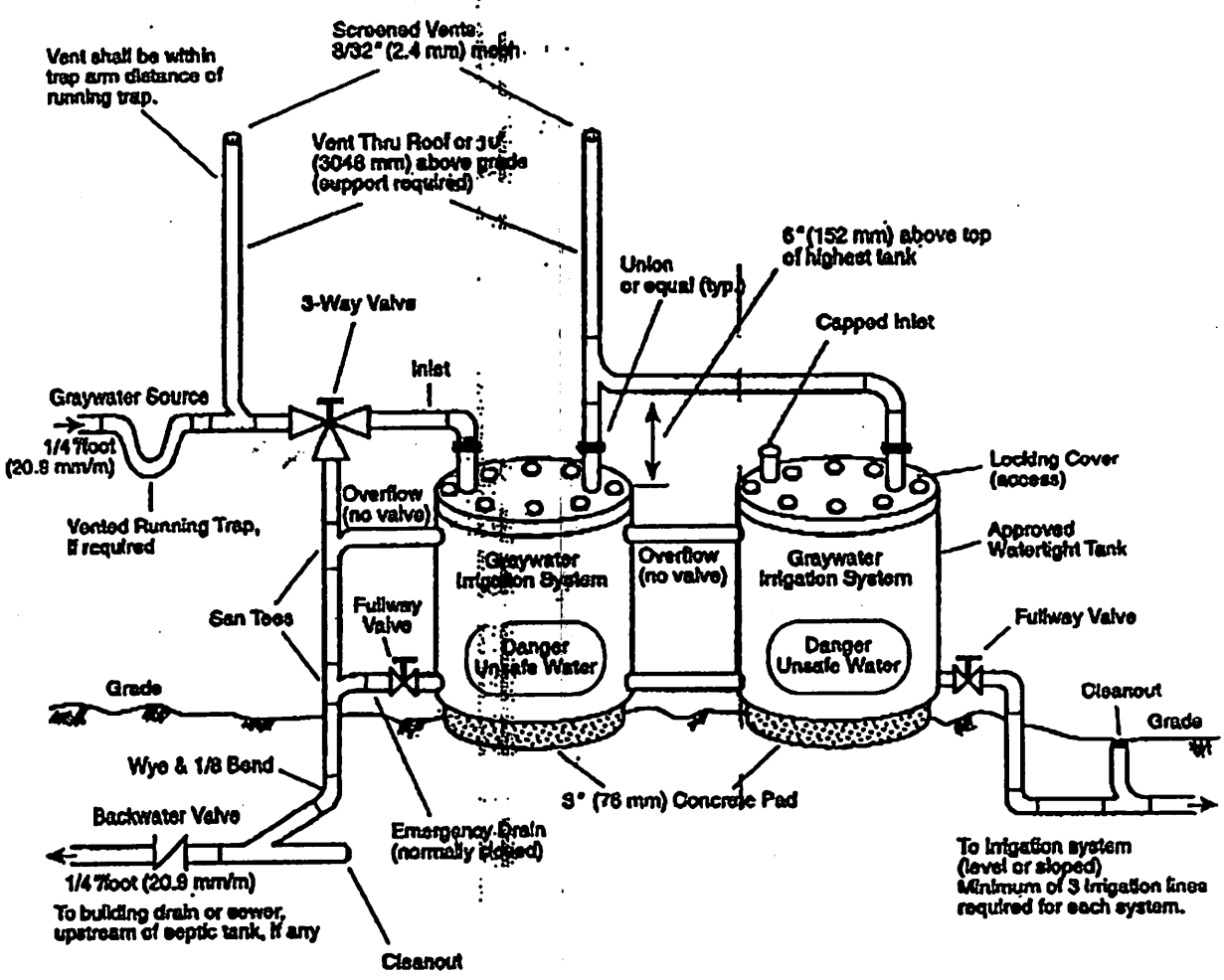


Figure G-3
Graywater System Multiple Tank Installation (conceptual)

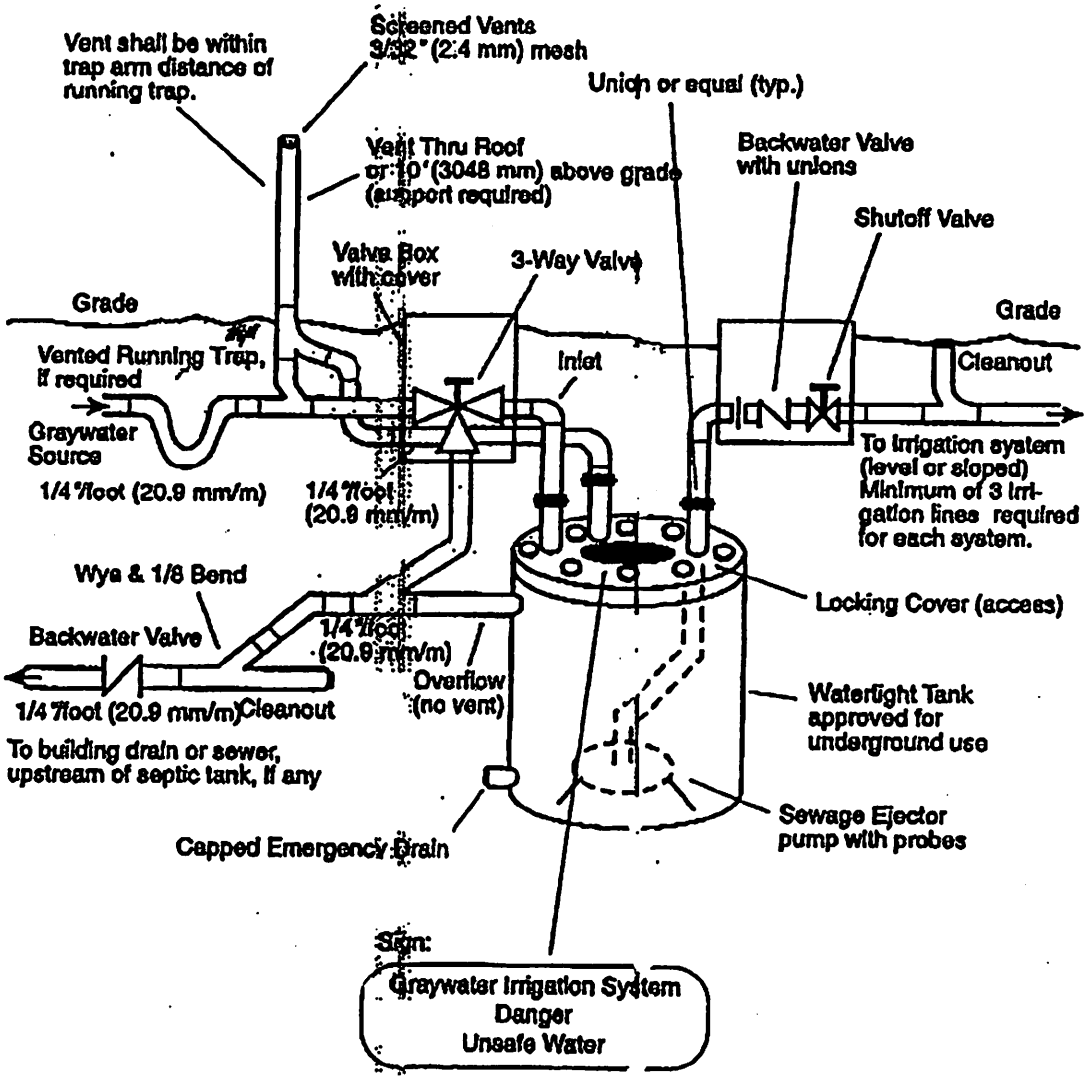
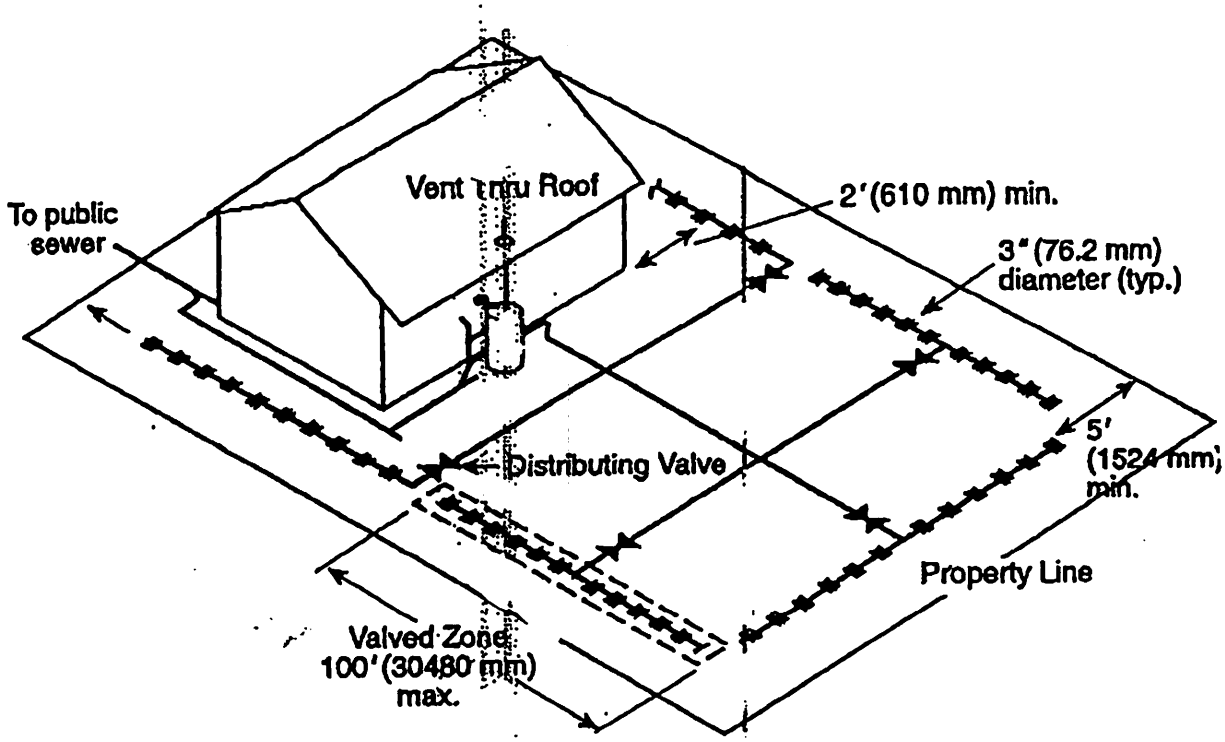


Figure G-4
Graywater System Underground Tank – Pumped (conceptual)



Note: Each valved zone shall have a minimum effective absorption/irrigation area in square feet predicated on the estimated graywater discharge in gallons per day and on the type of soil found in the area. The area of the field shall be equal to the aggregate length of perforated pipe sections within the valved zone times the width of the proposed field.

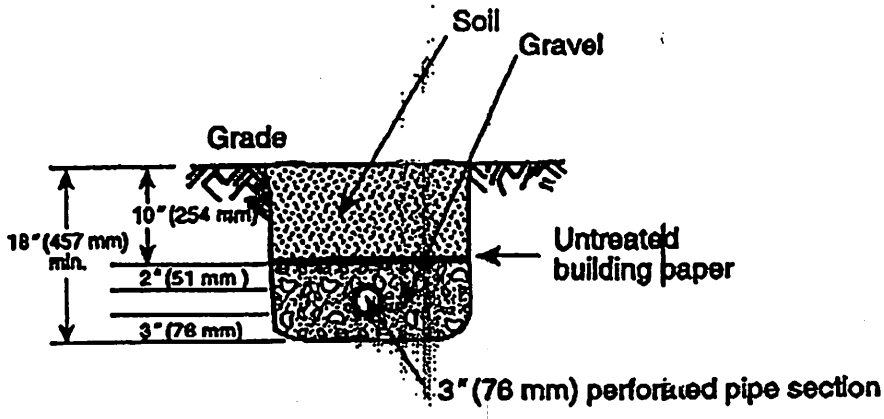


Figure G-5
Graywater System Typical Irrigation Layout (conceptual)

APPENDIX H

CO-EXISTING WITH CANYON WILDLIFE

CO-EXISTING WITH CANYON WILDLIFE
A HUMANE GUIDE FOR RESIDENTS OF TOPANGA, 2002

"When we try to pick out anything by itself,
we find it hitched to everything else in the universe."
–John Muir

SHARED SPACE: LIVING IN HARMONY WITH CANYON WILDLIFE

Topanga is a place where the urban, populated environment interfaces with the natural environment, populated by diverse wildlife. Most of us are thrilled to experience the privilege of sharing this environment with its wild inhabitants. Indeed, all we need do is gaze out our window or step outside to enjoy such things as the antics of a ground squirrel, the grace of a mule deer or the devotion of a pair of mourning doves. Our local wildlife can be wonderful neighbors—a way for us to remain connected to the natural environment. We benefit from their presence in other ways, too. Many native species control populations of rodents and insects, while others help keep roadways and neighborhoods clean by removing carrion, to name just two. Yet, wherever humans and wildlife co-exist, problems can occur. Most of these problems seem to come about when wild creatures find their way into our homes, yards or gardens. The purpose of this booklet is to provide humane, environmentally-responsible remedy options to some of the most common human-wildlife problems in our area. With a little knowledge and patience, we can all learn to live in harmony with our canyon wildlife.

THINK BEFORE ACTING

In general, it's a good idea to leave canyon wildlife undisturbed. That said, if a critter makes its way into what you consider "your territory," and you feel it poses some kind of threat to health or safety, you will probably want to take some kind of action. Whenever possible, first take some time to think about it. Many of us assume that a certain type of creature is a problem, when in fact, under many circumstances, an assumed "pest" poses no problem at all. For example, many snakes, spiders and insects are not only harmless to humans, they quite often help reduce populations of critters that can cause real problems. Another example: a beehive in the hollow of a tree that is many yards from your home does not necessarily pose a threat if you are aware that it is there, know to avoid it, and alert everyone in your household of its presence. Such a presence can actually be a good learning experience for a child, who can be taught to observe the behavior of the bees from a safe distance and to respect them as an integral player in the web of life.

HUMANE REMEDY OPTIONS

In the past, the so-called 'solution' to human-wildlife problems has been simply to kill "offending" critters by trapping, poisoning or some other lethal means. These methods are not only cruel and inhumane, they are damaging to the ecosystem, have the potential to harm companion animals and children and, generally, do not solve the problem over the long term. Poisoning, especially, can be devastating, not only for the targeted creature, but for any others, wild or domestic, that feed on the dead or dying animal or accidentally ingest the poison. As caring and compassionate people, it is important that we seek both humane and environmentally-responsible solutions to problems with wildlife whenever possible. Thankfully, those solutions are available to us, and they can be as simple as removing attractants to our homes and yards or using non-toxic repellents or other deterrents.

When other humane methods fail, it may be possible to humanely trap and relocate some creatures; however, this should be done by someone qualified to handle wildlife and should not be considered unless there's an immediate threat to health or safety. Especially when animals are nesting in your attic, chimney, cellar or some other unused portion of your property, the best strategy is to give the animals a grace period of a few weeks until youngsters are grown, at which time they will usually leave on their own. Then, make sure all animals are gone, find all entry holes and seal them. Live trapping is very traumatic for wildlife, and relocated animals have low survival rates when released in unfamiliar areas. Remember that if live trapping is absolutely necessary, animal families (mother and babies) should be humanely captured and released together. For more information, contact the California Wildlife Center at 310-457-WILD.

While the incidence is extremely rare, it should be emphasized here that any mammal infected with rabies can be dangerous. Those living in Topanga should learn how to read the signs of rabies. If you encounter an animal that is exhibiting the symptoms of rabies, or is otherwise sick or injured, do not approach it; seek expert assistance.

Similarly, it's a good idea to learn about the common stinging and biting insects, spiders and snakes living in Topanga and, in turn, teach young children what is not safe to touch. For more information on this subject, contact the Topanga Canyon Docents at 310-534-9400.

PREVENTION IS KEY

The first step in reducing human-wildlife problems is prevention. This starts with removing attractants, like food, water or shelter, that attracts wild animals to our home or yard. Some attractions, like a hummingbird feeder, are deliberate, and the animals that come to visit are very welcome. Other attractions, like fruit fallen from trees, debris piles, garbage and compost, may attract critters that can cause unwelcome problems. Here are several steps to take in general to minimize the attractiveness of your home or yard to these types of problems:

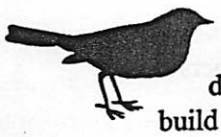
- Inspect your home for small openings and entryways and seal them; cap your chimney; keep doors and low windows closed at night and anytime you are not at home and/or install screen doors.
- Trim tree limbs away from the roof.
- Keep your property clean and free of debris piles, woodpiles, and thick brush near your home.
- Harvest for food, or collect for composting, all fallen fruit and ripe fruit still hanging from trees.
- Put trash and recyclables out as close to pick up time as possible. Keep containers tightly sealed and/or keep them in a latched enclosure.
- When composting, use enclosed bins. Avoid adding dog or cat waste or any food containing meat, milk or eggs.
- Keep companion animal food and water inside, especially at night.
- Do not feed wild animals. If you feed wild birds, put out only small amounts of seed or use squirrel-proof bird feeders. Birdseed attracts squirrels and rabbits that, in turn, attract coyotes and other predators.

POTENTIAL HUMAN-WILDLIFE PROBLEMS

BATS. Haunted by centuries of "old wives' tales," this flying mammal is actually one of nature's gentler creatures and one of the most beneficial. One bat may consume up to 600 insects, including mosquitoes, an hour. There are several species of bats living in the canyon (the vampire bat is not one of them). The rate of rabies among bats is very low (less than 1/2 of 1%), but be careful if there is ever a need to handle them, and never pick-up a bat that appears sick. Bats are attracted to warm, dark areas to roost, so they sometimes find their way into buildings. While they don't cause any real damage, they may frighten some occupants and leave objectionable droppings (guano). *Note: Bat guano, which has the highest percentage of nitrogen, is extremely beneficial in the garden, but be careful when handling it and try not to breathe it in.*

REMEDY OPTIONS:

- If a bat is in the house, do not panic. Keep animals away, confine the bat to one room and open a window or exterior door—they will usually fly out on their own. If the bat is not flying, check draperies or other places where the bat can hang easily, and with a thick towel, very gently capture and release it outside.
- If bats are residing in an attic or other area of the house, wait until they leave at nightfall, and, when you are sure all bats are gone, seal the holes and cracks where they may have entered.
- Bat-proof your home during the months of September-October or March-April. Doing so at other times may cause young bats to become trapped inside.
- After excluding bats from the home, provide alternate roosting sites such as bat houses to continue to benefit from their presence.
- For more information about bats, contact Bat Conservation International at 800-538-2287 or on the web at www.batcon.org
- For questions or concerns about bats in Topanga, contact Jackie Safanov at 310-455-3157 or Rosi Dagit at 310-455-7528.



BIRDS. Topanga is home to a great variety of birds. Each plays a unique role in the canyon ecosystem. The problems encountered, while usually not serious, vary depending on the type of bird. For example, songbirds may fly into open windows or build nests in chimneys; ravens may disturb gardens; and woodpeckers may drum on houses.

REMEDY OPTIONS:

- Cap the chimney to prevent birds (and other animals) from nesting in it. This should be done in the fall to prevent baby birds from being trapped inside.
- To keep birds away from an area, use reflective tape or model owls.
- To discourage drumming, modify the site by covering it with fabric or other non-toxic material.
- To safely release birds who have become trapped in skylights or other areas of a home, keep companion animals away, confine the bird to one room and open a window or outside door. If the bird does not fly out on its own, try these two methods: (1) use a dust mop or sponge mop and slowly move it closer and closer to the bird until it is forced to move or perch on the mop head. On the first few tries, the bird will usually attempt to avoid the mop, but eventually it will try perching on the mop head. When it does, bring it slowly to an open window or door and shake it gently to get the bird to fly; (2) simply approach the bird slowly from below and behind with your hand. Keep your hand wide-open just before you reach the bird. Slowly close your fingers around the bird to create a gentle cage, holding the wings closed. Bring the bird to an open window and release gently.

Note: Be aware that hummingbirds can go into a state of "turbor" in which the bird appears to be dead, but is not. If this happens, seek immediate expert assistance.

- For more information about the many birds of Topanga, contact Gerry Haigh, the "Birdman of Topanga" at 310-455-1696.
- For orphaned or injured birds, contact Topanga Animal Rescue at 310-455-7268.

FIELD RATS & MICE. Field rats and mice are common throughout the canyon. During extreme weather conditions, or if they have easy access and food or water is available, they may invade a home. Live traps can be used to humanely trap and relocate rats and mice, but unless you rat and mouse-proof your house, you will have a continual problem.

REMEDY OPTIONS:

- Rats and mice can squeeze through extremely small spaces. Conduct a thorough inspection of your home to ensure that there are no holes or cracks that a rat or mouse could squeeze through and then seal them.
- Remove debris piles, woodpiles, weeds, tall brush or dense ground cover near your home where rats or mice may be nesting.
- Practice good housekeeping.
- Remove food sources by cleaning up spilled food and storing food in glass, metal or plastic containers with lids.
- If you garden or keep wild birdseed, store seeds in a rat/mouse-proof container. *Note: One of the added benefits of keeping an indoor cat is that just his or her scent may cause rats and mice to shift away from a residence.*

RACCOONS. Raccoons provide a service by eating insects and rodents. However, these animals are famous for getting into garbage cans and compost piles. They may also nest in places like chimneys, cellars or attics. Although playful by nature, they may get into an occasional skirmish with dogs or cats when cornered. They have also been known to eat fish out of garden ponds.

REMEDY OPTIONS:

- Put trash and recyclables out as close to pick up time as possible. Keep containers tightly sealed and/or keep them in a latched enclosure.
- For compost, use enclosed bins.
- Keep cat and dog food inside, especially at night.
- Pick backyard fruit/vegetables when ripe and keep rotten fruit/vegetables off the ground.
- Clear brush piles from your property to eliminate nesting sites.
- Trim tree limbs away from the roof.
- Do home repairs to deter raccoons in the fall. This will prevent mothers and babies or hibernating raccoons from being trapped inside. Remember, never seal an entrance until you are sure all animals are gone.
- Keep companion animals well vaccinated against rabies and distemper and have them checked occasionally for roundworms.
- Learn how to protect fish by creating shelters for them or covering ponds with netting in the evenings.

SKUNKS. Skunks are excellent at rodent and insect control, and their diet includes black widow spiders and scorpions. Being carrion eaters, they also help keep roadways and neighborhoods clean. Although common in the canyon, they are rarely seen and usually do not present a problem unless startled, threatened or cornered. Their spray, although notoriously malodorous, is not otherwise a health or safety hazard. As with other animals, limiting access and eliminating potential food sources are key to making your house or yard a less attractive destination.

REMEDY OPTIONS:

- Keep cat and dog food inside and keep dog/cat doors closed at night.
- Put trash and recyclables out as close to pick up time as possible. Keep containers tightly sealed and/or keep them in a latched enclosure.
- Keep fruit trees picked and don't leave rotten fruit on the ground.
- Securely enclose chickens to prevent skunks from eating eggs and young chicks.
- Remove debris and brush piles from your property to eliminate denning sites.
- Do home repairs to prevent access by skunks in the fall. Babies may be trapped inside if done April through August. Make sure all animals are gone before sealing an entrance.
- If you encounter a skunk while hiking, slowly turn and walk the other way.

OPOSSUMS. Opossums rarely cause problems for humans. They are excellent at rodent and insect control and are far more beneficial as scavengers than harmful for any damage they could cause. They occasionally enter homes through dog/cat doors, which can be entirely avoided by keeping cat and dog food inside and securing dog/cat doors at night.

GOPHERS & MOLES. While the burrows these animals make benefit the soil by aerating it, some people are frustrated by the mounds of dirt pushed up in the yard or the collapsing of soil in the garden. Gophers eat the roots of plants and trunks of young trees. Moles, on the other hand, eat insect larvae in the soil, so removing moles may result in an insect problem.

REMEDY OPTIONS:

- Place chicken wire around bulbs and roots of plants or bury it a foot beneath the top soil of yard or gardens.
- Wrap tree trunks in commercial tree wrap.
- Rotate crops each season and plant different crops in alternating rows.
- "Mole-Med" an environmentally-friendly mole repellent can be found at most hardware and garden stores.

GROUND SQUIRRELS. These gregarious critters normally don't cause extensive damage, however, they will feed on flowers and vegetables in gardens, and some consider their burrows to be a nuisance. If high populations of squirrels are becoming a problem in your yard, begin to look for and eliminate their food sources. For example, check to see if they are dining at your outdoor bird feeder.

REMEDY OPTIONS:

- Use "squirrel-proof" bird feeders that prevent squirrels from accessing the seeds inside. Or, consider other offerings of wild bird food like trees and shrubs that produce berries

or flowers that attract birds but not squirrels. *Note: Do not use hot sauce or repellents on bird feeders.*

- To minimize squirrel activity in your garden, use fencing made of sheet metal or hardware clothe. Fencing needs to be at least 18 inches high with about 6 inches buried in the soil.
- Invite barn owls to your property by installing barn owl boxes for natural population control.

RABBITS. Rabbits are commonly seen throughout the canyon. While many welcome their presence in their yards, others are not so happy to find them nibbling on garden vegetation and other landscape plants.

REMEDY OPTIONS:

- Use chicken wire fencing around gardens. Bury fencing one foot beneath the ground, and make it three feet high.
- Wrap the base of trees with wire mesh or commercial tree tape.
- Hang garlic in mesh bags or puree it, add water and spray around the garden. Non-toxic repellent sprays are also available commercially.

DEER. Deer are fairly common in the canyon. Oak woodlands are a favorite feeding area, however, if food is scarce and deer populations high, they may also be tempted by home gardens and other landscape plants. Telltale signs of deer activity in your garden are sharp hoof marks in soft ground and jagged edges where stems and leaves have been nibbled.

REMEDY OPTIONS:

- There are a variety of "deer-resistant" landscape plants, trees and shrubs to make your yard less appealing to deer. For a list of deer-resistant plants, visit the website www.deerresistantplants.com or request a free copy of "Living with Deer" from the Fund for Animals at 301-585-2591.
- The use of powerful scents (such as predator urine) and non-toxic repellent sprays around the garden can also be helpful.

COYOTES. Coyotes are the foremost canine predator in the west and are an integral part of our canyon ecosystem. They help regulate the balance of nature by consuming large numbers of rodents, rabbits and other small mammals. Although excellent hunters of their own natural prey, coyotes will also kill domestic and companion animals such as cats, small dogs, puppies, old or injured dogs, ducks, chickens, rabbits and goats when given the opportunity. They rarely attack humans.

REMEDY OPTIONS:

- Keep cats and other small animals indoors, especially at night.
- House outdoor animals in secure, covered enclosures made of heavy, mesh wire (not chicken wire).
- Do not allow companion animals to roam from home.
- Spay or neuter canine companions to avoid attracting coyotes.
- Keep trash containers tightly sealed and keep cat and dog food indoors, especially at night.

- Use enclosed bins for composting, and do not add any foods containing meat, milk or eggs.
- Pick backyard fruit as soon as it ripens, and keep rotten fruit off the ground.
- Do not feed wildlife.
- Trapping and relocating coyotes is not recommended, viable or legal.
  Note: On rare occasion, a coyote adapted to human presence as a result of feeding by humans may act aggressively. If you encounter a coyote, do not run or turn your back. Instead, calmly back out of an area. Do not challenge coyotes by looking them directly in the eye. Make yourself look bigger and make loud noises. Protect small children by standing between them and the coyote. Fight back if necessary. Very importantly, do not feed wild animals. It weakens their natural and necessary fear of humans.

GREAT HORNED OWLS. Great Horned Owls are common throughout the canyon. They spend most of their time perched high in tall trees and are excellent at rodent control. They are listed here as a potential problem given that they could possibly prey on small cats, kittens and other small domesticated animals.

REMEDY OPTION:

- Keep small animals indoors. If they must be kept outside, they should be in an area protected by heavy mesh wire or some other adequate barrier.

RED-TAILED HAWKS. Red-tailed Hawks are commonly seen in Topanga. An impressive aerial hunter with a wingspread of 4-1/2 feet, they, too, have the capability to prey on kittens, rabbits and other small domesticated animals.

REMEDY OPTION:

- Again, keep small animals indoors or in a secure outdoor enclosure.

POTENTIAL HUMAN-WILDLIFE PROBLEMS – INSECTS

BLACK ANTS. Black ants are a problem for most people only when they are inside the house.

REMEDY OPTIONS:

- Place a line of cream of tartar or dried peppermint where ants are entering the house. Ants won't cross it. Some have had success with boric acid.
- Practice good housekeeping.
- Remove food sources by cleaning up spilled food and storing food in glass, metal or plastic containers with lids.

HONEYBEES. Honeybees are one of a group of insects that include wasps, hornets, fire ants and yellow jackets. They are light golden brown, and their bodies are covered with fuzz. They usually nest in old trees, spend a lot of their time collecting nectar and pollinating flowers and are extremely beneficial. Honeybees are not likely to sting while gathering nectar and pollen; however, they will protect their colony and sting in defense.

REMEDY OPTIONS:

- Learn how to recognize honeybee activity, i.e. buzzing or bees flying back and forth in a straight line. Teach children to be cautious and respectful of all bees.

- Periodically inspect your home and property for the presence of honeybee colonies.
- Learn how to bee-proof your home and yard.
- If you discover a swarm or colony of bees, avoid the area and keep children and animals away. Do not attempt to control the bees yourself, call a professional.
- If bees attack you, leave the area quickly. Cover your face and eyes with your arms and/or available clothing. Seek immediate shelter in a house, car or other structure where bees cannot enter. Do not stand and swat at bees or jump into water.
- For multiple stings or hypersensitive individuals, seek medical help.
- For information about compassionate removal and relocation of bees, contact "David the Beeman" at 310-207-1090 or the L.A. Honey Company at 323-264-2383.

MOTHS. Moths may eat at clothes.

REMEDY OPTIONS:

- Avoid using chemical mothballs. Instead, use cedar closet lining or cedar blocks, which are available at most bed and bath stores.
- Bay leaves or sachets made of lavender, mint or rosemary can be used in drawers.

POTENTIAL HUMAN-WILDLIFE DANGERS

RATTLESNAKES. Rattlesnakes are common throughout the canyon. It is important to know the difference between potentially dangerous rattlesnakes and harmless and beneficial snakes such as gopher and king snakes. Be particularly wary of baby rattlesnakes because their venom is more potent than that of adult snakes, and they release all their venom when biting. A rattlesnake bite constitutes a medical emergency and, as such, requires immediate professional evaluation.

REMEDY OPTIONS:

- Keep your yard free of debris piles, woodpiles and thick brush.
- Wear protective gloves and boots when working in or around these areas, and never reach blindly into undisturbed holes or under logs.
- Stay out of tall grass, especially during spring and summer months.
- Inspect your home for small openings and seal them.
- Keep unscreened doors and low windows closed at night.
- If you encounter a rattlesnake in your house or yard, do not try to capture it yourself. If someone is in danger, call the Topanga Fire Department at 310-455-1766, or, for removal and relocation, call John MacNeil at 310-455-2013.

BLACK WIDOW SPIDERS. Black Widow spiders are common throughout the canyon. They have slender legs, a shiny black color, with a distinctive, red "hourglass" shaped spot on their abdomen. They prefer dark, damp places like woodpiles, tree stumps, trash piles, storage sheds, vegetable gardens, stone walls and the under side of rocks. If they come indoors, they will go to dark places like corners of closets, garages or behind furniture. Shy by nature, they bite only when trapped, sat on or accidentally touched. A bite is rarely fatal, but can make one extremely sick.

REMEDY OPTIONS:

- Wear protective gloves whenever working in places like storage sheds, garages, or in wood or rock piles.
- Shake out blankets or clothing that have been stored in an attic, basement or closet and not used for a long time.
- Shake out shoes carefully before putting them on.
- Never reach blindly into cupboards or behind furniture without looking first.
- If bitten, seek medical help.
  Note: The vast majority of spiders in Topanga are harmless and beneficial. Spiders like "Daddy Long Legs" are excellent at reducing populations of flies, termites and other insects. Even large and impressive-looking spiders like tarantulas are, in reality, quite gentle. If you must remove spiders from your house, gently capture them in a glass jar or other container and release them outside.

TICKS. Ticks are common in wooded areas throughout the canyon. Ticks are parasites that feed on the blood of humans and other animals and can transmit serious diseases, including Lyme disease. April through October is considered the "tick season," although precaution should be taken year-round.

REMEDY OPTIONS:

- When hiking in wooded areas, wear long sleeves and light-colored, long pants and tuck your pants into your socks.
- Avoid trail margins, brush and grassy areas when in tick country.
- Check your body, and that of children and companion animals, thoroughly after any activity in wooded or brush areas.
- If a tick is found, remove it carefully with tweezers. Grab as closely to the skin as possible. Do not squeeze the tick's body, apply Vaseline, use heat or flame or attempt to clean with alcohol while the tick is still attached. Any of these actions may cause transmission of bacteria that cause disease.
- Learn the symptoms of Lyme disease and if you have been bitten, talk to your doctor right away.
- For more information, contact the West Vector Control District at 310-915-7370.

SCORPIONS. Scorpions are fairly common in the canyon. They are about three inches long, with eight legs and a small pair of claws that look like crabs' claws. They are usually nocturnal and more active when it rains. They prefer cool, damp places like basements and wood or debris piles. Reactions to the sting of a scorpion can range from mild to severe.

REMEDY OPTIONS:

- The best way to avoid getting stung by scorpions is to avoid the places where they like to spend time.
- Keep your yard free of debris piles, and if you are working in woodpiles, wear protective gloves.
- If you store your shoes in a garage or basement, shake them out carefully before putting them on.
- If stung, seek medical help.

POTENTIAL HUMAN-WILDLIFE DANGERS – INSECTS

YELLOW JACKETS. Yellow jackets are common throughout the canyon and will bite and sting repeatedly when disturbed, stepped on with bare feet or when caught in clothing. They have yellow and black stripes on their bodies and are smaller than wasps, hornets or honeybees. Yellow jackets are attracted by a wide variety of foods including meat, anything sweet including fruit, fruit juice, soda, cake, candy, etc. and some perfumes and suntan lotions. They usually nest in the ground or in old tree stumps, so it is important to make sure that they are not present in an area where children or companion animals are playing. They are most active in the summer and early fall.

REMEDY OPTIONS:

- Remove items that attract yellow jackets, particularly fruit that has fallen from a tree. When eating outside, keep food and drinks covered; do not drink from an open soda can in the summer—yellow jackets like to climb inside for a sip.
- Non-toxic traps that can be hung from trees and that use highly effective odor attractants are available at most garden-supply stores.

FIRE ANTS. Red Imported Fire Ants have recently been found in California. Extremely aggressive, they will repeatedly sting anything that disturbs them. They live in colonies that first nest in the ground and then create a mound of dirt over the nest. Mounds can grow up to 18 inches high.

REMEDY OPTIONS:

- Wear closed-toe shoes, socks and gloves whenever working in infested areas.
- Teach children about fire ants and their potential hazard.
- Do not enclose or tether animals near fire ant mounds.
- To help stop the spread of fire ants, avoid moving soil or any other infested item from your property.
- For more information, contact the West Vector Control District at 310-915-7370.

AFRICANIZED HONEYBEES. Africanized honeybees, also called "killer bees," arrived in southern California in 1994. Although the bees' "killer" reputation has been exaggerated, they are less predictable and more defensive than European honeybees, which look identical. They are more likely to defend a greater area around their colony, and they respond faster in greater numbers, although each bee can sting only once. *See remedy options listed above under "Honey Bees."*

- For more information about Africanized honeybees, contact the Resource Conservation District of the Santa Monica Mountains at 310-455-1030.
- For information about compassionate removal and relocation of bees, contact "David the Beeman" at 310-207-1090 or the L.A. Honey Company at 323-264-2383.

TERMITES. Termites are never good to have near or in a home. They can cause serious structural damage.

REMEDY OPTIONS:

- Have your home professionally inspected for termites every few years. Learn to recognize termites and signs of their presence.
- Several non-toxic abatement options now exist. *Note: If you must have your house professionally tented, make sure any animals that may be nesting under eaves or any other areas of the house are not present. Tenting is best done in the fall.*

MOUNTAIN LIONS. California Mountain Lions are the largest predators remaining in the Santa Monica Mountains. In 1990, they were given "special protected mammal" status by the state of California. Being solitary, they are rarely seen, but as more people move into mountain lion habitat, encounters between humans and mountain lions are likely to increase. With a better understanding of mountain lions and their habitats, we can coexist with these magnificent animals.

REMEDY OPTIONS NEAR YOUR HOME:

- Don't feed wildlife. By feeding deer, raccoons or other wildlife in your yard, you will inadvertently attract mountain lions, which prey upon them.
- "Deer-proof" your landscape; remove dense or low-lying vegetation around your home; install outdoor lighting activated by motion sensors.
- Keep companion and domestic animals secure.
- Keep close watch over children and make sure they are in before dusk and not out before dawn.
- Educate children about mountain lions and what to do if they encounter one.
- When hiking, don't hike alone. Go with a partner or with a group and keep close watch over children. Stay on established hiking tails.

IF YOU ENCOUNTER A MOUNTAIN LION:

- Do not approach, give mountain lion a way to escape.
- Do not run, crouch down or bend over.
- Without bending over, pick up children, so they do not run.
- Make eye contact, do not turn away.
- Make yourself look bigger (raise your arms) and speak in a firm, loud voice.
- Throw stones or branches, and if attacked, fight back with whatever you have at hand.
- For more information about mountain lions, contact the Mountain Lion Preservation Foundation at 916-442-2666 or on the web at www.mountainlion.org
  Sightings of mountain lions in Topanga should be reported to Rosi Dagit, Conservation Biologist for the Resource Conservation District of the Santa Monica Mountains at 310-455-1030.

BOBCATS. Bobcats are more common to our area than the mountain lion because they are much smaller and require less territory to survive. As more humans encroach upon the bobcat's territory, we will occasionally have encounters with them. Bobcats are usually shy and elusive, so encounters will most likely be brief. Problems can be avoided by keeping dog and cat food inside, keeping small animals indoors, especially at night, and by making sure outdoor animal enclosures are strong and secure. Again, do not feed wildlife. *Sightings should be reported to the Resource Conservation District of the Santa Monica Mountains at 310-455-1030.*

HOW YOU CAN HELP LOCAL WILDLIFE

- Learn about the natural and human history of the Santa Monica Mountains by reading and attending interpretive programs. Visit the Topanga State Park Nature Center and the Natural History Museum of Los Angeles County (see phone numbers below).
- Learn about how land is acquired and protected. Contact the National Park Service, California State Parks, Santa Monica Mountains Conservancy, Resource Conservation District of the Santa Monica Mountains and other local environmental organizations (see phone numbers below). Urge your government representatives to protect areas in and around the Santa Monica Mountains.
- Practice backyard conservation by creating habitats using native plants. Wherever possible, link your yard to surrounding wildlands and avoid the use of pesticides, herbicides and other toxic materials. Contact the National Wildlife Federation Backyard Habitat Program, www.nwf.org
- Practice low-impact hiking by staying on established trails. Pack out everything you pack in, and pick up trash left behind by others.
- If you come upon a young animal and believe it may be orphaned, wait. Often the mother is away foraging for food. Unless the "coast is clear," she will not return for her baby, so stay away from the animal. Unless the young animal appears in distress or very sick, leave it for 24 hours. If after 24 hours, the animal is still there and appears cold and hungry, call the California Wildlife Center at 310-457-WILD.
- If you find a truly orphaned or injured wild animal or bird, contain it, keep it warm, dark and quiet until you can get to a wildlife care center – do not try to give the animal food or liquids without instruction from an expert.
- When carrying out yard work where you are disturbing a lot of brush and tree limbs, be aware that you may encounter a den or birds nest. Be careful as you go and listen for the chirping of chicks or other signs that wildlife is present. It is best to do tree work in the fall, when hatchlings or other young animals have matured and moved on.
- Most baby bird injuries are caused by domestic animals. If you have nests or fledgling birds on your property, monitor your dogs and cats, especially during spring and summer months.
- Dogs and cats should never be free to harass or kill our local wildlife. Walk your dog on a leash and never allow him or her to roam freely in parkland or wilderness areas. For their own safety and that of native birds and lizards, cats should be kept indoors or in a secure indoor/outdoor enclosure.
- Sometimes people have good intentions, but actually do something harmful to wildlife. For example, if you set up a hummingbird feeder, once birds start visiting it regularly, it's important to change the solution at least every 2 to 3 days and keep the feeder filled. Birds may come to depend on it and can suffer or die if the food source disappears. It is better to consider wildflowers that attract hummingbirds for briefer periods.
- When storing empty containers of any kind, especially outdoors, store them upside down. There are at least two reasons for this: One is that small animals like lizards can become trapped and die slowly of starvation and dehydration; the other is that water can collect in an empty container, creating a breeding ground for mosquitoes.
- Outdoor lighting can have a negative impact on local wildlife. It's best to turn outdoor lights off at night or have them connected to a motion sensor.

SUGGESTED READING*

Wild Neighbors: The Humane Approach to Living with Wildlife, by the Humane Society of the United States, www.hsus.org

Living with Wildlife, by Diana Landau and Shelley Stump. The California Center for Wildlife. Sierra Club Books, 213-387-4287.

Bats in Your Belfry: Tips on Co-Existing with Urban Wildlife, Booklet published by The Fund for Animals Wildlife Rehabilitation Center, 619-789-2324.

Outdoors: Santa Monica Mountains National Recreation Area Quarterly Calendar of Events and Programs, National Park Service, 804-370-2301

Children's Reading:

Grandmother Oak, by Rosi Dagit

Charlotte's Web, by E.B. White

The Old Lady Who Liked Cats

Children's Publications: *Ranger Rick, Owl, Kid's Discover, National Geographic World, Your Big Backyard*

*Check with your local librarian for additional reading material.

IMPORTANT PHONE NUMBERS

Wildlife Care and Rehabilitation

California Wildlife Center, 310-457-WILD
Topanga Animal Rescue, 310-455-7268
Agoura Animal Shelter, 310-991-0071

Parks

Topanga State Park, 310-455-2465
California State Park Service, 818-880-0350
Santa Monica Mountains National Recreation Area, National Park Service, 805-370-2300

Resource Conservation

Resource Conservation District of the Santa Monica Mountains, 310-455-1030
Santa Monica Mountains Conservancy, 310-589-3200
Wildlife Habitat Council, 301-588-8994

Environmental / Animal Protection Organizations

Local:

Heal the Bay, 310-453-0395
Whale Rescue Team, 310-455-2729

National:

National Audubon Society, 212-979-3117
Sierra Club, 213-387-4287
The Nature Conservancy, 310-478-8426
National Wildlife Federation, www.nwf.org
Fund for Animals, 760-789-2324
Humane Society of the United States, www.hsus.org

Education
Topanga Canyon Docents, 310-534-9400
Topanga State Park Nature Center, 310-455-2465
Resource Conservation of the Santa Monica Mountains, 310-455-1030
Topanga Creek Watershed Committee, 310-455-1030 x211, www.topangaonline.com/twc
Topanga Online www.topangaonline.com/nature/wildlife (Sensitive Species Database)
Nature of Wildworks, 310-455-0550
Natural History Museum of Los Angeles County, 213-763-3466

Wildlife Questions or Concerns
Rosi Dagit, RCDSMM Conservation Biologist, 310-455-1030
Susan Clark, Topanga Animal Rescue, 310-455-7268
Jim Dine, Mammalogy Dept., Natural History Museum of L.A. County, 213-763-3369
California Department of Fish and Game, 213-620-4700

Bats
Jackie Safanov, 310-455-3157
Rosi Dagit, 310-455-1030

Birds
Gerry Haigh, 310-455-1696
Susan Clark, Topanga Animal Rescue, 310-455-7268

Bees
David the Beeman, 310-207-1090
L.A. Honey Company, 323-264-2383

Rattlesnakes
John MacNeil (capture and release), 310-455-1766
Topanga Fire Department, 310-455-1766

Contributors:
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Dedicated to:
Petie and all the wonderful wild critters of Topanga Canyon.

"In the end, our society will be defined not only by what we create, but by what we refuse to destroy."
– John C. Sawhill (1936-2000), president
The Nature Conservancy, 1990-2000
