



Caring for Our Creeks

Creekside Property Owner's Manual

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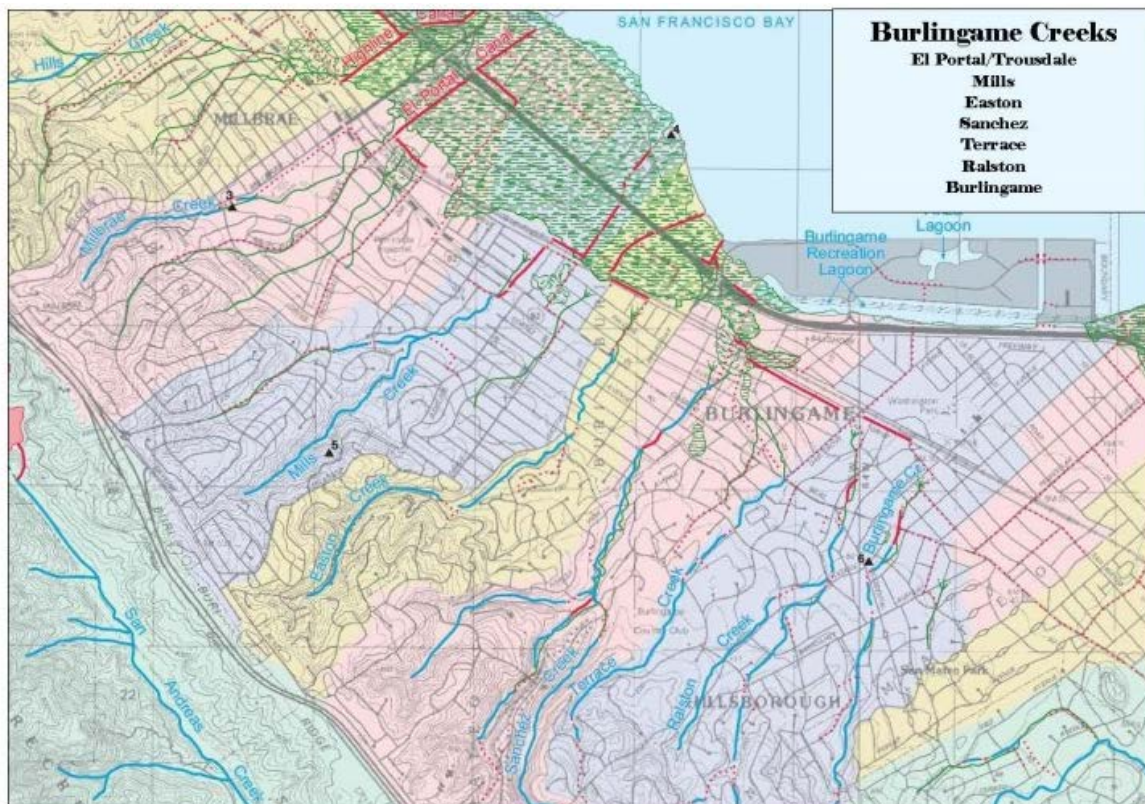
Where Are Our Creeks

The City of Burlingame has seven major creeks (El Portal/Trousdale, Mills, Easton, Sanchez, Terrace, Ralston, and Burlingame) that convey stormwater from the hills to the Bay. These creeks have existed long before Burlingame’s incorporation in 1908, and are a critical natural stormwater conveyance system that protects homes, businesses, and transportation networks from flooding during storm events.

It is important to point out that the creeks west of El Camino Real that run through the side or rear of private properties are privately owned. The majority of the creeks east of El Camino Real have been constructed to run underground in manmade storm drain pipes and box culvert structures.

The seven creeks provide over 11 miles of natural storm drains for our City. In addition, our manmade storm drainage lines that flow underground in pipes and concrete lined channels add an additional 45 miles to the City’s storm drain system. The City of Burlingame is fortunate to have these natural storm drains as they provide a habitat for wildlife, improve water quality to the Bay, and provide a host of aesthetic benefits.

How do we know the right things to do, and how do we handle the problems we face as Creekside property owners? That is what this manual is all about.



Why Are They Vulnerable

These fragile waterways are our natural storm drains of our City. They carry direct runoff from Creekside properties and runoff from the rest of the City's land area through linkage with manmade storm drains. Our creeks are an irreplaceable natural resource. They can be especially valuable to a Creekside property owner since a healthy creek traditionally increases the value of a Creekside property; whereas, a degraded creek can cause serious property damage and decrease its value.

What Should I Expect From This Guide?

This Guide provides you, the creekside homeowner, with practical information regarding the proper care, preventive maintenance, and if necessary, restoration of your creek bank. It will:

- Provide you recommendations to maintaining your creek.
- Inform you about the causes and effects of erosion.
- Offers advice for both preventing erosion and for stabilizing a bank experiencing erosion.
- Inform you about regulatory requirements which must be met before beginning a bank stabilization project or any other work in a creek setback.
- Take you through the process of securing proper permits.
- Provide you with agency contacts and resources that are available to you.

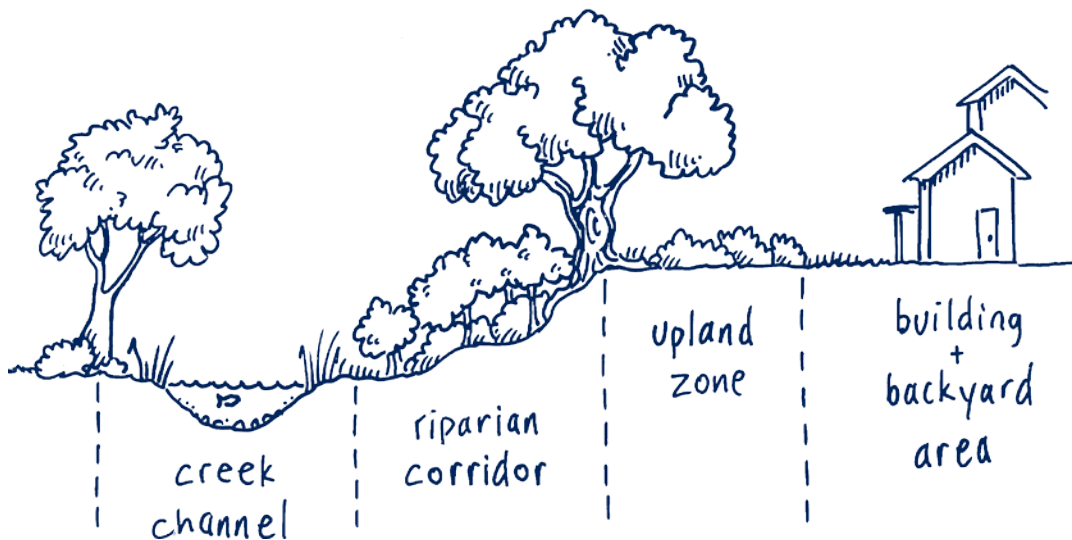
Maintaining the Creek

When the creek is not properly maintained, the resulting obstructions can lead to increased flooding, changes in the course of the creek, and increased erosion on the obstructed property or downstream property. It is imperative that any work be conducted in such a manner that will not adversely affect the natural habitat that share the creek with us. When maintaining the creek on your property, and to protect your property and that of your neighbors, we recommend the following guidelines:

1. Remove all debris and foreign objects. These may include items such as fallen trees, tree limbs, bottles and cans, broken concrete, fallen fences, shopping carts, appliances, or any man-made object. This is the property owner's responsibility even if the object washed down from upstream. It is recommended that all stored material in your backyard be placed a minimum of 10 feet away from the top of bank to avoid materials washing into the creek during heavy storms.
2. Remove vegetation except low ground cover from the creek banks including shrubs, tules, pampas grass, cattails, and bamboo. Do not clear-cut the creek slopes. Leave all root systems in place. Remove hanging vines that may create an obstruction to the natural flow of water in the creek. If you have berry vines, trim back to the bank.
3. Remove any tree limbs which have fallen or hang within two feet of the top of the bank. If there are trees growing in clusters, trees with multiple trunks, or trees within the stream channel that may cause obstruction to the flow of water, do not remove them until you contact the California Department of Fish and Wildlife for direction. For additional information contact Public Works or Parks and Recreation at (650) 558-7330.

What Exactly is Erosion?

When flowing water meets unprotected soil, soil is carried away by the water and erosion results. If the embankment is stable, the rate of erosion is slow and natural healing processes can usually keep up with it. However, urban development can accelerate the rate of change within the embankment beyond nature's healing capacities. New development has increased peak flows of our creeks that can result in severe property loss of vegetated land.



High flow rates from even a single intense rain can make significant changes in a creek bank. Increased volumes of runoff due to development and upstream changes of the creek channel may lead to serious erosion even on banks that previously had been stable for years. Barren slopes and improper construction of decks and structures in the riparian corridor and the upland zone can contribute to bank instability. Instability, in turn, can lead to bank failure and introduce large volumes of sediment (soil, sand, and fine gravel) into the creek. This sediment fills the creek bed and reduces its ability to carry high flows, leading to flooding as well as a further loss of creekside vegetation. It's up to you, the creekside homeowner, to break this cycle and keep your creek clean and its bank stable.

Why Me?

Because most of Burlingame creeks are located on private property, much of the responsibility for the health of creeks and the survival of creek-dependent wildlife lies with you, the creekside homeowner. The centerline of the creek for most creekside homeowners represents the property line, despite the perception of the location of an existing fence (which could be built at the top of the bank) as the property line. Ownership of creekside property carries special responsibilities and risks. You and your neighbors on both sides of the creek share responsibility for maintaining your banks and riparian corridor vegetation. By properly exercising this responsibility, you not only enhance your own property but can: prevent erosion, avoid flood losses and property damage; preserve water quality; and contribute to the survival of wildlife that benefits everybody in our community.

How Do I Recognize Erosion?

Bank erosion generally occurs as a result of the action of stream flow against the toe (base) of an unprotected slope. Look for barren areas at the bottom of the slope as well as signs of soil slippage at the top. As the bank slope readjusts after its toe is washed away, a fissure or crack evident at the top of the bank as the soil peels away. Severe erosion is accompanied by bank instability and, ultimately, collapse. Very steep banks are so vulnerable to active erosion that large sections of the bank may break away and fall into the creek.

Severe erosion with no protection and loss of soil/land occurs



How to Prevent Erosion

Check your creek bank regularly for signs of erosion so you can correct problems as they arise. Native riparian plants growing within the riparian corridor help stabilize banks, so revegetate barren slopes with native plants as quickly as possible. In times of flooding, a well-vegetated creek bank may be your property's best protection against erosion by:

- Binding and restraining soil in place
- Filtering soil out of runoff
- Intercepting the impact of raindrops
- Retarding velocity of runoff
- Allowing water infiltration into the soil
- Protecting slopes against undercutting and slumping
- Absorbing stormwater into the ground

Don't locate structures in the riparian corridor or upland zone. Structures built within reach of flood waters is not only subject to damage or loss, it also decreases the creek's ability to handle high flows safely. Structures such as storage sheds, patios, and decks threaten a bank's natural protective vegetation and decrease the stability of its slope. Construction and landscaping projects (even those in the building/backyard area) can compromise a bank's stability, so protect your creek from the effects of erosion by:

- Scheduling construction projects for late spring or summer months (May through September) when chances of rainfall and erosion are minimal;
- Covering exposed soil with straw, wood fiber, woven straw blankets, landscape fabric or other non-toxic permeable materials;
- Planting fast-growing native grass seed mixture or other native plants as temporary ground cover on larger exposed surfaces.

Never throw brush, grass clippings, and pruning into your creek or on its banks. They may be carried by wind or rain and block a culvert or create a blockage downstream, causing flooding as well as erosion. Collect them in the green containers provided for weekly curbside pickup of yard waste, or learn how to make a healthy compost pile for your garden.

How to Prevent Erosion (continued)

Manage debris. Accumulation of some natural debris in your creek or on its bank, such as trees, branches, logs and root wads, is often desirable since it creates food and shelter for wildlife. Excessive debris, however, can cause blockages and compromise the creek's capacity to effectively carry stormwater. This not only can cause elevated flood stages, it can increase erosion by deflecting stream flow into its banks. Therefore, you should:

- Remove trash, litter, and “urban artifacts” such as tires and old appliances from the creek channel and riparian corridor; and
- Routinely check the creek channel for fallen trees, branches, limbs, and brush

Simply removing all woody debris can degrade the wildlife habitat so it is important to carefully observe the situation before taking action. If it appears that a barrier obstructs creek flow and poses a threat to life or property (a house, utility pole, or other structure), it may need to be repositioned, partially removed, or removed altogether. It's often best to take small incremental steps in addressing removal by first trimming the portion of a fallen tree above the water and trying to leave the trunk and root wad intact. If it still presents a flood hazard, removal may be required. Removal of a barrier requires a Streambed Alteration Permit with the California Department of Fish and Wildlife and the Regional Water Quality Control Board may also require water certification.

Control runoff. Water running off your property can carry soil directly into the creek. Therefore, you should:

- Minimize paved areas. Impervious driveways, walkways, and patios increase the amount and velocity of water that flows into the creek. Use wooden decks, brick or stone patios, gravel, paving stones, or concrete blocks so that water can permeate into the soil.
- Manage roof drainage. Guide downspout discharge away from the creek in a protected way. Drain pipes projecting directly into creek bank or flexible pipes allowed to drape down a bank cause erosion. Reduce the force of water against bare soil by directing its discharge to rocks placed on filter fabric and route it to the creek through rock lined channels.

How to Prevent Erosion (continued)

Keep your bank vegetated with native plants. When ground and banks are left bare, soil washes off into the creek. Using native vegetation to stabilize banks is low-cost and highly effective. Native vegetation requires less water, is deep-rooted, and helps bind the soil in the bank. Its top growth serves to dissipate the energy, decrease the velocity and deflect the flow away from the bank, thereby reducing the potential for transferring erosion problems to new locations. When re-vegetating an eroding bank:

- Temporarily stabilize the area with geotextile fabric until the vegetation becomes fully established. These fabrics are woven netting made of synthetic or natural fibers and can be stapled into the soil to protect it from erosion. Synthetic fiber blankets have the disadvantage of being non-biodegradable. While a variety of natural fiber fabrics are available, jute or coconut fiber are best for use in waterways because they are strong, resistant to rot, and withstand high stream flow and velocities.
- Preserve a buffer strip of at least 10 feet of dense natural vegetation to grow along the water's edge; and
- Plant vegetation native to our area.

Be aware that many “natural appearing” banks are vulnerable to erosion because shallow-rooted invasive plants which don't provide effective bank stabilization have forced out native plants. When possible, these invaders should be carefully removed and replaced by native vegetation.

Seek expert technical advice before attempting the revegetation of a creek bank. Consult the California Native Plant Society or the California Invasive Plant Council if you have questions regarding which plants are acceptable along your creek. Some examples of native plants best for our creeks can be found on the next page, along with some non-native plants which should be avoided because they are considered invasive and encroach into native species.

Revegetating with willows is the easiest way to establish woody vegetation on a denuded creek bank. Historically, willows grew along most of the creeks in coastal California and still do. They can be planted from dormant cuttings or “sprigs”. They are

How to Prevent Erosion (continued)

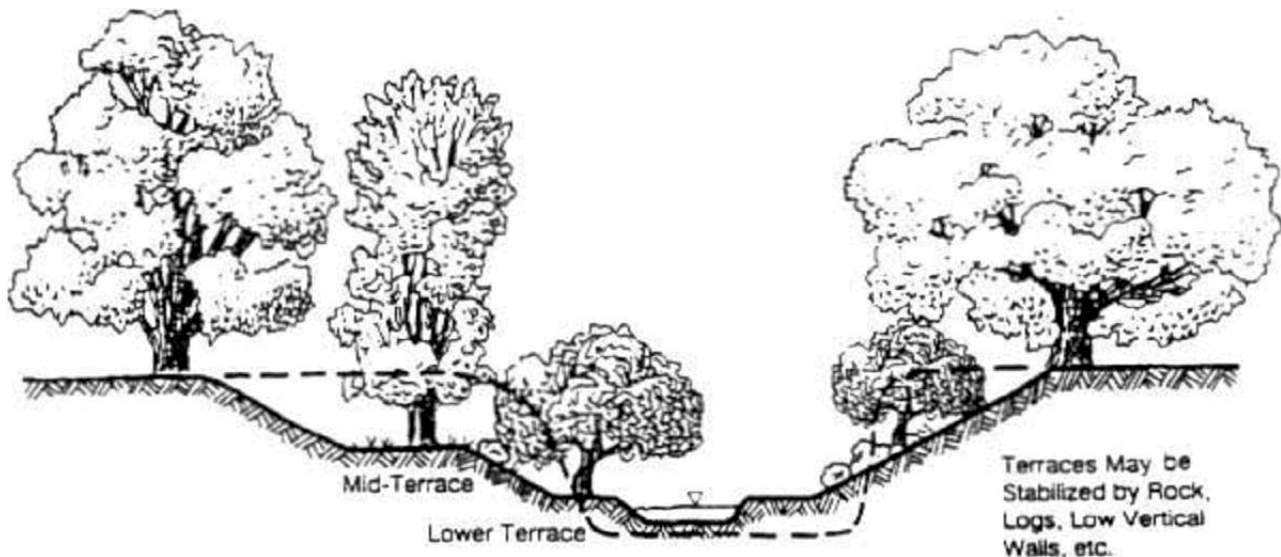
fast-growing and have deep roots. Several methods for revegetating with willows exist and the most appropriate one depends on the creek bank. Methods include pole plantings, brush layering, brush mattresses, wattles, and post plantings.

Native Riparian Corridor Plants	Non-native Invasive Plants
Black Walnut (<i>Juglans californica</i> var. <i>hindsii</i>) California Bay (<i>Umbrellularia californica</i>) Pacific madrone (<i>Arbutus menziesii</i>) Arroyo willow (<i>Salix lasiolepis</i>) Red willow (<i>Salix laevigata</i>) Coast live oak (<i>Quercus agrifolia</i>) Valley oak (<i>Quercus lobata</i>) California buckeye (<i>Aesculus californica</i>) Big leaf maple (<i>Acer macrophyllum</i>) Box Elder (<i>Acer negundo</i> car. <i>Californicum</i>) White alder (<i>Alnus rhombifolia</i>) Fremont Cottonwood (<i>Populus fremontii</i>) Blue elderberry (<i>Sambucus mexicana</i>) Coyote crush (<i>Baccharis pilularis</i>) Toyon (<i>Heteromeles arbutifolia</i>) Coffeeberry (<i>Rhamnus californica</i>) California rose (<i>Rosa californica</i>) Snowberry (<i>Symphoricarpos albus</i>) Red columbine (<i>Aquilega formosa</i>) Seep spring Monkey Flower (<i>Mimulus guttatus</i>) Pink-flowering currant (<i>Ribes sanguineum</i>) Evergreen currant (<i>Ribes riburnifolium</i>) California strawberry (<i>Fragaria vesca</i>) California blackberry (<i>Rubus ursinus</i>) Pipevine (<i>Aristolochia californica</i>) Douglas iris (<i>Iris douglasiana</i>) Virgins bower (<i>Clematis ligusticifolia</i>) California poppy (<i>Ecshscholzia californica</i>) Meadow barley Molate fescue Creeping wile rye California brome	Eucalyptus Gums Kangaroo thorn Bailey acacia Black acacia Green wattle Silver wattle Golden wattle Tree of heaven Pines White poplar Plums Himalaya blackberry Tobacco Giant reed French broom Wild radish Wild lettuce Periwinkle Algerian ivy Fennel Perennial pepperweed Ox Tongue Wild oat Ripgut grass Wild barley Pampas grass Bamboo

My Bank is Still Eroding, What Should I Do?

If the bank is unstable and continues to erode despite preventative and vegetative measures, you should consult with a qualified professional to evaluate if structural repairs are needed. If the bank is steep and there is sufficient space between the top of bank and the building/backyard area, you should consider reducing your bank to a slope of one vertical foot for every two horizontal feet, using terraces reinforced with rock or log retaining walls such as rock-filled gabions or log crib walls. Terracing done with professional help will improve the prospects of establishing new vegetation and contribute to bank stability.

Stabilize Slopes by Creating Terraced Banks



While your first instinct may be to dump rock (rip-rap) on the severely eroded areas, don't do it. This won't properly stabilize the toe of the bank and will only encourage further erosion. Furthermore, rip-rap won't dissipate any of the excess stream energy that caused the erosion in the first place. Instead, it will transfer and sometimes amplify this energy to the next section of unprotected bank, causing more erosion. Unless the entire creek is treated in this manner - a costly and unsightly option - the erosion problem is not solved, but merely transferred to a new location. Indeed, any hard objects placed on the banks can perpetuate erosion. Stream flow deflected off rocks, concrete, and railroad ties creates eddying that erodes the creek's bank up and downstream. They can also deflect currents to the opposite bank, causing that bank to be undercut. For these reasons, the best restoration strategies employ vegetation in combination with structural methods.

My Bank is Still Eroding, What Should I Do? (continued)

Use Multiple Walls to Stabilize a Steep Bank Rather than a Single High Wall



Before undertaking a creek bank stabilization project, it is important to consider how your actions will affect your neighbors on both sides of the creek, upstream and downstream. Indeed, you might want to consider enlisting your neighbors in a group effort. Benefits include sharing the costs of planning, permits and repairs that will likely complement and enhance all of the properties.

You should:

- Seek professional assistance to determine the exact cause of erosion;
- Identify the best option for restoring the bank;
- Contact the Engineering and Planning Departments for specific requirements;
- Consult with a qualified registered Professional Engineer experienced in the area of the proposed design to prepare detailed restoration plans;
- Submit copies of the plans to the Engineering and other pertinent agencies (State Department of Fish and Wildlife, California Regional Water Quality Control Board, and Army Corps of Engineers), for review;
- Resubmit plans, if revisions are necessary for approval by these agencies;
- Secure a Grading/Drainage Permit from the Public Works Engineering Department.

Building Something?

Protect your creek by not locating structures and storage containers near the creek bank. Any structure built within reach of flood waters is subject to damage or loss and may decrease the creek's ability to handle flood flows safely. Structures such as storage sheds, patios, and decks when too close to a creek typically remove the creek's natural protective vegetation and often decrease the stability of vulnerable slopes. The construction process also disturbs the soil and vegetation adding to sediment buildup in the creek.

The best way to accommodate flood waters is to avoid constructing improvements in the flood zone and to maintain the area in its natural state. If you need to construct near the creek or need to undertake repairs to a creek bank, certain procedures and/or setback ordinances must be followed. Consult the Planning Department and Municipal Code Chapter 18 for further details. Here are some typical steps to building by the creek:

New Structures

1. Contact the Planning Department for setback requirements.
2. Consult with a qualified registered Professional Engineer with expertise in creek, erosion, and drainage issues to prepare plans for review by the Engineering Department. Other local, regional, State and Federal permits may also be required which may be obtained using the Joint Aquatic Resource Permit Application (JARPA).
3. Revise plans if needed, and resubmit.
4. Obtain permit.
5. Cooperate with inspectors during construction.
6. Implement all conditions of approval.
7. Obtain final inspection and approval.

Creek Bank Stabilization

1. Seek professional assistance to determine the exact cause of erosion and to identify the best option for bank restoration.
2. Discuss plans with the Planning, Engineering, and Building Departments for permit requirements.
3. Follow steps 2 through 7 above (New Structures).

Plans should indicate significant natural features and indicate proposed tree species. Contact the Planning Department for specific plan requirements, including setbacks from top of creek bank.

Useful Resources

City of Burlingame

Telephone

Public Works/Engineering	650-558-7230
Public Works – Corporation Yard (maintenance)	650-558-7670
Community Development/Building	650-558-7260
Community Development/Planning	650-558-7250

State

California Department of Fish and Wildlife 707-576-2786
Mr. Randi Adair, Senior Environmental Scientist Supervisor
Bay Delta Region
7329 Silverado Trail
Napa, CA 94558
Randi.Adair@wildlife.ca.gov

Regional Water Quality Control Board 510-622-2316
San Francisco Bay Regional Water Quality Control Board
Mr. Tahsa Sturgis, Water Resource Control Engineer
1515 Clay Street, Suite 1400
Oakland, CA 94612
Tahsa.Sturgis@Waterboards.ca.gov

Federal

U.S. Army Corps of Engineers 415-503-6763
San Francisco District
Ms. Naomi Schowalter
333 Market Street, 8th Floor
San Francisco, CA 94105-2197
Naomi.a.schowalter@usace.army.mil

Other Resources

Guide to SF Bay Area Creeks
<http://explore.museumca.org/creeks/>
Bay Nature – native plant gardening resources 415-287-6755
www.baynature.org/article/native-plant-gardening-resources/
California Invasive Plant Council 510-843-3902
www.cal-ipc.org/

This information presented in this guide is intended as general educational material
and reasonable efforts have been made to provide accurate information.