

WILDFIRE SAFETY: LESSONS LEARNED FROM SOUTHERN CALIFORNIA

by Greg Rubin

The great San Diego wildfires of 2003 and 2007 have taught us a number of lessons, and surprisingly, much of the conventional wisdom is flying out the window. The truth is that none of our landscaping clients lost their homes despite being surrounded by native plants, despite being in the middle of these firestorms, and despite having neighbors with conventional landscapes whose homes burned to the ground. While there are many who still believe that if you plant native shrubs near your home, they will spontaneously combust and burn down your house, the reality is quite the opposite.

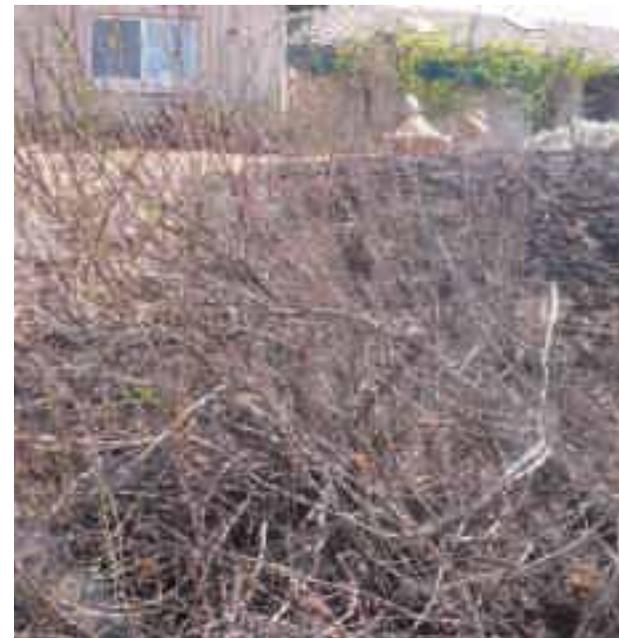
SAFETY IN NATIVES

So what is it about native landscapes that can lead to such fire resistance? One thing that contributes to it is to hydrate the plants with overhead irrigation throughout the warm months, from roughly early June to mid-October. The amount of moisture delivered can be slight—approximately a quarter inch of precipitation per watering. That equates to about 40 minutes on a rotator type system. The watering interval on an established landscape is once every 10-14 days, depending on location and exposure. Steep inland slopes may be watered as frequently as every 7-10 days, again depending on exposure. Each watering is about equivalent to a summer thunderstorm or fog drip—well within the tolerance range of most natives. The goal is to “dust off” the leaves (dust can actually become a problem on such drought tolerant landscapes!), wet the mulch, but not saturate hot soil. This helps avoid pathogen problems.



ABOVE: During the Witch Fire of 2007 a non-native rosemary (*Rosmarinus officinalis*) on the left was incinerated next to a volunteer flat-top buckwheat (*Eriogonum fasciculatum*), which, though scalded, survived. Both were receiving twice monthly irrigation. Clearly this was enough hydration to ensure low combustibility in the native buckwheat but inadequate for the non-native rosemary. RIGHT: Green leaves are still evident on the *Eriogonum fasciculatum* (foreground) if you look closely, while all that remains of the *Rosmarinus officinalis* is a black smudge (background). All photographs by the author.

Native leaves are able to absorb the overhead moisture, and it appears that they hang on to that moisture even in the face of flames. Other plants surely exhibit these properties; however, it typically requires much less water to hydrate a native





plant than an exotic. Ironically, it is often the plants that we think of as highly combustible that end up benefitting the most from this supplemental watering.

In fact, it seems that fire resistance in natives has less to do with plant selection than with hydration. An interesting study was conducted by Bert Wilson of Las Pilitas Nursery (www.laspilitas.com) where he examined the relative ignition times of various native and non-native plants when exposed to a propane torch. He also noted whether they were hydrated or not. Although not a scientifically controlled study, it is fairly unique and useful as a relative measure. Some plants that would ignite in 15 seconds took over a minute to do so once hydrated. Many of the ignition times for natives were far in excess of those for non-na-



TOP: A home that survived both the 2003 and 2007 San Diego fires. The house is surrounded completely by an 8-foot-wide decomposed granite apron. The plantings immediately outside this zone and for the first 30 feet are hydrated, low-growing, and well-spaced. BOTTOM: The same house, with the first 30 feet of well-watered plantings hidden behind a low rock wall. Outside of that perimeter are planted native groundcovers that are being irrigated about every 10 days in summer. Note also that in this particular case, a road (in the foreground) was constructed around the house approximately 100 feet away. This "country lane" actually doubles as a fire-break, which gives firefighters easy access. Note also the use of metal roofing to prevent embers from igniting the structure.

tives. It should be noted that Bert was also a volunteer firefighter for San Luis Obispo County for 14 years.

CLEARING VS. THINNING

In the panic that followed our great San Diego firestorm of October 2003, many agencies and insurance carriers required that surrounding property be cleared 100, 200, even 300 feet or more. This resulted in environmental devastation of huge swaths of land, horrible erosion problems, and the establishment of non-native grasses and weeds that become flashy fuels by the following August. Worse still, many homes whose surrounding landscape had been cleared to bare mineral soil for hundreds of feet *still* burned to the ground, sometimes surrounded by green lawn and palm trees. This certainly ran counter to the conventional wisdom that wholesale removal of vegetation (considered fuel for any fire) would prevent this kind of thing from happening.

As a former aerospace engineer, it also occurred to me that clearing all vegetation around a home actually created the perfect conditions for the high winds that accompany large fires to flow unperturbed (laminar flow). There was no longer any barrier to create turbulence or interference and slow down the 80 mph bone-dry winds laden with cinders as thick as the fire falls of Yosemite. Nothing, that is, except the houses. As chaparral ecologist Richard Halsey explains it, “You have created the perfect bowling alley for embers.” On the other hand, low-growing, hydrated groundcovers and shrubs can disturb and cool the otherwise uninterrupted flow of fire. Allowing thinned natural vegetation to remain, in addition to landscape plantings that are irrigated, may in fact help prevent structures from igniting. This brings us to the subject of fire zones and defensible space.

ZONING AND DEFENSIBLE SPACE

It is critical that firefighters have an area or zone around a house where they can safely fight a fire. This is what is known as “defensible space.” The first 30 feet is probably the most critical. This is where a passing fire crew quickly assesses whether it is safe to stop and set up a perimeter or move on. This first zone is where you want to have a considerable amount of hardscape—flagstone, boulders, pavers, cement, gravel, etc. Plants should be either lower growing or have an open “see-through” structure so as to limit potential fuel for a fire. They should be hydrated with once-per-week watering. Many native perennials and low-growing shrubs would fit the bill here. Try to avoid planting directly under the eaves, beginning plantings three to four feet out from them.

Zone 2 is the area that is 30 to 100 feet from your house. (This may extend up to 300 feet if your house is located on a ridge or at the end of a north- or east-facing box canyon. If there is existing chaparral growing in Zone 2, thin it by about 50%, because this actually removes about 70% of the fuel volume. Clear cutting or bulldozing only creates more problems. Thinning implies

cutting the shrubs to the ground, but *not* removing by the roots. This prevents further erosion and soil disturbance that will bring up even more weeds. Chamise (*Adenostoma fasciculatum*), laurel sumac (*Malosma laurina*) growing near the house, and maybe some buckwheat (*Eriogonum fasciculatum*) and sage (*Salvia* spp.) are targeted first for thinning. Plants like manzanita (*Arctostaphylos* spp.), California lilac (*Ceanothus* spp.), hollyleaf cherry (*Prunus ilicifolia*), lemonadeberry (*Rhus integrifolia*), and bush rue (*Cneoridium dumosum*) are usually preserved,

These two photos depict the before and after condition of a stand of chaparral that has been thinned to roughly 50% canopy coverage. Debris has been chipped and replaced on site as a mulch to help prevent weed germination in the open areas. This area is now much more fire-resistant without resorting to clearing it entirely of native vegetation.





Once impenetrable chaparral in Zone 2 (30-100 feet from this person's home) has been transformed into a fire-resistant native "private park" through vegetation thinning, paths, a bench, a bridge, a bird bath, and the addition of some non-woody native perennials.

although dead wood should be removed.

It is advisable to open up their structure when possible by pruning lower branches. All trimmings should be mulched and then placed back on the areas that have now been thinned out, to help suppress weeds. This is also an opportunity to lace the area with four-to-five-foot-wide paths that double as fire-breaks and which further open up the vegetation. One can bring in benches, bird baths, non-woody perennials, signage, and other features to transform once impenetrable chaparral into an inviting, mature native landscape. The environment does not have to be destroyed in the name of fire safety. There are many creative, aesthetic landscaping "solutions" that lower the risk of fire danger.

MAINTENANCE CONSIDERATIONS

Good site maintenance is of paramount importance when it comes to fire safety. Non-native

weeds are typically annuals and perennials that are dead or dormant by August. They tend to be rich in "lignin" which means their dry, dead carcasses sit on top of the soil, having robbed the system of nutrients and moisture. Compare this to wildflowers, which usually get reabsorbed into the soil after they die, so that by summer there is little evidence of the previous spring's show. Unlike native chaparral that tolerates intense but infrequent fires, non-native weeds welcome and promote frequent burning. It is therefore essential that they be controlled and removed.

Most native plant communities, by virtue of their specialized and finely adapted ecology, do not support the growth of non-native annual weeds when in a healthy and undisturbed condition. This is because the litter layer (mulch) that forms kills most weeds. In addition, most of the native plant community's nutrition is held in the mycorrhizal fungi and is not made available to the weeds (which are usually non-mycorrhizal). Disturbing the plant community opens up the canopy and

makes nutrition available to the invasives. The process of removing 50% of the existing canopy (thinning the chaparral), although not as invasive as wholesale clear-cutting or removal, is still a type of disturbance that allows for infection by weeds, much like an open wound.

If left to their own devices, weeds will severely compromise the ecology of native plant communities by robbing mois-

ture and nutrition from the system. Worse, they act as fire ladders into the remaining native shrubs and trees that are now weakened and even more fire prone. This is the worst of all possible situations—an unhealthy plant community depleted of its moisture and full of the driest tinder so that the vegetation can easily combust. The fact that annual weeds are dead and dry by the end of summer is what leads to desertification (land degradation to desert-like conditions due to climatic changes and/or destructive land-use practices). Humidity levels actually drop in these weedy areas because none of the moisture is being held onto in living tissue. Unfortunately, this describes much of what is happening in California.

Controlling annual weeds can be a challenge. Certainly using mulched tree trimmings helps. Hand pulling may be enough when the amount of weeds makes it practical. However, with a typical seed bank of 10,000 to 100,000 seeds per cubic foot, post and/or pre-emergent chemical treatment may be required. Whatever method is chosen, it is essential that

the site be maintained as weed-free as possible once it has been opened up.

Another important maintenance step is continuing to keep the canopy coverage pruned to around 50%. Whenever possible, trees should be pruned up from their base six feet. Lower perennials and shrubs should be kept pruned to a height of about 18" when practical. A good rule of thumb is to provide clearance *between* tree limbs and groundcover (shrubs, perennials) that is a minimum of three times the height of the lower plants. All dead wood needs to be removed. In addition, most of the plants that have been cut to the ground (like chamise) will regenerate from basal burls. While they can be allowed to grow for up to one year, they will have to be cut to the ground again once their newer green growth starts to become woody.

If Zone 2 (30 to 100 feet from the house) is devoid of naturally occurring vegetation and is instead planted in irrigated natives, the maintenance should be fairly straightforward. The plants should mostly be lower-growing (under 18") and spaced for final size. This prevents plants growing on top of each other and forming a woody thatch. Shredded redwood bark (gorilla hair) that has been matted down with water so that it is poorly aerated is the mulch of choice and is usually quite effective at controlling annual weeds, especially when combined with hand weeding, or with pre-emergents in large, hard to maintain areas where hand pulling simply isn't practical. The next section details plant selection and protocols for a firewise native landscape.

FIREWISE PLANNING AND PLANTING

Zone 1 must be irrigated, ideally with overhead irrigation once a

week. This ensures that the plantings are always hydrated and less likely to burn. There should be lots of hardscape (flagstone, interlocking pavers, decomposed granite, gravel, etc.), including an apron of these same materials that extends beyond the eaves line. There are a number of native plants that will both tolerate this frequent watering and provide low fuel volume. Some attractive evergreen shrubs meeting these requirements include lower-growing manzanitas like *Arctostaphylos* 'Carmel Sur,' 'Radiant,' 'Emerald Carpet,' and 'Pacific Mist,' as well as medium-height manzanitas like 'Sunset' and 'Howard McMinn.'

Lower-growing, garden-tolerant wild lilacs would include *Ceanothus thyrsiflorus repens*, and *Ceanothus gloriosus* 'Heart's Desire' and 'Anchor Bay'. Native perennials that could tolerate these conditions would include seaside daisy (*Eriogon glaucus* 'WR'), Mattole River fuchsia (*Zauschneria* [*Epilobium*] *septentrionalis*), and goldenrod (*Solidago* spp.). Monkeyflower (*Mimulus aurantiacus*) may be shorter-lived under these conditions but will certainly put on a show for the two to five years it survives (just get a new one when it dies). Decorative 6-12" boulders placed on the rootballs of the plants surrounded by gorilla hair can be used for mulch, but the bark must be watered down to consolidate it immediately after planting.

Zone 2 ideally consists of either thinned chaparral or lightly hydrated native plantings. Coyote brush (*Baccharis* 'Pigeon Point'), California lilac (*Ceanothus* 'Yankee Point'), manzanita (*Arctostaphylos* 'John Dourley'), and San Diego marsh elder (*Iva hayesiana*) are all excellent choices if this area is to be planted. A smattering of larger shrubs, such as *Ceanothus* 'Blue Jeans' and 'Concha,' coffeeberry (*Rhamnus* 'Eve Case' and 'Mount San Bruno'), and toyon (*Heteromeles arbutifolia*) are all fine as long as they are situated in groups of three

or less to prevent creating a large fuel mass. There should be about 10 feet between these small groups of larger shrubs. It is also a good idea to create small firebreaks by incorporating lots of trails in this area that are at least four feet wide. Fully established Zone 2 plantings must be irrigated about once every 8-14 days during the warm months with overhead irrigation in order to promote adequate hydration. The possibility of lightly irrigating existing chaparral in Zone 2 (wetting leaves and mulch, but not to the saturation point) is being investigated by the author.

CONCLUSION

Fire in Southern California is an unfortunate inevitability; however, homeowners can create defensible space around their homes that avoids wholesale environmental destruction. Proper hydration of landscape plants is critical. Utilizing a large proportion of hardscape within the first 30 feet of structures, along with plants that are low-growing, contain a low fuel volume, and are regularly irrigated is recommended. Beyond this first zone, lightly watered native plantings or chaparral thinning is a good practice, especially when considering that it typically takes much less water to hydrate native plants than exotics. This, in combination with good site maintenance, should help keep homes defensible during fires.

REFERENCES

- Halsey, R.W. 2008. *Fire, Chaparral, and Survival in Southern California*, 2d ed. Sunbelt Publications, San Diego, CA.
- Wilson, B. 2011. *A Manual of California Native Plants*, <http://www.laspilitas.com/cat1.htm>. (accessed March 31, 2011).

Greg Rubin, 25950 Los Arboles Ranch Road, Escondido, CA 92026, greg@calowndesign.com, www.calown.com