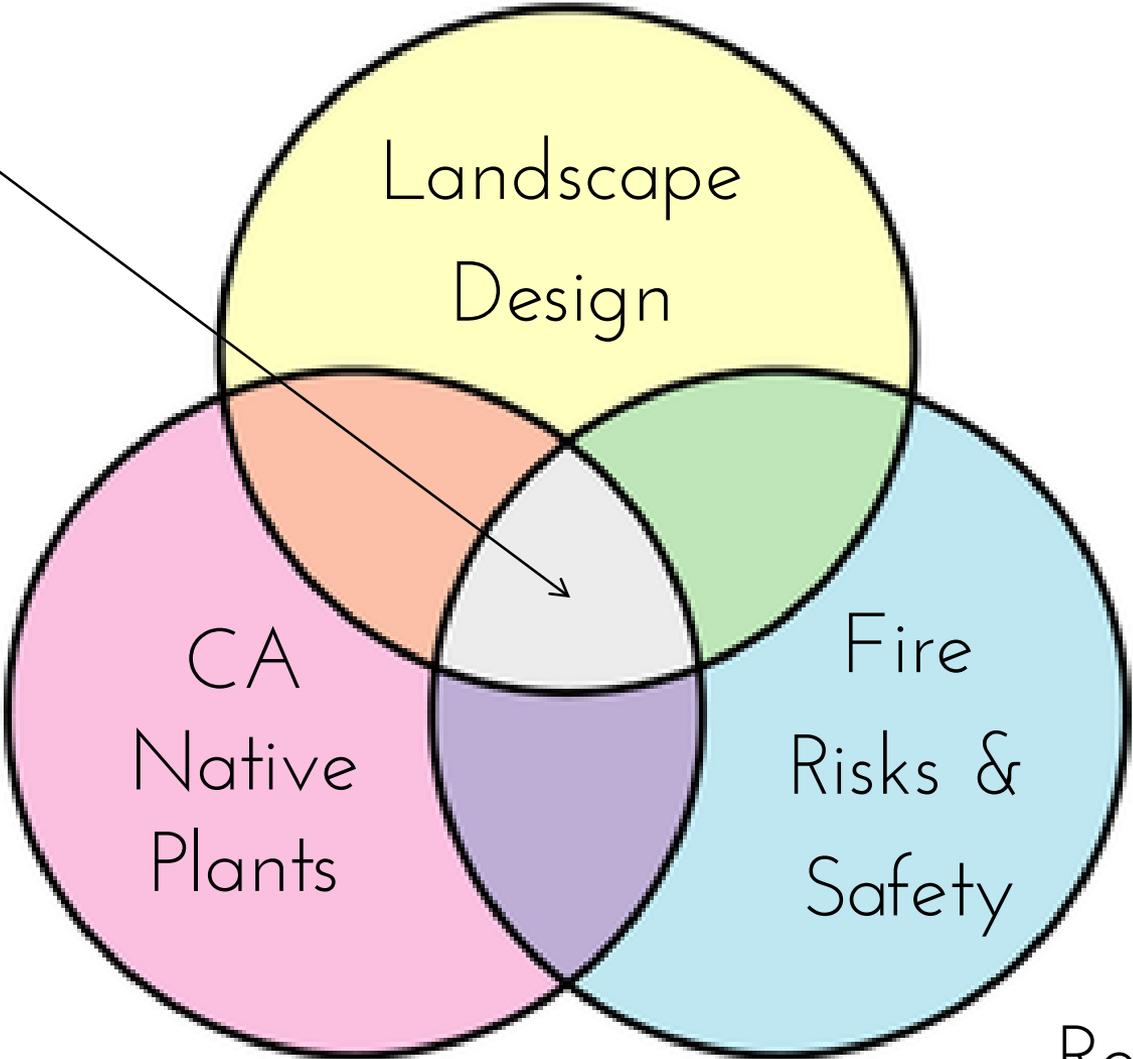


NATIVE PLANT DESIGN & MAINTENANCE...

...In the context of fire

PLAN OF ATTACK

we
are
here



Resources..

WHY NATIVES?

- Sense of place (scale)
- Habitat
- Environmental benefit
 - Fewer inputs
 - Less water
 - Less pollution
 - Less contamination
 - Healthier for all
 - Caveats apply...



Photo by [Connor McSheffrey](#) on [Unsplash](#)

WHY NATIVES?

Caveat: Choose plants that like what you have to offer!

- Soil type, condition, nutrients, pH
- Sun & wind exposure
- Water needs
- Companion plants
- Maintenance abilities

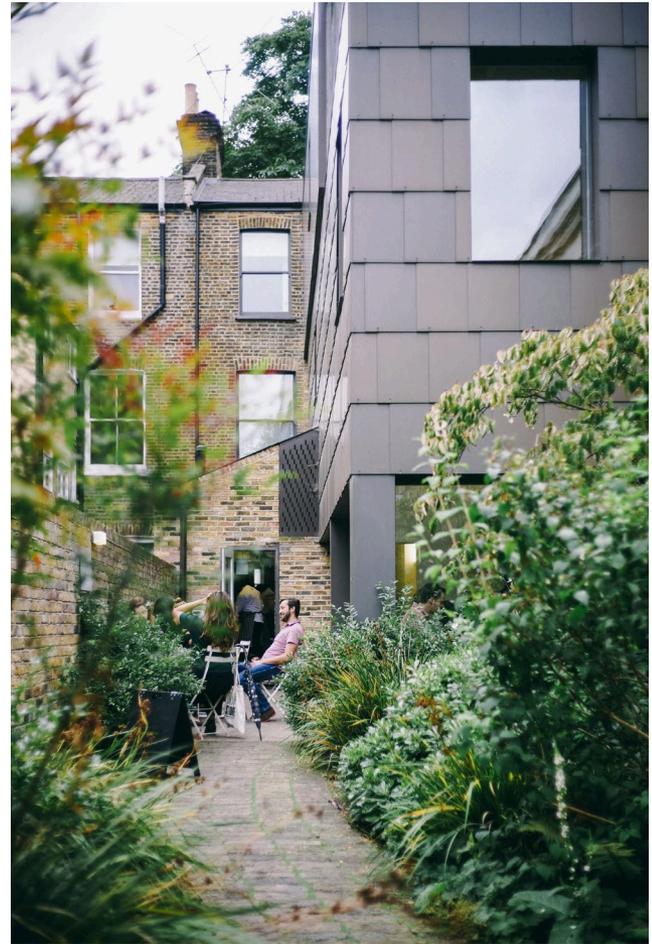


Photo by [Josh Wilburne](#) on [Unsplash](#)

WHY NATIVES?

Habitat: better to retain than replace.

- Food & water
- Shelter & nesting
- Host plants
- Nursery availability...
- Providing for local fauna

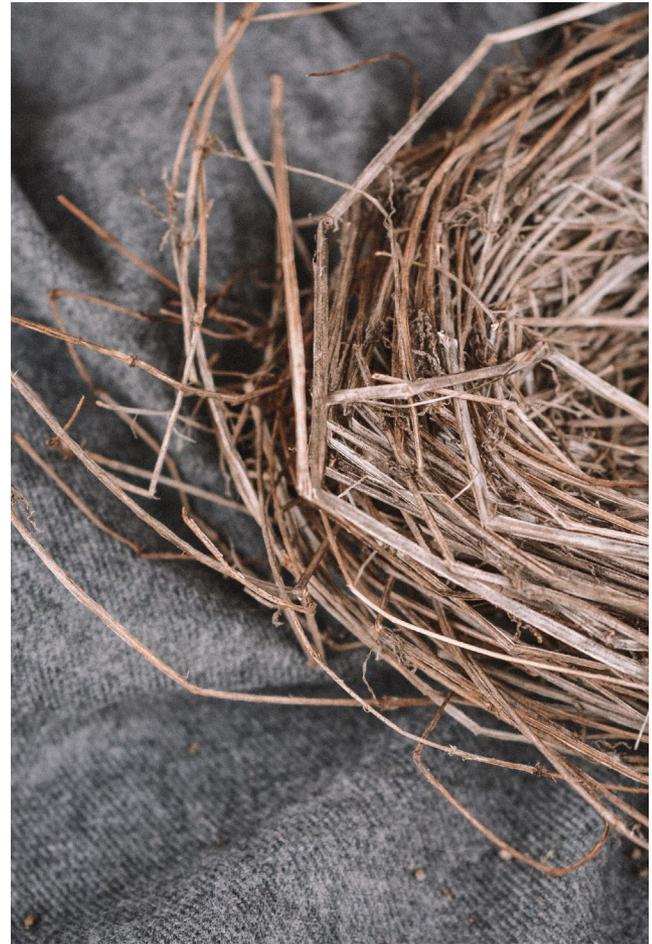


Photo by [Serafima Lazarenko](#) on [Unsplash](#)

WHY NATIVES?

The built environment:

- As natural as we can, still not pristine.
- Hotter, drier
- Soils altered
- Less diversity
- More pollution, etc
- Different values

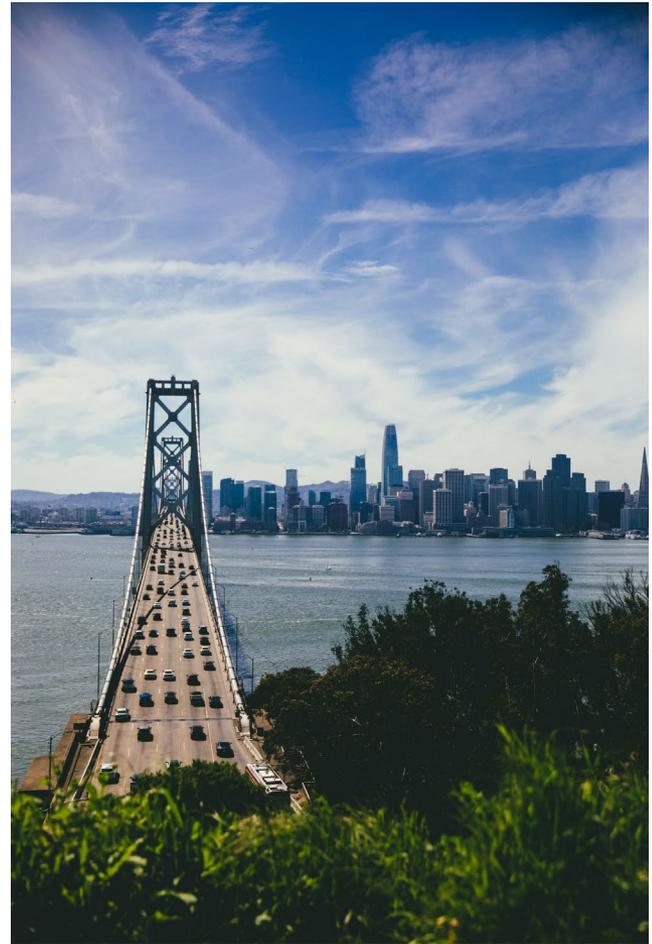


Photo by [Joel Danielson](#) on [Unsplash](#)

DEFENSIBLE ZONES

The house that
doesn't ignite
doesn't burn

Home hardening is #1



Photo by [Jen Theodore](#) on [Unsplash](#)

IGNITION & BEHAVIOR

Ignition / how fires spread:

- Embers: #1 threat
- Direct flame contact
- Heat energy transferred reaches temperature of ignition



Photo by [Ai Nhan](#) on [Unsplash](#)

IGNITION & BEHAVIOR

Behavior & tendencies

- Wind - any direction
- Uphill - preheating
- Fast flash light fuel
- Intense heavy fuels
- Fire ladders
- Creates own wind (embers!)

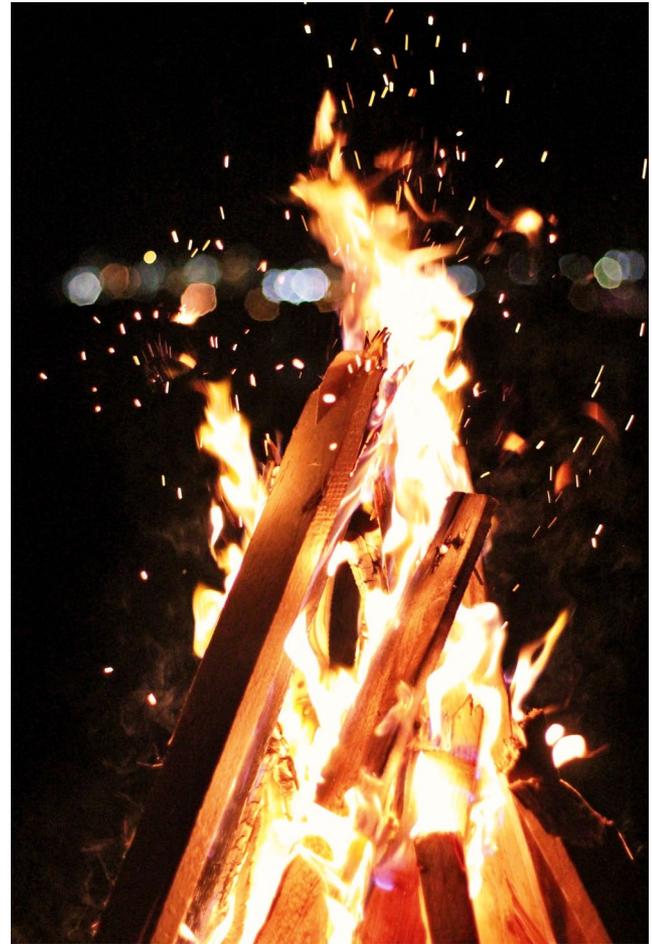


Photo by [Tamara Gore](#) on [Unsplash](#)

FIRE VS. TIME & TEMPERATURE

But why? Energy!

- Size matters
 - To ignite (ie kindling)
 - To hold a flame /
“meat on the bones”
- Dry / brittle matters
- Will it make embers?



.Photo by [Siim Lukka](#) on [Unsplash](#)

IGNITION & BEHAVIOR



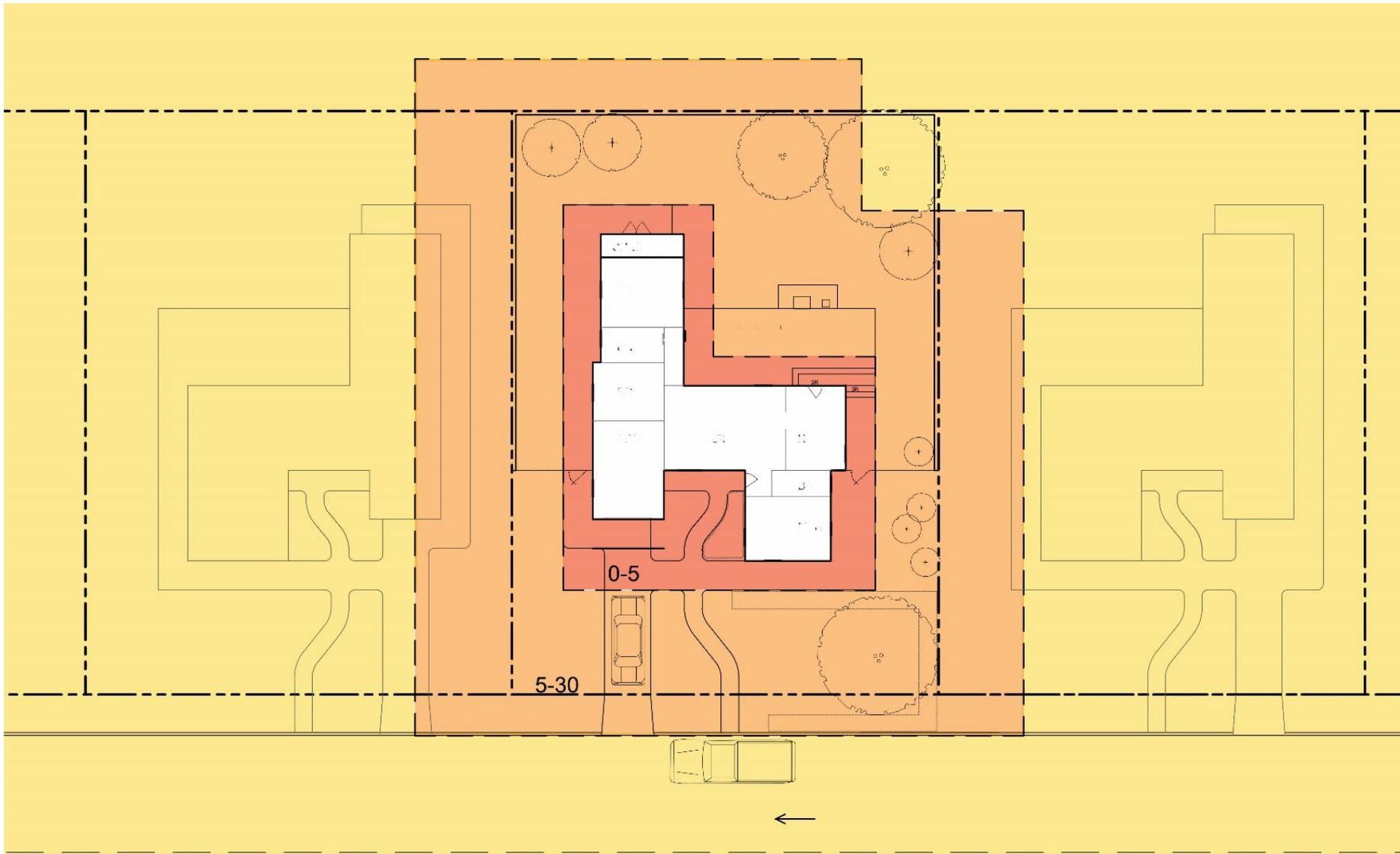
IGNITION & BEHAVIOR



DEFENSIBLE ZONES

IBHS wildfire preparedness guidance currently recommends creating and maintaining a 0-5 ft noncombustible zone around a building, including the entire footprint of an attached deck. This zone is **designed to protect the building from ignition** that can result from wind-blown embers that can accumulate at the base of the exterior wall, and from exposure to radiant heat or direct flame contact that would occur due to the ignition of combustible materials located near the building or under an attached deck.

DEFENSIBLE ZONES



DEFENSIBLE ZONES

They are not:

- Promise of defense
- Guarantee of success
- Once & done
- Standardized
- Perfect (embers, grandfathering, hardening, etc)

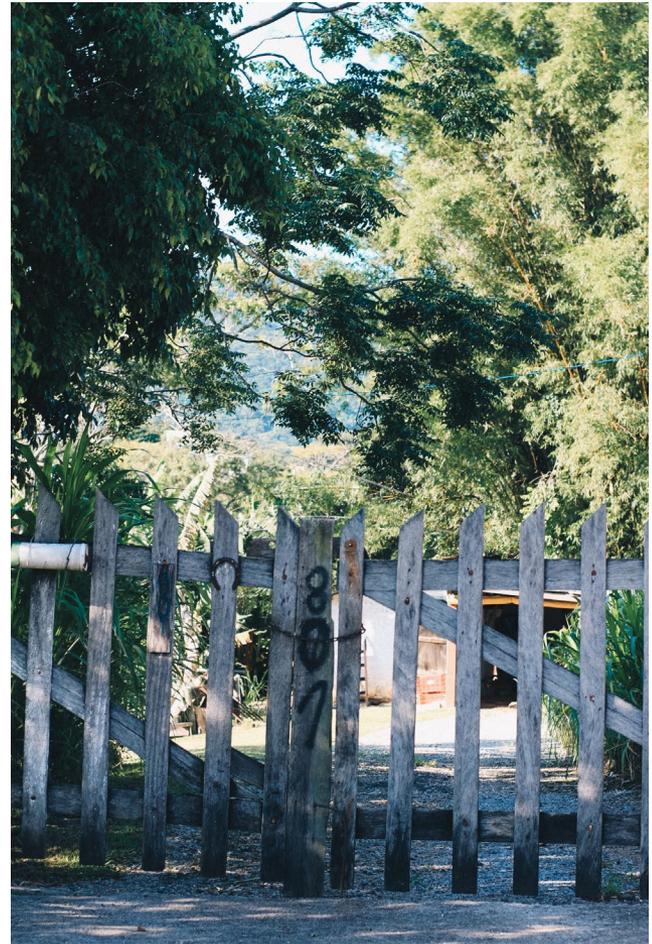


Photo by [william f. santos](#) on [Unsplash](#)

DEFENSIBLE ZONES

Intention:

- Slow fire's progress
- Lower flame height
- Reduce fire intensity
- Occupant way OUT
- Firefighter access IN
- Buy time
- A goal as possible

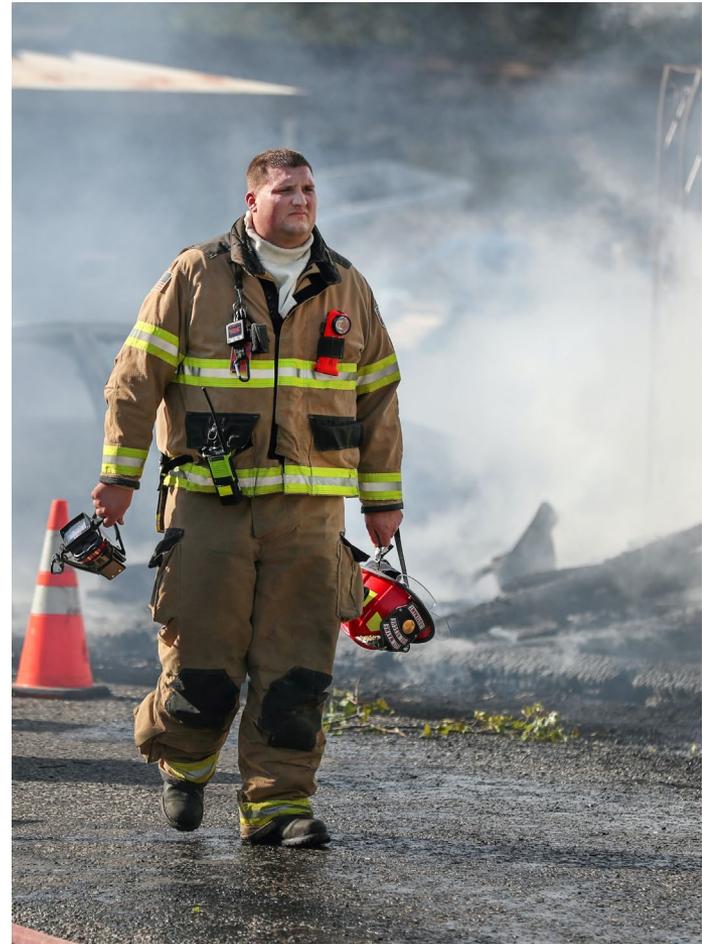
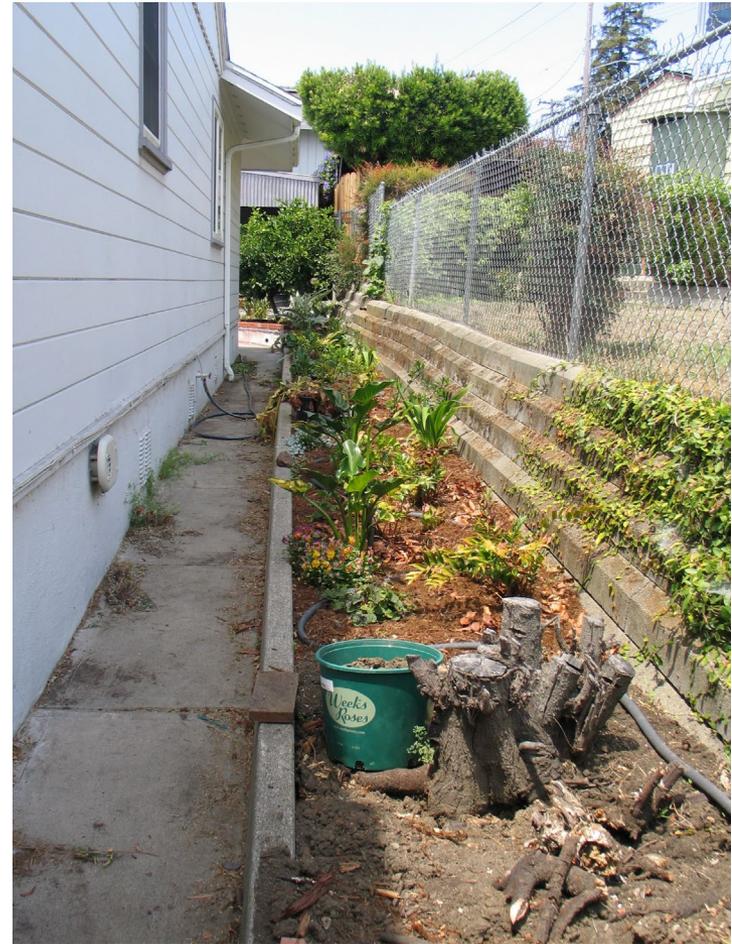


Photo by [Randy Fath](#) on [Unsplash](#)

DEFENSIBILITY ZONE 0-5

Outside:

- 0-5' zone (2011)
- non-combustible
- Debris, storage, decks, internal corners, weeds, roof overhanging trees
- Can a firefighter get through?



Jen's side yard in 2014. Oh my...

DEFENSIBILITY ZONE 0-5'

0-5' Also include

- The way out!
 - Long driveways
 - Footpaths / trails
 - Windows & doors
- Maintenance ongoing
- Environmental impacts



Photo by [Reid Naaykens](#) on [Unsplash](#)

DEFENSIBLE ZONES 5-30

Outdoors (cont.):

- 5-30' zone
- Lower, less flammable
- Sheds, paths, driveways, conflict with neighbors

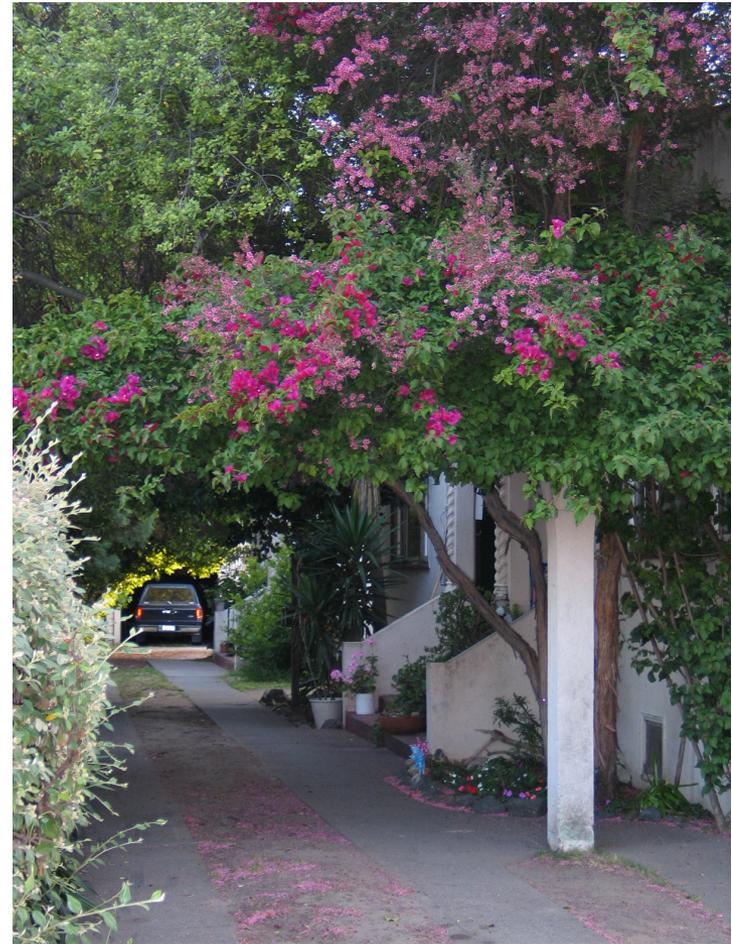


Photo by Jen of a driveway in Alameda

WOOHOO!

Questions so far?



Photo by [Jorge Rojas](#) on [Unsplash](#)

NOW – PLANTS!

Match the
plants to the conditions,
not the other way
around.



Photo by [Roberto Nickson](#) on [Unsplash](#)

PLANT LISTS

Plant lists are not a
shopping list...

...they are
homework assignments

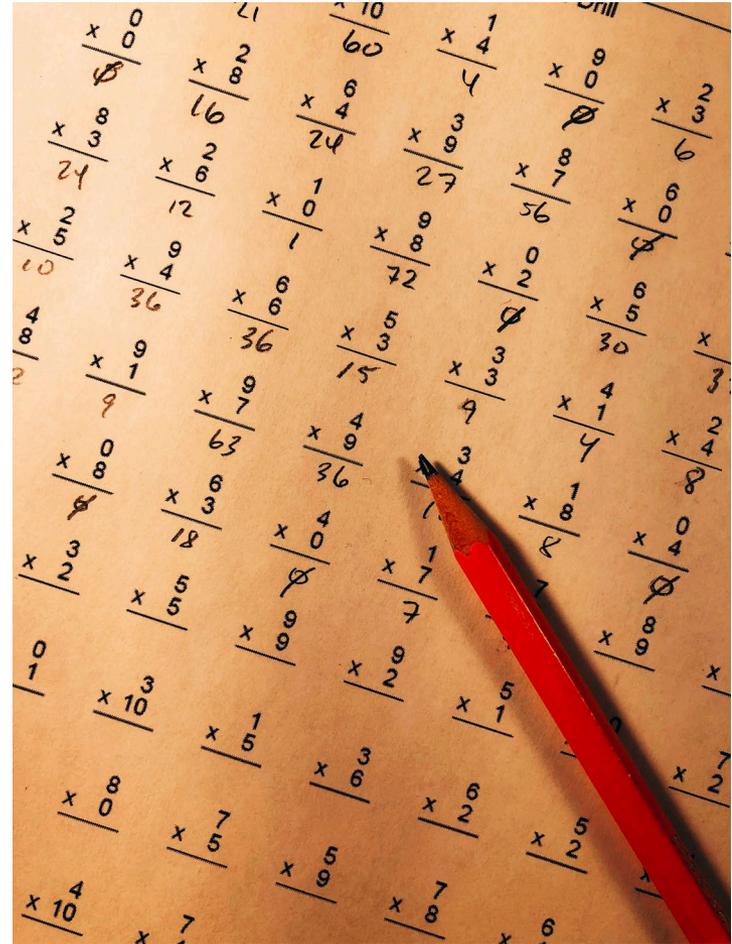


Photo by [Chris Liverani](#) on [Unsplash](#)

PLANT LISTS – THE BAD

- Public pressure
- Expectation of a guarantee or better chances
- Often repackaged
- Poor practice to rely on w/o further study
- A starting point only



Photo by [Matthew Brodeur](#) on [Unsplash](#)

PLANT LISTS – THE GOOD

- Specific lists:
 - sun, water, soil
 - salt tolerant
 - plant communities
- Need cross-reference
- Build understanding
- Use judgement
- ...but for fire?....

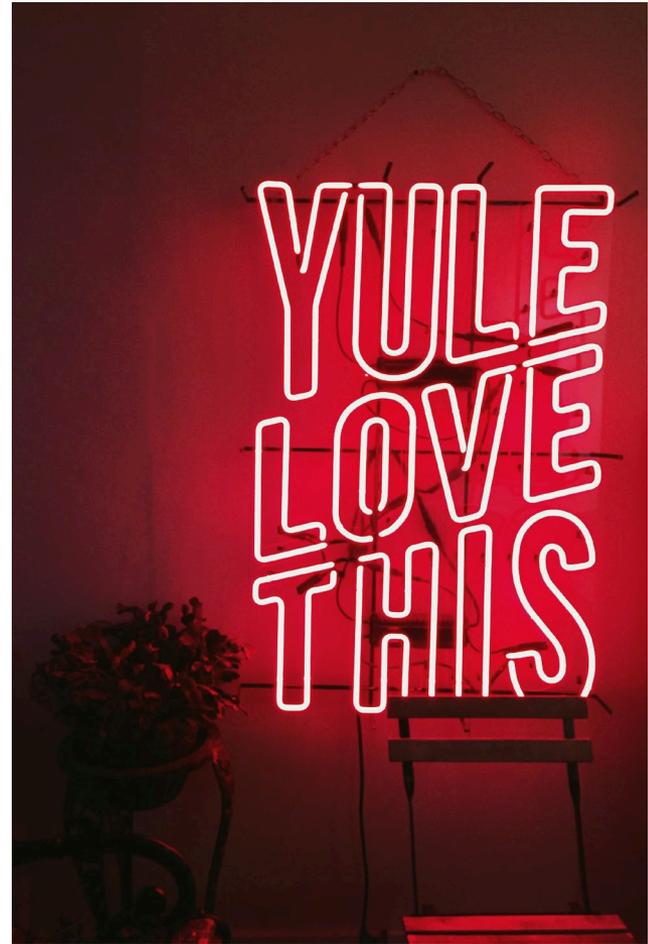


Photo by [Elise Petrovich](#) on [Unsplash](#)

PLANT LISTS – FOR FIRE?!

- No standard
- Resistant? Meaning?
- Ignores:
 - Site conditions
 - Maintenance
 - Age, health
 - Cultivars
 - Regional diff.
 - Design, water, etc.



Flora Grubb nursery, San Francisco

PLANT PROFILING

- Approx. 6,500 CA native plants
- Some in nurseries, diversity has changed with covid
- A few that demonstrate things to think about....

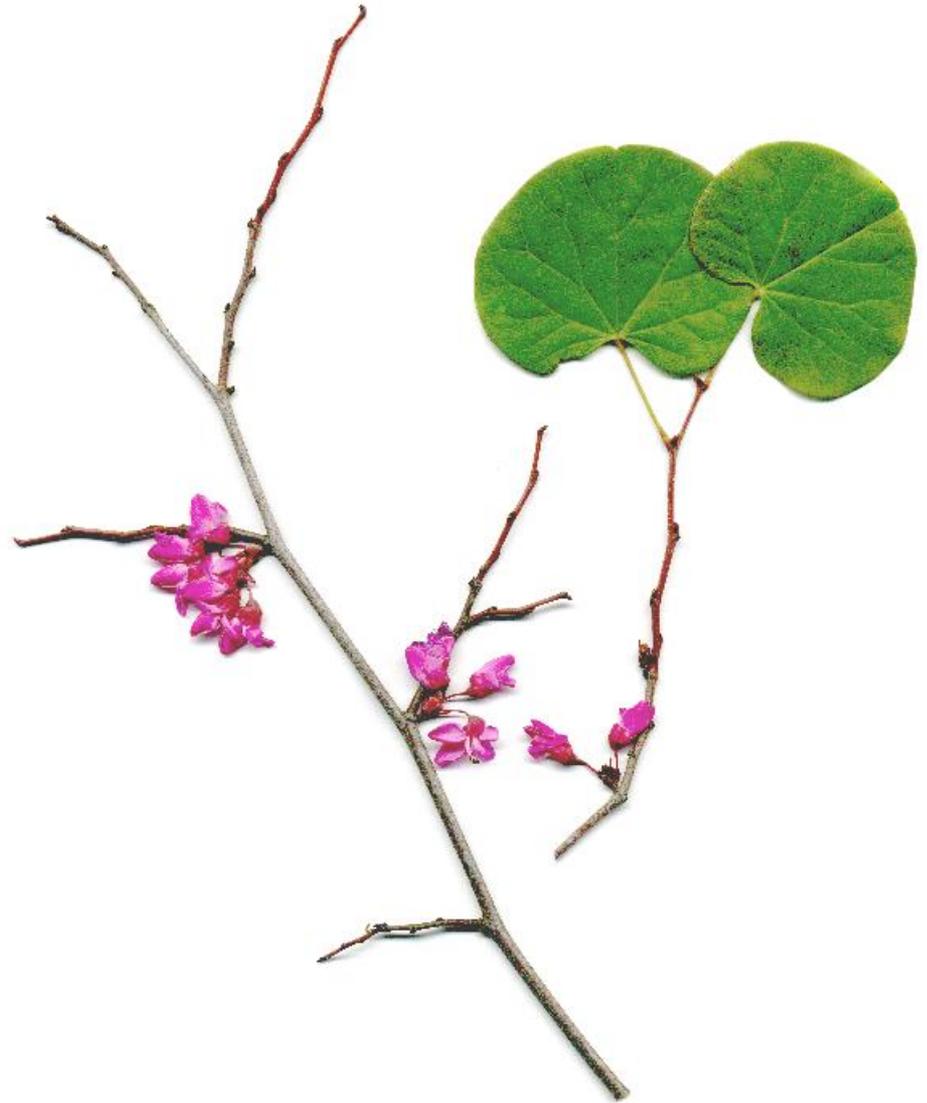


Redwoods along 880 near 238 (Google)

NOW – PLANTS!

Flammability attributes:

- Fine vs. coarse
- Thick vs. thin
- Fuzzy vs. smooth
- Sap, resin, sticky
- Brittle vs. bendy
- Fragrant foliage



NOW – PLANTS!

Flammability variables:

- Lifespan / age
- Lifecycles / seasonality
- Growth rate
- Persistent foliage
- Stress response



Mimulus – healthy vs. stressed (source unknown)

PLANT PROFILING

Quercus agrifolia

- Understory plants?
- No summer water
- Leaf litter - biology
- Impact / mortality
- Understory plant lists...



Blue Sky Ecological Reserve, Poway, CA.
Blackened in a fire 2.5 years ago but alive and regenerating.

PLANT PROFILING

Q. agrifol. vs. plant lists

- Wrong question!
- Understory:
 - Summer water
 - Establishing others
 - Disrupting rootzone
 - Keep leaf litter
 - All impact lifespan

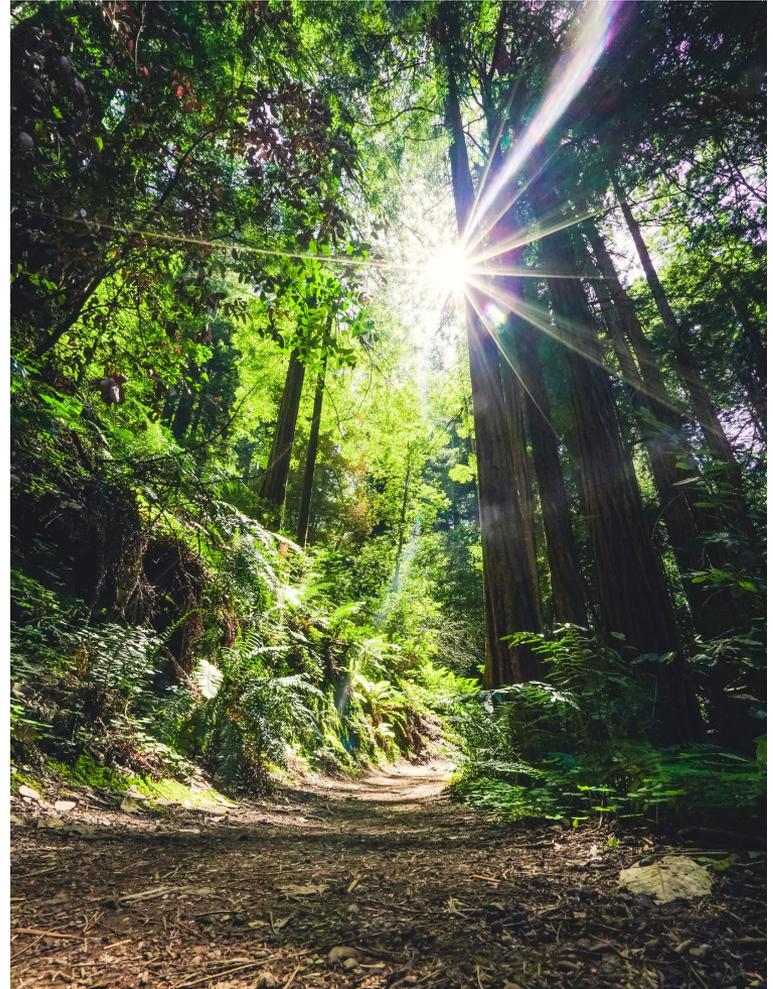


Quercus agrifolia (photo public domain Wikipedia)

PLANT PROFILING

Redwoods

- Aggressive roots
- High water needs
- Leaf drop
- Protected spaces
- Leaf design + fog drip = free water



Muir woods Photo by [Eric Ward](#) on [Unsplash](#)

PLANT PROFILING

Redwoods

- Flammability? Not listed on Las Pilitas burn list, but less flammable of most conifers (if healthy)
- Fires often don't kill mature trees



Sequoia sempervirens 2 yrs after Middledorf Fire
Jen's photo

PLANT PROFILING

Oaks

- No summer water
- High, hot & dry
- Sensitive & aggressive roots
- Critical plentiful leaf litter
- Summer dry grassy understory

Redwoods

- High water
- Low, shaded, moist
- Aggressive roots
- Loads of leaf litter
- Fire: high canopy with age
- Summer fog drip lush understory

PLANT PROFILING

Cercis occidentalis

- Likes drier exposed areas to our wetter North, and damper, shadier spots to our drier south...
- On many fire resistant plant lists.
- >60 seconds



© 2007 Stan Shebs via Calscape

PLANT PROFILING

Ribes sanguineum

- Fuzzy leaves
- Sun to shade depending (low pf)
- Upright habit
- Variety of soils ok
- Prob. host to many butterflies (86?!)
- >60 seconds



Ribes sanguineum var. *glutinosum*
'Claremont' photo from Devil Mountain

PLANT PROFILING

Salvia clevelandii

- 5-10 year lifespan (if)
- Leans over (spacing)
- Dry, well-drained or dies fast (far S. CA)
- Fragrant foliage
- Prune w/o defoliating
- Bugs, hummingbirds!
- 7-15 seconds



Photo of S. 'Winifred Gilman' from Yerba Buena Nursery Website

PLANT PROFILING

S. clevelandii x *S.*
pachyphylla: parents of
S. 'Celestial Blue'

- Native? Purist?
- Foliage far less fragrant, more gray
- Smaller, still leans
- *S. cleve*: 7 sec; *S.*
pach. >60



S. x 'Celestial Blue' Photo from Las Pilitas nursery website

PLANT PROFILING

Achillea millefolium

- Wucols: native vs non-native cultivars different
- Calscape: 15 cvs
- Wholesale: 26 cvs
- Variable burn times



Gc P	N/A	Achillea millefolium (non-native hybrids)	yarrow (non-native hybrids)	Moderate / Medium	<input type="checkbox"/>
Gc P N		Achillea millefolium (CA native cultivars)	yarrow	Low	<input type="checkbox"/>

PLANT PROFILING

Achillea millefolium

- Lead, copper, & zinc concentrating
- Deep rooted
- Gray or green foliage
- Color range
- Height range



PLANT PROFILING

Bouteloua gracilis

- Native, not widely
- 2 colors b/c sport
- Deep rooting
- Deciduous?! Don't trim too early unless a dry year b/c pretty through winter



B. 'Blonde Ambition' from Proven Winners

PLANT PROFILING

Bouteloua gracilis

- Spacing, little “meat”, non-fragrant, flexible
- Near paths
- Mass planting
- Can mow
- Tough - tried to kill



Bouteloua gracilis photo: Matt Lavin

NOW – PLANTS!

le: Coyote Bush

- Harder to ignite young green foliage
- Grows deadwood, twiggy, collects leaf litter with age
- Need to trim, a little water to keep lush.
- Lists contradict



Baccharis piliularis ©2020 Jean Pawek

PLANT PROFILING

Carex tumulicola & C. divulsa “Berkeley sedge”

- C. tumulicola native
- C. divulsa invasive
- Confusing labeling in the trade
- A learning opportunity



Carex divulsa – invasive!

PLANT PROFILING

C. tumulicola "Foothill Sedge"

- Low 6-12" ht x 24" sp
- Flexible, not fragrant.
- Summer semi-deciduous
- Path edges, rustic lawns



C. tumulicola ©2002 Dean Wm. Taylor

PLANT PROFILING

Follow the story:

- <https://plantright.org/watch/carex-divulsa/>
- https://www.smgrowers.com/products/plants/plantdisplay.asp?plant_id=352



Carex tumulicola ©2009 Chris Wagner

PLANT PROFILING

Struthiopteris
(Blechnum) spicant

- Sterile horizontal fronds (to 3' dia)
- Fertile verticals: spore release in July-Aug,
- Verticals wither after
- Maintenance



Image: <http://de.wikipedia.org/wiki/Benutzer:Drahkrub>

GRAVEL AS MULCH CONTROVERSY

Inorganic mulches ☹️

- Hot
- Soil compaction
- Doesn't hold water
- What plant wants this?
- Environmental
- Maintenance

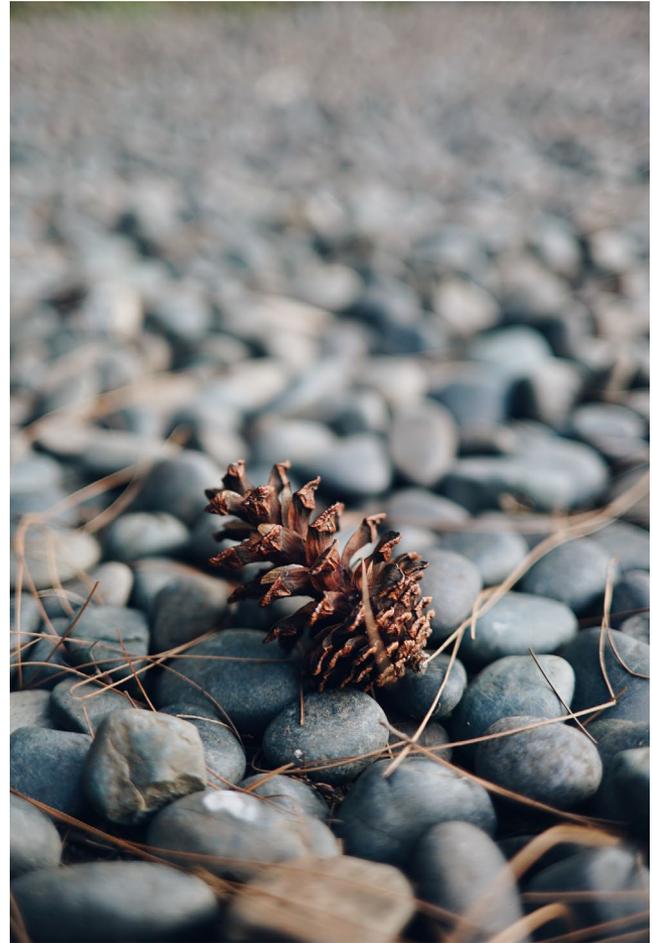


Photo by [Harry Tharsiman](#) on [Unsplash](#)

MORE OR LESS EXPENSIVE?

- Environmental costs: can we afford not to?
- Design: investing the time for study
- Maintenance: a different kind of investment



Photo by [Diane Helentjaris](#) on [Unsplash](#)

SO NOW WHAT?!

- Start with the site
 - Existing
 - Fire origins, directions
- Gather options
 - Plants
 - Materials
- Get specific, detailed

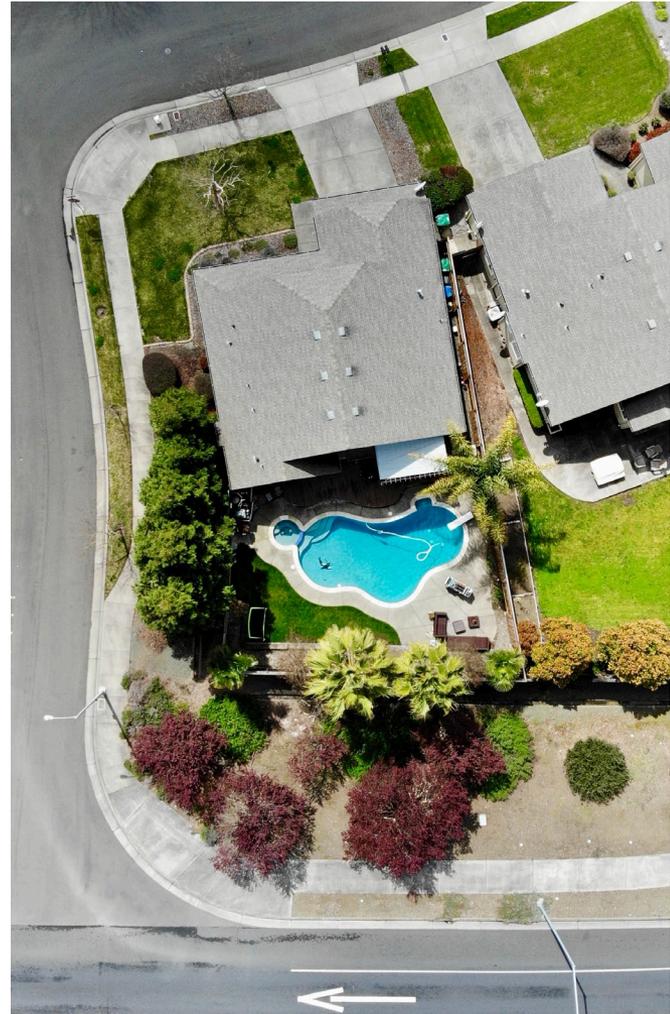


Photo by [Carles Rabada](#) on [Unsplash](#)

WORKFLOW

Site

- Evaluate: where is fire coming from / likely to go?
- Inventory existing (to remain) and work from there.
- Start w/ 0-5' zone
- Include egress



Photo by [Josh Berendes](#) on [Unsplash](#)

WORKFLOW

- Calscape: your location, companion plants, maintenance and habitat info (!!)
- Las Pilitas: plant communities, critters, burn times chart
- SFPlantFinder: stormwater, hell strip, soil type, native, etc.

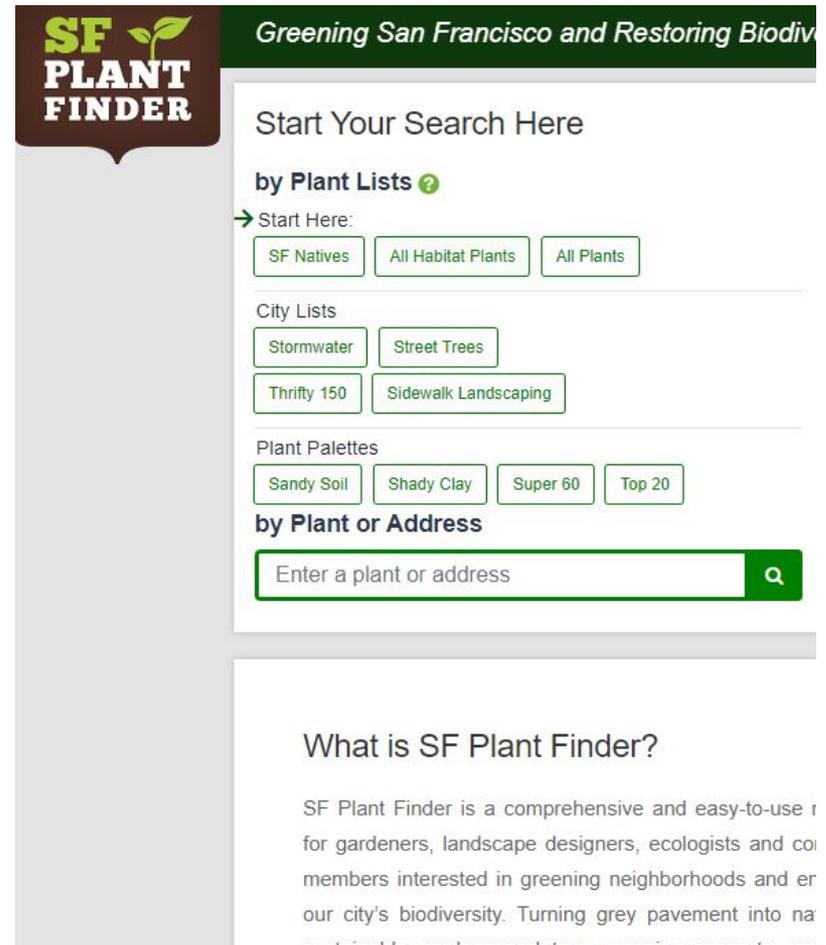
If after sixty seconds the plant didn't light, that's amazing. Bushes that burnt after 15-30 seconds are about as flammable as some of the Ceanothus should be considered heat shields.

Genus	Species	Variety	Cultivar	live ignition (seconds)	dead leaf ignition (seconds)	notes
<u>Abies</u>	bracteata			>60		
<u>Acacia</u>	greggii			>60		one weak flash
<u>Acer</u>	circinatum			15		
<u>Acer</u>	macrophyllum			>60		
<u>Acer</u>	negundo	californicum		30	1	
<u>Achillea</u>	millefolium	californica		5	1	six inch flame height
<u>Achillea</u>	millefolium	rosea	Island Pink	>60	1	
<u>Adenostoma</u>	fasciculatum			30		dried seed heads -1 second.
<u>Adiantum</u>	jordanii			>60		
<u>Aesculus</u>	californica			>60		
<u>Agrostis</u>	pallens			>60		a lot of dead grass, but the green leaves extinguished the dead ones
<u>Alnus</u>	rhombifolia			15		
<u>Ambrosia</u>	psilostachya			>60		
<u>Anaphalis</u>	margaritacea			>60		
<u>Anemopsis</u>	californica			>60		leaves develop water blisters

Las Pilitas burn times – 60 sec. or less

WORKFLOW – PLANTS

- Double-check invasive lists
- Check nurseries to see if the plants are in available
- WUCOLS: water needs, natives noted...



The screenshot shows the SF Plant Finder website. At the top left is the logo "SF PLANT FINDER" with a green leaf icon. To the right is a dark green banner with the text "Greening San Francisco and Restoring Biodiversity". Below the banner, the main content area is titled "Start Your Search Here" and "by Plant Lists ?". Under "Start Here:", there are three buttons: "SF Natives", "All Habitat Plants", and "All Plants". Below that, under "City Lists", there are four buttons: "Stormwater", "Street Trees", "Thrifty 150", and "Sidewalk Landscaping". Under "Plant Palettes", there are four buttons: "Sandy Soil", "Shady Clay", "Super 60", and "Top 20". At the bottom of the search section, there is a search bar with the placeholder text "Enter a plant or address" and a green search button with a magnifying glass icon. Below the search bar, there is a section titled "What is SF Plant Finder?" with a paragraph of text that is partially cut off at the bottom.

WORKFLOW & DESIGN - WATER

Water needs

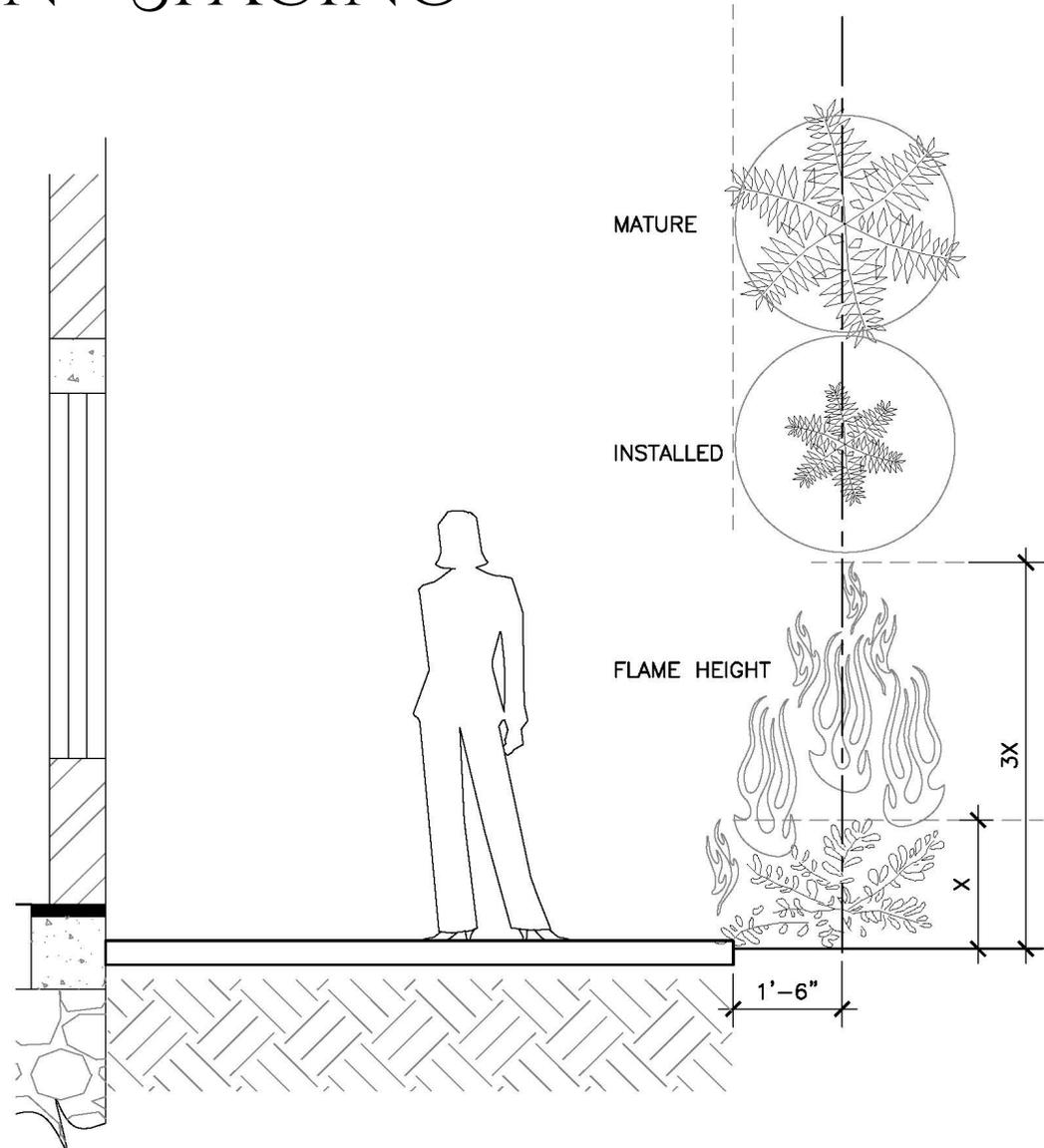
- Plants w/ the same water needs go together
- Careful of hot vs. moist areas - adjust
- If irrigated, work w/ irrigation zones
- Use WUCOLS



Photo by [rebekah baines](#) on [Unsplash](#)

DESIGN - SPACING

- Mature Size
- Poor placement = trim & water need
- Form vs 3x
- Ex. assumes 36" wide plant at maturity = locate center 18" away



DESIGN - COLOR COMBOS



Complementary flower colors



Analogous flower colors

ONE example, just the flowers of two plants – there's also foliage color, height, seasonality, etc oodles of variations out there! (6,500 CA natives can bring so many choices)

SUMMARY

- Cost of doing things better & smarter.
- Plant communities, databases and cross-referencing
- Likes what you have to offer
- Healthier overall
- = **Totally worth it**

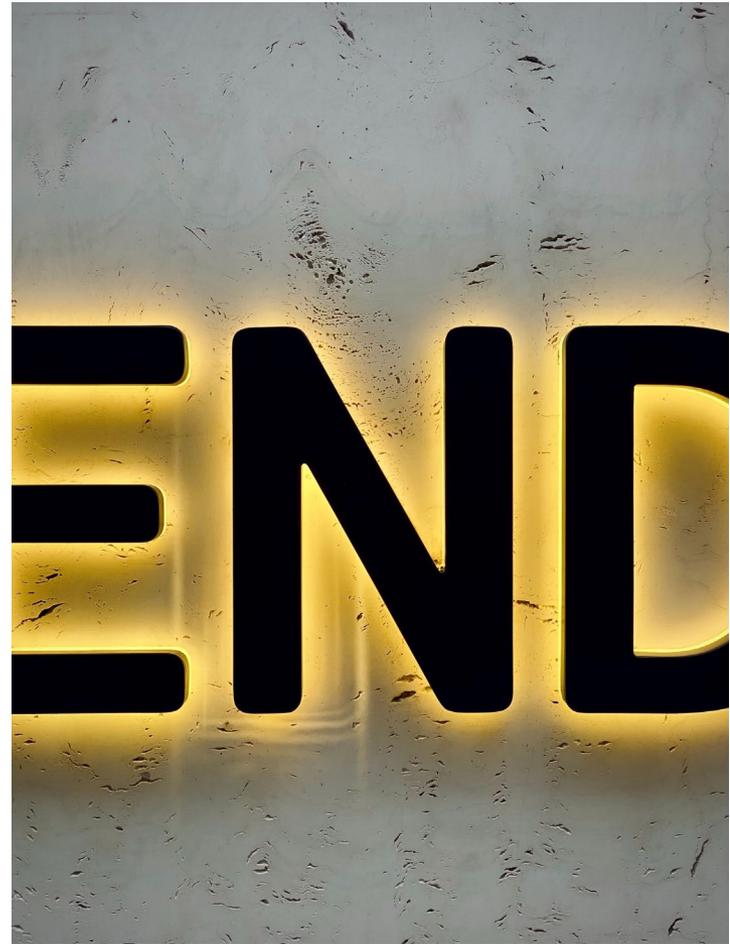


Photo by [Arno Senoner](#) on [Unsplash](#)

THANKS!

Feel free to contact me:

Jennifer@deGraafAssoc.com

Our *newest* efforts:

LifePropertyEnvironment.com

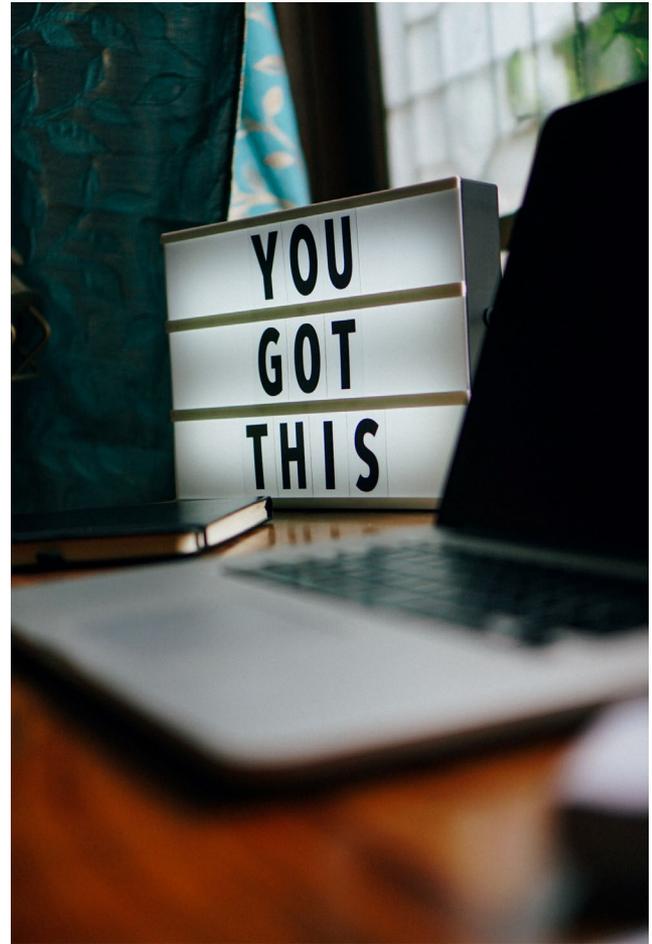


Photo by [Prateek Katyal](#) on [Unsplash](#)

RESOURCES – BOOKS!

- Firescaping: Kent (2nd ed)
- Designing California Native Gardens: Keator, Middlebrook
- California Native Plants for the Garden: Bornstein, Fross, O'Brien
- Managing Wildfire in the Wildfire Urban Interface: Blonski, Miller, Rice
- California Bees & Blooms: Frankie, Thorp, Coville, Ertter
- Bringing Nature Home: Tallamy

RESOURCES

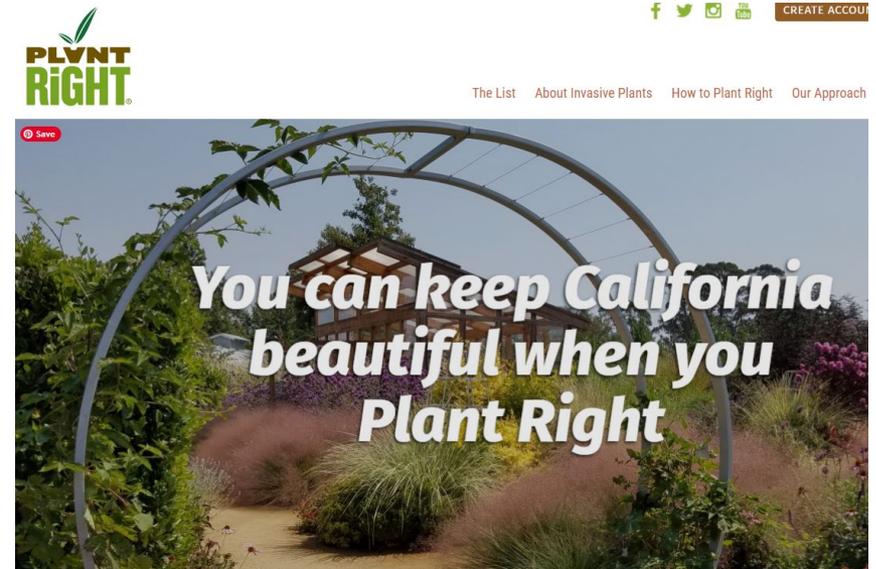
- SFplantFinder.org/
- LasPilitas.com/
- Wucols (CA native search checkbox!)
- Calscape.org (CNPS)
- Specialty native plant nursery websites.



RESOURCES

Invasive plants:

- CalIPC:
<https://www.cal-ipc.org/>
- Plant Right:
<https://plantright.org/>



RESOURCES

- CA native Oaks:
<https://anrcatalog.ucanr.edu/pdf/21538.pdf>
- <https://www.Audubon.org/PlantsForBirds>
(great faq)
- <https://www.inaturalist.org/>



Find Native Plants For Your Area

Include your email, and Audubon will send tips on how to bring more birds to your home.

[Privacy Policy](#)



Bring birds to your home today by growing native plants. With Audubon's **Native Plant Database**, you can find the best plants for the birds in your area. Growing bird-friendly plants will attract and protect the birds you love while making your space beautiful, easy to care for, and better for the environment. Explore all of our native plant resources here, including our factsheets on **creating a native plant garden** and **how it can save you money**.

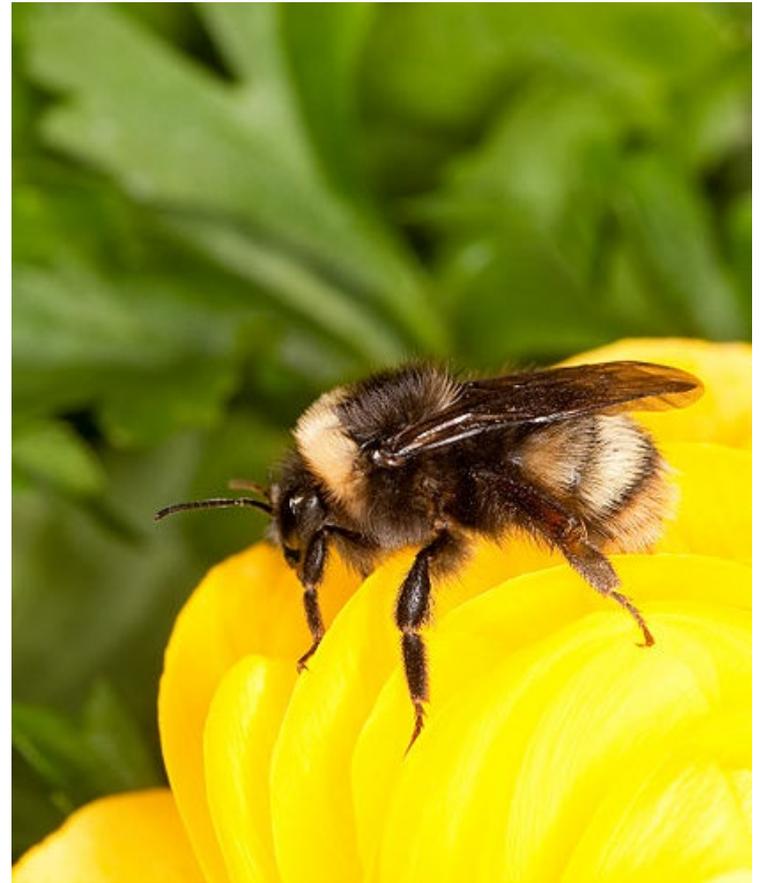


Get Started!

Plants for birds from Audubon

RESOURCES

- <https://xerces.org/>
- <https://xerces.org/events/webinars>
- <https://xerces.org/press/court-rules-state-of-california-lacks-authority-to-protect-imperiled-bumble-bee-species-under>



Bombus occidentalis: Western Bumblebee, read the article there at the bottom.

RESOURCES

- 564fire.com videos showing fire fighting
- <https://ibhs.org/risk-research/wildfire/>
- Home hardening: <https://www.firesafemarin.org/home-hardening>



IBHS controlled studies