From: **Linda L. Smith** [redacted]
Date: Mon, May 5, 2025 at 11:18 AM
Subject: Fire risks and state mitigation requirements
To: Nova Romero <nromero@ci.carmel.ca.us>

Dear Nova,

Would you please send this letter and attachment to the City Council for them to see before today's meeting and to include in the public record, and also please share it with the Forest and Beach Commissioners, City Forester, Public Works director and staff, City Administrator and Assistant, as well s the Planning Commission and Planning staff.

Thank you.

Sincerely,

Linda L Smith

Dear Mayor and City Council,

I have been active in conservation and climate change issues for the majority of my life, being a 4th generation Carmelite with direct links to Carmel's origins as the unique Village in a Monterey Pine Forest, where residents cherished their Monterey pines and Oaks and native under-story habitat shrubs and all the life they support. Las Manzanitas is the name that had been given to this area before it was called Carmel. This completely unique town, by virtue of the vision of its illustrious founders, captured the imagination of cultured people and lovers of Nature the world over. This is our true heritage. It "has no prototype", as the great architect Nathaniel Owings put it. It is a one of a kind village, a blessing and a reality that is enshrined in our city documents, our General Plan, our LCP! And as such it is protected by the California Coastal Act. Carmel is not Pacific Grove. It is not Monterey.

For the past 30+ years, working with Monterey Pine Forest Watch, and having been directly involved in efforts to save and protect the Monterey Peninsula's endangered Native Monterey Pine Forest, it is distressing to see that this rare forest treasure has never been in greater danger than it is right now, thanks to draconian state mandates that can only be implemented in Carmel by destroying its very being. Defensible space requirements would

completely preclude the planting of any Monterey pines or Coast live oaks, the very keystone trees of the native Monterey Pine Forest in which we live and which are the heart and soul of Carmel! Nor would it allow the planting of the majority of native shrub habitat that would grow more than 6 feet high. These state requirements are meant for true wild lands where parcels are large, not for 40 x 100 foot lots. And the state designations and mandates do not take into account the fact of fog on the Monterey Peninsula. Winter rains, fog and cool Summer temperatures protect us for much of the year. Climate scientists identify the Monterey Peninsula a refugia for species as the climate warms, because of cooler temperatures and fog created by upwellings from the cold deep Monterey Marine Canyon. UCB's Dr Axelrod stated that our native Monterey Pine Forest survived past climate warmings, especially because of this factor. And this is why there are so many endemic species here, species that exist nowhere else. It has been a refugia in the past.

From my research, even among experts there is plenty of disagreement about how to address risk generally. Marin's fire expert has pointed out a number of myths that are widespread that are causing hysteria about the supposed danger of trees. Other factors are much more important. And most fires are grass fires which are much more deadly because they move so fast. And the overwhelming majority of wildfires are started by humans. Carmel and the Monterey Peninsula need to look at other types of fire risk management as well. Closing businesses down during extreme fire risk weather, encouraging homeowners to water their trees and shrubs and soil to keep them hydrated, drone surveillance are some ideas that common sense tells us to encourage. I'm sure there are other such ideas.

I think it's time that Carmel speaks up for itself and, while requiring common sense actions to abate risk, protects its natural and cultural environment and heritage and that of the surrounding native Monterey Pine Forest which is the character and essential ecosystem of our Peninsula.

Attached is a fascinating and helpful article by an experienced fire fighter who did experiments on the combustibility of California native plants. It turns out that most of them are highly fire resistant! What do you know...Evolution at work. It's time to learn about where we live and to work with Mother Nature for a change.

Sincerely,

Linda L Smith

Leaf burn times of California native plants (& Several Non-Native Plants)

California Plants and Fire

In a two week period of September of 2005, temperatures were in the 90's and the humidity was about 30%. Individual leaves, or leaf clusters, of similar size, of various plant species, were tested for ignition times until two numbers were within a few seconds. If after five tries, numbers were still divergent, numbers were either listed as a range or averaged if all over the place. Most plants tested were field grown and had not been watered all summer (exceptions noted in table below). Every effort was made to duplicate a very dry coastal garden under water rationing.

Garden watered plants should be considerably harder to ignite if watered as little as fifteen minutes once every two weeks, BUT, not always. However, the worst fires I've seen are at the end of a drought cycle when there is no water to even fight the fire, never mind water the plants.

Field tests of experimental crown fires revealed that wooden walls can successfully survive intense flame fronts from as close as approximately 30 feet away.
Most structures are lost because of firebrands, (debris on fire that is falling from the sky). (Cohen, 1995)

If you live in town and have a twenty foot front yard, ignore this list. This is primarily for those of you in rural residential areas, at the worst with a poor well, thirty minutes from the nearest fire engine and are gone a lot. The designers that are planning an urban interface should find this useful also.

Using a propane torch with a one centimeter length flame (+/- 1mm), the blue tip of flame was placed on to a leaf, if leaves large, or first leaf cluster if leaves small, until the leaves ignited and held a flame longer than five seconds. Some leaves would flash. If they held a flame or carried to other leaves that was counted. Some blacked and never ignited, some never even glowed, and others ignited easily. At first the tests were done on the plants themselves, but that proved too exciting and the slightest breeze altered the results (and had potential for even more excitement). I settled on collecting a few stems of a few plants and testing those in a closed barn within minutes of collection. Results were not what I'd had heard or read, and often not what I expected. Generally, (and boy are there inconsistencies,) the more drought tolerant the plant, the poorer it burns, the smaller the leaf, the poorer it burns, and the wider spaced leaves are very hard to ignite. For the most part, unwatered natives did better than watered non-natives.
Good mulch is an important component of California's gardens/landscapes and ecology. The moisture that mulch retains helps keep the plant material hydrated and a little less flammable. Mulch (shredded redwood bark or shredded cedar bark) does burn, and creeps along with a smoldering fire that can be kicked or raked out. This type of mulch burns with a lot of smoke,and little flame. A pile of dead leaves, twigs and sticks does not burn in the same way. Think of the comparison of a newspaper laid flat on the ground versus each page wadded up into a pile. The worst situation is when you have flashy fuels like dead grass running up into either taller weeds, dead leaves of garden plants or some of the native plants.

This experiment really points out that weed control and garden hygiene are as important, or more important, than plant choice or irrigation practices.

Flame applied to leaf. Notice it is not bursting into flame.

Many of the leaves never even glowed.

If after sixty seconds the plant didn't light, that's amazing. Bushes that burnt after 15-30 seconds are about as flammable as your home.

Some of the Ceanothus should be considered heat shields.

Genus	Species	Variety	Cultivar	live ignition (seconds)	dead leaf ignition (seconds)	notes
Abies	bracteata			>60		
Acacia	greggii			>60		one weak flash
Acer	circinatum			15		
Acer	macrophyllum			>60		
Acer	negundo	californicum		30	1	
Achillea	millefolium	californica		5	1	six inch flame height

Genus	Species	Variety	Cultivar	live ignition (seconds)	dead leaf ignition (seconds)	notes
Achillea	millefolium	rosea	Island Pink	>60	1	
Adenostoma	fasciculatum			30		dried seed heads -1 second.
Adiantum	jordanii			>60		
Aesculus	californica			>60		
Agrostis	pallens			>60		a lot of dead grass, but the green leaves extinguished the dead ones
Alnus	rhombifolia			15		
Ambrosia	psilostachya			>60		
Anaphalis	margaritacea			>60		
Anemopsis	californica			>60		leaves develop water blisters
Aquilegia	eximia			no fuel		
Aquilegia	formosa			no fuel		
Aquilegia	pubescens			no fuel		
Aquilegia	shockleyi			no fuel		

Genus	Species	Variety	Cultivar	live ignition (seconds)	dead leaf ignition (seconds)	notes
Arbutus	menziesii			>60	15	
Manzanitas are all over the chart and do not appear to change when watered.						
Arctostaphylos			Baby Bear Manzanita Bush	>60		
Arctostaphylos			Ian Bush Manzanita	10		watered ones were also 10
Arctostaphylos			John Dourley	45		watered sample
Arctostaphylos			Mama Bear Manzanita	7		
Arctostaphylos			Margarita Pearl	30		
Arctostaphylos			Pacific Mist	30		
Arctostaphylos	crustacea	eastwoodiana		10-20		
Arctostaphylos	densiflora		Harmony Manzanita	>60		
Arctostaphylos	densiflora		Howard McMinn Manzanita	15		watered sample was 30
Arctostaphylos	densiflora		Sentinel Manzanita	>60		

Genus	Species	Variety	Cultivar	live ignition (seconds)	dead leaf ignition (seconds)	notes
Arctostaphylos	edmundsii		Big Sur Manzanita	20		
Arctostaphylos	edmundsii		Carmel Sur Manzanita	30		
Arctostaphylos	glandulosa	adamsii		5		
Arctostaphylos	glandulosa	glandulosa		10		
Arctostaphylos	glandulosa	ssp.crassifolia	Del Mar Manzanita	>60		
Arctostaphylos	glandulosa	zacaensis	San Marcos Manzanita	10		
Arctostaphylos	glauca			20		
Arctostaphylos	glauca		Ramona Manzanita	50		
Arctostaphylos	hookeri		Wayside Manzanita	>60		watered sample
Arctostaphylos	hookeri	franciscana	Franciscana Manzanita	7		extreme drought -7 secs. watered- 7 secs., but it sure looks better
Arctostaphylos	hookerii X pajaroensis		Sunset Manzanita	>60		

Genus	Species	Variety	Cultivar	live ignition (seconds)	dead leaf ignition (seconds)	notes
Arctostaphylos	insularis			7		
Arctostaphylos	manzanita		Dr. Hurd Manzanita Tree	15		
Arctostaphylos	manzanita		Real manzanita	>60		watered sample
Arctostaphylos	manzanita_x_densiflora		Austin Griffiths Manzanita	45		watered plants easier to ignite than dry land ones?
Arctostaphylos	mariposa			>60		even charcoal wouldn't ignite after 90 secs.
Arctostaphylos	morroensis		Park View Manzanita	12		
Arctostaphylos	obispoensis		San Luis Obispo Manzanita	15	3	
Arctostaphylos	pajaroensis		Paradise Manzanita	7		
Arctostaphylos	parryana		Snow Lodge Manzanita	20	1	
Arctostaphylos	patula			12		

Genus	Species	Variety	Cultivar	live ignition (seconds)	dead leaf ignition (seconds)	notes
Arctostaphylos	pechoensis			5		
Arctostaphylos	pilosula	pilosula	Atascadero Manzanita	5		
Arctostaphylos	pungens			30		
Arctostaphylos	purissima		Burton Mesa Groundcover	15		
Arctostaphylos	refugioensis		Refugio Manzanita	15	1	
Arctostaphylos	rudis			7		
Arctostaphylos	silvicola		Ghostly Manzanita	12		
Arctostaphylos	standfordiana			10		
Arctostaphylos	stanfordiana	bakeri	Louis Edmunds Manzanita	15		
Arctostaphylos	uva-ursi		Point Reyes Manzanita	>60		watered sample
Arctostaphylos	uva-ursi		Radiant Manzanita	15		watered sample
Arctostaphylos	uva-ursi	suborbiculata	San Bruno	>60		watered sample

Genus	Species	Variety	Cultivar	live ignition (seconds)	dead leaf ignition (seconds)	notes
Arctostaphylos	viridissima			>60		
Arctostaphylos	viscida	ssp. viscida		15		regularly watered sample- 15 secs.
Arctostaphylos	wellsii		Wells Manzanita	20		
Argemone	munita					
Aristolochia	californica		Sierra Giant Pipe Vine	>60		
Artemisia	californica			>60	1	'melted' down to dead/dry leaves then burned after 60 secs.
Artemisia	californica	Canyon Gray	Canyon Grey	>60	1	
Artemisia	californicaX	Montara	Montara	>60	1	dead material difficult to extinguish
Artemisia	douglasiana			15		
Artemisia	ludoviciana	ludoviciana		>60	10	
Artemisia	tridentata			>60		watered sample - >60 secs.

Genus	Species	Variety	Cultivar	live ignition (seconds)	dead leaf ignition (seconds)	notes
Asclepias	eriocarpa			>60		
Asclepias	fascicularis			>60		
Asclepias	speciosa			55	3	no flame after 5 secs., had to work to light
Aster	ascendens			>60		one ignited at 45 secs.
Atriplex	canescens			>60		
Atriplex	lentiformis	Breweri		>60		
Baccharis	douglasii			>60		will not sustain flame
Baccharis	pilularis	consanguinea		25		varied from 12 to >60 secs. on very old plant
Baccharis	pilularis	pilularis	Pigeon Point	>60		used dry, unwatered plant
Baccharis	pilularis	pilularis	Santa Ana	>60		
Baccharis	pilularis	pilularis	Twin Peaks			
Baccharis	viminea			>60		

Genus	Species	Variety	Cultivar	live ignition (seconds)	dead leaf ignition (seconds)	notes
Brickellia	californica			>60	1	if leaves clustered, can be burnt
Calliandra	eriophylla					
Calycanthus	occidentalis			>60	>60	will not stay lit
Camissonia	cheiranthifolia	ssp. suffruticosa		>60		
Carex	globosa			>60		
Carex	praegracilis			15		summer deciduous
Carex	sartwelliana			>60		
Carex	spissa			>60		
Carpenteria	californica			>50		one in four tries was able to get leaf to burn
Ceanothus species are relatively hard to burn and respond well to light overhead watering once every two weeks. A dust- off once every two weeks makes them really hard to burn.						
Ceanothus			Blue Jeans	>60		
Ceanothus			Celestial Blue	>60		

Genus	Species	Variety	Cultivar	live ignition (seconds)	dead leaf ignition (seconds)	notes
Ceanothus			Concha	>60		
Ceanothus			Frosty Blue	30		very drought stressed watered sample = >60
Ceanothus			Joyce Coulter	>60		
Ceanothus			Julia Phelps	>60		
Ceanothus			L.T.Blue	>60		sparse foliage difficult to light
Ceanothus			Mills Glory	45		>60
Ceanothus			Mountain Haze	>60	15	
Ceanothus			Ray Hartman	>60		
Ceanothus			Remote Blue Ceanothus	>60	2	
Ceanothus			Tassajara Blue Ceanothus	45		watered sample
Ceanothus			Wheeler Canyon	>>60		

Genus	Species	Variety	Cultivar	live ignition (seconds)	dead leaf ignition (seconds)	notes
Ceanothus	arboreus			20		watered sample = >60
Ceanothus	arboreus		Owlswood Blue	>60		melted leaves will not ignite
Ceanothus	crassifolius			15		
Ceanothus	cuneatus			25		
Ceanothus	cuneatus		Sierra mt. lilac	50		
Ceanothus	cyaneus			>60		
Ceanothus	cyaneus		Sierra Blue Ceanothus	10-30		leaves roll and ignite
Ceanothus	gloriosus		Hearts Desire	>60		
Ceanothus	gloriosus	porrectus		>60		
Ceanothus	griseus	horizontalis	Yankee Point	>60	50	looked like it would burn
Ceanothus	hearstiorum			>15		with regular watering = >60
Ceanothus	impressus	impressus		50		flame held just 5 secs. on unwatered plant

Genus	Species	Variety	Cultivar	live ignition (seconds)	dead leaf ignition (seconds)	notes
Ceanothus	impressus	nipomoensis		>60		
Ceanothus	maritimus			30		
Ceanothus	megacarpusX		Tranquil Margarita	55		
Ceanothus	oliganthus	oliganthus		>60		
Ceanothus	prostratus			>60		
Ceanothus	ramulosus	fascicularis		7		
Ceanothus	rigidus		Snowball	>60		
Ceanothus	sorediatus		Klamath	>60		
Ceanothus	spinosus			>90		
Ceanothus	thyrsiflorus		Big Sur California lilac	>60		
Ceanothus	thyrsiflorus		Skylark	>60		
Ceanothus	thyrsiflorus	repens		>60		
Ceanothus	tomentosus			>60		one leaf burnt out of six
Ceanothus	verrucosus			75		kept getting just over 60

Genus	Species	Variety	Cultivar	live ignition (seconds)	dead leaf ignition (seconds)	notes
						secs.
Cephalanthus	occidentalis	californica		40		watered sample = >60
Cercidium	floridum			>60		
Cercis	occidentalis			>60		
Cercocarpus	alnifolius			>60		did light once in six tries
Cercocarpus	betuloides			50		mostly >60 secs., some ignition
Chamaebatia	foliolosa					
Chilopsis	linearis			>60		
Chrysothamnus	nauseosus			>60	10	
Clematis	ligusticifolia			>60		
Comarostaphylis	diversifolia			15		leaves rolled and ignited
Corethrogyne	filaginifolia			>60		
Cornus	glabrata			15		
Cornus	stolonifera			7		

Genus	Species	Variety	Cultivar	live ignition (seconds)	dead leaf ignition (seconds)	notes
Corylus	cornuta	californica		10		only lights 50% of time, vaporizes then
Crataegus	douglasii			>60		
Cupressus	forbesii			>60		
Cupressus	nevadensis			15		
Dendromecon	rigida			>60	1	prune to ground every 3-5 years
Diplacus	aurantiacus		Sierra monkey flower	>60		watered sample
Diplacus	aurantiacus	australis	Ramona	>60	deciduous, 5	need to tidy!
Diplacus	aurantiacus	lompocensis	Vandenberg Monkey Flower	30		old flower/capsules burn
Diplacus	grandiflorus			3	1	need to tidy!
Diplacus	longiflorus			>60		at water's edge
Diplacus	longiflorus		Conejo monkey flower	3		seed capsules ignite watered and trimmed sample = >60

Genus	Species	Variety	Cultivar	live ignition (seconds)	dead leaf ignition (seconds)	notes
Diplacus	puniceus		Otay monkey flower	3		dead-heading would fix
Diplacus	rutilus			>60		water sample
Dudleya	pulverulenta				3	
Elymus	condensatus			>60		
Encelia	californica			>60	1	
Encelia	farinosa			>60		
Epilobium	angustifolium					
Epipactis	gigantea			45		
Ericameria	arborescens			>60		
Ericameria	ericoides			>60		
Erigeron			Wayne Roderick Daisy	>60		
Erigeron	glaucus			>60	1	
Erigeron	glaucus		Cape Sebastian	>60	1	

Genus	Species	Variety	Cultivar	live ignition (seconds)	dead leaf ignition (seconds)	notes
Eriodictyon	angustifolium (californicum)			40- >60		very variable
Eriodictyon	crassifolium			20		
Eriodictyon	tomentosum			20	5	
Eriogonum	arborescens			>60		foliage was non-flammable
Eriogonum	fasciculatum	foliolosum		>60	1	
Eriogonum	fasciculatum	polifolium		>60		similar to lavender
Eriogonum	giganteum			>60	>60	
Eriogonum	grande	rubescens		>60		
Eriogonum	parvifolium			>60		
Eriogonum	umbellatum			10		dead leaves are a problem
Eriogonum	umbellatum	polyanthum	Shasta Buckwheat	50		turns to charcoal and burns
Eriogonum	wrighti	subscaposum		>60		
Eriophyllum	confertiflorum			2		took 3 tries to carry flame

Genus	Species	Variety	Cultivar	live ignition (seconds)	dead leaf ignition (seconds)	notes
Eriophyllum	staechadifolium	artemisiaefolium		>60		
Fallugia	paradoxa			>60		
Ferocactus	acanthodes	cholla		3		spines burn good!
Fragaria	californica			>60		nothing left after 20 secs.
Fragaria	chiloensis			>60		occasionally lit, but no live coals
Fraxinus	dipetala			10		
Fraxinus	latifolia X velutina			>60		
Fremontodendron			Ken Taylor	20	15	
Fremontodendron			Pacific Sunset	15		
Fremontodendron	californicum			>60		
Fremontodendron	californicum	decumbens		>60		
Garrya	elliptica	James Roof		15		
Garrya	flavescens	pallida		20	3	
Garrya	veatchii			15	3	

Genus	Species	Variety	Cultivar	live ignition (seconds)	dead leaf ignition (seconds)	notes
Grindelia	camporum			>60		
Haplopappus	squarrosus			>60	1	
Haplopappus	venetus	vernoniodes		>60		
Heleniun	hoopesii			>60		
Heleocharis	parishii			>60		
Helianthemum	scoparium			>60		
Heteromeles	arbutifolia			50		burn out moisture to burn leaf
Heterotheca	grandiflora					
Heuchera	maxima			>60		blew holes in leaves
Holodiscus	discolor			5	1	
Horkelia	cuneata			>60		
Horkelia	parryi			>60		
Isomeris	arborea					
Iva	hayesiana			>60	>60	

Genus	Species	Variety	Cultivar	live ignition (seconds)	dead leaf ignition (seconds)	notes
Juglans	hindsii			>60		leaves melt, flash, flame dies
Juncus	patens			>60		
Juniperus	californica			>60		
Juniperus	communis	montana		>60		burned creeping, smouldering, slowly
Keckiella	antirrhinoides			>60	1	
Keckiella	breviflora			>60	1	
Keckiella	ternata	septentrionalis		>60	3	tidy, if summer deciduous
Larrea	tridentata			>60		low flammability
Lepechinia	fragrans			>60		smokes a lot
Leptodactylon	californicum			1 sec.		
Libocedrus	decurrens			30		
Lithocarpus	densiflorus			15		
Lobelia	cardinalis			>60		

Genus	Species	Variety	Cultivar	live ignition (seconds)	dead leaf ignition (seconds)	notes
Lobelia	dunnii	serrata		>60		appears non-flammable
Lonicera	hispidula			45	5	watered sample = >60
Lonicera	interrupta			10		
Lonicera	subspicata	denudata		15		
Lotus	scoparius			>60	3	if untrimmed = 3 seconds
Lupinus	albifrons			60		
Lupinus	excubitus			>60		'melts into black mass'
Lyonothamnus	floribundus	ssp. asplenifolius		30		
Mahonia	aquifolium		Compacta	>50		burns as leaves dry out
Mahonia	Higginisii			10		
Mahonia	nevinii			20-50		leaves burned a second, then went out
Mahonia	pinnata			10		

Genus	Species	Variety	Cultivar	live ignition (seconds)	dead leaf ignition (seconds)	notes
Mahonia	repens			20	3	
Malacothamnus	fasciculatus			>60		
Malacothamnus	marrubioides			25	1	
Malacothamnus	palmeri	involucratus		45		smells like cow chips
Maurandya	antirrhiniflora			>60		
Mimulus	cardinalis			>60		
Mimulus	guttatus			>60		
Monardella	antonina			>60		
Monardella	linoides	stricta		>15		
Monardella	macrantha			>60		
Monardella	villosa			10		flashes, then dies
Monardella	virides			15		
Muhlenbergia	rigens			3		slow, like straw broom
Myrica	californica			15-40		watered sample = very inconsistent

Genus	Species	Variety	Cultivar	live ignition (seconds)	dead leaf ignition (seconds)	notes
Oenothera	caespitosa	marginata				
Oenothera	hookeri			>60		no coal embers
Ornithostaphylos	oppositifolia			30		
Penstemon			Margarita BOP	<60	2	tidy dead leaves
Penstemon	eatonii			>60		
Penstemon	grinnellii			10		very dry plant
Penstemon	heterophyllus			>60		
Penstemon	incertus			10		
Penstemon	newberryi			>60		nothing left of plant
Penstemon	spectabilis			20-30		
Philadelphus	lewisii			>60		lit once in 5 tries
Physocarpus	capitatus			5	1	low to moderate fuel load
Pickeringia	montana			>60		
Pinus	attenuata			15		

Genus	Species	Variety	Cultivar	live ignition (seconds)	dead leaf ignition (seconds)	notes
Pinus	flexilis			20		
Pinus	jeffreyi			40		
Pinus	monophylla			45		
Pinus	muricata			>60	1	live leaves fall off instead of igniting
Pinus	ponderosa			>60		lit once in 10 tries
Pinus	sabiniana			45	3	
Platanus	racemosa			>.60		kinda burned at 60 secs., if leaves rolled right and the angle was right
Pluchera	odorata	odorata		>60		not even coal
Populus	fremontii			60	1	dead leaves burn very well
Populus	tremuloides			5		poof!
Populus	trichocarpa			30	1	
Potentilla	glandulosa			>60		

Genus	Species	Variety	Cultivar	live ignition (seconds)	dead leaf ignition (seconds)	notes
Prosopis	glandulosa	torreyana		15		
Prosopis	pubescens			>60		
Prunus	ilicifolia			7		
Prunus	lyonii			45	2	
Prunus	virginiana	demissa		20		
Prunus	virginiana	melanocarpa		avg 40		ignited twice in 5 tries
Pseudotsuga	menziesii			40		
Psoralea	orbicularis			>60		
Ptelea	crenulata			25	1	
Pteridium	aquilinum	pubescens		>60	1	
Purshia	glandulosa			50		unwatered and very dry
Purshia	tridentata			>60		
Pycnanthemum	californicum			30-60		

Oaks are pretty flammable, but with management are not a problem. Do not run out and cut all your oaks down, but do make sure there are no weeds or upright twiggy dead debris under them and prune the limbs up so you can walk under them.

Genus	Species	Variety	Cultivar	live ignition (seconds)	dead leaf ignition (seconds)	notes
Quercus	agrifolia			10 sec.		watered sample = 10 seconds
Quercus	berberidifolia			20		
Quercus	chrysolepis			5		
Quercus	douglasii			>60		I have no idea, tried repeatedly
Quercus	engelmannii			7		
Quercus	garryana	breweri		15	10	
Quercus	kelloggii			10		
Quercus	lobata			avg 15		
Quercus	tomentella			25	2	
Quercus	wislizenii			5		watered sample
Rhamnus	californica			>60		smoulder only
Rhamnus	californica		San Bruno	30		with some watering = >60
Rhamnus	californica	Eve Case		>60		will not sustain ignition
Rhamnus	californica	Tranquil Margarita		>60		

Genus	Species	Variety	Cultivar	live ignition (seconds)	dead leaf ignition (seconds)	notes
Rhamnus	crocea			>60		both watered and unwatered didn't light
Rhamnus	crocea	ilicifolia		15		bigger leaves burn more easily?
Rhus	integrifolia			>60		
Rhus	laurina			>60		tried repeatedly, got one flash out of five+ tries suspect dead leaves for its reputation of being flammable, so tidy!
Rhus	ovata			>60		popped a lot
Rhus	trilobata			>60		
Ribes	aureum	gracillimum		50	3	if dead leaves are allowed to pile up or linger, that can be a problem
Ribes	californicum			>60		
Ribes	indecorum			>60	3	

Genus	Species	Variety	Cultivar	live ignition (seconds)	dead leaf ignition (seconds)	notes
Ribes	malvaceum			>60		can burn in 30 seconds but doesn't carry flame
Ribes	menziesii			>60	3	
Ribes	nevadense			30		poor ignition
Ribes	quercetorum			>60		
Ribes	sanguineum	glutinosum		>60		
Ribes	speciosum			>60	10	
Ribes	viburnifolium			>60		vaporized to little ash
Romneya	coulteri			>60	1	
Rosa	californica			>60		
Rosa	gymnocarpa			>60		
Rosa	pinetorum			>60		got one leaf to light, not repeatable
Rosa	woodsii	glabrata (mohavensis)		45		
Rubus	parviflorus			45		

Genus	Species	Variety	Cultivar	live ignition (seconds)	dead leaf ignition (seconds)	notes
Salix	laevigata			15		
Salix	lasiolepis			10		
Salvias are very flammable, if you do not keep them clean and wash the foliage off occasionally. Just washing the leaves off every two weeks and keeping them tidy is enough to make them almost fire proof.						
Salvia			Bee's Bliss	10	5	tidy!
Salvia			Celestial Blue	12		very little fuel watered and trimmed = >60 secs.
Salvia			Daras Choice	50	3	
Salvia			Gracias	10	3	tidy! watered sample = 40 secs.
Salvia			Pozo Blue	see notes		young leaves = 30 secs. old leaves = 15 secs. trimmed and watered = >60 secs.
Salvia	apiana			20		on edge of watered area = >60 secs.
Salvia	apiana	compacta		10		

Genus	Species	Variety	Cultivar	live ignition (seconds)	dead leaf ignition (seconds)	notes
Salvia	brandegei			>60		very clean
Salvia	clevelandii		Alpine Cleveland sage	7-15		watered sample = >60 secs.
Salvia	clevelandii		Winifred Gilmam Cleveland Sage	15		watered = >60 secs., but erratic
Salvia	dorrii			>60		
Salvia	leucophylla			12		
Salvia	leucophylla		Pt. Sal	15		
Salvia	mellifera			20		
Salvia	mellifera	repens		>60		at edge of watered area
Salvia	munzii			>60		not even charcoal
Salvia	pachyphylla			>60		smells good!
Salvia	spathacea			15		summer deciduous, needs to be tidied. watered sample = >60 secs.

Genus	Species	Variety	Cultivar	live ignition (seconds)	dead leaf ignition (seconds)	notes
Salvia	spathacea		Powerline Pink	20		
Salvia	spathecea		Las Pilitas	>60		
Sambucus	caerulea			>60		
Sambucus	mexicana			>60	1	keep tidy
Satureja	douglasii			>60		
Satureja	mimuloides			10		
Scrophularia	atrata			>60		
Scrophularia	californica			>60		
Scutellaria	austinae			>60		
Sedum	oreganum			>60		water expelled from leaves
Senecio	douglasii			>60		leaves melted
Sequoia	sempervirens					
Sisyrinchium	bellum			>60		watered sample
Sisyrinchium	californicum			>60		watered sample

Genus	Species	Variety	Cultivar	live ignition (seconds)	dead leaf ignition (seconds)	notes
Solanum	xanti			>60		smells like bad goat cheese
Solanum	xanti	hoffmannii		>60		old pig smell
Solidago	californica			>60		some unsustained ignition
Solidago	canadensis	elongata		7-15		
Solidago	confinis			>60		
Sphaeralcea	ambigua			30	3	need to tidy
Spiraea	douglasii			5		
Stachys	ajugoides	rigida	Persnickety Pink	>60		
Stachys	bullata			>60		
Stachys	chamissonis			>60		
Stanleya	pinnata			>60		
Styrax	officinalis	fulvescens		7		watered sample
Symphoricarpos	albus	laevigatus		>60		
Tellima	grandiflora			>60		

Genus	Species	Variety	Cultivar	live ignition (seconds)	dead leaf ignition (seconds)	notes
Thalictrum	fendleri			>60	1	need to tidy!
Thuja	plicata			15		very oily
Toxicodendron	diversilobum			>60		held breath
Trichostema	lanatum			10		
Trichostema	parishii			10		
Umbellularia	californica			15		
Vaccinium	ovatum			>60		foliage melted
Venegasia	carpesioides			>60	1	
Vitis	californica			55	3	dead burning leaves go out after 5 secs.
Vitis	girdiana			>60		
Wyethia	ovata			>60	1	
Xylococcus	bicolor			45		varied from 15-60+ secs.
Yucca	whipplei	percusa		>60		
The California fuchsias are not flammable, but any of their debris is. Mow them down every December or January and you should be fine.						

Genus	Species	Variety	Cultivar	live ignition (seconds)	dead leaf ignition (seconds)	notes
Zauschneria	californica		Catalina	>60		
Zauschneria	californica		Ghostly Red	>60	5	debris doesn't carry flame
Zauschneria	californica		Pink	>60		
Zauschneria	californica		White	>60		
Zauschneria	californica	Uvas Canyon		>60		
Zauschneria	californica	mexicana		>60	10	
Zauschneria	cana			>60		
Zauschneria	latifolia	johnstonii		>60	15	
Zauschneria	latifolia	viscosa		>60		
Zauschneria	septentrionalis		Mattole River	>60	5	

Non-Native Grasses and Weeds

The numbers explain why brush fires slowly spread in comparison to grass/weed fires. Grass/weed fires can kill you. Look at it this way (and there are no absolutes in nature): when a field is in annual grass and mustard, and the ignition time per plant is almost instantaneous, you'll get what appears to be area ignition. On the Las Pilitas fire we had an area by Santa Margarita Lake where the fire moved through miles of grass in a few minutes. You can't outrun something that basically blows up.

Brush burns at, on average, 45 seconds per plant and makes a very hot creeping fire,(with some dramatic flashes); you can't be within one hundred feet of it and be comfortable, but you can usually move to one side or the other. Houses can tolerate a great deal more heat than humans and can be undamaged in spectacular fires. In contrast, if you have weeds in brush, you get a very fast, erratic, spotty, and hot fire.

In fire training one of the points they drilled into the concrete of our heads was, "firemen rarely die in brush fires...all the recent deaths in California have been in grass fires".Back in the 1980's during the Chispa fire we (volunteer and paid firefighters) were back-firing into the main fire to stop it. We could not light the brush; the torch made a fire ball in the brush, and it would go out and not stay lit. After about thirty minutes of this frustration (hey, we were exhausted and a little slow) we figured out that if we looked for weeds (mostly annual grasses), we could light them and they would light the brush. That worked!

Plant	state of plant	ignition speed in seconds	comments
Annual grass (Bromus diandrus)	dead since May	instant, so fast impossible to time. Whole plant gone in a second.	weed control is very important

Melilotus	dead Yellow Sweet Clover	2	these can be big plants
Mustard	fields of dead mustard	3	
Star Thistle (Centaurea solstitialis)	dead	2	the back of one of the parcels was covered with this, 30 foot flames, looked like oil fire

Typical non-native landscape plants. These are not NATIVE!			
Plant	**Live leaf ignition (in seconds)**	**dead leaf ignition (in seconds)**	**Notes (times in seconds)**
Abelia	30		watered planter in Atascadero, California
Apple, Improved Pippin Here's how many different apple varieties have grown here.	30-60	2	very variable, this one was watered regularly. Under drought, is flammable
Blackberry	50-60		regular water
Bottle bush (Callistemon)	12		regular water on drip
Bottle Tree(Brachychiton)	>60		regular water
Buddleja davidi ('Butterfly bush')	5		very flammable in watered greenhouse, this was a WOW one, looked so moist, burned real fast

Cistus villosa	new growth 45, old growth 10		watered planter in Atascadero, California
Cotoneaster, groundcover	>60		watered sample from SLO (San Luis Obispo)
Cotoneaster, shrub	10		watered sample from SLO
Day Lilly	>60		dead material does burn
Elm, Chinese	30		watered sample from SLO
Eucalyptus, Red Flowering Gum	15		these can be big trees and make spot fires for a mile or more.
Eucalyptus, Red Gum	5		watered sample from SLO, "
Gamolepis daisy	>60		watered planter in Atascadero, California
Gazania	>60		these accumulate a lot of dead material that is very flammable.
Grape, Thompson Seedless	>60	3	hygiene is important
Ivy, Algerian	20		In a watered flower bed. A little wind, drought, and slope, this would be interesting.
Juniper, Pfitzer	15		hot fast fire
Lavender, English	20		dead stuff lights easily, live stuff burns easily all year.

Lavender, Hidcote	20	1	dead stuff lights easily, live stuff burns easily all year.
Lavender, Munstead	>60	1	dead stuff lights easily
Lavender, Spanish	>60	1	live foliage with breeze = >30 dead stuff lights easily
Lemon Verbena	5		some of the tropical stuff ignites readily
Lilac, common	3		plant was very dry, I've seen similar in dry gardens
Myoporum parvifolium	>60		watered sample from SLO
Nandina	10		watered planter in Atascadero, California
Oleander	10		on drip
Peach, Elberta	45		regular water
Pear	20		very lush and regularly watered.
Persimmon	>60		looked lush and had regular water
Pittosporum Tobira	7		
Plum, Santa Rosa	15		looked lush and had regular water

Quince, Pineapple	30		looked lush and had regular water
Raphiolepis sp.	12		watered planter in Atascadero, California - popped and snapped
Thyme (Thymus sp.)	<60		

Mulch	time to ignite for sustained 5 seconds
dry Chipped Cedar leaves	1 sec. -flame height six inches
dry Redwood shavings	1 sec. -flame height one inch
dry Oak and Pine chips	10 secs.- flame height one inch. Pieces too large and random to lay flat
dry Shredded redwood bark	loosely laid single grind = 15 secs.- flame height 3 inches. properly laid single grind = 20-30 secs.- flame height one inch. (the sticks ignite) loosely laid double grind = 15 secs.- flame height 2 inches. Properly laid double grind = 60 secs.- flame height one inch. Mulch needs to lay flat and compact with no twigs or debris (a heavy watering at application will help accomplish this) Dry shredded redwoodbark should not run up to structure. Embers will ignite in fire storm, but flame heat is so low vegetation seldom ignites.

Materials. Don't forget the fence, deck and siding.

Material	time to ignite for sustained 5 seconds
1X cedar board	35 seconds

daily newspaper laid flat	5 seconds
cardboard	1 second
stained 1X pine	5 seconds
1X redwood	50-60 seconds
1X linseed treated (cured) redwood	10 seconds
9/16 plywood	30 seconds
1X4 and 2X4 doug fir	30 seconds

In conclusion, you want to work towards a weed-free landscape, with no leaves on the roof, no flammable wood furniture or lath type structures near the house, and no wood shingles or any other flammable item within thirty feet of the house. Picture a hot day with 20 mph winds and a helicopter flying over your home throwing out buckets of lit matches. Hygiene is the most important thing to remember.

Really stupid things cause most problems in a fire situation; that corner of the yard that you never weeded, where you left the old cardboard box and tree trimmings, the rattan furniture under the bamboo overhang, and the rabbit that was on fire and ran under your lath- covered deck.

Choice of plant material matters; native plants are generally less flammable than non-native plants. For many species, watering makes no difference. Mulch is ok as long as it doesn't run right up to within about a foot of the house. The trade off is the mulch can smolder and cause some heart burn, but the plants will have better moisture retention and be less likely to burn.

A fire landscape should contain only enough plants to stabilize the site. Be very limited in plant material; rocks and concrete do not usually burn. Decomposed granite walkways are a wonderful addition to a native plant garden.

Plan on not having any water during a fire, even for months leading to a fire. It's common for the power to go out in fire areas along with water pumps and for the fires to occur during water rationing. In urban interface areas it's also common for all the people a mile ahead of the fire to water their houses down and the water not to be available to homes nearest the fire. On one fire we pulled the engine up to a hydrant on one of the higher streets, hooked up the hose, turned on the hydrant to listen to a sucking sound as our hose went flat.

Cohen, Jack. Structure Ignition Assessment Model (SIAM), USDA Forest Service Gen. Tech. Rep. PSW-GTR-158. 1995.