The Next Major Fire in the East Bay Hills

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by David Maloney

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On September 27, 2013, the U.S. Forest Service AMSET unit released an analysis that said the removal of Eucalyptus trees from the East Bay Hills would increase the risk of fire.

In 1987 I was severely burned fighting a fire in Oakland. I know that unimaginable pain. Both my hands received moderate and severe second-degree burns. I have carried a scar from that burn for 28 years. It will be with me for the rest of my life. Every time I hear of a firefighter being burned to death, I go into a depression that lasts for hours. I know the pain that young man or woman went through in the beginning stages of his or her death. This article is dedicated to those firefighters who have lost their lives in the line of duty, and to those who will lose their lives if The University of California at Berkeley (UCB), East Bay Regional Parks District (EBRPD), and the City of Oakland are allowed to implement their plans to cut down approximately 500,000 trees in the East Bay hills.

The next fire in the East Bay Hills has the potential of killing more than 1,000 people and destroying over 100,000 homes if the above three publicly funded agencies are allowed to enact their fallacious "Fire Hazard Mitigation Plans" — which in reality are plans to remove non-native trees from the East Bay Hills under the guise of reducing the risk of fire. These plans are exploiting the tragedy of the 1991 Oakland Hills Fire to achieve an objective which is not related to fire science or wildland fire prevention.

The plans:

- ignore the U.S. Forest Service recommendation **not** to remove Eucalyptus trees.
- ignore the recommendations made by the 1991/1992 Task Force on Emergency Preparedness and Community Restoration, commonly known as the Oakland/Berkeley

Mayors' Firestorm Task Force, of which I was a member.

- have no basis in fire science.
- violate fundamental principles of Wildland Fire Prevention.
- are ideologically motivated.
- create the conditions for a perfect firestorm.

This firestorm could destroy all of Oakland down to the 880 freeway, (The Montclair district of Oakland, with its delightful Montclair Village shopping area, could be incinerated, and the Claremont Hotel would not be saved in this fire.) All of Berkeley down to Fourth street could be burned, as well all of Piedmont, Albany, El Cerrito, most of Richmond and Emeryville, all of San Leandro, Hayward, Castro Valley and Fremont.

This fire would not be restricted to the west side of the East Bay hills, but could, for the first time, due to the removal of hundreds of thousands of trees, move down the east side of the hills to incinerate Orinda, then move deep into Contra Costa County, consuming Lafayette, Moraga, Walnut Creek and Concord. While burning to the East it could also spread south and destroy Alamo and Danville.

Unlike the cities on the Alameda County side of the Caldecott Tunnel, the cities on the Contra Costa County side cannot even hope to receive the cool air that comes through the Golden Gate most nights, which would lower the temperature of the fire, thereby allowing firefighters to contain it. This cool air will be blocked by the East Bay hills.

Tens of thousands of people will be forced to evacuate their homes. Freeways would be clogged. People will have to abandon their cars and run down the freeway between the rows of stalled vehicles, carrying only the possessions they could flee with. A valiant attempt will be made to stop the fire at the intersection of freeways 680 and 580 near Dublin, and use all of 580 as a fire break. This attempt will fail, just as highways 13 and 24 in 1991 failed to stop the Oakland Hills fire in 1991. The fire will jump 580 and continue south, consuming Dublin and Pleasanton, then continue further South, East and West to become the worst catastrophe in American history.

This is **not** doomsday science fiction. *This happened in Australia on February 7, 2009*, the day the Black Saturday Fires began. The Black Saturday Fires consumed 1,100,000 (one million one hundred thousand acres), 750 times more land than was burned in the 1991 Oakland Hills fire. The Black Saturday fires destroyed 25 towns, killed 173 people and released the energy equivalent of 1,500 atomic bombs exploding.

In Australia, logging had replaced forests with grasses, and chaparral, (land covered with bushes and shrubs, which are woody plants. Australians use "bush" for what we call chaparral). This is

exactly what the three above agencies want to do here. These taxpayer funded agencies want to convert our East Bay forests into the same predominantly grass, and chaparral terrain of nearby rural Lake and Amador Counties - where the disastrous Valley, Rocky and Butte fires occurred in the summer of 2015. These fires burned 76,067, 69,438 and 70,868 acres, respectively, destroyed many homes and buildings and killed six people.

The EBRPD, UC Berkeley (UCB), and the City of Oakland (Oakland) deforestation plan will create an enormous belt of grass and chaparral that will stretch from Richmond to Castro Valley to the eastern edge of Contra Costa County. This grassland belt will be many times more flammable than wooded terrain. In Australia, the Black Saturday fires occurred 30 miles from Melbourne, in land that once was rife with trees.

Australian fire scientists, after an exhaustive two year study, concluded that logging, which removed moisture collecting trees from the terrain, contributed greatly to the devastation caused by the fires. This was reported in the August 3, 2014 Melbourne Herald Sun: which stated,

"Professor David Lindenmayer, Australia's leading scientist of forest ecology said, 'Our findings show the severity of the fires on Black Saturday was significantly higher in the areas that had been logged.' The scientists say the study showed conclusively that logging prior to Black Saturday made the deadly blaze much more extreme."

On April 21, 2009, two months after the Black Saturday fires began, and one month after they were suppressed, the Australian Royal Commission investigating the fire issued the following findings, reported in The Herald Sun:

"The heat of the fire reached 100,000 kilowatts per meter. The maximum intensity at which a forest fire can be controlled is 4,000 kilowatts per meter. Not only the intensity of the fire, the heat of the fire, but its speed was phenomenal. Black Saturday's 173 victims were defenseless in the face of an inferno that created fireballs of atomic force."

The energy created by the Black Saturday fire was 1,500 times greater than the energy of the Atomic bomb dropped on Hiroshima — It was equivalent to 43 pounds of TNT exploding in each square yard of the one million one hundred thousand acre fire. (For comparison, the Oakland Hills fire burned 1,500 acres; the equivalent of two Hiroshima sized atomic bombs.)

The April 7, 2009 issue of the Sydney Herald reported, "Kevin Tolhurst, a professor of Fire Ecology at Melbourne University, concluded a study that showed that wind speeds generated by the fire reached 170 kilometers per hour (75 miles per hour). This accounted for the incredible speed of the fire."

This is the future that the East Bay Regional Parks District, U.C. Berkeley and Oakland have in store for us.

The massive destruction that would occur would not be restricted to Alameda County. In Contra Costa County well known buildings and businesses would be destroyed, including: Macy's, Nordstroms, Traders Joes, Whole Foods and Safeway in downtown Walnut Creek; the Orinda theater; Whole Foods, Safeway, Big O Tires, Peet's Coffee in downtown Lafayette — and all other businesses. The jobs they provide will disappear. This catastrophe would not only destroy the economy of the Bay Area, but also have an immense cost in human suffering.

"False facts are highly injurious to the progress of science, for they often endure long."
- Charles Darwin

We constantly we hear from people with no training or experience in Fire Science — whose actual goal is to "restore" the East Bay hills to how they appeared in 1776 — how dangerous Eucalyptus trees are.

In an interview with Lucy Kang of KPFA, broadcast August 14, 2015, representatives of the Sierra Club, EBRPD and the Claremont Canyon Conservancy claimed that removing half a million "non-native" trees and "restoring" the land to its what it was like in 1776 would make us all safe from wildfire.

Carolyn Jones, Public Information Supervisor for the EBRPD said, *"Removing these trees would make us fire safe. Historically speaking the East Bay Hills looked much like, um, the other hills in California, mostly grassy with pockets of Oak groves and, you know, riparian streams and so forth."*

In other words, deforest our public land and convert it into hundreds of thousands of acres of grass fields — duplicating the vegetation of Lake and Amador counties where the disastrous Valley, Rocky and Butte grass wildfires occurred in 2015.

Michelle Myers, Director of the San Francisco Bay chapter of the Sierra Club said, "*We firmly believe the best way to encourage a healthy and vibrant ecosystem that is also fire safe is to allow the native grasses, the native chaparral, the riparian habitat, allow that to come back. That will be much more fire resistant."*

The California Chaparral Institute, the foremost authority on chaparral in California, contradicts Meyers and Jones. It states on its website, **"There is no question chaparral provides the**

perfect fuel for wildfires." And, "Being dense, impenetrable and prone to infrequent, huge wildfires is the natural condition of chaparral." And, "There is no question chaparral is extremely flammable, especially during dry weather conditions."

Ms. Myers also described what she thinks happens if a Eucalyptus tree catches fire. *"When they light, the fire goes up and creates something called a crown fire."* The implication that a tree fire automatically generates a crown fire is not true. "Crown fires need strong winds, steep slopes, and a heavy fuel load to keep burning." (U.S. Forest Service, Fire and Aviation Management Web Site) Any species of tree with crowns is capable of supplying fuel for a crown fire.

Ms. Myers also didn't say which species of Eucalyptus she was talking about, or mention that there are three different species predominant in the East Bay Hills, or that there are over 700 species of Eucalyptus in the genus of Eucalyptus, all with different flammability levels. She lumped them all together. She also implied that only Eucalyptus trees throw off embers. In fact, trees of all species throw off embers when on fire.

Ms. Myers, a representative of an environmental organization, and Ms. Jones, a public information officer, were being asked fire science questions, which was unfair to both of them and clearly outside of their area of expertise.

In the early 1960's the California State Fire Marshall's office described a group of people who were making erroneous pronouncements about fire prevention methods, and who were members of well known organizations, by saying, "they typified opinionated misinformation being spread by those with quotable positions."

It is mind boggling that in the San Francisco Bay Area, a place with so many institutions of higher learning, and rich in intellectual resources, such a lack of knowledge of fire science by public servants and leaders of well known environmental organizations can exert so much influence; an influence which threatens public resources, public safety and exponentially increases the probability of a mega disaster. Have any members of the organizations represented in the KPFA interview taken a fire science course, fought a fire or received training to prevent a wildland fire? Why does the media ask environmentalists questions that can only be accurately answered by wildland fire prevention personnel? And shouldn't the U.S. Forest Service analysis released on September 27, 2013, be prominently mentioned in this crucial controversy?

"*It is difficult to get a man to understand something when his salary depends on his not understanding it*." - Upton Sinclair

Michelle Myers and Carolyn Jones don't understand the basics of wildland fire science and that our world is very different than the world of 1776. Today, ten million people live in the Bay Area, as opposed to about a thousand in 1776. Two and one half million people live in the East Bay, where there are hundreds of thousands of buildings and residences which weren't here in 1776. This residential and commercial building density represents a tremendous fuel load. If a fire advances into this fuel load there will be no stopping it. What they and many other people also don't understand is that grasses and chaparral are much more flammable than trees, and that one species of Eucalyptus, the Blue Gum, (*Eucalyptus Globulus*,) which is prevalent in the East Bay hills, **is highly fire resistant** - much more fire resistant than any "native" tree, other than Redwood or Douglas Fir.

All trees perform three vital functions in preventing or slowing the spread of grass and chaparral fires: they collect, with their leaves, moisture from the night air and drip it on the natural vegetation beneath them; the tops (canopies) of the trees create shade so this moisture is not evaporated by the sun by mid day; they act as windbreaks which slow the velocity of the wind that pushes grass and chaparral fires.

Removing trees of any species and wanting grasses and chaparral to replace them greatly increases the chance of a catastrophic, unstoppable fire.

The plans of U.C. Berkeley, the City of Oakland and EBRPD are Catastrophically Flawed because they contain fundamental errors that would not reduce wildland fire hazard but create the conditions that would dramatically increase the likelihood of a severe fire in the East Bay Hills.

a. These plans completely ignore the importance of moisture in precluding, and/or modifying the size and scope of a wildland fire. The wetter grasses are, the harder it is for them to catch fire, and remain on fire. The West, Alameda County, side of the East Bay hills directly faces the Golden Gate and/or San Francisco Bay. The leaves of the approximately half a million trees the plans would cut down, collect about 20 inches of moisture a year *per tree* from the fog and cool air that comes through the Golden Gate and over the Bay, then drip this moisture on the ground and grasses beneath the trees. Every night of the year these trees collect and drip moisture on the ground. The annual rainfall per year is 24 inches in the East Bay HIlls; each tree almost **doubles** the amount of water dropped on the grasses beneath it per year. Remove these trees, and the grasses beneath them dry out by mid-day in the spring, summer and early fall. This will be especially devastating in drought years.
b. These trees also produce shade which prevents the sun's rays from evaporating moisture on the grasses.

c. Additionally, these trees act as windbreaks, dramatically slowing the spread of a fire should one occur. UC Davis, in an article about Eucalyptus, states, they are "an excellent wind break."

Moist living trees will be logged and left on the ground to dry out and decompose. These dried logs, coupled with the dry grasses and chaparral in the hills, will become the most explosive fuel available in a wildland fire. *The plans creates the conditions for a perfect firestorm.*

NOTE: The East Bay Municipal Utility District (EBMUD), which supplies water to Alameda and Contra Costa counties, practices sound wildland fire prevention policies. It refuses to cut down any healthy tree, "native" or "non-native," because it recognizes the value of the moisture collected and dripped by these trees on its property. Its wildland fire mitigation practice is to clear the grasses, brush and shrubs beneath its trees.

EBMUD is also well aware of the enormous amount of water needed to fight a fire. Modern fire engines pump eighteen hundred gallons of water per minute onto a fire. Three hundred seventy fire engines were used to fight the Oakland Hills fire in 1991, which had a perimeter of 5.25 miles. ("Oakland Hills Fire - An Overview" by Captain Don Parker, Oakland Fire Dept Office of Fire Services) The amount of water used by these fire engines was almost *forty million gallons per hour.* If hundreds of thousands of trees are cut down, the next fire will be much larger than the '91 fire, and require many more fire engines. This will increase, by millions of gallons, the amount of water needed to attempt to contain and suppress it. Water supplies are becoming chronically short in the California and the East Bay. We cannot allow unsound, unsafe actions that pretend to be wildland fire prevention strategies but actually *increase* the chance of wildland fire which will further deplete our water supplies.)

The EBRPD, UCB and the City of Oakland display a tremendous lack of knowledge of wildland fire science. Instead, they share a seemingly fanatical desire to eradicate any species of tree that wasn't here when the Spanish sailed through the Golden Gate in 1776. They are exploiting the public's fear of wildfire and misrepresenting fire hazard mitigation as a strategy to achieve their goals.

One example of their true intentions is revealed by their refusal to tell the public that the California Bay Laurel tree, which they consider "native" to the Bay Area has more volatile oil than any Eucalyptus tree. For years we've been hearing that the volatile oils of the Eucalyptus trees make them a supreme fire hazard. Yet *the Bay Laurel contains 7.6% volatile oils of the samples tested,* according to the Journal of Agricultural and Food Chemistry (1974). The amount of volatile oils in Eucalyptus trees range from 1 to 7% of the samples tested. But no Bay

Laurel trees are to be cut down — nor ever mentioned. Only trees labeled "non-native" are discussed and targeted for elimination.

Again, it's important to emphasize — because the proponents of the deforestation plan repeatedly ignore or misrepresent well documented, publicly available official reports — ***The 1991 Oakland Hills fire originated in grass and brush (a dense growth of bushes.) This grass and brush fire ignited trees and residences. As this was happening the fire was expanding its perimeter, igniting more grasses, brush, houses and trees. The Oakland Fire Dept. then declared the fire out of control. House fires burn at about 1,500 degrees for about an hour. The heat and embers radiating from the house fires ignited still more trees. This began a chain reaction of trees igniting houses and houses in turn igniting more trees.***

The Oakland Hills fire of 1991 was not slowed down by fire suppression. It was slowed down by cool night air coming in through the Golden Gate, and the natural decrease of air temperature associated with night. (It's a law of thermodynamics that heat always travels from a higher source to a lower source.) This mass of cold air drew heat from the fire, which caused it to dramatically decrease its rate of spread to the point that fire suppression could contain it.

People in Contra Costa county will **not** receive any cool air coming through the Golden Gate. The Contra Costa county side of the our East Bay hills faces away from the Golden Gate and San Francisco Bay. *Almost always, the Alameda County side of the hills acts as a barrier, preventing Contra Costa County from receiving the cool air and fog from the Golden Gate and San Francisco Bay* . And the night temperature in Contra Costa county from April through mid November is almost always significantly higher than in Alameda County. This is why Contra Costa is at very high risk if the deforestation plan is implemented. A large fire in Contra Costa will not get the benefit of nature's nocturnal help.

The 1991 fire initially was pushed southwest, away from Contra Costa county, by strong winds coming from the northeast. But the fire became a firestorm, which is a fire so large that it generates its own winds. The fire, pushed by its own wind, started moving outward in all directions, including toward Contra Costa County. This fire-generated wind reached a speed of 29 miles per hour. ("Fire-Induced Winds in the 20 October 1991 Oakland Hills Fire," by J. Trelles and P. Pagni) As night fell the movement of fire from Oakland toward Contra Costa was slowed, as mentioned, by the cool air coming through the Golden Gate, and a significant decrease in air temperature in Oakland.

But the speed of grass fires can be at least twice that of fires that involve trees, especially if there are only a few trees, or none, to act as windbreaks. So If there had been no trees, or only a few, on the hillsides and ridgeline of the East Bay Regional Park in 1991, it is quite possible that the

‘91 fire would have reached Orinda and other cities in Contra Costa County *before* the air on the Alameda side of the hills cooled it to the point that it could be contained, and restricted, to the Oakland side of the hills.

(The distance between Oakland and Concord is almost eighteen miles. If the cool night air and trees had not slowed the ‘91 fire from its 29 mph wind speed, it had the surreal and shocking possibility of arriving in Concord from Oakland in a little over one half hour. This would have been a worst case scenario. But surreal and shocking worst case scenarios became realities in the Black Saturday Fires which reached wind speeds of 75 mph. In any event, due to variables inherent in firestorms, the fire would have reached Concord no later than five to six hours after crossing into Contra Costa County.)

Any living tree, no matter what its species, is much less flammable than grass and chaparral. Every living tree due to its moisture content and canopy coverage of ground fuels contributes to wildfire hazard mitigation. Every living tree is composed of at least 35% water. The amount of water in dry grass is about 1/100 of 1% -almost zero per cent - of its total volume. Every living tree is a reservoir of water. Living trees contain thousands of times more water than dry grasses. It is folly to cut down living trees and allow dry grasses to replace them.

“In grass fuels, moisture content is a critical factor in determining flammability. Fires spread only at a low rate, or not at all, in grasses that are green, but when the same grasses become cured and dry, fires will race through them at an extremely rapid rate.” - National Fire Protection Handbook (NFPA).

“Live trees contain a great deal of moisture while dead logs contain very little. Lighter, thinner fuels such as grasses, leaves, and needles quickly lose moisture and therefore burn rapidly.” - San Diego Wildfires Education Project

Every living tree in the world is composed of at **least** 35% water year round Most trees are composed of 50-65% water year round. Trees are small reservoirs of water. Grasses contain no water in the summer. The smallest Blue Gum Eucalyptus tree (Eucalyptus Globulus) - the species of Eucalyptus prevalent in the East Bay Hills - contains at its driest, over 1,400 pounds of water. The largest Blue Gum trees contain, at their driest, over 3,200 pounds of water.

Eucalyptus trees are the main target of those who would cut down trees and put us in grave danger. (They use the “blue car” propaganda tactic, which is explained later in this article.) They claim that Eucalyptus trees are more flammable than other trees — and more flammable than grasses — is untrue and now dangerously misleading. *There is not one shred of fire science to support this claim.* The beginnings of this myth coincided with the founding of the

California Native Plant Society in 1965. It has been repeated so often, it is now taken by many as fact. The reality is that one genus of tree, the Eucalyptus, which has over 700 species, is being targeted for removal by "native" plant extremists. Their strategy? Concoct, repeat, and sell to the public the falsehood that it is the only tree on Earth that explodes in fires, the only tree that throws embers long distances in fires, the only tree with volatile oils, and so on.

Let's dispel these myths. All species of trees can explode in fires. Put into the YouTube search bar "exploding trees in fires." You will see olive trees, pine trees and other species of trees exploding when on fire. Type into your browser search bar "eyewitness trees exploding in fires" to read eyewitness accounts of trees from all over North America exploding in fires.

Natural vegetation is what fire scientists call grasses, shrubs, brush and trees. All natural vegetation, when on fire, throw burning embers. No species of grass, shrub, bush or tree has a monopoly on this. And, it is important to note, **all** species of trees can throw burning embers long distances.

Saying that the volatile oils in Eucalyptus trees make it highly flammable is the biggest stretch of truth, and maybe the most glaring example of a word or phrase being misused with the intent of eradicating Eucalyptus trees and scaring the public to accomplish what the truth won't allow - removal of Eucalyptus trees.

Volatile oils have nothing to do with the flammability of a tree. Sound counterintuitive? Volatile oils and essential oils are two terms that are synonymous and represent the same oil in a plant or tree. **The essential oil of any tree or plant is named that because it's essential to the fragrance of the tree or plant. The same oil is also called volatile because after going through manufacturing processes it is turned into a flammable liquid**. Terpene is a very common essential/volatile oil. After going through a manufacturing process it becomes turpentine.

Why are the essential/volatile oils of any tree irrelevant to the flammability of a tree? Because of the moisture content in all trees, the thickness of their bark, and the density of their wood, most tree species require 800º to 1200º F (Fahrenheit) of heat to ignite. A few, like the Redwood tree, Douglas Fir and Blue Gum Eucalyptus can withstand more than 1500 F heat if the fire moves rapidly past them. All trees contain water — approximately 30% of a tree is water. Every species of tree in the East Bay hills is at least 30% water. This moisture is far greater than the amount of essential/volatile oil in any tree. It overwhelms by far any chance the essential/volatile oil has to set the tree on fire.

Also, the volatile/essential oil in any tree cannot sustain heat long enough to ignite the highly dense wood of the tree. (There is an inverse proportion between temperature and amount of time it takes for all combustibles, including trees, to catch fire. The lower the temperature the longer it must be applied to a tree; the higher the temperature the less time is needed for the tree to catch fire.) This is an evolutionary mechanism that trees developed to survive. The amount of essential/volatile oil in a Eucalyptus depends on what species of Eucalyptus is being sampled. Across the 700 species of Eucalyptus the range is between 1% to 7.0% As stated previously, the California Bay Laurel tree contains approximately 7.6% volatile oils.

Additionally, essential/volatile oils rise to the top (the canopy) of trees as the air temperature of the day warms, or as the heat of a fire approaches the tree. In non-mountainous regions like the SF Bay Area, (where lightning strikes are more extremely rare), the canopy (top) of a tree catches fire because a fire ascends the tree from its trunk or branches. In other words the tree is already on fire before its essential/volatile oils are involved.

If the top of any tree is going to catch fire before its lower parts, it's usually due to lightning. The amount of energy in a lightning bolt that strikes the top of a tree is so great that it dwarfs the ability of the wood of the tree to withstand it. The wood catches fire first and *then* ignites the tree's essential/volatile oils. So even at the top of the tree the volatile oils are irrelevant in the tree's ignition. In the East Bay Hills we don't have to worry that lightning will ignite the canopy of a tree. The assertion that the essential/volatile oils in Eucalyptus trees make their canopies more flammable than other trees is nonsense.

Sometimes in a wildland fire burning embers from grasses, brush, shrubs, or trees are swept by wind onto the tops of other trees and ignite them. *This can happen with any species of tree.* Additionally, burning houses in the wildland/urban interface, such as we have in the East Bay, make major contributions in terms of size and quantity to the total amount of embers. We learned this from the 1991 fire.

Constantly pretending that characteristics common to all trees are unique to Eucalyptus trees is like saying, "If a blue car crashes into a house at 100 mph, the damage to the house is because the car is blue." Any car hitting a house at 100 mph is going to do extensive damage regardless of its color.

The propaganda used against the Eucalyptus is three-fold.

1) There are more than 700 species of trees in the genus *Eucalyptus*. Lumping all 700 *Eucalyptus* species into one category is like saying all fish in the ocean are one species with the same characteristics and attributes. Each species of Eucalyptus has different

characteristics and attributes. For example: *Eucalpytus globulus*, the Blue Gum species of the genus *Eucalyptus*, is highly fire resistant. Mature trees are tall, ranging from 80 to 150 feet. Its bark is thick and moist, and its lowest branches start about 25 to 30 feet above the ground. It has long, relativity broad leaves that collect much moisture from the air and drip in on the ground beneath. It is dominant in the East Bay hills.

(We have many pictures of Blue Gum Eucalyptus trees surviving wildland fires while others species of trees labeled "native" were incinerated. One of the most dramatic examples of this phenomenon are the photographs we have have of Blue Gum trees alive and well after enduring the heat of the Scripps Ranch fire in San Diego, CA, in 2003. Everything around these Blue Gums has been incinerated. We have another profound picture. This is of a Blue Gum that withstood the 2000 degree heat of the '91 Oakland Hills Fire, standing tall and alive while all around it trees "native" to the Bay Area have been reduced to ash.)

The Dwarf Blue Gum, *Eucalyptus compacta*, is not as fire resistant. It is short, about 25 to 30 feet tall and its branches grow low to the ground. Yet it is still more fire resistant than any grass, brush or shrub. But lumping these two very different species together to condemn both is convenient if your goal is to get rid of trees that weren't here in 1776.

2) Deliberate use of militant language that strongly biases discussion thereby disallowing reasonable discourse. Any species tree that wasn't here in 1776 is labeled "non-native" — and then "invasive." A tree that *was* here in 1776 is "native." "Invasive" trees "encroach" on "native" tree land. This use of militant language to describe Eucalyptus trees began around the time the California Native Plant Society was formed. Choosing the date of Europeans arrival into San Francisco Bay as the determinant of whether a tree is "native" or "non-native" is arbitrary and has nothing to do with a scientific determination of its flammability.

3) Omitting information needed to have a balanced viewpoint. For example, let's enter a pretend world where we all know that cars exist but we don't know much about cars. Then a group of people who hate the color blue assert, "All blue cars are very dangerous. Blue cars can go 100 mph and when they crash horrible things happen. Their hoods crumple and they can even crash at 10 mph. Their tires go flat at inopportune times. They can run out of gas. If you make a turn going too fast they will flip over, their engines quit without warning, they crash into other non-blue, safer cars. And they kill people.

We don't know about cars in our pretend world so we believe what we are told, and assume only blue cars have these characteristics, when in fact all cars do.

The Eucalyptus trees are like the blue cars. When they catch fire they react like all trees do. But most people understandably don't know the details about what happens to trees when they catch fire. And they don't know there is more than one species of Eucalyptus trees in the East Bay hills. *The public has been bombarded with misinformation for over fifty years* and believes trees are more flammable than grasses, that all Eucalyptus trees are one species and that Eucalyptus trees have fire characteristics different from and more dangerous than other trees.

We have many examples of facts destroying myths. California's Oak trees, which were here in 1776, have branches lower to the ground than Blue Gum Eucalyptus tree and are therefore more likely to be ignited from grass and shrub fires. Almost all the Oak trees in the Oakland Hills fire of 1991 were burned to ash, while many,many Blue Gum Eucalyptus with their longer trunks, thicker moist trunks, and branches high from the ground survived the fire. There is photographic evidence of this, showing Blue Gum Eucalyptus trees alive and standing tall after fire burned all the neighboring Oak Trees and houses to a crisp.

The people who want all trees that weren't here in 1776 removed like to state that Eucalyptus trees drop strips of bark to the ground which are flammable. *This is another red herring used to divert attention away from fact.* Singling out eucalyptus litter with such statements is propagandistic, designed to mislead and frighten the public. It is the "blue car" tactic. And It doesn't differentiate the species of Eucalyptus. It lumps all the 700 plus species of Eucalyptus into one. *All trees drop litter onto the ground that is flammable.*

In many cases the strips of bark the Blue Gum and Red Gum produce and drop on the ground are less flammable than the litter that "native" trees produce. Why? Because they are thicker, so it takes more heat for them to catch fire. For practical purposes though it can be said that the litter that all trees in the East Bay produce are equivalent in flammability, including the litter "native" trees produce.

The U.S. National Park Service confirms this when, describing how a ground fire burns tree litter on the forest floor, eliminating for several years the litter's capability to fuel a fire states:

"In five to eight years enough litter can accumulate in a forest to return ground quantity fuel to the pre fire level."

The U.S. Forest Service doesn't differentiate species of trees when talking about how litter can fuel a fire. In other words, *all* tree species produce litter that is fuel for a fire.

It takes about 6-8 years for Eucalyptus strips to accumulate to the point that they pose a fire threat. But during this same time grasses, brushes and shrubs are growing at a much faster rate.

An inexpensive plan that would preserve our forests is to have crews go and clear out the brushes, shrubs, bark strips, fallen branches (inevitably dried out) and dead leaf litter from *all* trees. It would also be environmentally safe. (The Environmental Impact Statement for the City of Oakland, U.C. Berkeley, and EBRPD plans lists toxic Dow Garlon™ and Monsanto Roundup™to be applied twice a year, for up to ten years, *or more, as needed*, to tree stumps to prevent them from re-sprouting. These thousands of gallons of herbicides, will leach into the ground water, and then the Bay.)

The highly fire resistant Blue Gum eucalyptus is very efficient at using water. (This is another pin in the balloon of misinformation that has been spread for 50 years.) The Blue Gum evolved in Southeastern Australia where there is little rainfall and six or more grass fires a year. To survive, it evolved fire resistant qualities and an efficient use of water. It is, ironically, not only highly fire resistant, but is perfectly adapted to survive in California in drought years. It will fare better than many "native" tree species. Many "native," trees, particularly oaks, due to the drought, are drying out, causing their branches to crack and fall to the ground to become kindling for any fire. The plan would cut down almost one half million eucalyptus trees that retain more moisture than many "native" tree species.

For over 50 years the people who want to get rid of trees based on their species have had a monopoly on dispensing information. Few challenged what seemed a harmless eccentricity. Now, however, it is serious misinformation that endangers our precious forests and public safety.

(On a side note: Eucalyptus trees were brought here in 1850, 170 years ago. At the same time Monterey Pine trees were brought by settlers from Monterey county, 80 miles south of San Francisco to the SF Bay Area. Monterey Pine is "non-native" because it originated in Monterey county, 80 miles south of the East Bay! Because neither species originated in the SF Bay Area the California Native Plant Society and its allies refer to Monterey Pine and Eucalyptus as "invasive." How many years does a tree species have to be here before it's considered "native"? Is this whole "native" vs. "non native" tree schism getting silly?)

"The National Fire Protection Association (NFPA) is a global nonprofit organization established in 1896 and devoted to eliminating, death, injury, property and economic loss due to fire, electrical and related hazards." Its mission is to "help save lives and reduce loss with information, knowledge and passion. Its "information and knowledge comes in many forms" including extensive "research and data analysis, technical training and certification." (From the NFPA's website.)

In the NFPA's Fire Protection Handbook, on page 13-61 of Volume II, it is stated, *"Cured (dry) grass, if present in large and uniform volume, provides the most flammable ground fuel in the*

region." The word region refers to any area any where in the world that is under discussion. The above statement was based on rigorous scientific research and analysis. And there are no conditions to the statement. No if, ands, or buts. It's a flat out truth. In Australia this fundamental principle was ignored and the results were disastrous. In the East Bay wildland/urban interface, where our population and housing density is much more than that part of Australia where the Black Saturday fires occurred, ignoring this principle will cause a devastating fire that will take years to recover from.

The role of trees and moisture in preventing wildland fires is so crucial it is worth repeating in the next three short paragraphs using slightly different language.

All living trees, regardless of their species, perform important Wildland fire prevention functions and are far less flammable than grasses.

1) Their leaves collect moisture from the air and drip it onto the ground. On the west side of the East Bay hills this is especially true. Trees there collect - from the fog and cool air coming through Golden Gate - and drip about 20 inches of moisture a year on the grasses underneath. (Average annual rainfall is 24" a year). Think of this moisture drip as rain. In drought years this moisture drip is especially important. Each tree removed represents an average loss of 20 inches of water dripped on the ground per tree each and every year.

2) The shade provided by the leaves and branches of the trees either prevents this moisture from being dried out by the sun, or on very hot days, significantly delays the time it takes for the grasses to dry. Without trees the grasses, especially in the East Bay, dry out by 10 or 11 AM. The grasses are then ripe for fire. With trees, in non drought years, the grasses are almost always moist. Without trees, the grasses will always be dry, whether or not it's a drought year. The role of trees in delaying or preventing the drying out of grasses is very critical.

Fire science has shown that the species of a tree is irrelevant in determining its flammability. The structure of a tree determines its flammability. This is why we have photos of Blue Gum eucalyptus trees alive and well and standing tall in the Oakland Hills Fire zone, while all around them Oak trees had been reduced to ashes.

In a landmark study by S.T. Michaletz and E.A. Johnson entitled, "Heat transfer Processes Linking Fire Behavior and Tree Mortality," it was proven that the flammability of a tree is determined by three characteristics of the tree, regardless of its species:

1) The thickness of its bark. This is important because any species of tree resists fire as long as its bark protects the inside of the tree. When the fire burns through the bark it

starts to burn the inside of the tree. That is when the tree succumbs to the fire, loses all of its moisture, then emits massive amounts of radiant heat and dies.

2) The amount of moisture in the trees bark. Moisture is water. The more water in a trees bark, the longer the bark can resist the damage caused by fire and the longer this "shield" can protect the life processes which exist inside the tree. The thicker the bark the more moisture it can hold. And the longer it takes for the tree to catch fire and produce massive amounts of radiant heat.

3) The height from the ground of the lowest branches of a tree. Ninety-nine percent (99%) of the time trees catch fire is because they are ignited by grasses, bushes, shrubs, or, in the wildland/urban interface, houses. Every blade of grass in a grass fire has what's called a "flame length." Every bush and every shrub on fire also produce a flame length. The flame length is the height of the flame produced by the burning fuel. Grasses in a grass fire and brush in a brush fire can ignite tree branches. The higher above the ground the branches of a tree are, the farther they are from the flames of burning grass and brush, and therefore less likely to ignite. As noted earlier, the lowest branches of a mature Blue Gum Eucalyptus tree are 25-30 feet above the ground. This feature, combined with its thick, fire-resistant bark, make Blue Gum Eucalyptus trees very fire resistant.

Bushes, shrubs and vines also produce "fire ladders." A fire ladder is natural vegetation that connects the ground to the branches of a tree, and transmits fire upward from the ground to the tree. The more removed from the ground the lowest branches are, the less chance of a fire ladder attaching itself to that tree. Oak trees, which are"native" to the EAST Bay hills, have thick barks, but very low hanging branches. This is why oak trees have low fire resistance, and why the majority of oak trees in the Oakland Hills fire burned to a crisp. Yet oak trees, as well as Bay Laurel trees, both species with lower branches and therefore more susceptible to fire, are not scheduled to be cut down in the "fire mitigation plans."

There are those who argue that the species of a tree determines its structure. There is some truth in this. But by emphasizing structure, Fire Science precludes focusing on species as the determining characteristic. The National Fire Protection Associations says, "fuel types are classified on the basis of the physical characteristics of the fuels themselves."

By contrast, preoccupation with species can lead to erroneous conclusions, which then would allow dangerous, misleading actions such as that proposed by the EBRPD, U.C. Berkeley and the City of Oakland.

Natural vegetative fuels are grasses, brush, shrubs and trees. Class A fuels are fuels which turn to ash when burned. Natural vegetation is a Class A fuel. A fundamental principle which determines the inherent flammability of all class A fuels is its ratio of surface area to its density. *Because of this fundamental principle that applies to all Class A fuels*, *dried grasses are the most flammable natural vegetative fuel.*

Why are grasses much more flammable than any species of tree? Their ratio of surface area to density is very high. Compared to grasses, trees are very dense and therefore have a low surface area to density ratio.

To illustrate how volatile grasses are, take a single sheet of 8.5 x 11" copy paper. . The surface area of each side of it is 93.5 square inches. So the total surface area of the paper is 187 square inches. But its density, which is its thickness, is only about 4/100's of an inch. It has a very high ratio of surface area to density. This is why it burns so fast.

Hold a second sheet of copy paper. Twist each end in opposite directions, as you would to light kindling in a fireplace. You have *decreased* its surface area and *increased* its density. — dramatically decreasing its surface area-to-density ratio. This is why it now burns much more slowly.

Another example is a page from a newspaper. If the entire page is put into a fireplace without being crinkled it burns rapidly. If the ends are twisted in opposite directions it burns much slower.

(Those who want to cut down 500,000 trees criticize this example by saying, "It's not scientific." **Of course it's not scientific!** It's an illustration of a principle. It is not a laboratory experiment to prove a principle. The criticism is another red herring designed to divert attention away from fact.)

Blades of grass, especially of wild grasses are very thin, about 4/100 of an inch. Their lengths vary, but because they are so thin they have very low density. There surface area-to-density ratio is very high. Because trees are much denser, they have a much lower surface area to density ratio. This is one reason trees are much harder to ignite in a wildfire than grasses. (They also contain water whereas dry grasses don't.)

Trees also act as windbreaks. In a grass fire, the velocity of the wind is a critically important factor in determining the fire's speed. Even slight differences in wind velocity can greatly affect the rapidity of a grass fire

The difference in the average speed of a grass fire and a fire involving trees is dramatic. A large grass fire can move twice as fast as a wildland fire involving trees, which can move at about 6.7 mph. Without trees, a large grass fire starting in Oakland might reach Castro Valley or Walnut Creek in an hour, very little time for evacuation or effective fire suppression. A fire involving trees, should it get out of control, will reach Castro Valley in two hours. (A catastrophic grass fire, like the Black Saturday fires, will spread at a much faster rate).

As stated above only 1% of all wildland fires start in trees. The other 99% start in grasses, bushes and shrubs. (The Oakland Hills fire of 1991 started in grass.) And only 8% of all wildland fires catch trees on fire. *This means that 91% of all wildland fires do not involve trees at all but are restricted to grasses, bushes and shrubs*. *If we decrease the amount of trees in the hills and replace them with grasses we will have dramatically increased the chances of a wildland fire occurring.*

The first NFPA principle violated by the deforestation plan is the logging of trees. Living trees contain much more moisture than dead ones. (Note the logged trees will not be removed from the hillsides.) When a tree dies its moisture evaporates. Its trunk and the tree are almost always replaced by grasses, and/or shrubs, which are the most flammable natural vegetative fuel.

Trees, because of their thick bark, ability to collect moisture from the air, especially in foggy areas, and branches away from the ground, are the *most* fire resistant natural vegetation. Grasses, which will grow in place of the logged trees, are the *least* fire resistant and most flammable natural vegetation.

The NFPA's Fire Protection Handbook (Vol II, page 13-61) states, "Cured (dry) grass, if present in large and uniform volume, provides the most flammable ground fuel in the region." There are no modifying conditions in this statement. There are no ifs, ands, or buts. If the most fire resistant vegetation is removed, less fire resistant vegetation (e.g., grasses)will take its place. The second principle violated is leaving dead wood on the ground. It will dry out and become highly flammable.

The worst fire in the history of Angel Island in the San Francisco Bay occurred in 2008. Several years before, dozens of highly fire resistant Blue Gum Eucalyptus trees that were almost directly in the path of the fog and cool air that regularly comes through the Golden Gate were cut down. These trees collected and dripped onto the ground 59" of moisture each year – almost six feet of water — which kept the island's grasses moist. When they were removed, the grasses dried out by midday. The ground where the trees were logged for the first time in decades resembled dry ground in Lake County. The people responsible for the removal of these trees proved how little they know about fire science and the role of trees in preventing wildland fires twice. Once by

removing the trees, and again by saying, after the fire, that it would have been worse if the "flammable" trees weren't removed. These are the same people and institutions that are advocating the removal of trees from the East Bay Hills, which will make the East Bay Hills become like the dry, flammable, grassy terrain in Lake County where large, destructive grass fires destroyed Middletown last summer (2015).

What determines the fire resistance of a tree? It has nothing to do with what species a tree is. The structure of a tree determines its fire resistance. Trees that have their lowest branches high above the ground, thick bark, and high moisture content are the most fire resistant. Because most wildland fires begin as grass fires, fires moves rapidly past trees with these qualities. But a grass fire will not blow right past a house. The radiant heat from a grass fire will start a fire on the exterior walls of a wood house and build up heat underneath the eaves of a house and start fires there, which will go to the roof. This is exactly what happened in the Oakland Hills fire of 1991. The burning grasses ignited houses and then the prolonged house fires ignited trees. This was researched and reported by the Oakland and Berkeley Mayors' Task Force, which I served on. But this important fact has been consistently and systematically ignored by those who want to eradicate eucalyptus, Monterey Pine and acacia trees.

Without the hundreds of thousands of trees that have grown in the past 160 years that today act as windbreaks, any grass fire will spread even more rapidly than in 1991. And that fire wasn't contained until the winds dropped and cooling night fog (moisture) moved into the Bay. Grass fires move fast. Relatively small grass fires can reach a speed of 7.5 miles per hour. Large grass fires can attain speeds of 45 miles per hour. These speeds were reached in Australia's Black Saturday fire. This means that if the so-called" fire mitigation" plan is implemented, a grass fire in the Oakland Hills could reach Castro Valley to the South, or Walnut Creek to the East, both *15 miles away, in 20 minutes*. Imagine being in your home in Castro Valley or Walnut Creek and being told to evacuate immediately because of a fire burning 15 miles away.

Grasses are flat, about the same thickness as a piece of copy paper, and long. They have a much higher ratio of surface area to density than trees. So grasses catch fire much more easily than trees.

In 1991 I was asked to serve on the Task Force on Emergency Preparedness and Community Restoration, commonly known as the 1991 Oakland/Berkeley Mayors' Fire Storm Task Force. Our mission was to investigate the causes of the '91 fire and make recommendations to prevent its recurrence. The committee spent hundreds of hours analyzing data and examining the burned areas.

In February, 1992, we issued our report to the Mayors and the public. Our recommendations were:

"The most important factor in reducing fire danger from vegetation is not removing specific species but regular ongoing maintenance.

The high density of flammable structures contributed significantly to the spread in intensity of the Oakland hills fire. Trees did play a role in spreading the fire, but in many cases the trees caught fire from the houses, not vice-versa. The current emphasis on blue gum eucalyptus and Monterey Pine as culprits in the cause of the fire and calls for removal of them are an oversimplification that can lead to negative environmental consequences.

Develop a clearly illustrated vegetation management program based on scientific principles and accepted wildfire management practices.

Provide regular brush removal as well as mulching/composting to encourage residents to maintain vegetation. Particular tree species do not pose a significant fire danger when properly maintained."

All of these recommendations have been ignored by U.C. Berkeley, the City of Oakland and the East Bay Regional Park District."

The behavior of the governmental agencies over the years relative to this discussion has been mysterious. The agency funding the removal of the trees, FEMA, (Federal Emergency Management Agency) received 14,000 comments when it asked for public input on its idea to finance the so called "fire mitigation plans." 13,000 of the comments, over 90% of them, opposed the project. Most of these were comments from people who live in the affected area. These comments were ignored, and FEMA went ahead and funded the plan. **FEMA even ignored the analysis sent to it by the U.S. Forest Service which stated that the fire hazard mitigation plans calling for removing Eucalyptus trees would increase the chance of a fire.** Initially FEMA rejected funding the plan, saying it would not reduce fire hazard in the proposed area.

There are over 700 species of Eucalyptus trees. Some of them are extremely fire resistant, e.g., the Blue Gum, and some are not, like the Dwarf Blue Gum. Some of California's native trees are very fire resistant, like the Redwood and Douglas Fir; some are not, like the Oak tree, which has branches low to the ground which catch fire from a grass fire or fire ladders. But none of the oak trees are to be cut down in the EBRPD plan. But all of the Eucalyptus trees including the highly fire resistant Blue Gum are slated to be removed.

I'm often asked at presentations, "Why are there so few firefighters and fire departments in the East Bay speaking out against against this plan?" Or, "If these plans are so bad, wouldn't more firefighters speak out against it?" Or, "I know a fireman who says Eucalyptus trees are more flammable than any other tree, and you're saying their not. Who am I to believe?" And, "Why are fire departments in the East Bay silent about it, as if they have no opinion? It seems like the only people speaking in favor of the plan are those who want to get rid of "non-native trees."

These are good questions and I like when they're asked. The short answer to all of them is that the U.S. Forest Service supports my views, and The National Fire Protection Association (NFPA) supports my views. I tell audiences, "Everything I have said is based on sound scientific research and analysis."

I also answer, "Anybody who talks about Eucalyptus trees as if they are all the same species with the same characteristics and attributes is not familiar with what makes a tree flammable. Ask him or her what studies he/she can cite validating their claim that eucalyptus trees are especially flammable.

When I hear unsubstantiated statements like, "Australian firefighters call them 'gasoline' trees," my response is twofold: 1) Australians don't use the word "gasoline." They use the word "petrol." 2) " No one has ever supplied the names of Australian firefighters who say this, or what species of Eucalyptus they are referring to."

When asked why fire departments in the area are silent on this issue, I respond, "I don't know. Write a letter to the chief of your local fire department. Call or write your local newspaper and ask them to investigate this issue. I personally am surprised the media hasn't dug into this critically important issue that involves the safety of tens of thousands of people."

Fire suppression ***justifiably*** gets over 99% of the resources and funding available to whatever fire department we're talking about. Ninety-nine per cent of all the personnel in any fire department are in fire suppression. This makes sense, because when a fire starts it *must* be contained and suppressed by fire departments to prevent enormous amounts of damage. If the fire has no containment it is categorized as an "out of control" fire. As long as it is an "out of control" fire it will get bigger and bigger, destroying more and more until it is either contained, or suppressed (put out) by nature through rain, or it has burned all fuel available to it. Entire cities can be destroyed. And massive amounts of wildland. (In 1910, in Idaho and western Montana, the largest forest fire in the history of the United States occurred, burning three million acres of virgin timberland. The fire was extinguished by rain.) As mentioned earlier, nature can help in

the containment process by slowing down the rate of fire spread through cool air, as happened in the ‘91 Oakland Hills fire.

I was lucky to be a firefighter at the second busiest fire engine company west of the Mississippi. I’ve fought over 300 structure fires, and many other kinds of fires.

Fire suppression deals with fires *after* they start. It specializes in putting fires out. Its very knowledgeable about that. Fire suppression is very good at what it does: its training, education, and work focused on containing and suppressing fires. I learned about the National Fire Protection Association when I entered fire prevention.

Fire *investigation* also gets involved *after* a fire has started. Arson investigation is a part of fire investigation. A relatively new discipline called fire ecology is also a part of fire investigation.

The research and analysis of the National Fire Protection Association comes under the category of fire investigation and prevention. The NFPA is not a part of any fire department but its contributions to fire science are immeasurable, and shape many policies that fire departments employ. It gives recommendations on prevention based on the results of its investigations.

The environment that Michelle Meyers and Carolyn Jones and the Sierra Club, et al. want to create will not tolerate a mistake in judgement. The East Bay hills is not a laboratory in which errors can be made and rectified. It is a living phenomena. Creating a fire prone region will lead to a disaster. We have fire science to understand the laws of fire. This understanding informs us how fire originates and behaves. This knowledge of how fire originates and behaves gives us the tools to prevent fires before they happen, whether in the wildland/urban interface, or strictly urban area. Ignoring fire science and proceeding on opinion unsupported by fact is incredibly negligent. Trying to push through fire mitigation plans based on of how one would like the East Bay hills to look; based on restoring the East Bay hills to a bygone era, and not based on fire science will result in disaster. The great Spanish philosopher Santayana said, “Fanaticism is redoubling your effort while losing sight of your purpose.”

Ignorance and influence are the parents of disaster. The Sierra club, the California Native Plant Society, Claremont Canyon Conservancy and others are very influential organizations. They are misusing their influence by attempting to lead the public into supporting the destruction of our East Bay forests and the creation of grassy, fire prone East Bay hills. And they are showing a lack of understanding of the entity of fire and the laws of physics which tell us how that entity behaves.

As I stated earlier in this paper, I have been involved in hundreds of fires. I know fire. It is not an abstract, theoretical phenomena to me. It is a reality. Fire is an overwhelming energy, like the ocean. And like the ocean, it is unforgiving to those who don't *deeply respect* its strength, energy and behaviors. To live safely with the threat of fire requires an appreciation for those laws of physics which enable us to understand it. Those who approach fire with anything other than awe and **respect** for how it behaves will be destroyed.

As I stated in my comment to FEMA written in 2009. "There is nothing wrong with advocating for native plant restoration. There is nothing wrong with advocating for land transformation. There is everything wrong with trying to effect either one or both under the guise of wildfire hazard management. It endangers the firefighters who will be called to fight the fires that will be caused by improper wildfire hazard management due to putting ideology ahead of fire science, and imperils the public."

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