

WRITTEN STATEMENT FOR THE RECORD

OF

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HEARING ON  
RECOVERING FROM THE FIRES: RESTORING AND PROTECTING  
COMMUNITIES, WATER, WILDLIFE, AND FORESTS IN SOUTHERN CALIFORNIA

BEFORE THE  
COMMITTEE ON RESOURCES,  
SUBCOMMITTEE ON FORESTS AND FOREST HEALTH

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## INTRODUCTION

My name is Dr. Thomas M. Bonnicksen. I am a forest ecologist and professor in the Department of Forest Science at Texas A&M University. I am also a visiting scholar and board member of The Forest Foundation in Auburn, California. I have conducted research on the history and restoration of America's native forests, especially California's forests and brushlands, for more than 30 years. I have written over 100 scientific and technical papers and I recently published a book titled ***America's Ancient Forests: from the Ice Age to the Age of Discovery*** (Copyright January 2000, John Wiley & Sons, Inc., 594 pages). The book documents the 18,000-year history of North America's native forests.

Contact information is located at the end of this written statement.

## MORAL IMPERATIVE

Mr. Chairman, members of the Committee, this is a sad day for all of us. The Southern California fires of 2003 burned 739,597 acres, took 22 human lives, caused \$2.2 billion in losses, and cost taxpayers more than \$250 million to contain. In the San Bernardino Mountains alone, six people lost their lives, 993 homes and 10 businesses were destroyed, and over 90,000 acres burned.

Equally important, and often ignored, are the millions of tons of pollutants generated by these monster fires that fill the air and impair human health. Furthermore, few people realize that the aftermath of a fire can be just as devastating as the fire itself. Total runoff in just this area (the Santa Ana River Watershed) is likely to increase by more than 10 percent and peak storm flows will increase about five times the average. Sediment loads carried downstream could be 30 to 50 times normal, and as much as 20,000 tons of nutrients, nitrates, and phosphorus formerly bound in soil will probably be released and make its way into groundwater. Uranium and other radioactive materials also will be transported downstream with toxic organics and carcinogenic compounds from partial combustion of forest materials. This will decrease the usability of one of this region's primary water sources. It is estimated that 1.7 billion cubic yards of rock, sand, and debris will clog water control structures and dams as well.

These horrific fires are a warning. We can anticipate similar catastrophes in overgrown forests throughout the West if we do not change our ways. We have already seen this happen in Arizona and Colorado. The Sierra Nevada may be next.

Nothing done by management to the environment would come close to the ecological and social costs of monster fires. There is no argument, no matter how compelling or well meaning, that justifies allowing uncontrolled and unnatural wildfires to kill human beings, destroy homes, forests, and the habitat of millions of animals, pollute the air and water, and strip irreplaceable soil from the land. We know how to prevent these catastrophic fires and we have a moral obligation to prevent them in the future.

## **IMPRESSIONS OF DISASTER**

I have been working on restoring beetle-killed forests in these mountains with Forest Service professionals almost continuously for most of this year, and I had warned of a possible tragedy as early as 1994. I know many of the people who live here. That makes this tragedy even more personal. Under the auspices of this Committee, I was able to see the devastation first hand while the fires were still burning. I will never forget what I saw, experienced, and felt at the time.

Shortly after passing through the police roadblock, I could not believe how barren the soils were as I drove up Waterman Canyon. Nothing remained except smoldering embers and a smell like burned newspaper. The only life I saw was a single yellow jacket. The fire was so hot that rocks exploded and flames left behind only stubs of the thickest branches on the shrubs. There is no doubt; soil erosion must be addressed because it could be severe.

I also remember driving up this same road through Waterman Canyon many times this year talking with Jon Regelbrugge, Doug Pumphrey, and other Forest Service professionals about the need to use prescribed burning to break up the overgrown brushlands below Lake Arrowhead. They were frustrated by a lack of resources that made it difficult to protect Lake Arrowhead and Running Springs from a fire that came up the canyon. We know all too well the consequences of not having adequate means to take preventative action.

My second impression was how well firefighters planned their defense of Lake Arrowhead. They used backing fires from Highway 18 to deprive the fire coming up Waterman Canyon of fuel. There is no doubt that their actions saved Lake Arrowhead. I only saw the smoldering ruins of one home on that ridge; the rest of Lake Arrowhead was spared, except for Cedar Glen.

I had seen Cedar Glen before it burned. I knew that the people living there were in serious trouble. They lived in a narrow canyon, thickly overgrown with trees of all sizes, and surrounded on the ridges above with a half-dead forest.

Tragically, the fires this fall looped around the East side of the firefighter's defensive line and swooped across the half-dead forest into Cedar Glen. I saw the homes that it destroyed, still smoking in the aftermath of the fire. It was a terrible sight. I will never forget seeing a garden hose laid across a railing where the owner had left it after trying to protect their home and then fleeing before a wall of flames. Nearby, a child's wooden swing set stood untouched by the fire while the house lay in ruins 50 feet away.

The fire passed through the Los Angeles Council of Boy Scouts Camp before reaching Cedar Glen. I saw half the forest on their lands destroyed and still smoking. The western pine beetle had killed thousands of the trees before the fire. The trees were

still draped with dead pine needles when the fire reached them, so they burned with extreme heat, and many were reduced to charred spikes. Not even a branch was left on many of the burned trees, and the ground was barren underneath.

I had warned a Boy Scout leader at the camp, and officials in Los Angeles, that this could happen when I was there in late summer. However, they had too little time to take action to prevent it. The pool where Boy Scouts were swimming this summer was untouched, but everything else was gone. Their headquarters lay in ruins, and a barracks was reduced to a chimney and the twisted metal wreckage of bunkbeds where Boy Scouts had slept just a month earlier. What saved them was the time of year when the fire passed through their camp. They were safely at home in October.

My final impression was of the depressing emptiness of Crestline and Lake Arrowhead. Where before I saw a forest community full of people going about their daily lives, now, there was nothing but silence. People left in haste and could take only one car, so other cars were parked as if someone was home. Empty chairs were sitting by tables with drinks still on them. Occasionally, I would hear a hungry stray dog barking abandoned in the rush to safety. People who left their homes behind had no idea if they would ever see the things they cared about again. We cannot imagine how they must have felt. I only know that we should have acted sooner to help prevent these people from experiencing such trauma.

## **TRAGEDY FORETOLD**

I, and several other panelists, appeared before the House Resources Committee in this very place about two months ago to help prevent the tragic fires that today's hearing is addressing. I said then that history will judge us by how we respond to the crisis caused by overgrown and beetle-ravaged forests. I should have added our overgrown and aged chaparral. History really means that our children and our grandchildren will judge us. Did we take the action needed to protect the lives and homes of their parents, them as children, and their children? Did we protect the forests that we enjoyed so that they could share our experiences and receive their forest heritage unimpaired?

The answer is no, at least so far. We did not act swiftly enough to prevent the loss of an entire forest - 474,000 acres - in the San Bernardino and San Jacinto Mountains to the ravages of the western pine beetle, or the wildfires that followed in October of 2003. We also failed to prevent the chaparral fires that took so many lives and destroyed so many homes in San Diego County and elsewhere in Southern California.

I was honored to be invited to witness President Bush signing the Healthy Forest Restoration Act of 2003 this past Wednesday in Washington D.C. This historic act will help prevent future disasters, but it came too late to prevent the fires this year.

I have been working in the San Bernardino Mountains with Forest Service professionals almost continuously this year. We knew that we faced a crisis and that dramatic action

was needed to prevent a disaster. Not only were beetle-killed trees about to fall on people, houses, powerlines, and cars, but a catastrophic fire could sweep into communities from any direction at any time. Something had to be done. However, the Forest Service was hampered in its efforts to prevent a disaster. They had too few people and too little money, and they faced too many restrictions, to reduce fuels over a large enough area to decrease the fire threat significantly.

Sadly, the insect infestations and wildfires were predictable and preventable. We did not look after our forests. Meanwhile, trees grew and forests became overgrown and unhealthy.

I conducted a workshop in 1994 in which 27 specialists representing many interests and agencies came together in Lake Arrowhead to do something about the unnaturally thick forests in the San Bernardino Mountains that led to this disaster. We knew that communities like Lake Arrowhead, Big Bear, Crestline, Idyllwild, and Wrightwood, were in imminent danger from wildfire. The workshop produced a report charting a course to improve the safety and health of forests surrounding these communities. Unfortunately, bark beetles got there before anyone took action to thin the forest and make it more resistant to bark beetles and fires.

The highest priority recommendation in the 1994 report for the San Bernardino Mountains called for developing “a comprehensive and integrated fire protection program consisting of”

- A fuels management program (mechanical removal and prescribed fire)
- Strategically located park-like fuel breaks
- A public information and education program dealing with structural (residential and business) modifications and landscape design
- Effective enforcement

In addition, the report emphasized “private sector and government partnerships to carry out this alternative, including funding, because government agencies alone cannot solve wildfire problems.” Subsequent recommendations elaborated and expanded these ideas.

Brushlands in Southern California face the same problem as forests. They have grown old and thick. Hundreds of thousands of acres of brush are ready to burn. We know where the next big fires will be due to the age of the chaparral, but we have done almost nothing to prevent them. We also know how to break up the fuels and save lives and property, but we seem incapable of taking action. As a result, we have lost many lives this year, thousands of homes, and hundreds of thousands of acres of forest and brushland.

Again, I wrote a report in 1995 documenting the severe fire hazard in the brushlands of San Diego County. A total of 59 specialists representing many interests and agencies participated in preparing the recommendations. Like the San Bernardino Mountains

report, we had a plan for preventing catastrophic wildfires. Unfortunately, we failed to act and that is where most of the lives and property were lost this year.

Selected recommendations in the 1995 report include:

- Design a prescribed burn pattern or mosaic based on vegetation and wildlife surveys, fire history, and public outreach programs
- Encourage the construction of community fuelbreaks
- Conduct public meetings with private and public landowners and solicit information on their needs and opinions regarding wildfire control and prescribed burning
- Conduct education programs to reduce the public's risk from wildfires
- Encourage the public to assume greater responsibility for self-protection from wildfires

There is no doubt that the recommendations in the 1994 and 1995 reports, if implemented when proposed, would have dramatically reduced the death and destruction caused by the horrific fires of 2003.

## **PAY NOW OR PAY MORE LATER**

It is prophetic that the Healthy Forest Restoration Act of 2003 requires weighing the risk of action against the risk of inaction when making management decisions. Think of the terrible human, financial, and ecological losses suffered in Southern California this year and weigh them against the minor risks of having used scientific management to prevent them.

We cannot put a price on lives lost and human suffering, which, by itself justifies fire prevention. In addition, economic losses could be higher than \$2.2 billion in just Southern California. Using the most comprehensive and expensive methods, that is enough money to restore over seven million acres of chaparral to a more fire-resistant and natural condition, which is far more than is needed. Similarly, that money could pay to remove most of the beetle-killed trees in Southern California and rebuild new fire-resistant forests that are more natural and sustainable than those that were lost.

Here in the San Bernardino Mountains, we can restore about half the 474,000 acres of forest devastated by the western pine beetle, perhaps more. The remainder is inaccessible because of steep slopes and the lack of roads. It is tragic to know that we cannot restore so much of this forest. Especially since most of the historic pine and mixed-conifer forests will convert to unnatural oak-shrub forests. Wildlife will suffer as well, and an endless cycle of severe and unnatural wildfires is likely.

It is even questionable if we can restore much of the accessible forest because of the high cost. I estimate that it will take as much as \$1 billion to do the job right on 237,000

acres. Probably less, as we become more efficient. That means providing immediate fire protection and rebuilding the new forest.

This is far more money than taxpayers will bear. However, if private companies could harvest and thin only the trees required to restore and sustain a healthy, fire-resistant forest, it could be done. In exchange, companies would sell the wood and, thereby, significantly reduce public expenditures.

The problem is finding someone to buy the wood. There is no biomass or wood processing facility nearby. That means the initial public expenditure will have to include providing subsidies to build the infrastructure needed to make the restoration of fire-resistant forests financially feasible.

The inescapable truth is that we will pay now for prevention or we will pay far more later to deal with disaster and its aftermath. On average, it costs only one-seventh as much to prevent a catastrophic wildfire than it does to fight it, mitigate the damage, and pay to replace what is lost. This does not include the loss of forests, wildlife habitat, soil, and the degradation of our precious supplies of water.

## **CLEAR CHOICES FOR THE FUTURE**

There are two choices for the future of Southern California's forests and brushlands, and no middle ground for debate. First, leave them alone, or the "hands off" option. This means dooming hundreds of thousands of acres of beetle-killed forests. No longer will people in this region enjoy shady forests of huge pines and firs. Instead, they will see thickets of oak and brush, and many animals will disappear. Not only that, but this option will pass to future generations an unending cycle of death and destruction from fire and insects, as well as accelerating costs for firefighting, and rehabilitating forests, brushlands, and communities.

Our second option is to restore the natural fire- and insect-resistant forests, and diverse natural brushlands, through active management. This would enhance watersheds and water quality, improve habitat for a diverse range of native wildlife, and expand scenic and recreational opportunities. Most importantly, it would secure a safe future for the people of Southern California by protecting communities and breaking the cycle of monster fires.

Both options cost money. However, the "hands off" option will cost taxpayers at least seven times as much as the "management" option, not including the cost in lives and destruction of public and private property. The ratio in favor of management could be even higher when subtracting the economic value that might be derived from selling wood products and clean biomass energy.

There is no question. Active management is essential if we are to secure a safe and sustainable future for our forests and brushlands, and the people who depend on them.

## WHAT WE NEED TO DO

Active management means using the history of a forest or brushland as a model for its future. That does not involve a futile effort to duplicate the past. It means learning from the past. The most important lesson we can learn is that historic forests and brushlands were sustainable, diverse, and far less susceptible to the monster fires we see today.

Historically, most of California's forests were open because Native American and lightning fires burned regularly. These gentle fires stayed on the ground as they wandered around under trees. You could walk over the flames without burning your legs even though they occasionally flared up and killed patches of trees. Such scattered hot spots kept forests diverse by creating openings where young trees and shrubs could grow.

Brushlands like chaparral and coastal sage burned hotter. These hot fires often swept over thousands of acres. They were stand-replacing fires that renewed the brush on about a 40-year cycle. Even so, they were much smaller than today's brush fires. They usually burned patches of a few thousand acres, sometimes larger, but seldom, if ever, hundreds of thousands of acres as we see today.

The patchiness of historic forests and brushlands is the key to their restoration and the solution to the wildfire problem. They consisted of mosaics of patches. Some patches were freshly burned, others were young or old, depending on how many years passed since fire created a new opening where plants could grow.

The variety of patches in historic forests and brushlands helped to contain hot fires. Freshly burned areas, patches of young trees or shrubs

play an important role in fire behavior, but continuous heavy fuels are the fundamental cause for the outbreak of monster fires plaguing the West, especially California.

This is even more serious because monster fires create even bigger monsters. Huge blocks of seedlings that grow on burned areas become older and thicker at the same time. When it burns again, fire spreads farther and creates an even bigger block of fuel for the next fire. This cycle of monster fires has begun. Today, the average fire is nearly double the size it was in the last two decades and it may double again.

We can see this in Figures 1 and 2. Figure 1, created by Dr. Richard Minnich, from UC Riverside, in 1971, shows the difference in the size of fires in Southern California and Baja California. The difference is striking because of the political border that separates the two countries. There is no ecological reason for this dramatic difference. On the Mexican side, patches are very small, a few thousand acres, because fires burn as they did when Native Americans lived there. Farmers set fires regularly to maintain the mosaic of small patches that provide habitat for game and livestock, and keep fires small and safe. They also let lightning fires burn because less flammable patches easily contain them.

In contrast, we have been putting out fires for over a century in Southern California. Even longer if one considers the proclamation by Don Jose Joaquin de Arrillaga, Captain of Cavalry, Interim Governor and Inspector Comandante of Upper and Lower California, in 1793, which was strictly enforced in Alta California. He said, "With attention to the widespread damage which results...I see myself required to have the foresight to prohibit...all kinds of burning, not only in the vicinity of the towns, but even at the most remote distances..." It only takes 30-40 years for chaparral to grow old enough to create large areas of highly flammable fuel. Even though ranchers changed burning practices when California became a state, this simple proclamation helped start the cycle of monster fires long before some people believe that fire control became effective.

More than two centuries of efforts to control fires increased the size of chaparral patches in Southern California. They grew to more than 10 times the size of patches in Baja California where fire controls were not enforced. It is not surprising that our fires are also more than 10 times the size of those in Mexico. This year our fires are becoming even larger because we know that monster fires create bigger monsters.

Figure 2, which was graciously created at my request by San Diego County for this Congressional hearing, shows that the October fires of 2003 were concentrated in older brushlands. As expected, firefighters also found it easier to stop the fires at the boundaries of younger less flammable patches of chaparral, even in Santa Anna winds.

The evidence is clear. We cannot blame people for living in fire-prone rural areas because they want a more enjoyable lifestyle for their families. Fires may be inevitable, but not the monster fires that we created by failing to be good stewards of our forests and brushlands.

We must restore our forests and brushlands to a more fire-resistant condition by recreating the historic mosaic of patches. The less flammable younger patches will contain hot fires and make them easier to extinguish. This, in combination with modern and effective firefighting organizations and less flammable structures, will break the cycle of monster fires. Consequently, the lives and property of the people of Southern California will be protected as well.

## **GETTING TO WORK**

Addressing the wildfire problem in Southern California brushlands is obvious and relatively simple. Science shows that brushlands are resilient, no matter how often fires burn or how hot the fire. They recover fully and in the same way. That is, the same plant species will grow after a fire in the same order that they grew before. All that we need to do to restore diversity and naturalness to brushlands is to create the more fire-resistant historic mosaic. This will solve the fire problem if communities and individuals also assume their responsibility for providing defensible space and less flammable structures.

The problem is more difficult in San Bernardino Mountain forests. The scope and magnitude of devastation from the bark beetle outbreak is unprecedented in recorded history. We have lost an entire forest because there are simply too many trees. Drought has contributed to the crisis, but it is not the underlying cause. Forest density is 10 times what is natural – 200 to 500 large trees stand on an acre where 50 would be natural and sustainable.

The fires of 2003 did little to reduce the number of trees or remove dead trees killed by bark beetles. About 85-90 percent of the forest was untouched by the fires and is ready to fuel the next one. At least 60 percent of the trees are dead in this forest, and as many as 90 percent of the trees will be dead by next year when the bark beetle epidemic slows down for lack of food.

We must remove the dead and dying trees and restore the forest in strategic areas during the next eight months. Otherwise, the enormous amount of fuel that remains in these forests will likely generate fires next year that are far worse than this year.

The desired future condition is a native mixed-conifer forest that approximates the historic range of variation characteristic of this forest type. The desired restored forest will provide opportunities for economically sustaining the forest and all of its values.

The long-term restoration goal should be to develop a patchy forest mosaic consistent with the open historical forest. That means a patch size of one acre, a smallest patch size of 0.2 acres, and at least 68 percent of patches less than 1.8 acres. In addition, approximately 42 percent of the mosaic should consist of patches of mature and large

mature trees of which no more than 47 percent should contain a multi-layered understory.

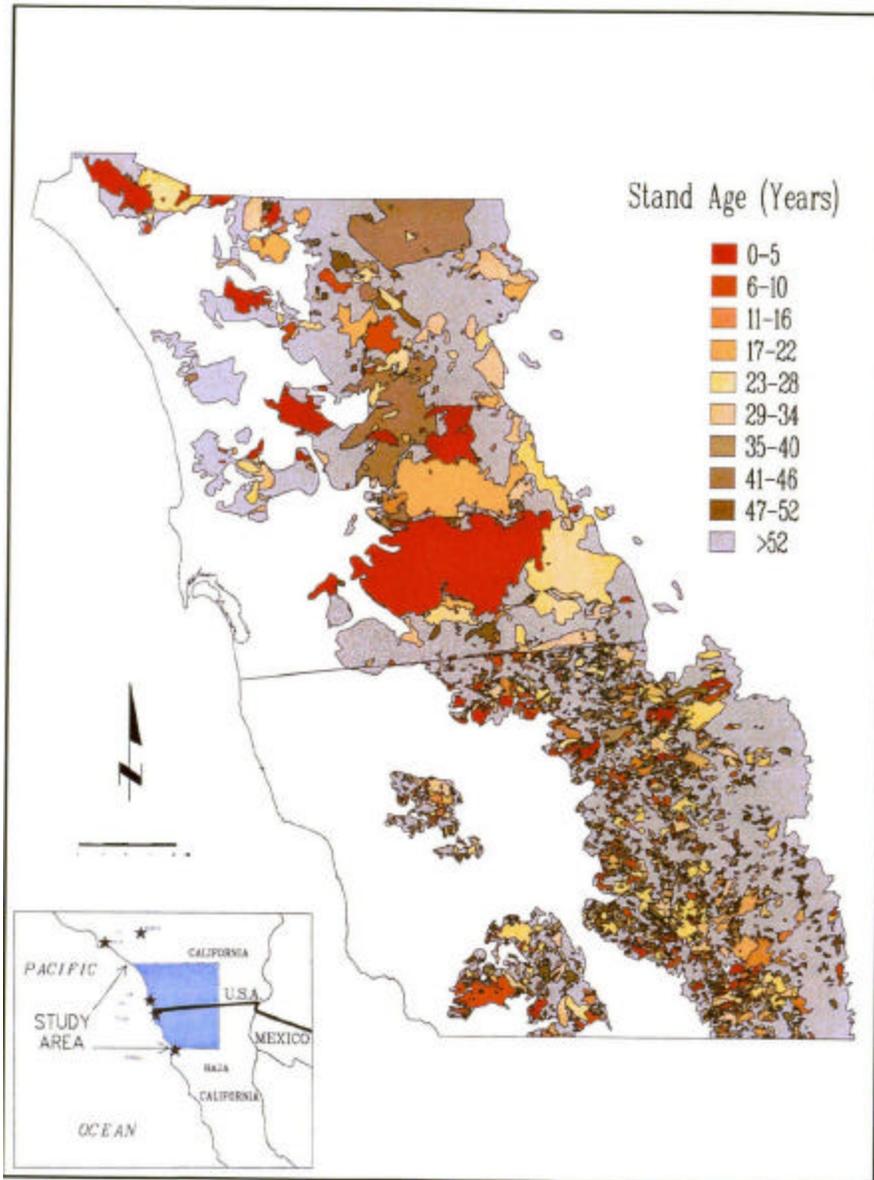
Mechanical methods are the most important tools we have to restore this forest and reduce fire hazards. Mechanical methods followed by prescribed fire may also be effective when used together, but safety and air quality restrictions are major constraints. Prescribed fire alone will not be effective because it is too unpredictable and dangerous in overgrown forests.

The approach for restoring San Bernardino Mountain forests involves cutting the dead and dying trees in a way that minimizes damage to live trees and other vegetation desired to meet the long-term restoration and protection goals. Then, remove, or chip the slash to reduce fuels, and leave enough snags and logs for wildlife. That means approximately 2-3 snags per acre in groups and 5-9 logs 24 inches or larger oriented across slope so that they also control soil erosion. The surviving trees must be thinned as well so that they grow quickly and to protect them from fire because they will become the oldest trees in the future forest.

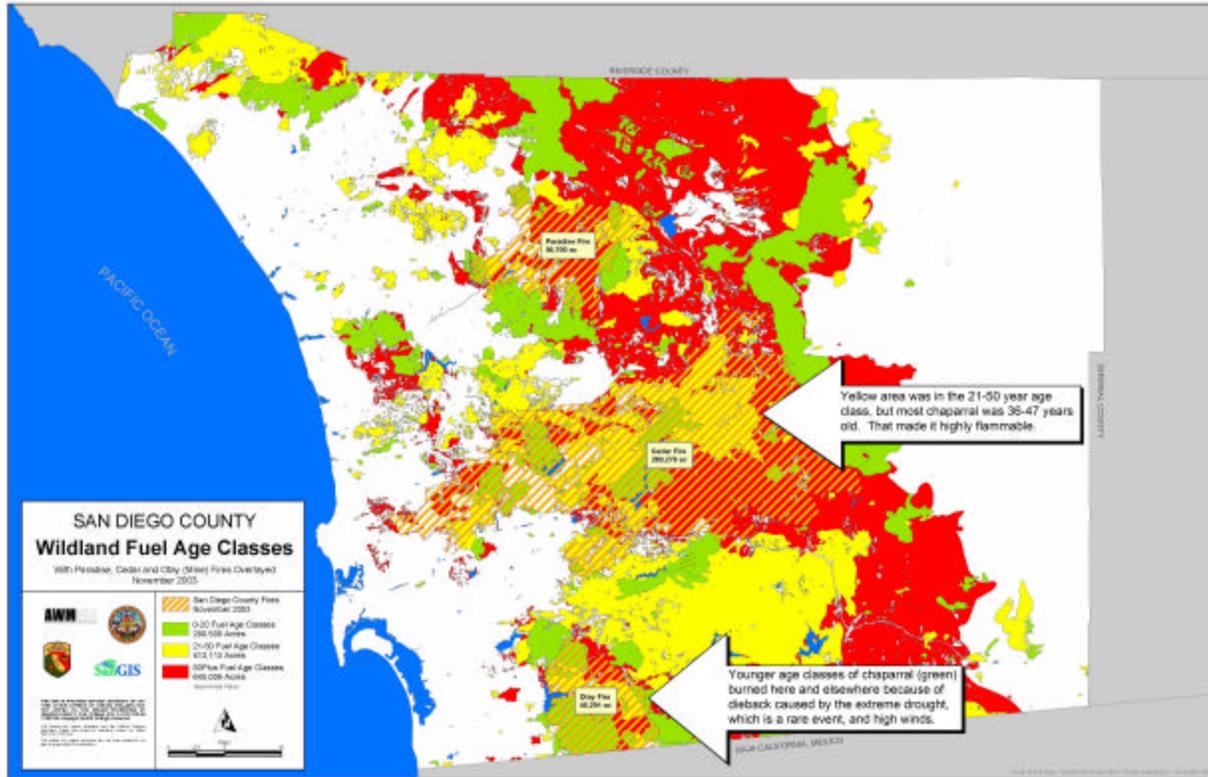
Next, begin rebuilding the forest by planting native trees in gaps left by beetle-killed trees. Additional gaps will have to be opened and planted at different times and places to ensure that the restored forest has groups of trees of different ages. This will take five or more decades. By then seed from adjacent trees will fill new gaps and the forest will look relatively natural since some sites will grow trees 120 feet tall in 50 years.

When complete, and even during the early phases of restoration, the restored forest will reduce threats to local communities from wildfire by providing a system of fire resistant patches that act as fuelbreaks strategically dispersed throughout the forest mosaic. In short, the restored forest will look and behave in much the same way as historic forests. It also will be healthy, diverse, sustainable, attractive, resistant to insects and drought, and nearly immune from monster fires.

**FIGURE 1.**



**FIGURE 2.**



## CONTACT

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