



# Indigenous Fire Management:

Solving California's Catastrophic Drought & Wildfire Problems.

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May 6, 2016 in Fort McMurray, Alberta, Canada Wildfires, which are still burning out of control, have forced the evacuation of more than 80,000 residents from the town. (Photo by Scott Olson/Getty Images) Fig. 3



(Photo by Scott Olson/Getty Images) Fig. 4



The White River in Sharon was full of floating logs in about 1910. How many trees were cut down in the forest...? Fig. 6

## History of Ignition

Intro: Understanding how wildfires have become so intense.

Western culture's techniques to manage the land has led to devastating wildfires, from too much accumulation of foliage, and has aided the drought's influence and the effects of climate change. California and the United States' Eurocentric approach to combating wildfire has proven time and time again to be extremely unsustainable from both an economic and environmental perspective.

Over the past few centuries, western civilization has settled in lands they do not understand. Western cultures pushed out native peoples from the land they've cultivated for thousands of years, whom had gained traditional ecological knowledge from the land and earlier generations. Native peoples refined their knowledge over centuries to best understand what the land needs to healthily sustain populations and wildlife.

The current state California is in has therefore led our governments to turn towards indigenous groups for help and insight to more efficiently and effectively manage our forests and meadows. This collaboration between knowledge, money, and power to make change could help reverse the effects that drought and wildfire are having on our state and the world. This article will take a dive into understanding how we have arrived at such catastrophic levels of wildfires and what we can do going forward to protect communities, the environment and lower our risk of cataclysmic wildfire destruction.

“California and the United States Eurocentric approach to combating wildfire has proven time and time again to be extremely unsustainable from both an economic and environmental perspective.”

Charred trees from a forest fire in the Whitewater-Baldy Complex in New Mexico dominate the landscape in this June 2, 2012 photo: Reuters/Kari Greer/US Forest Service/Handout. Fig. 5



“When settlers from the west came, they clear cut hundreds of square miles of forests, then when these forest grew back over decades, all of the trees competed for space, acting as a thick fuel loads for fires like we see today.”

Up until the past 115 years prior to the creation of the United States Forest Service, (USFS) and the massive dislocation and slaughter of Native American tribes throughout the continent, tribes like the North Fork Mono had been applying cultural burning and landscape restoration for thousands of years. This allowed them to live off of the land while also practicing critically important prescribed burns of forests to sustain a healthy ecosystem.

This connection between humans manicuring the forest and the forest providing resources creating a flourishing habitat for species, created an inextricable

link which made the forests dependent on human interaction, enabling a healthy balance and existence between humans and forests. Without the burning practices that Native Americans used, the forests would become overgrown and unmanageable, not able to sustain food sources, wildlife habitat, water retention and biodiversity.

Much of which is the unfortunate case we are living in today. When settlers from the west came, they clear cut hundreds of square miles of forests, then when these forest grew back over decades, all of the trees competed for space, acting as thick fuel loads for fires like we see today. Along with the fact that there were no more Indigenous people to manicure the forests, it has now become the main issue of why our forest fires are getting so massive.

In a harsh reality, our fear of fire and the want to suppress it, which was created 115 years ago, has now led to a greater unpredictability of wildfires, (Kimmer & Lake, 2001) emerging a new era of mega-wildfires. Because we have not been practicing these methods done by the North Fork Mono Tribe and hundreds of other tribes in the past, we now face a bleak future

of irreversible high intensity wildfires that we have become all too accustomed to witnessing.

Unless we start embracing the fact that not all fire is bad and realize that “Smokey the Bear tactics” of suppressing all fires is what has led us to this historical problem and instead use the Native American model of prescribed burning, we will find it extremely difficult, if not impossible to deal with the onslaught of mega-wildfires that California is facing in the near future.

In all honesty, no human beings have been in the America’s longer than Native Americans and other Indigenous cultures, so it would be more than sufficient to say that after these people have been living in a symbiotic relationship with the natural world over thousands of years, that they would know this land a lot better than we ever have or will. It is time for us to change our perspective on their knowledge and culture and work alongside tribes and embrace what they have to teach us, because it is truly our only way out of falling into massive economic debt from fighting mega-wildfire’s, long term solutions to drought issues, destruction of communities and scarring damage to our environment, all from wildfires.

Through generations of traditional knowledge passed down one to the next, significant methods have been shared amongst others, such as the notion that cultural resource and broadcast burns helps clear

When modern Europeans arrived in North America, an estimated 50 million bison inhabited the continent. After the great slaughter of American bison during the 1800s, the number of bison remaining alive in North America declined to as low as 541. Fig. 7



the ground of old duff, invasive plants, and enhance and restore the cultural resource vegetation as well as native grasses. (R. Goode, 2015) These age old practices help provide a better habitat for biodiversity and in turn act as natural wildfire break zones in the sense that, the mosaic of patches differing in successional age and flammability would itself limit the extent of fires. (Kimmer & Lake, 2001) Also increasing meadows and groundwater resources, which act as sponges absorbing and retaining water, will release the water in the late spring and summer months extending our range of usable water rather than this water going to trees in the forest, which just act as more fuel sources for wildfires.

The North Fork Mono Tribe have always worked alongside nature rather than our Eurocentric views of working against it. They use fire as a natural resource to bring ecosystems back into balance. Since fires enhance habitats by opening up the canopy--the trees and shrubs that shade lower-growing plants -- and thus allowing light and energy to reach the forest floor. (Aldern, 2011) Furthermore, the amount of water that can be saved by thinning forest and meadows is still unknown, but according to a University of California forest study thinning could yearly add up to 16% more water flow out of the Sierra Nevada and into California’s water supply. (Romero, 2015) These two aspects are just a few of the many approaches and scientific evidence that has been proven to work for thousands of years in the past to rehabilitate and sustain ecological habitats, so it is imperative that with what we know today about how much more severe wildfires are going to become, that we utilize this Traditional Knowledge to take progressive action.

*“Our meadow restoration practices have proven that we don’t need to reintroduce species, because what belongs there is there and or will be brought back there by the habitat while traveling through the meadow. All the plants that belong there will flourish when the water returns and the openness returns and the sunlight returns and they are no longer competing for space and moisture or light.” -Ron Goode*

## Solutions

Native Practices: Indigenous techniques have repeatedly proven to work.

California is facing a future of uncontrollable mega-wildfires that have potential to be mitigated using Native American cultural traditions of prescribed burns to reduce fuel loads and restore forests and meadows, which can bring back a significant amount of water to our drought stricken state.

Our focus on this subject allowed us to meet with Ron Goode, chairman and a descendant of the North Fork Mono Tribe located in the foothills of the Sierra Nevada Mountain range. Goode has long been a proponent of meadow restoration and prescribed burning, both of which is done by removing excess trees, shrubs, and non-native plants, thus limiting the forests water consumption and redirecting it to more critical resources. Water can then seep into aquifers instead of being consumed, helping restore our groundwater.

The removal of excess foliage also reduces the risk of large, uncontrollable wildfires. Fire was the most important land management tool that they had to maintain their land and culture (Anderson and Moratto, 1996). By burning the underbrush, they were maintaining the wellbeing of meadows and grasslands, improving their hunt for deer, enhancing their production of basketry and cordage materials, and reducing fuel accumulation to prevent future fires.

A wildfire moving through light, flashy fuels at a low rate of speed. Note the direction the flames are leaning and the smoke is drifting. This is a low intensity fire and easy to control. Fig. 8



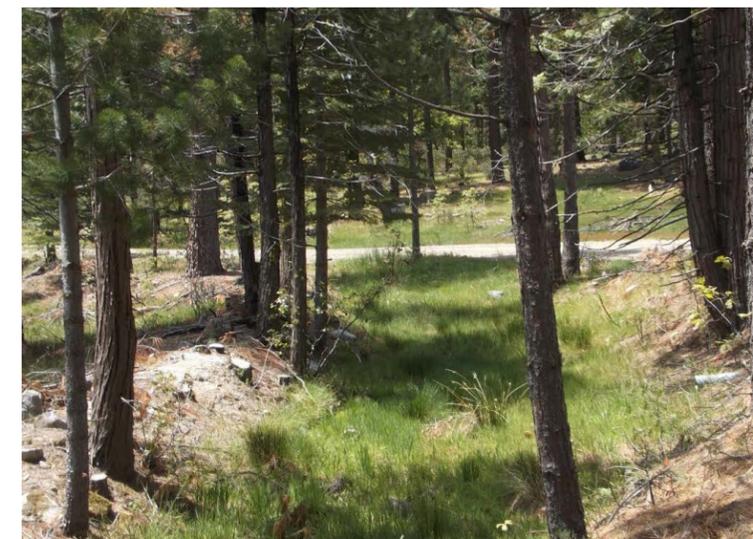
**Above:** Native plant, insect, and animal populations all rebound when meadows are restored to their natural states. Photo courtesy: Ron Goode

**Below:** A picture from the North Fork Mono Tribe territory in the Sierra Nevada Foothills, showing the positive outcomes of forest thinning and control burns which yield more water for meadows and a buffer from any external wildfires.

Prescribed burns also increase native species diversity by reducing invasive plants and competition therefore promoting seedling production, increasing flower stalk yields, recycling nutrients, and clearing away detritus (Anderson, 1996). The main reason elders practiced controlled burns was to keep underbrush down to prevent large devastating fires. They have experienced losing their homes and prized possessions due to fires.

The North Fork burn every year in the fall when the ground is more damp and cold, timing is a critical part in control burns. They set fires just to burn the grass, because it opens the canopy so light can reach the floor and water can percolate into the ground. Meadows act like sponges that soak up large amounts of water then slowly release it into streams.

**The removal of excess foliage also reduces the risk of large, uncontrollable wildfires.**



# Native Control Burning

Steps towards more resistant ecosystems against wildfires.

Ron Goode was kind enough to provide us with images that he took during a control burn that heavily emphasizes a step by step instruction on how a controlled burn should take place. Notice how this area is overflowing with dead grey brush, lacking the ability to absorb water and acting as fuel to feed a wildfire. Versus, a green lush patch blooming with flowers attracting insect which in turn bring the birds to feed and nest. The deer graze for shrubbery to eat while they defecate and turn the soil which allows for more insects and smaller game to appear like rabbits. They lure in the foxes and hawks. The leftover carcasses

of these small rodents call to the noses of the mountain cats and bears to hunt upon the doe and eat berries which get pollinated from the bee's. These are all outcomes of a prescribed burn. It is a simple understanding; the key to less wildfires is to properly burn areas the way they had been done for thousands of years prior because it is what this land has been used to. Our fear of fire came from a Eurocentric view, to try and conquer while suppressing nature rather than live alongside it. As the old saying goes, "Listen to your elders."



Resource for Restoration

1



4

Height of the burn



2

Prepping a site



5

End of the burn



3

Starting the burn



6

Mop up

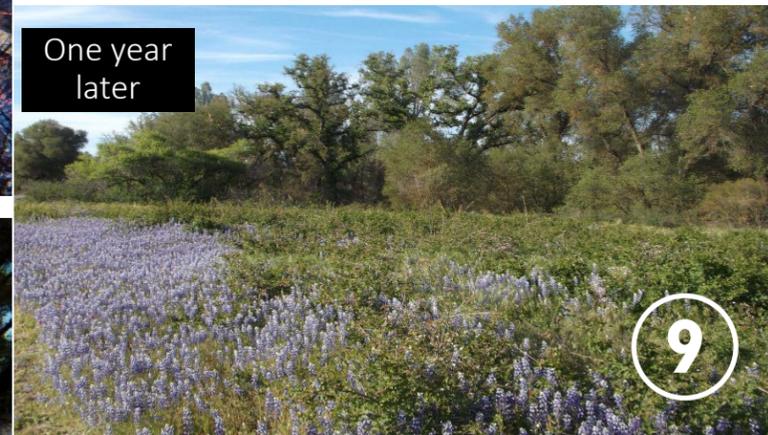


One week later



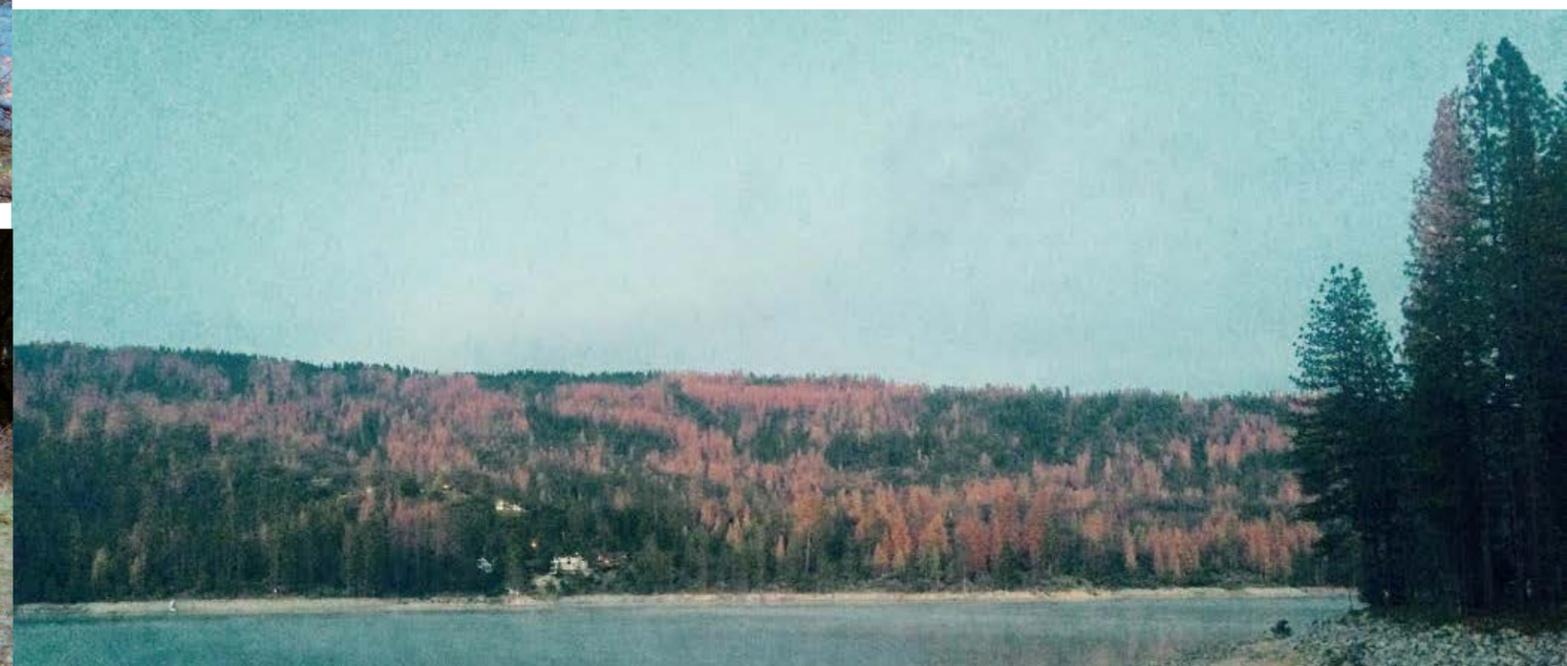
One year later

8



One year later

9



The fuel deposits for wildfires create high intensity burns which kill off all of the wildlife that cannot hide from the high temperatures and fast moving flames. In low intensity fires, these animals can withstand the lower temperatures that pass along without destroying the land.

Some of us were fortunate enough to work alongside Ron Goode and do some restoration work in the meadows. Our experience between driving around and camping for a night in Bass Lake, CA at the foothills of the Sierra Nevada, and then going to one of Ron's meadows was like night and day. It was more apparent that there are too many trees here acting as timber for massive fires to leach on in the unmanaged areas. The thicketed amount of trees affected by "The Bark Beetle", brown and dead from the lack of being able to get enough water evenly distributed between all the roots of the trees. The water allows the trees to create a sap that keeps the Bark Beetle out but because the area is not managed properly and we are in the midst of a furious drought, the beetles infest the bark and kill the tree, now acting as more fuel to the flame.

Ron currently oversees about 15 meadows. These meadows are a complete contrast to the other forests that are unmanaged in the area and provide a unique ecosystem habitat that is extremely resistant to wildfires because of proper management. There are 3,000 plus meadows in the Sierra Nevada foothills that are currently unmanaged.

**Below:** This picture was taken by us in April 2016, all of the brown thickets of trees averaging 100 ft. tall have been effected by the lack of forest management, drought and the bark beetle.

# Spending in the Wrong Places

The economic black holes of wildfires

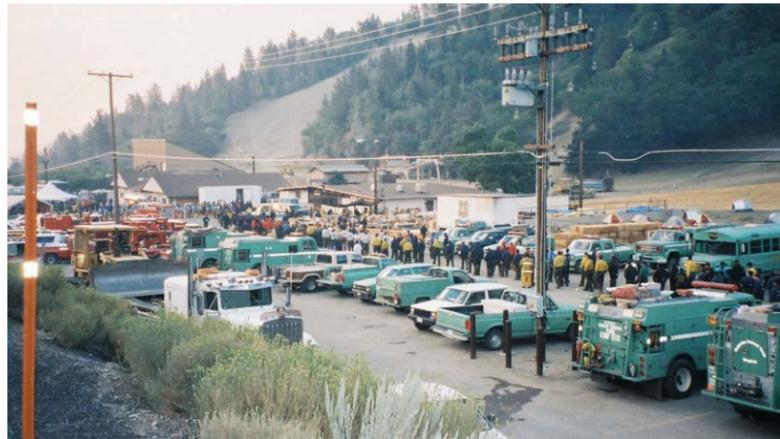
*“With each dollar spent preparing for fire on prescribed fire burning you save about 7 dollars or more in fire suppression.”* -Timothy Ingalsbee, PhD, Executive Director Firefighters United for Safety, Ethics, and Ecology

It is clear that we are putting our money in the wrong side of this debate and is clearly economically unsustainable, because we are simply going to run out of money before we can stop having these mega-fires, if we keep doing what we have been for the past 150 years. This change in tactics would not only reduce the likelihood of extreme unmanageable wildfires, but it would also more adequately protect homeowners, communities and the environment.

Modern forest management is still primarily driven by economics, and is based on the European view of the forests as wilderness not to be touched or as a resource or to just generate profit. Thus, the longer we go without treating areas with burns, the larger and more complex this issue becomes for us down the line. (M.Varnar Chairman, Northern California Prescribed Fire Control) It is very important that we do not hamstring forest managers, that because of climate change you cannot use fire as a management tool. These forest systems are going to burn eventually, especially as we see more dry and wet periods as well as overall warmer temperatures, we are going to see a much higher frequency of large fires on the

landscape. So the steps we can take now as fire in a process to restore systems will pay dividends off in the future. (M. Hurteau Dept. of ecosystems science and management Penn State.) In long terms, the relevant amount of carbon burned from these forests will promote proper growth of healthy forest in the future which will sequester more carbon than originally emitted.

The amount of mobilization, resources, expertise and money needed to run wildfire outposts and operation's is economically unsustainable compared to doing controlled/prescribed burns in wildfire off season, which reduces the need for more of these kinds of costly operation when fire season rolls around. Fig. 9,10,11



Ron Goode of the North Fork Mono Tribe directs a burning treatment for a patch of sourberry plants. Photo by Belinda Aldern.

*“Fighting wildfires is costly. The United States government now spends about \$2 billion a year just to stop them, according to the National Interagency Fire Center. That’s up from \$239 million in 1985.”*  
-University of Florida

The Forest Service is working with local communities and are helping educate the youth. The North Fork Mono tribe and others are collaborating with government based land management agencies to reintroduce controlled burns. In the recent decades, smoke regulations in California have frequently stopped fire permits from being issued. Other conflicts with prescribed burns are endangered species protections, air quality regulations, and fears of liability. National and state agencies have become advocates of maintaining, tending, and encouraging growth of plants important to Native Americans. Wildfires in California are not by any means and in any time soon going to get better, we must look at restructuring where we spend our money in terms of the long run benefits.

We are fighting fires on the wrong end of the economic spectrum. These retardant drops, manpower delegation, and resource consumption are costly while being very ineffective. It is not hard to shift the focus of how we fight these fires; we need to put this manpower into mitigation efforts because it is siphoning state and government funding out of the taxpayers to fight these fires once they start erupting. All of our aircraft and land operations are extremely expensive and ineffective in the big picture.

It does not take a rocket scientist to puzzle together that as the practices have been proven before, this

manpower takes much less effort and safety measures relative to the brunt work fire crews have to do on the ground during a fire. This looks like it could be a positive field for job growth and help mitigate the issue of wildfires if we are truly serious about changing our current practices. The amount of supplies and materials needed for prescribed burning restoration/conservation work is minuscule compared to the amount of technology, engineering, and gear that has been designed to combat wildfires. Seeing the big picture yet?

There is a stark difference between the two different ends of spending for pre-wildfire season control burning and wildfire season fire mitigation. Control/prescribed burning is hands down more effective at stopping and preventing wildfires compared to our current operations. Below is a trailer full of control burning gear, it is clearly a fraction of the costs we are putting into fighting fires on the tail end. If we were really serious about this issue we could mobilize a huge workforce to tackle this problem with the oversight of indigenous knowledge and truly start to get California to retain more of its water and reduce wildfires.

Trailer full of burn tools needed for control/perscribed burns. Fig. 12



# Drought & Climate Change

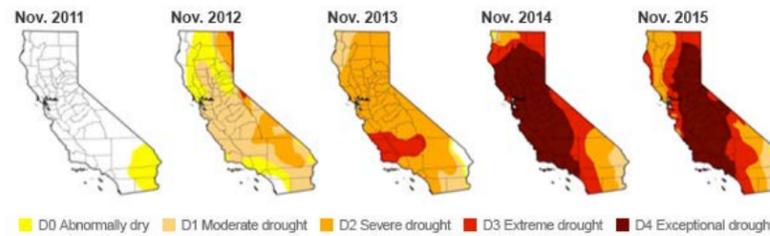
How fire can help California's Drought

We must adapt, look towards more traditional ways, and understand connections as a systemic system to lessen the effects of climate change.

Human caused climate change is a threat to people, animals, plants, culture, and the world as a whole. Due to climate change we are in the middle of the sixth extinction (Kolbert, 2014). The five extinctions before were because of natural causes. The sixth is happening now and is caused by climate change. Human caused climate change is occurring, because of the burning of fossil fuels. To save important ecosystems, like the Sierra Nevada (Goode, 2014).

The burning of fossil fuels increases the greenhouse effect. The greenhouse effect is important for life to exist on Earth, but a human caused increase has and will increase the average temperature on Earth. This will lead to longer droughts, more extreme heat waves, and more extreme storms (Dessler, 2012). We must adapt, look towards more traditional ways, and understand connections as a systemic system to lessen the effect of climate change.

Time-series comparison of statewide drought conditions



## U.S. Drought Monitor West

May 5, 2015

(Released Thursday, May 7, 2015)

Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
<b>Current</b>	23.35	76.65	63.22	39.05	17.54	7.95
<b>Last Week</b> 4/28/2015	26.14	73.86	62.12	39.33	17.64	7.95
<b>3 Months Ago</b> 2/3/2015	30.68	69.32	52.74	31.35	18.51	6.96
<b>Start of Calendar Year</b> 12/30/2014	34.76	65.24	54.48	33.50	18.68	5.40
<b>Start of Water Year</b> 9/30/2014	31.48	68.52	55.57	35.65	19.95	8.90
<b>One Year Ago</b> 5/6/2014	30.20	69.80	61.47	45.60	19.60	4.69

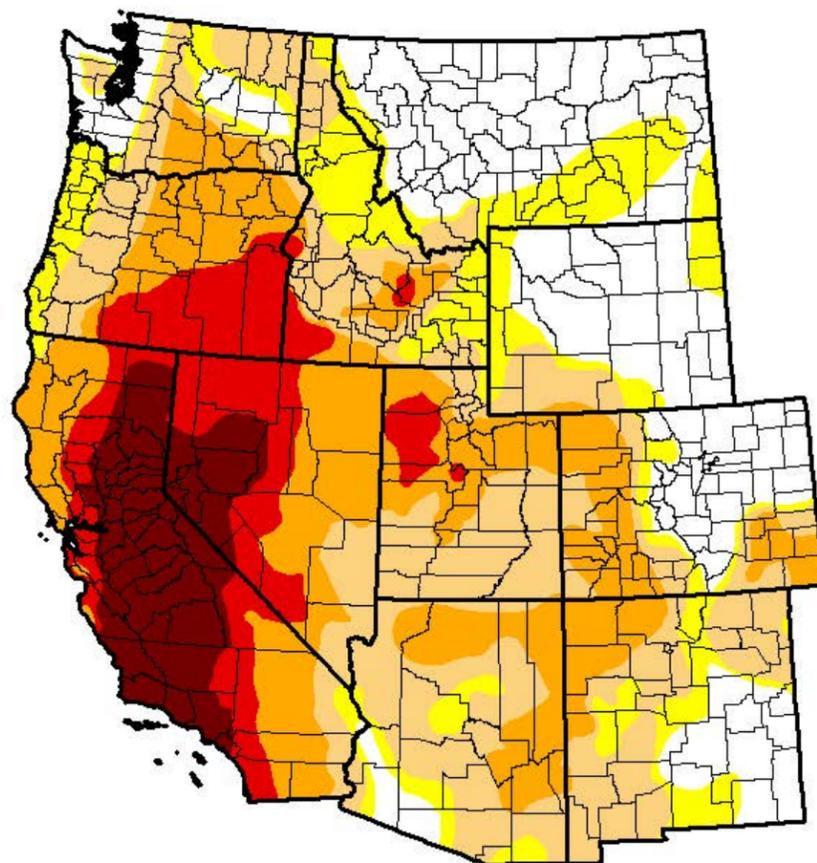
Intensity:



The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

**Author:**

Mark Svoboda  
National Drought Mitigation Center



Notice how prescribed fire is going to burn into itself and effectively reduce the potential fuel load for a wildfire. When the timing is right we can control the area of the burn and massively reduce fuel loads, this is a key practice California needs to be taking advantage of if we want to have less costly wildfires in the future. Fig. 13

In California the effects of climate change are being felt and will only intensify. The reason for this historic drought is climate change. California will become even more warmer and dryer, in turn costing the people of California more for water and cooling cost (Xu, 2012). In California the temperature could rise 4.7-10.5 degrees Fahrenheit on average, leading to greater exposures to health risks (Moser, 2016). The increase in temperature and the lack of water will increase the occurrence of high intensity fires. Fire severity will alter the course of post-fire recovery. The bigger the fire the longer it will take for an area to recover (Meng, 2015). Modern science proves that traditional knowledge works and we must use this knowledge to hold on to the little water we get and to decrease the occurrence of high intensity fires. We must apply this knowledge to work today. The Sierra Nevada is one of the most diverse temperate conifer forests on Earth, leading to a high amount of biocultural diversity. Fifty percent of California vascular

“Less than .01% of prescribed fires escape.” -University of Florida/IFAS study

plants occur in the Sierra Nevada. It is home to 400 endemic plants, 200 rare species, the Giant Sequoia, and the highest mountain peak in the lower 48 (Hogan, 2015). This diversity is at risk, because of human caused climate change. There are many negative effect of climate change on the Sierra Nevada that include: meadows are drying up, wildflowers are blooming earlier, glaciers are melting, temperature zones will rise hundreds of feet for the Giant Sequoias, seventy percent of the area is at ecological risk from wildfires, half of the species have shifted their range, and in fifty years the snowpack will reduce twenty-five to forty percent (Cone, 2013). The Sierra Nevada is just one example of the negative effects of climate change. The effects will harm all of California and the world. Policy needs to change, before it is too late.

# Conclusion

Time to apply our knowledge.

Modern science proves that traditional knowledge works and we must use this knowledge to hold on to the little water we get and to decrease the occurrence of high intensity fires.

In conclusion, we can prevent these massive wildfires from happening by practicing more control burns in the proper seasons when the solution is incredibly simple. The biggest problems standing in our way are the political policies. Government, communities and our ecosystem will continue to suffer more and more if we do not uplift laws about wildfires. We can either choose to keep going down the path of short term and long-term destruction of mega-wildfires or step up to the plate and get policy changed to help reduce these economically destructive “unnatural wildfires”. We have been upsetting a cycle that indigenous people practiced for thousands of years and have halted their practices. Historically speaking high intensity wildfires were a complete rarity compared to what has been unfolding in the last 100 years.

Prescribed burns remove shrubs, trees, and non-native plants which will help conserve water by soaking into aquifers instead of being consumed by vegetation. These control/prescribed burns effectively kill off invasive plants help restore natural habitat. The removal of the excess foliage will reduce fuel for forest fires and help reduce the effects of climate change, as well as help our state absorb more water into our meadows and replenish our groundwater. Fire is the

The results could not be any more clear. Fig. 14



best way to maintain the land. (Anderson and Moratto, 1996).

The main reason for controlled burns was to keep the underbrush down in prevent large forest fires. The North Fork Mono Tribe had used cultural burning and landscape restoration in order to live on the land without fear of dangerous fires spiraling out of control. This also helped keep the forest healthy because the fires would not completely destroy the trees and meadows. There was also no overgrowth to destroy vegetation. Cultural resource and broadcast burns help clear the old duff, invasive plants, and restore cultural vegetation and native grasses. These fires bring the ecosystem into balance and help it stay healthy for longer periods of time. (Anderson, 1996).

The University of California suggests that thinning forests could add up to 16 percent more water flow out of the Sierra Nevada and into our water supply. Climate change is a threat to our planet and humans have significantly contributed by burning a multitude of fossil fuels. This has increased the temperature on Earth and this can lead to longer droughts and extreme heat waves or storms (Kolbert, 2014). California can save money if the amount of water used in forest is decreased and the Earth’s crust will not be

The amount of carbon burned from control burns versus wildfires will help grow numbers of healthy forests in the future. In the long term these forests will not only sequester more carbon than originally emitted in the control burns, but also be much more resistant to wildfires, rather than be completely obliterated by them when they happen.

be as dry. This will then lead to less intense fires, which will decrease the time for a burned area to recover. The Sierra Nevada is the most diverse temperate conifer forest on Earth that makes it a high biocultural diversity area. The diversity of the Sierra Nevada is at risk, as the negative effects will dry it out completely if our current path of destruction continues (Hogan, 2015). These effects are occurring rapidly and if we do not change our ways, we can ruin our environments and we may cease to exist. We need to take care of our planet and learn to live with it instead of just on it.

Every dollar spent on prescribed burning saves approximately seven dollars in fire suppression (T. Ingalsbee). This will mean more money for the parks and more opportunities to fund projects that we are currently not exploring. We cannot entirely suppress all future fires but we can control them so that they do not burn more forest than is needed. The amount of carbon burned from control burns versus wildfires will help grow numbers of healthy forests in the future. In the long term these forests will not only sequester more carbon than originally emitted in the control burns, but also be much more resistant to wildfires, rather than be completely obliterated by them when they happen. More agencies are now advocating for maintaining and growth of plants that are important to Native Americans. Since we feared fire in the past, we have created more fuel for fires to burn through now. This has backfired on how we use to deal with forests. We can create jobs to help maintain the forests in order to inspect certain areas and cut down trees that are no longer viable to that specific area.

The hardest notion for the general public to understand is that fires will actually help allow us to retain more water, policy and government laws created a hundred years ago are standing in the way of helping California’s ability to retain water where we need it most. If we want to have any impact going forward towards adapting to droughts and wildfires we need to start changing how we envision policy and work closer with Native American Communities and USFS to develop a conservation effort that has potential to drastically lower the economic black holes that wildfires are causing this state and nation. We are putting our money in the wrong places, it is time for us as humans to realize we are up against a clock and the longer we wait the more expensive and detrimental to our way of living and the problems we face will be harder to fix.

For more information on this subject we have provided an informative video link and the Facebook Link to the North Fork Mono Tribe’s page.

**Youtube: Catching Fire: Prescribed Burning in Northern CA:** Tells a compelling story of how a small but committed group of local, tribal, state and federal land managers are bringing back the use of prescribed fire as a tool to protect communities and ecosystems across Northern California. It examines the use of fire by the Karuk Tribe of California, and the connection between the rise of megafires across the West and the last century of fire suppression. Drawing on interviews with fire scientists, tribal and federal land managers, and fire savvy residents from across the North State, this film provides insight on how our relationship to fire can be restored through strategic use of fire as a powerful management tool.

**Facebook: North Fork Mono Tribe:** The North Fork Mono Tribe is a state-recognized tribe with a 1.4 million-acre homeland in Calif. Tribal members hold trust & fee lands totaling ~10,000 ac.

In conclusion, we can prevent these massive wildfires from happening by practicing more control burns in the proper seasons when the solution is incredibly simple. The biggest problems standing in our way are the political policies. Government, communities and our ecosystem will continue to suffer more and more if we do not uplift laws about wildfires.

A new drone under development at the University of Nebraska-Lincoln could change the way wildfires are fought – and encourage the use of prescribed burns for conservation purposes. (Photo by Ariana Brocius, NET News)



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