

Forest and Climate Health vs. Fire Mitigation

Let's not destroy the health of the forest in the pursuit of fire mitigation.



Trees are important in the fight against Climate Change. Trees sequester carbon in their wood for a hundred or more years. We need more trees, not less. Mass logging has never been good, and the need for fire mitigation doesn't change that fact.

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Fire Prevention vs Forest Health

Wildfires have ravaged the western United States for many years, and the problem just seems to get worse. Millions of acres have burned, killing the forests and releasing tons of CO₂ into the atmosphere. Thousands of homes have been destroyed. Something has to be done. Cries for forest management for fire mitigation are widespread, and even presidents have said that forest management is the solution.



The 2021 fire in Boulder Country devastated this subdivision.

The current paradigm is that man's control of fires for the last hundred years has allowed the forests to become overly thick. The attempt at recreating previous forest conditions is known as Ecological Forest Management, and the prescription for fire mitigation, therefore, is to thin the forests. The purpose of this paper is to suggest a better method of thinning than is currently in practice that will actually address forest ecology.

The Forest Ecosystem is more than Trees

The attempt to slow down wildfires should not neglect the primary goal of maintaining healthy forests. I believe that the current method of forest thinning is destroying the health of forests. The current method of thinning is based on the flawed assumption that the reduction of competition makes for healthier individual trees. That assumption is flawed, and modern ecological science shows that, to be healthy, the trees need each other and their associates. Trees and the other plants support each other's health in many ways, not least of which is the mycorrhizal network that connects them all.

Trees cannot thrive alone. The forest is a unified whole, and all the plants and animals, all the fungi and other microorganisms are part of the entire community we call the forest. We should not destroy those crucial relationships by over-thinning the forests. Ecological Forest Management must include all those organisms, not just the big old trees.

Water is the Limiting Factor for Tree Growth

In 2002, eastern Colorado had a severe drought. There was essentially no precipitation for a year. There

were watering restrictions, and the lawns dried up, but I learned something. **The only place lawns stayed green was in the shade of large trees! It turns out that more soil moisture is lost through evaporation than through the plants as transpiration.** The combined transpiration of the grass and the trees was not as great as the water loss by evaporation in soils not shaded by trees. **Forest trees conserve water by shading each other.**

The Shade of Trees Conserves Water!

Water is the greatest limiting factor to tree growth in Colorado and other areas of the mountain west. When trees are thinned, or I should say over-thinned, the root systems of the trees are exposed to the sun, and a huge amount of water is lost by way of evaporation. Over-thinning leaves forests in a state of perpetual drought. This defeats the purpose of thinning by making the drought stressed trees MORE susceptible to fire. In addition, the forest health suffers. The trees are less healthy and more susceptible to bark beetles and other pests.

My prescription for thinning, therefore, is to leave large groups of trees that can shade each other. The critical fact is that trees shade each other. Usually there are natural meadows or breaks in the trees. My idea of thinning is to expand the natural breaks in the trees or to create breaks in the trees where there are none. **Yet it is critically important to leave the root systems of most trees shaded for the conservation of water.**

Water Conservation and the Water Cycles

The conservation of water in the forest is critical, not only for the health of the forest, but for healthy water cycling, for flood prevention, and even for the mitigation of global warming. One argument, from those advocating thinning, is that climate change is causing the forest snow melt to happen earlier in the year than previously. That creates a more drought stressed forest which is more susceptible to fire. Well, thinning the forest causes the snow pack to melt even more quickly because the sun can reach the snow pack to melt it.

Another factor in forest and water cycle health is the ability of water to infiltrate into the soil and be retained. The current paradigm wants to remove the smaller plants and the forest floor litter to mimic the effects of a low grade fire. Everyone knows that one of the after effects of a fire is flooding. Over-thinning causes the same problem. That current model of thinning causes a lack of water infiltration and retention in the forest. Soil compaction from the logging operations makes things worse. We all know the problems flooding cause downstream, but the problems for the forest are multiple. Soil erosion and the loss of soil nutrients are significant problems, but the big problem for the forest is drought. Drought is the killer. Well watered plants moderate the temperature, so the lack of water retention after thinning makes the forest not only drier but hotter.

Local and global water cycles are important. The short water cycle, according to science, says that more than half the water evaporated from a land falls on that same land. If the water all runs off, there is nothing left to form local clouds, and the drought is made worse. As less water is retained locally, the light and frequent precipitation from local clouds decrease. There is more drought, and the storms that come from the oceans tend to be more severe. The smaller plants and the litter on the forest floor are critical for the retention of water in the forest.

The large water cycle involves the amount of water on the land versus the amount of water in the oceans. If more water flows from the land to the ocean than is returned through precipitation, then the land dries out. When men lower the infiltration of rainwater into the soil, it runs off quickly, and the land dries out. One of men's activities that lowers water infiltration is deforestation. Forest thinning is deforestation and adversely affects the water cycles.

So, what's called Ecological Forest Management has to be concerned with more than the number of trees per acre or the amount of space between trees. Water management should be near the top of the list. The other plants in the forest should be near the top of the list. Let's not destroy the ecology of the forest in the name of saving the forest from fire by over-thinning.

Many areas of the world that used to be healthy grasslands and forests are now deserts because of the

activities of man. Many desert areas are being brought back to life as men and women learn about the relation of plants to the water cycles and the conservation of water. Studies have shown that even individual properties, such as a ranch, that are properly managed receive more precipitation and retain more water than their neighbors! Those of us concerned with fire mitigation need to make what's been learned about water part of the Forest Ecology paradigm, so we don't turn our forests into deserts.



Recently thinned trees burned in the Cal-Wood Fire.

The Benefits of Thinning Are Limited

In 2020 the Cal-Wood Fire roared through Boulder County. It was a firestorm and moved with unprecedented speed. One area that burned was the Heil Ranch north of Boulder. The county had just completed a major thinning project in the path of the fire. All of the recently thinned trees burned. The thinning was done correctly according to current standards. The point to be made here is that thinning won't stop a fire storm.

The spread of fire usually doesn't happen because a burning tree is touching another tree, but because of blowing embers. Fires are made worse by strong winds, and a fire can generate its own weather and make the winds worse. Those winds blow glowing hot embers, sometimes for miles, and when those embers land in a tree or another flammable object, a new fire is started or thousands of new fires.

The point to be made is that thinning is not the panacea for fire prevention that it is often made to be. If a fire were to start in the middle of the thinned forest, the thinning would reduce the likelihood of the fire grow-



These trees in the middle of a 400 yard wide meadow burned. Thinning was irrelevant.



As the Marshall Fire showed us, grass fires can be just as devastating as forest fires.

ing to catastrophic proportions, but it will not stop a fire that is already raging.

In December of 2021 we had the worst fire in Boulder County history. Over a thousand homes were lost. It was a grass fire, not a forest fire. Meadows can burn just as hot and quickly as forests. The assumption is that thinning trees will stop a fire is a flawed assumption. The understory of a dense forest may well be less flammable than a grass meadow.

Other Downsides to Thinning

In addition, the thinning causes harm to the forest. Environmentalists have opposed logging for many years. Well, thinning is logging. Logging roads need to be built to access the trees. Soil is compacted. Those roads cause weed problems and erosion. Trees are usually damaged by logging equipment.

Thinning is often done incorrectly. Smaller trees are removed, so the age diversity of the forest is lost. The thinning leaves a monoculture of trees all about the same age. Monocultures don't happen much in nature, but when they do, they're almost always bad. Should a bark beetle infestation move in, all the trees would be lost because they all have the right thickness of bark for the beetles to raise families. In addition, the natural mulch of fallen debris that supports the whole ecosystem through water retention and food for the associates is lost.

Let's Leave Groups of Trees and Their Associated Ecosystems

Let's think about overall forest health, not just about fire mitigation. Thinning doesn't make for healthier trees. It causes drought and disruption of the entire ecosystem. When thinking fire mitigation, leave large groups of trees and create breaks between the groups of trees. Trees evolved in groups, not as individuals.

My prescription is to leave parts of the forest alone. We know a lot about forest ecology, but we have a history of grievous mistakes when we try to manage nature. While we need to do something to mitigate fire, we can leave part of the ecology alone by leaving groups of trees untouched. Leave the shade, leave the tree associates, leave the plants and litter that help the infiltration of water. We can still mitigate fire by creating breaks between the groups of trees.

Prescription

1. Leave large groups of trees to shade each other to conserve water.
2. Take advantage of natural meadows. Expand them to create natural fire breaks between the groups of trees.
3. If no natural meadows exist, then create fire breaks between the groups of trees. The fire breaks should be 75 to 100 feet in width.
4. Consider pruning lower deadwood out of trees to reduce ladder fuel that could take a ground fire up to the crown of a tree. No skidders or other equipment should be driven into the groups of trees.
5. When thinning, don't just leave large trees. Currently, the forest mitigation takes out all the small trees, even though the managers claim otherwise. Small and medium sized trees must be left to insure forest survival during beetle infestations and other catastrophes.
6. It's okay to thin trees that are structurally interfering with each other. It's not okay to thin trees to create space between the crowns of trees. The shade to all root systems must be maintained absolutely to conserve water. Water conservation should be the number one objective of forest health management and fire mitigation.
7. In areas within a hundred yards of developments or residences, consider mowing tall grass annually in the late summer after the grass has dropped its seeds. Do not destroy other small plants in the process.