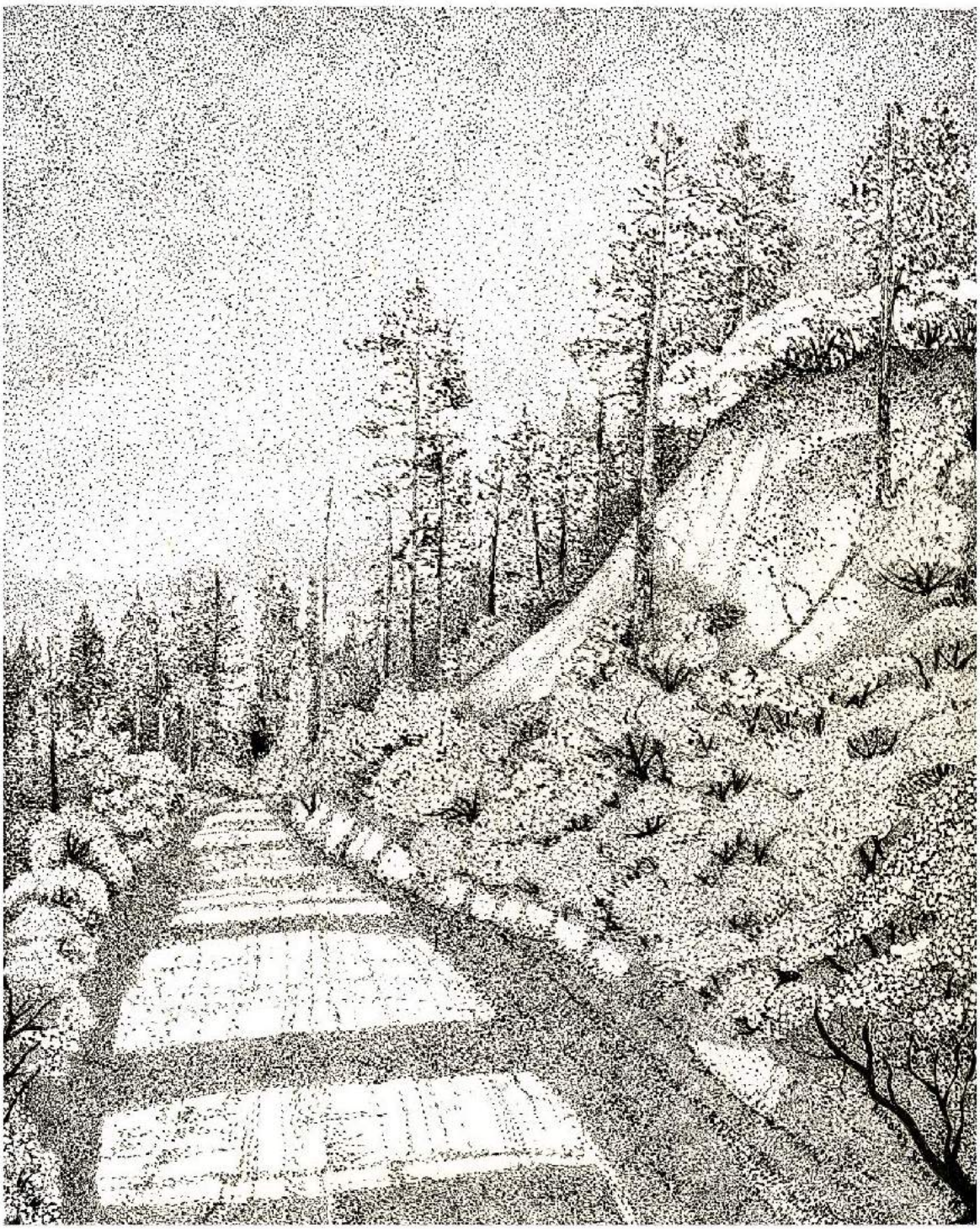
TREE RINGS

THE JOURNAL OF THE YUBA WATERSHED INSTITUTE



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YUBA WATERSHED INSTITUTE

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Nikolas Streiff is a local illustrator who has been working on a comprehensive bioregional illustration series on the 'Inimim Forest and the Yuba Watershed, to glorify manzanita, madrone, and the chaparral.

Join us for the 22nd Annual
Fungus Foray and Wild Mushroom Exposition
December 14-15, 2019
Shady Creek Outdoor School and Event Center
Register at www.YubaWatershedInstitute.org/register

Tree Rings is published from time to time by the Yuba Watershed Institute (YWI), a 501(c)3 organization based on the San Juan Ridge in Nevada County, California. We welcome unsolicited articles, art, letters and notes.

Notes on Increasing Resilience in the 'Inimim Forest, By Chris Friedel
Executive Director of the Yuba Watershed Institute

On the San Juan Ridge in Nevada County, the Yuba Watershed Institute is spearheading several projects to improve the resilience of the forest ecosystem. But what exactly do we mean by "resilience"? In ecology, resilience is the ability of an ecosystem and its components to resist or absorb impacts from a stressor without being pushed into a different state. For the mixed conifer forests of the Sierra Nevada, these stressors come in the form of natural disturbances such as wildfire, drought, bark beetles, or intense wind storms. If these forests were not resilient to these stressors, the trees would die and be replaced by another type of ecosystem, like oak woodlands, manzanita thickets, or grasslands.

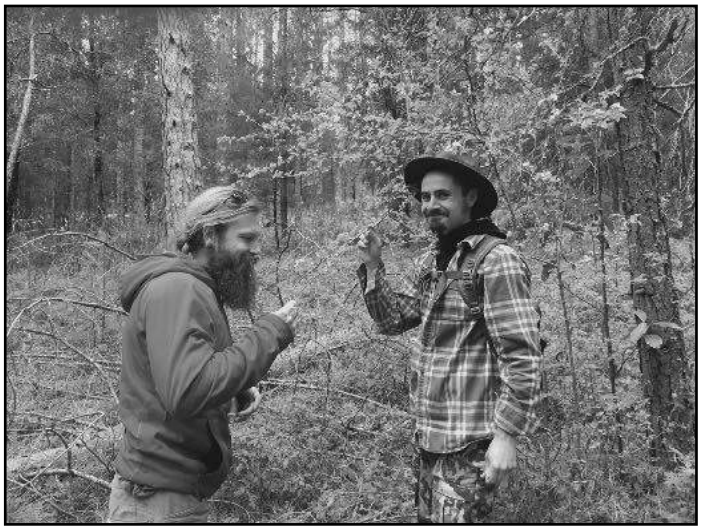
Piles of small trees and brush on the Shields Camp parcel, awaiting favorable conditions for the BLM to burn

Ponderosa pine and mixed conifer forests have dominated the mid-elevation slopes of the Sierra Nevada for thousands of years, a testament to the resilience of this vegetation type. However, in recent years this resilience is being tested. Since 2010, an estimated 129 million trees have died on California's National Forest lands alone. This wave of tree mortality has been caused by higher temperatures, prolonged drought, and bark beetle infestations, all exacerbated by the high tree densities resulting from a century of fire suppression. In addition, the large, intense wildfires we have seen in recent years can accelerate the loss of forests. The 2014 King Fire, in the central Sierra Nevada, led to conversion of thousands of acres of ponderosa pine and mixed conifer forest to oak woodlands and chaparral.

What do we stand to lose from this kind of "non-resilient" response to disturbance? After a bark beetle outbreak or a high-severity fire, we lose more than just the trees. Forests provide important services to our human communities, like carbon storage, water holding capacity, water filtration, wildlife habitat, recreation opportunities, and timber production. It is in our best interests to figure out how to improve our forests' resilience to stressors, especially as these disturbances grow more severe in the future. Climate projections for California call for longer periods of prolonged drought, higher variability of precipitation, and increased fire frequency due to higher temperature and lower humidity levels in late summer and fall.

How do we improve the resilience of a forest? One way is to understand what caused the resilience in the first place. There is evidence that intermediate levels of disturbance can actually increase an ecosystem's resilience or ability to rebound from stress. In most of California, before Euro-American settlement, regular surface fires (every 8 to 20 years in mixed conifer forests) caused by lightning strikes and Native American burning kept surface fuel levels low and killed the majority of small trees, reducing ladder fuels. This lowered the risk of stand-replacing fires and loss of forest cover. In addition, these frequent, low-severity fires created patchy, heterogeneous forest structure and diverse patterns of species composition. Patchiness also aids forest resilience; the more different combinations of species, ages, heights, and shapes of vegetation in the landscape, the more possibilities for the forest ecosystem to respond favorably to new environmental conditions. Conversely, if the forest is homogeneous – all one age or one species – the system is "brittle" and easily perturbed if conditions change to those outside of what is favorable for those elements.

Once we understand the types of disturbance "regimes" under which our forests evolved, we can act to restore these intermediate levels of stress, while attempting to recreate the diversity of ages, structures, and species that resulted from them. In the 'Inimim Forest, the YWI is doing this through physical manipulations of the forest (such as removing small trees and shrubs and thinning mature stands) to increase the "patchiness" of structure and function, and reintroduction of historical disturbance regimes, primarily through the use of prescribed fire.



Volunteers Jon Oleson and Bo Blain helping to flag understory plants to retain during fuels reduction work

Whether or not a forest is resilient depends on what scale of time and space you are considering. If you zoom out far enough in time, changes in ecosystem type (e.g. from forest to shrubland or grassland) can seem like natural or inevitable adaptations to a changing environment. Perhaps manzanita brush fields and oak woodlands are actually more appropriate vegetation types for the Rim Fire landscape under a hotter climate with more variable rainfall. In this case, human intervention (such as the fire suppression that created the fuel buildups that led to the wildfire) would simply be hastening a process that would have happened naturally, albeit more slowly. That said, as a society we have decided that we value the existing forest more than the shrubs or woodlands that would replace it, so maintaining the resilience of the forest is desirable to us.

As is often the case with natural phenomena, the concept of ecosystem resilience has analogues in our human lives and society. One example is the resilience of the human body. Regular exercise, which can be thought of as a mild stressor or intermediate level of disturbance, helps to maintain strength, flexibility, and organ function. Similarly, exposure to pathogens helps the immune system maintain a robust defense system.

The concept can also be applied to organizations. "Disruptions" in the marketplace can be analogous to disturbances in an ecosystem. It is a popular idea today that healthy organizational culture should encourage a certain amount of innovation – trying new things, challenging established patterns of doing business – and that this constant low level of disruption will help prevent larger disruptions that may lead to the failure of the enterprise. The idea that diversity can lead to stability is a familiar one, captured nicely in the phrase "Don't put all of your eggs in one basket."

'Inimim Forest Landscape Resilience Project

In recent years YWI has received the following grants to improve the resilience of the 'Inimim Forest, in collaboration with the BLM:

2017 - completed

- *Bella Vista Foundation* - $38,280 to update the 'Inimim Forest Management Plan

2018 - in progress

- *Sierra Nevada Conservancy* - $75,000 to develop a Draft Environmental Assessment
- *CAL FIRE* - $414,678 to implement understory fuels reduction on Shields Camp and Bear Tree parcels and to create a 200-foot shaded fuel break along key roads

2019 - in progress

- *Sierra Nevada Conservancy* - $300,000 to extend the roadside shaded fuel break by 200 feet and to remove hazard trees on 9.5 acres

Zendo, by Tom Levy

In the dark,
Sitting in zazen,
Quietly
Keeping Paul company.

For each mantra,
He clicks one bead.

Bulging bicep timbers
Hold up the roof.
Single light bulb hangs,
Glowing tungsten,
The only warmth.

The rain falling.
Tin roof,
Sheet metal drumming.
The storm,
Passing.

Surrounding us:
Scrub lands,
Placer mining wastelands,
Big-tree woods.

In my memory,
Walking again through this torn
And slowly healing land.
Sitting,
Watching thoughts pass.

Sitting on milled lumber floor,
On San Juan Ridge,
On this Earth,
Round as my head,
In which thoughts,
Cloud-drift by.

Sit at the threshold.
Try not to enter.
Try not to hold on.
Try to let go.
Emptying,
Like the clouds.

And the rain falling.
Tin roof,
Sheet metal drumming.
The storm,
Passing.

—1992, Kitkitdizee, California
With thanks to Gary Snyder for his hospitality.

'Together,' by Dan Murnane

How Can I Call This Home, by Gavrila Nikhila

How can I call this home?

My root begins to drop but hovers just above the blood soaked, tear soaked ground.
I have lived here for years now.
My body roars alongside the rushing river as she howls for winter rain droplets to merge with her.
I surrender beneath her shallow warmed waters that become darker and darker as life grows from sun beamed nourishment.
And as my hands graze ancient rocks at the bottom of her full belly, I hear the wells of sorrow again.

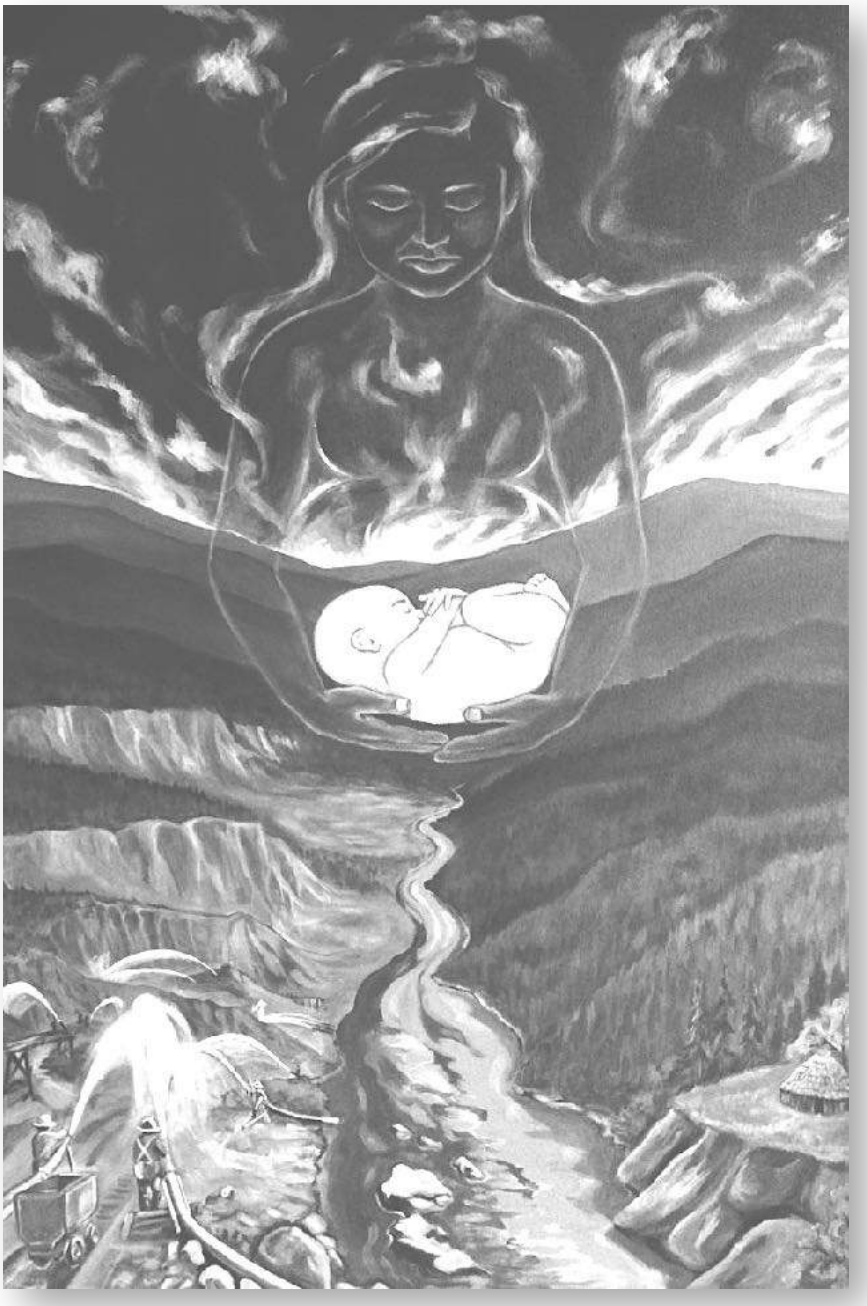
Were these the stones that you once swallowed between your legs so that you could protect the one aspect of yourself that you could call your own?

This land is cracked with massacre, with perversion, with greed.
There is an everlasting tremble, the reverberating trauma of the people whose home this was before.
Don't be fooled by the concrete, the roads, the houses, the glitter of the Nevada City lights.
There was life underneath it all.
There was life erased.
As our people plowed into this land of rushing river, set up camp, eager for gold,
You were plowed over.
Could you catch a breath?
Did it happen quicker than you could blink?
Was it a surprise or did you know, have a foreboding or warning, that everything was about to change?

A tsunami of invaders, looking past you, you were a mere obstacle in the way, no longer seen as a human being at all.
My mind fast forwards and rewinds as dominance silences fear.
As ugly white hands force tanned ones into a corner.
Gold piles grow as edible earth is devoured by carefully constructed explosions.
How many children were killed?
If the people that built this very town, built it over your former home,
Then how, I ask, how can I call this home?
My heart trembles, tears leak to meet yours in the soil.
You had to go to sleep so that no one would know you were still breathing.
Where did all the others go?
Tell me.
Are they still trembling beneath my feet as I walk within my life?
Are they whispering prayers in the wind so that they won't be forgotten?
Perhaps I tend the soil and grow the food so that I can hear their song, so I can remember.

Please, keep singing.
I am listening.
Let us remove our shoes so that we remember that we walk on holy ground.

Photo: Cynthia King



The poem and art on these two pages were created for the Art Reception for Nisenan Heritage Day, to honor the Nevada City Rancheria Nisenan.

This year's art reception titled Homeland: Restoration. Sovereignty. Recognition will take place on November 1st, at the Nevada City Winery from 6-10 pm and will exhibit a new collection of artworks created by local artists and tribal members.

Mother Earth
Acrylic and Goldleaf on Canvas
Artist: Mira Clark
existinspired.com

The image of the Earth as a living being and nurturing mother served as a cultural constraint restricting the actions of human beings in many cultures for millennia. The Nisenan are one such culture. One does not readily slay a mother, digging into her for gold or mutilate her body. The Gold Rush of the 1850s was devastating to the environment and the Nisenan, reflecting a very different perspective of the Earth's value. Commercial mining required a specific belief system in regards to the Earth to carry out destructive acts against the environment and other living beings. This painting captures the violation of mining and this clash of beliefs. The Gold baby in this painting represents the precious metal that is like the unborn child of the Mother Earth.

Perspectives from a Long-Term Study of Fuel Reduction and Forest Restoration in the Sierra Nevada, by Brandon M. Collins, Scott L. Stephens, and Robert A. York

Forest management in much of the Sierra Nevada has undergone a significant redirection in recent decades. Prior to this, fire was largely absent from many foresters' credo; it was neither considered as a tool for management nor viewed as an inherent ecological component for sustaining basic forest processes. Yet fire has been a part of these forests for millennia, and its removal has slowly but markedly changed forests in unintended ways. The cumulative effects of removing fire for over 100 years are manifested in the large and uncharacteristically severe fires that are now happening annually. Additionally, the recent drought in California spotlighted another major vulnerability of Sierra Nevada forests, large-scale tree mortality from bark beetles and possibly other yet-unseen insect and pathogen outbreaks. While climate certainly had a role in recent fire and tree mortality events, current forest conditions are undoubtedly contributing to both. Our great challenge in Sierra Nevada forests is to reintroduce the role once played by fire – a fundamental ecosystem process, while also considering the reality of social, ecological, and economic constraints that exist in California. This means proactively trying and constantly evaluating all possible management approaches. In this article we present findings from a robust study of different approaches to reducing wildfire hazard in these historically fire-adapted forests.

Historical forest conditions in the Sierra Nevada were quite different from those typical of contemporary forests. The forest we see today does not look like the forest that existed in previous centuries. We will simplify the findings from numerous forest reconstruction studies to a few key points: historical forests had much lower tree density, larger trees, greater variability in structure and spatial patterns, less fuel accumulated on the forest floor, and greater understory plant diversity. These historical conditions were a product of frequent fire (every 10-15 years) that generally burned on the forest floor with occasional torching of individual trees, so called "low- to moderate-severity." Due to the large departure in contemporary forests there has been a push to restore forest structure and composition to that akin to historical conditions. Forest restoration can be done by mechanically removing trees (with chainsaws or heavy equipment), with fire (either prescribed fire or intentional use of naturally ignited wildfire), or a combination of the two. The intent with these methods is reduce tree density by removing smaller and mid-sized trees, and in case of fire use, consume accumulated fuels on forest floors. The dual benefit achieved with forest restoration is that it also mitigates wildfire hazard.

The Fire and Fire Surrogate Study at Blodgett Forest (near Georgetown, CA) was initiated in order to study the effectiveness and overall ecological impacts of these different forest restoration/fire hazard reduction treatments. Through the combined commitment of the forest managers and researchers at UC Berkeley, the study has been maintained continuously since its onset in 2001. While 18 years is a relatively short time frame relative to the lifespan of trees, the study is nonetheless a uniquely long-term look at forest management options and their effectiveness.

The Fire and Fire Surrogate study at Blodgett Forest is comprised of a network of twelve stands (35-70 acres each) that were randomly assigned to four treatments representing the basic range of forest restoration/fire hazard reduction options. The treatments were:

- Control: no active management.
- Mechanical-only: commercial timber harvest, which removed mid-sized trees, followed by mastication, which chipped/shredded smaller trees in place. Initial treatment was completed in 2002, with a second mastication done in 2017.
- Fire-only treatment: prescribed fires applied in 2002, 2009, and 2016.
- Mechanical+fire treatment: same mechanical treatment described previously, followed by prescribed fire. Initial treatment was completed in 2002, with second mastication and prescribed fire applied in 2018.

The initial effects of the different treatments followed a somewhat expected pattern. Both treatments involving fire were quite effective at reducing modeled wildfire hazard, even under fairly extreme weather conditions. This was due to the high consumption of fuel on the forest floor (called surface fuel) and to the considerable reduction in small trees and low branches (called ladder fuel). The effectiveness of the mechanical-only treatment at reducing wildfire hazard was not obvious initially. While this treatment largely eliminated ladder fuels, it did so at the expense of augmenting surface fuels (from the masticated material left on site).

By 2009 it was apparent that the treatments were on

distinct and somewhat surprising trajectories. The most surprising finding was that the augmented surface fuel in the mechanical-only stands was gone, presumably from natural decomposition. As a result, the modeled wildfire hazard decreased significantly. Hence, the mechanical treatment "aged well" from a hazard perspective.

The second most surprising finding was the vigorous understory shrub response in the mechanical+fire stands. The increased light to the forest floor from the commercial thinning, coupled with the removal of surface fuels and the heat/smoke stimulus from fire allowed for rapid establishment of large stature shrubs, mainly *Ceanothus* species. The mechanical+fire treatment was still effective at reducing wildfire hazard in 2009, but this was likely to be compromised as the shrubs got taller and denser. The fire-only stands started to accumulate surface fuels as the small to mid-sized trees killed by the initial fire began to fall to the forest floor, hence the

need for a second prescribed fire applied in the fall of 2009. This emphasized an important distinction between the two mechanical treatments and the fire-only treatment related to the fate of killed trees. It would take multiple "entries" to entirely remove those unwanted trees with fire alone; whereas with mechanical methods they could be removed immediately.

The distinction among treatments got even more interesting over time. Tree growth was accelerated in the mechanical-only stands. This was evident in diameter and crown expansion for overstory trees remaining after thinning, as well as for regenerating trees in the understory. This increased growth in overstory trees had a noticeable effect of increasing individual tree vigor relative to the other treatments (as studied from tree ring widths). Tree regeneration in the understory was so strong that another mastication was warranted in 2017 to maintain low fire hazard. Similarly, the shrub growth in the mechanical+fire warranted another mastication before a second prescribed fire could be applied. This was done because it would have been difficult and quite risky to burn the shrubs effectively without torching the entire stand. The fire-only stands continued to "recruit" dead trees into the surface fuels, but an interesting phenomenon became apparent. After two burns the fire-only stands were developing a "patchy" pattern of tree clumps, openings with shrubs, and large isolated individual trees. This pattern appears to be a common characteristic of historical forests that experienced frequent fire. It is also thought to provide a suite of habitat types for wildlife species that are adapted to distinct structural/compositional environments. Recent research also suggests there may be additional benefits of this patchy pattern tied to snow retention and water yield.

The state of California recently put forth some unequivocal statements (and funding) on the need for large-scale forest restoration/fire hazard reduction. So, which treatments examined in this nearly 20-year study should be used in this effort? The answer that we offer is 'all of the above.' Each of the treatments we studied had direct benefits for forest restoration/fire hazard reduction and several co-benefits (e.g., wood products, habitat improvement, water yield, reduce wildfire emissions, stabilizing forest carbon). On many forest-dominated landscapes the different land management, ownership, and societal constraints requires a diversified approach to forest restoration that includes prescribed burning, commercial thinning, and mastication. In fact, landscape-level restoration will also need to include managing naturally ignited wildfires, hand thinning (removing only small diameter trees), pile-burning, and grazing. The uncharacteristically high vulnerability to wildfire and drought exists at such great scale throughout California forests that action is warranted now, even if our current scientific understanding is imperfect. We know enough from studies like the Fire and Fire Surrogate Study at Blodgett to move forward competently with large-scale forest treatment, recognizing that we'll likely need to continue to study treatment impacts and adjust future treatments. This approach, called Active Adaptive Management, has been recognized for decades as a solution to large environmental problems like the one faced in the Sierra Nevada. Yet it has been difficult to accomplish. California now has the opportunity to succeed in the face of this great challenge.


Photo: Tim Van Wagner

Resilient Brain, by Al Stahler

Houseplants lean toward the window; sunflowers turn toward the sun. Plants can see light. Further – as Darwin discovered – plants discriminate red from blue.

The molecules that enable plants to see blue remained long-hidden, leading to their being dubbed, in the 1970s, "cryptochromes."

Eventually, blue-sensing cryptochromes were identified in plants, allowing biologists – knowing what to look for – to find them in animals, including human animals.

It makes sense for plants to search out red and blue – it's those colors that most energize chlorophyll. (At the risk of stating the obvious, plants don't do much with green light – they largely reflect it). But why should animals care about blue light?

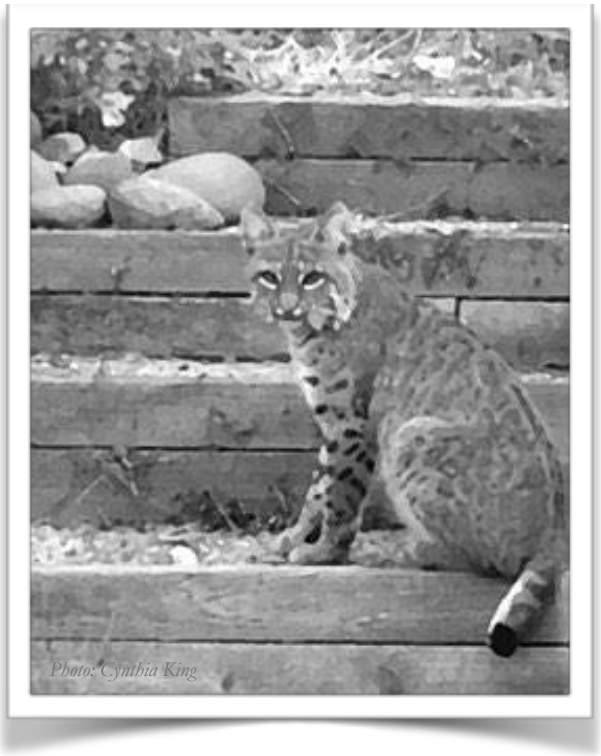


Photo: Cynthia King

Blue skylight? Must be daytime. No blue? Must be sleepy-time.

Resilience, in physics, is the ability of a springy material to bounce back, after it's been squashed. Replace "squashed" with "knocked down," and it's not a bad definition, in general.

Human resilience, one suspects, would benefit from a healthy brain – one that can learn, remember, acquire wisdom.

Why should we spend a third of our lives asleep? It seems a non-productive way to spend one's time. Can't tend the fields, nor the herds; neither hunt, nor gather; neither build nor repair. And it left our more-outdoorsy ancestors vulnerable to night-stalking predators. As biologist Allan Rechtschaffen put it, "If sleep does not serve an absolutely vital function, then it is the biggest mistake the evolutionary process has ever made."

Learning involves more than studying. The material, it turns out, is processed – put in order – by the sleeping brain. The material is also locked into memory by the sleeping brain (in a different phase of sleep).

Strong emotions reduce one's ability to make good decisions. Anger lowers one's IQ. A good night's sleep enhances emotional control.

Every organ in the body needs sleep (if your brain is groggy, so are your liver, your pancreas, your heart). The brain is the most metabolically-active organ in the body – one-fifth of the energy our bodies derive from food is used by our three-pound brains. Metabolism builds up waste products, many of them toxic. It is during sleep that most of these toxins are flushed from the brain (parts of which actually shrink to allow more cerebral-spinal fluid to flow through). Among the toxins flushed out are the proteins that build the plaques seen in Alzheimer's disease (AD). Research is ongoing to try to tie sleep hygiene with later development of AD.

Sleeping pills do not engender good sleep; alcohol interferes with the sleep phase needed for memory; caffeine blocks the signals the brain puts out when it needs sleep.

Why We Sleep, by Matthew Walker, Director of the Center for Human Sleep Science at UC Berkeley, is one of the very few books that have actually changed my behavior. I've been sharing a loaner copy with friends and neighbors – get in touch if you'd like to borrow it.

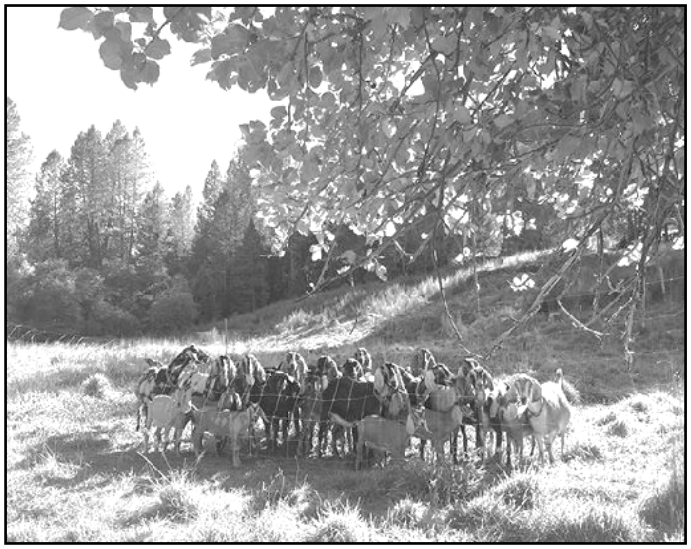
Walk the Land, by Tim Van Wagner
Farmer and Land Steward at First Rain Farm

One of my favorite pastimes is to take a walk. I like to leave from my farm, choose a direction, and head out into the woods. I'm familiar with much of the terrain surrounding my home but there are always new pockets to discover. Inevitably, I must pass through private property along the way and I suppose it's a hold-over from my childhood years of exploring the mixture of BLM and private lands along the NID ditches on Banner Mountain, without a sense of wrong-doing, that allows me to think of it as a harmless act. For me, these walks are a time of reconnection with nature. I take slow steps as I tune into my senses. I stay away from houses and people, which is not very difficult in my neighborhood with acreages ranging from five to forty acres. As I walk in this way my senses open and a subtle harmony comes over me. As I walk the terrain I feel like I'm in constant communication with my surroundings. My body is trying to tell me the story of the forest: the plants, animals, and ground underneath.

From place to place I notice different features that become a kernel of understanding in this story. A large cedar stump, blackened by fire yet clearly cut by a chainsaw. That stump, now surrounded by a dense thicket of smaller trees, many with a ladder of dry, dead limbs leading to the canopy stretching towards the sun. Who cut this tree and when? Where is that tree now? Evidence of an access road is practically indiscernible except for the faint outline of a cut along the drainage. How quickly the structure of the forest can change. In another spot, I notice a series of steep ravines – clearly evidence of water flowing in the past. Knowing the history of mining in my neighborhood, I'm able to piece together a picture of how these ravines were created using water to erode the hillside; chasing old riverbed deposits into the hillside until the gold petered out. The staggering amount of soil displaced is hard to fathom. The elaborate network of ditches and riveted pipe transporting water to the mining sites alone was a feat. I come across these overgrown and slumped ditches frequently; their tell-tale sign a near-contour course across the hills - allowing them to move water great distances.

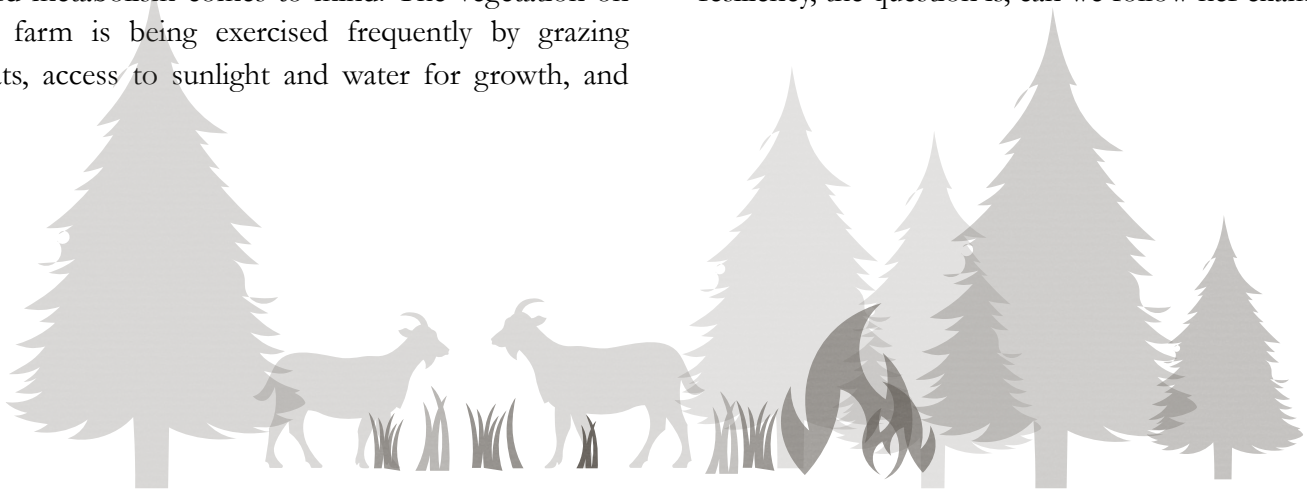
Ravines and ditches in my neighborhood have been reclaimed by vegetation and to the untrained eye might seem like undisturbed land. Further along I run into an old section of fence: a series of weathered split rail cedar and locust posts, draped by a few strands of rusty barbed wire. A limb here, a fallen tree there, over time, have rendered this once-sturdy fence a mere tripping hazard. The shadows from the dense canopy above have smothered out the understory and the brittle feel of dry and dead vegetation is heavy on my breath. It's difficult to walk a straight path through this thicket of a forest and it's confusing to consider that this barbed wire fence was built to contain cattle. It's confusing because cattle don't eat dead trees, and they don't particularly like living trees either – they eat grass, and grass needs light. Reconstructing the picture in my head of the time this fence was built, I see a completely different landscape. It's no coincidence that the majority of the conifers in much of Nevada County, namely pine, cedar and fir, are not older than eighty years and that many of our forested lands were used for grazing until the 1950s and 1960s. Grazing animals, including cattle, sheep, and goats, will have an altering effect on the landscape's vegetation and this largely depends on how the animals are managed.

While our food system has gone through a rapid industrialization process since the post-World War Two era, resulting in the concentration of food production in areas well-suited to scale and mechanization, there has been an abandonment of agricultural lands in other areas, like ours. Combine the effects of dwindling agricultural land management with the policy of fire suppression over this period and we arrive at the situation we have today. Our forests are overstocked and dying, species diversity within the forests has declined, and the threat of catastrophic fire is very real. The benefits of attentive agricultural land management to the health of the land and the safety of our communities were taken for granted and now have been largely lost.



As I emerge from the forest and approach the farm my senses are pleased to be home and are greeted by the green pasture grasses, the sound of the creek, the pleasant odor of goats and the feeling of sunlight and air flow. This place is alive and as I reflect on the differences between the unmanaged forest land and my farm the word metabolism comes to mind. The vegetation on my farm is being exercised frequently by grazing goats, access to sunlight and water for growth, and occasionally, being harvested or opened further by my own efforts. This exercise is good for the land and creates a healthy metabolism where plants grow strong and healthy and when they die their remains are broken down and released more quickly, providing nourishment for the next life. The word stagnation comes to mind when I think of the unmanaged forested lands. Thickets of trees are at the same time very slowly growing and dying. They reach for the sunlight; packed in tight with their neighbors, blocking light from reaching the forest floor. These same thickets intercept rain and allow less water to penetrate the soil while at the same time pull water out of the earth through transpiration.

Sometimes I think a fire is just what this land needs; to be exercised and refreshed. We need to increase the metabolism of our forests because an active metabolism is resilient. Ultimately, mother nature will find a way to exercise the land - be it through beetle kill pine trees, drought stress die-off, or fire. Mother nature is the ultimate expression of resiliency, the question is, can we follow her example?



The Hand Stone, by Debra Weistar

"Look what I found in the garden this morning." Tom handed me a perfectly smooth, pear-shaped stone that fit my palm as if it were a tool made for a small hand, a female hand. The stone felt more than old and worn; it felt respected and forgotten, cared for and long lost.

"I've never found anything like this on our land before," Tom went on. Neither of us has, and we've lived and worked on this land for almost 34 years.

"We should give it to Shelly for the museum," I said, "I'll ask her about it."

Shelly Covert is the spokesperson for the Nevada City Rancheria Nisenan Tribe. She sits on the Tribal Council and is the Executive Director for C.H.I.R.P., the California Heritage: Indigenous Research Project. Some of the last remaining Nisenan tribal artifacts are archived and available for public viewing at Firehouse No. 1 museum in Nevada City.

I saw Shelly a week later and told her about the relic. "A hand stone," she said. When I asked what we should do with it, her answer surprised me. I had assumed she would want it for the museum, an archeological record of habitation and Nisenan life in the Sierra foothills.

Her response revealed a relationship I had not considered.

"Yes, of course we are curious and want to see what ancestral artifacts are unearthed. We would also love to have the opportunity to decide whether or not it is appropriate to remove it into Tribal safekeeping, but usually, we prefer that most artifacts remain where they were found, and where they were used, as long as they are safe. They are part of the land. In this case, take a photo, record the GPS coordinates, and then, put it back where you found it."

They are part of the land. I walked away thinking, "Of course, how right that is. Why didn't I think of that?" I know why. Because despite my best intentions, despite dedicated self-education, despite my internal anguish over the obliteration of human and natural communities at the hands of 19th and 20th century gold diggers, despite all that – I am still subject to social conditioning. Conditioning that covets rarity, considers Nature a possession, and forgets from time to time to listen to the land. Conditioning that is the lens of the Western worldview, no matter how much I shake my fist and rail against it. It is deep in me.

These wake-up moments are my saving grace. Because when my assumptions are shattered and I dare to look at the world through a different lens, or no lens at all, that is when I enter the supple, resilient, open field of perception.

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Morihei Ueshiba, the founder of modern Aikido, is credited as saying, "Whoever has the mind to fight has broken his connection to the Universe." And yet, sometimes it feels that fighting is the only way to protect what most connects us to the Universe.

A few years ago, the Ridge community fought the reopening of the San Juan Ridge Mine. Call it "oppose" if you like, but in activist parlance, it was a fight. We fought with words – written and spoken, legalese and layman, at county supervisor meetings and town halls, on radio talk shows and in newspaper articles, on television news, and with a scrappy documentary film. We fought for our water, and we fought for our home. Some would say we won because the (most recent) permit application expired. But "expired" in this context does not mean denied. And it certainly doesn't mean buried once and for all.

'Coyote Den and Widow Maker,'
by Nikolas Streiff

San Juan Mining Corporation (SJMC) still exists. They still own the 2,000+ acres of mine property. Investors are still waiting for a return, some of them "gold bugs." But some things are *not* the same. When you stand up for what is right, sometimes the right people notice. Sometimes it does make a difference.

A new project is in the works. The current SJMC CEO has moved onto the land and is making his home here. Neighbors are organizing and engaging in dialog with each other, and with the mine company. There is serious talk of regeneration and restoration, and economic opportunity that is not tied to resource extraction.

To engage a new level of possibility takes risk and trust. To trust again, after a betrayal (or two or three) requires that supple, resilient, awake mind. Awake mind does not trust blindly or irresponsibly. Resilience requires openness, adaptability, and scrutiny. It requires reaching out and offering our best. It requires boldness and faith. Not faith in a certain outcome, but faith in one another and a belief that doing the right thing is the only option there is.

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My thoughts return to Shelly Covert and all her relations, including other branches of the tribe, and members whom I have not met. I don't personally know what it is like to reconstruct a culture piece by piece. I don't know what it is like to wait year after year after year for my tribe – my people – to be recognized by the federal government. I don't know what it means to reclaim a language a word, a phrase, a concept at a time, and then teach it to the next generation to keep it alive. But I know it matters.

Tom and I have not yet released the hand stone, but we will. We will lay it in the earth where it emerged, and we will give thanks for the lessons it brought to us. And we will plant, and tend, and continue to care for this land. We will not give up.

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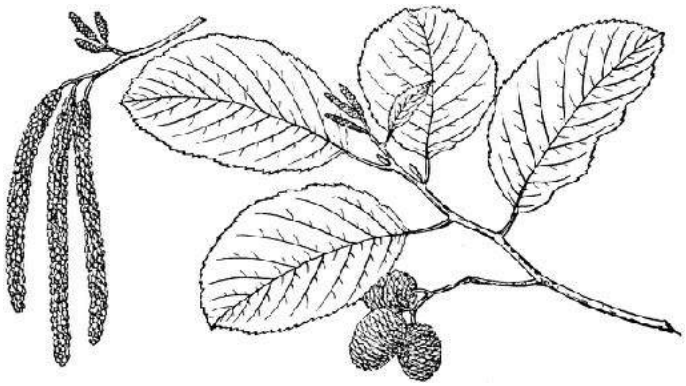
*Terry Dobson, "Aikido in Action." In *Gold Nuggets: Readings for Experiential Education*, Edited by Jim Schoel and Mike Stratton, 1990.

Frogs, Alders, and the Changing Landscape of Shady Creek, by Tom Van Wagner

Viewing a satellite image of the San Juan Ridge with the aid of Google Earth is an instructive exercise. One dominant feature appears as a big white splotch: the extensive tertiary gravels outcropping of the Shady Creek upper watershed around North Columbia and Jackass Flat Road. Deposited millions of years ago by ancient rivers of pre-Sierra times, these famous, auriferous gravels impact the geomorphology of Shady Creek along its entire length, and their physical effects also produce important biological impacts.

Shady Creek's elevational profile resembles a series of stair-steps extending approximately ten miles from its headwaters to its confluence with the South Yuba River downstream of the Highway 49 bridge. Near-level, low-gradient reaches are filled bank-to-bank with headwaters-derived gravels, which are washed downstream year after year, gradually reaching the Yuba. Punctuating these are steeper, boulder-packed reaches often lying on bedrock. Here gravels are fewer due to the scouring effect of higher velocity flows. Flowing water with its gravitational energy moves downhill, entraining loose creek substrate – boulders, cobbles, gravels, sand, clay and organic matter – battering the resistant channel elements as these materials are moved and redeposited. The result is perpetual stream channel change – sometimes great, other times subtle. But within equilibrial limits, the channel's course is resilient.



White Alder, *Alnus rhombifolia*

Clipart courtesy FCIT

Each year an interplay between frogs, riparian trees, and stream gravels unfolds, modulated by annual precipitation levels and the ensuing volume and intensity of stream discharge. I have been observing the effects of this for a number of years on a low-gradient reach of Shady Creek extending approximately one mile directly upstream of the Purdon Road bridge crossing. The response of white alders, the dominant riparian tree species here, to the annual variation of stream discharge appears to be affecting the size and viability of the foothill yellow-legged frog population and the abundance of non-native bullfrogs.

Foothill yellow-legged frogs (*Rana boylii*) mate and deposit eggs in this part of Shady Creek. Their spawning season may extend over a period of two to five weeks, as changing physical conditions stimulate mating and egg mass deposition.

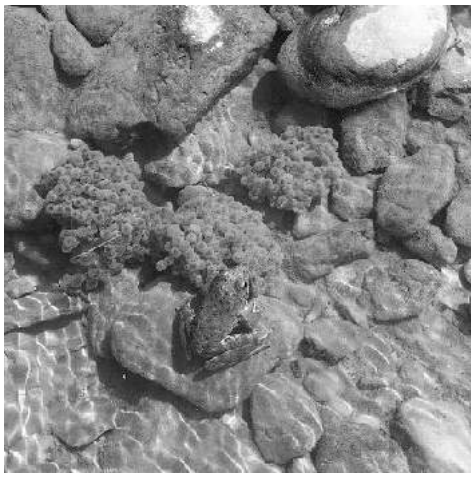
Spherical clusters of eggs are typically attached to submerged rocky substrate, especially boulders and cobbles along the creek edge. Mature, adult females may release 1,000 or more eggs in this once per season event. Spawning commences as water reaches a minimum temperature of about 16 degrees Celsius (60.8 degrees Fahrenheit) and a warming trend in air temperatures occurs. Importantly, overall discharge (flow rate) must reach a critical minimum enabling the formation of potential spawning sites. Optimal depth, which allows for total submersion of eggs for about a one-month incubation period, current approaching zero velocity, and sites with relatively high levels of sunlight are ideal.

Egg mortality may occur as the creek's discharge declines into summer, exposing eggs to lethal desiccation. Additionally, unseasonable high velocity discharge may disrupt egg mass continuity, releasing individual eggs from the mass, reducing the chance of their survival. Sunlight exposure, by warming the egg masses, hastens the development and hatching of eggs. Quarter-inch tadpole hatchlings then feed on algae and grow until late summer or early fall when metamorphosis occurs. The cohort of tiny frogs feed and grow until conditions become cool enough to

induce reduction of feeding activity. Through the rainy season, all age classes of foothill yellow-legged frogs (FYLFs) remain in or near the creek in relative quiescence, but may be found sluggishly active during unseasonable warm periods.

Dense alder canopies can shade the creek. To reach a large size alders require a fairly consolidated substrate, providing root stability, and at least a portion of the root system requires saturation year-round. The instability of Shady Creek's gravels tends to prevent growth of larger, older trees, though a few scattered individuals exist.

Through the most recent drought the FYLF population maintained fairly consistent and robust numbers. One key to this success, I believe, was the maintenance of numerous adequate spawning sites. The low precipitation, low discharge years seemed to smooth creek channel contours, creating "U-shaped" cross-sections ideal for egg mass deposition sites. I observed and recorded as many as 40 egg masses along the creek edge during the drought years.



A male foothill yellow-legged frog beside three moderate size egg masses. This spawning site has excellent insolation, adequate cobbles for egg mass attachment, very low current velocity, and is deep enough to provide complete egg mass submergence throughout the approximate three-week incubation period to hatching and subsequent tadpole dispersal.

However, with lower drought discharges, robust white alder growth and seedling establishment ensued; denser growth began to shade some of the best spawning sites. Also, surveys during this period revealed very few bullfrogs, serious predators and competitors of FYLFs.

With the end of the drought, higher discharge events returned to Shady Creek. FYLFs have not fared well. Their numbers are down. Although many of the channel gravels have rearranged, only a few white alders have been lost to erosion. Additionally, the main channel where frogs spawn has been carved into more of a "V-shape," and this has made much of the stream edge less desirable for egg deposition. A slightly higher flow velocity now exists due to the steepening of the channel profile. During the three spawning seasons post-drought, I observed a concentration of egg masses in a few desirable locations and no egg masses in many sites where I'd consistently seen them in drought years. In 2018, one site had eight masses but began to dry down early, exposing the egg mass tops to lethal desiccation. This concentration also became a possible "bonanza" site for any predators lucky enough to discover it.

To compound the negative impacts of increased shade and velocity, bullfrogs seems to be increasing in number. More and more juvenile bullfrogs are appearing on this reach of Shady Creek. Though it's not spawning habitat for bullfrogs, early metamorphs find their way into Shady Creek from numerous ponds in the creek's watershed as they disseminate to new habitat. Recent wet years have most likely produced bumper crops of baby bullfrogs. I found a partially digested FYLF metamorph in the dissected stomach contents of a juvenile bullfrog in 2017. A number of studies elsewhere have linked this species to FYLF declines. In a May 2019 survey, for the first time, my survey of Shady Creek revealed more bullfrogs than FYLFs.

High flows may also kill or injure overwintering FYLFs, which tend to remain in or nearby the creek. A southern California population was totally lost from a creek during a flooding event in the early 1970s.

Populations of animals and plants ebb and flow. This is a constant. Change is a constant. I'll be keeping an eye on the dynamic drama underway in Shady Creek, to see how the story unfolds.

Opening up the Crown, by Kurt Lorenz

As I write, it is not yet a year since fire ravaged Paradise, California, and killed more than 80 people. In the last 12 to 24 months there has been a measurable shift in the public consciousness about wildfire. Santa Rosa blew our minds. It looked post-apocalyptic, but here in the foothills "Paradise" finally scared the crap out of us. The risk is here, and it is now. The phrase, "Just another day in Paradise!" has been retired.

Nancy and I own a place on the south slope edge of the lava cap bisected by Cruzon Grade Rd. At 4,000' elevation this is the crest of the "Ridge," and it is also a potential wildfire disaster site. We talk about it. "Drive up to Graniteville, not downslope." Will we even get a chance to drive anywhere?

When Nancy moved here in 1978 the understory was so thick that she couldn't even see if there was a view to the south. It has taken 41 years of labor to get to this open woodland we enjoy now. The ladder fuels are mostly gone, and I can see through the tree trunks to watch wildlife 200 yards away. Much of the heavy clearing was done under a Proposition 204 grant some years back, but endless groundwork has been necessary, and in the winter we rake and burn around our homestead. So why more work now?

Here's a hint. When you can finally see the forest for the trees, folks, look up. It's called the canopy when you are bird watching, and the crown when it is burning. In the wrong conditions the crown can carry fire right across the top of us, but it won't stay up there, and in less than an hour could make thousands of acres unrecognizable. The only solution is to thin the medium to large trees – to open up the crown. CAL FIRE has approved a new program to encourage this outcome. I'm working on it, working on me.

The orange survey tape I am using slithers out of my fingers as I walk around a large tree. I realize that I am condemning this tree to death, and I don't like it. As I mark, I am constantly looking up. Is it Doug Fir or White fir? Given a choice I will keep Doug Fir, and let the White go. Does this pine have a broken or double top? Is this tall beauty too close to the house, ready to rain down burning cones and branches? It has to go, but as I tape it I hear it muttering that we humans built the house in the wrong place. "Too bad," I answer. "I have mobility, and arrogance, and orange tape." I know that the thought is problematic. Ugh.

The next morning I stare at the horizontal orange lines in horror, and try to picture that stand of trees with all of those trunks gone. I feel ill. Eventually I wade in between the condemned and rip off two tape circles, just to feel the power to pardon those who did no wrong. I look up to see what the crown will be if these two are still here. Doing the right thing is also doing the wrong thing.

Last night I went out in the moonlight to shake off the day. I looked again at some marked trees in a group of Incense Cedars that have always been too close to each other and too close to the house. I found that the judge and prosecutor, me, had been too hard on two of them, outliers from the main group, and exonerated them from death row. I came back in with crumpled orange tape in my pocket.

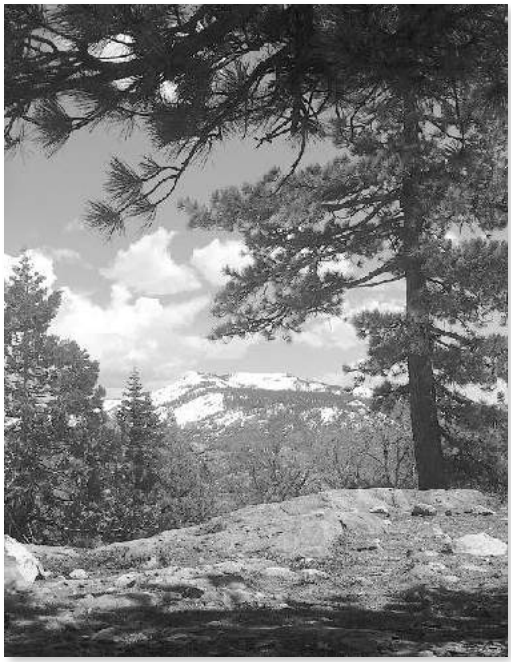
The evolution of the forest here on the west slope was defined by fire. Cellulose and carbon are what they are, and so is lightning. The forest routinely burned and the biota had to adapt or go to live somewhere else. Native Americans used fire regularly, but their knowledge was dismissed by the white settlers. Big mistake.

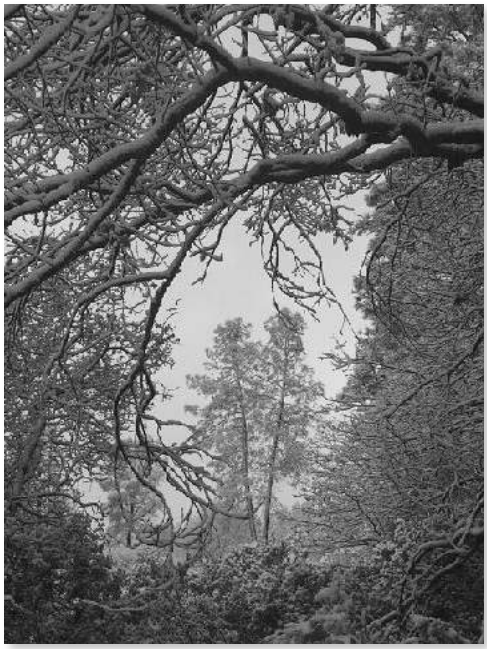
We are part of a generation that collectively bounded off to something better, anything, please, and landed here in the Sierra, and in the Coast Range, and in the Bay Area, and the places where others had started to congregate only a few years earlier. "My people," we cried, and put down roots.

Now I creak around in my early 70s and wonder about this thinning and how it feels and how I feel and what shall we do? I am stunned by the huge growth of specific trees I have known intimately for 40 years now. I am shorter and slower, but they are much taller and stouter, and crowded. Time to act, again, continuously. It is now almost a hundred years since the last major fire right here. "Much too long," I mumble. "Much too long."

Before the Mountain Snow Falls
by Adam DeFranco

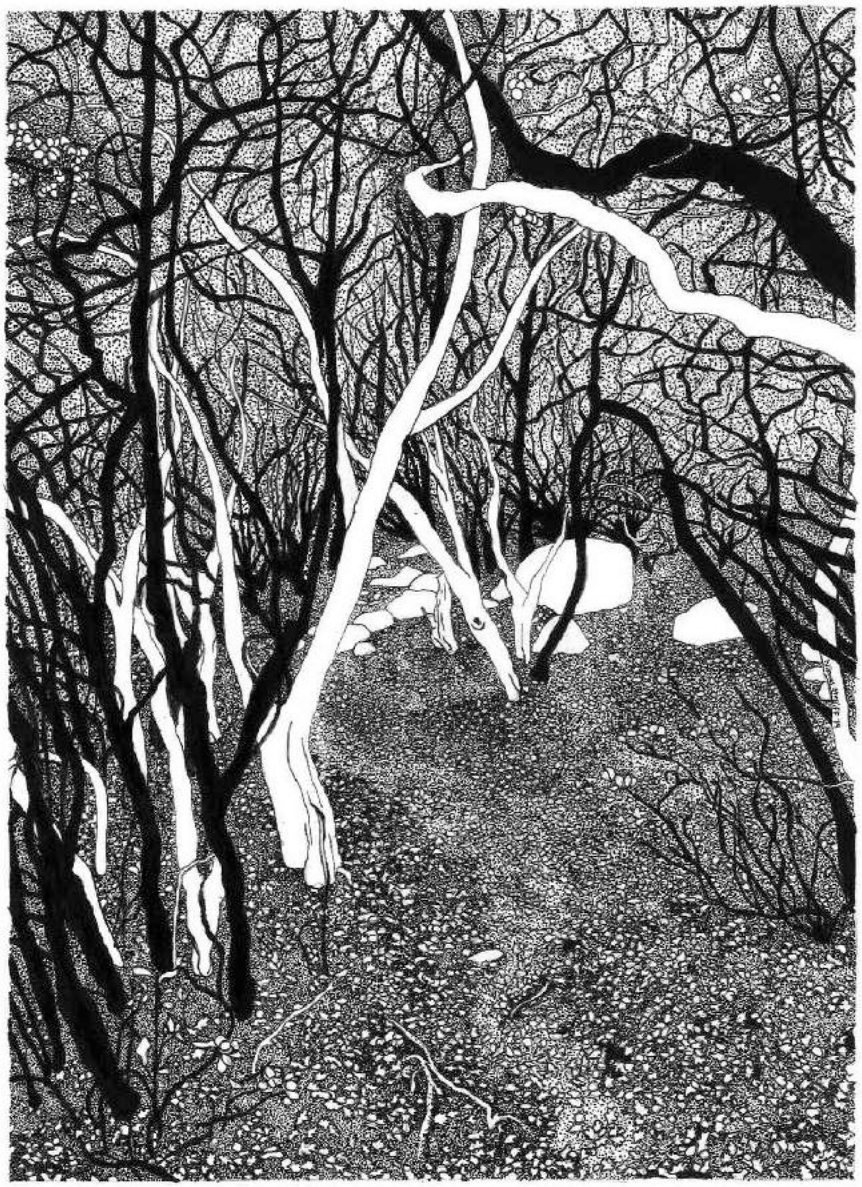
Before the mountain snow falls
the wild herds
will drop down
it's all a feast to them
their lives
their natural instincts
as pure as the river
as easy as gravity
.
they give it no thought
no worry
blizzard or sun
they are perfect buddhas
enlightened in their own way
grasp the inevitable
the transitory
the eternal
snow
falling on the mountain





Grouse Ridge a Sleeping Lady
by Lisa Haden

Grouse Ridge a sleeping lady
in her fresh snowy mantle
she looks at
the sky a very
washed out blue like
the eyes of an old person
mild yet full of manna
after the vicissitudes of snow



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