Journal of California and Great Basin Anthropology | Vol. 42, No. 1 (2022) | pp. 85–95

Putting Fire on the Land: The Indigenous People Spoke the Language of Ecology, and Understood the Connectedness and Relationship Between Land, Water, and Fire

RON W. GOODE
North Fork Mono Tribe

STEPHANIE FARISH BEARD
Consultant to North Fork Mono Tribe

CHRISTINA ORAFTIK
Consultant to North Fork Mono Tribe

As it becomes more broadly understood that controlled fire can be used as a preventive measure to reduce wildfire risk in California, there is debate over how that fire should be implemented. The Indigenous peoples of what is now called California have long used fire to cultivate the landscape and have passed down their burning traditions through the generations. However, government agencies have favored the Western science approach to prescribed burning. Prescribed burning is the application of fire to an ecosystem for fuel reduction, habitat improvement, and other ecological goals. In California, wildfire risk reduction is a primary goal of prescribed burning. Cultural burning is practiced in many different forms by Indigenous peoples all over the world, and has an even broader variety of goals. While wildfire risk reduction is one goal of cultural burning, other goals of the practice include—but are not limited to—cultivating new growth in food and other resource species, reducing pests and diseased plants, for spiritual reasons, or for increasing community safety through visibility.

Cultural burning therefore employs different techniques and priorities when performing a burn. For the Nium, or North Fork Mono, two of the most important goals of cultural burning are the return and renewal of culturally important plant and medicine species, and restoring the water table. Both cultural burning and prescribed burning are being employed in the southern Sierra Nevada mountians of California. This article explores how cultural burning among the North Fork Mono differs from government agency-led prescribed burning, including examining how the knowledge which informs each type of burning differs and how the underlying assumptions around these knowledge bases can impede fruitful cooperation between fire practioners. The authors call for an increase in cultural burn agreements that would allow the state's tribes to conduct cultural burns themselves on more state and federal land.

Before 1850, when the Indians lived on the land, the forest canopy was kept open. The thickness of the canopy was 40% or less; today, when the Creek Fire of 2020 burned 380,000 acres, the canopy was 80–90% thick. In 1834, when Joseph R. Walker came over the Sierra Nevada Mountains on the north side of what is now Yosemite National Park, he stated that the trails were wide open, and the forest was wide open, allowing him and his men to travel easily through the mountains and forest (Phillips 1993). In 1846, when Charles Fremont (Blount 1984) came over the Sierras, he too spoke of the openness. Spanish soldiers scouting for places to build another mission observed that they traveled under the canopy of the oaks for some 28 leagues. In 1851, when Jeff Mayfield came from the coast through the Central Valley, he noted the openness, the vast expanses of beautiful flowers, and how the great Valley Oaks went on and on for miles (Mayfield and Margolan 1993). Finally, when John Muir came to the Mono in 1868, he talked about how all the mountain Indians had to do was step out of their cedar-bark houses and into a garden of eden (Wood 2019).

Fire was the key to keeping the forest floor clean and keeping the trails open, pruning and manicuring the trees, whether in the forest, the foothills, or on the valley floor. Fire keeps the lower-level canopy up off the ground so fire will burn through.

Through the ages, Indigenous fire set by the Nium of North Fork has been talked about and recorded—e.g., as in Joseph Kinsman's diary (1894). Kinsman recorded his daily life from 1874 to 1894, a twenty-year span. On one such occasion, Kinsman stepped outside his door in the early morning before sunrise and exclaimed, "There's those damn Indians burning already, they got 6–7 fires already going this morning!" When a wildfire occurred, the Indians were once again called upon. "Go get those

Indians, they know the trails, they can put out the fire with their wet gunny sacks" said Mr. Brown, the local store owner, as he requested their help (Kinsman 1894).

In the early to mid 1900s, ranchers from the lower foothills talked about how the local natives worked with their grandparents, who taught them how to use fire (O'Neal 1953). They kept the forest open, as it was when they arrived, burning and restoring the native grasses and edible resources for their goats, sheep, and (eventually) for their cattle. Today there are generational cowboys and even Indigenous tribal members still running cattle out in the forest. However, now they are not allowed to put fire back on the land, so when a wildfire does come it's destructive—during the recent Creek Fire, some cattle ranchers lost all of their cattle, and many lost 75% or more of their herd because of fire suppression.

Until fire suppression was instituted in the early 1900s, the Mono did put fire on the land on a constant basis. Following suppression and oppression, the North Fork Mono went underground, burning only on their private lands (homesteads)—i.e., public domain (Indian allotments, of which the Nium had 52 historically), plus their rancheria and their Williamson Act agricultural lands. Even there, on their private lands, they managed to get into trouble with the local authorities when they tried to burn their cultural resources.[1] This created a problem culturally, as the materials used for making baskets were no longer healthy, prospering plants or shrubs. If you cannot put fire on a plant resource, the resource is never renewed. The roots get smaller in size and length, and the root plants bunch up without proper harvesting and tilling. The shrubs grow large, get old, and die. Shrubs need to be pruned, thinned, cut back, and burned. The basket makers need the young shoots, which are supple and workable. When the resource is burned, the plant quickly adds straight, new growth, which creates the perfect basket materials. The older a stalk, the more rigid and hollow it gets, causing it to break more easily so the quality of the basket is diminished. Therefore, during the twentieth century, tribal cultural practices were diminished as well.

Throughout California, many tribes are now putting fire back on the land. Some tribes—e.g., the Yurok, Karuk, Pitt, Maidu, Pomo, Miwok, Paiute, Washo, Ohlone, Cahuilla, Chumash, and Mono groups like the North Fork Rancheria, Big Sandy Rancheria, Cold Springs Rancheria, the Dunlap Mono, and the North Fork Nium—have had fire on their lands over the last twenty to thirty years. Yet this has not occurred without ordeals, objections, challenges, and strife. There is constant negativism between Native science and Western science, and push-back has come from naysayers who say that cultural burning is not sufficient to make a difference in wildfire reduction. Government agencies, such as the California Department of Water Resources (DWR), the US Forest Service (USFS), and the National Park Service (NPS) depend upon Western science, and say they want to use Traditional Ecological Knowledge (TEK), but that they do not know how to implement it. Virtual discussions are centered around "Indigenous Fire" and "Prescribed Burning." What does each term mean? In this article, we will discuss the breakdown between approaches and provide strategies for closing the "gap" between the philosophical concepts of prescribed burning, managed wildfire, and cultural burning practices within the context of our presently changing climate.

As you read this article, consider the time-depth of place-based understanding that informs California Indigenous science. Here, TEK is based on a relationship to this place we now call California that extends back in time for millennia. However, if you were to ask an Indigenous person how long they have been here, they would likely say since time immemorial. They do not need to *prove* their relationship to this place, or their understanding of the interconnectedness of the systems that exist here, by supplying mountains of empirical evidence. Such quantification to prove one's expertise is only necessary when the time depth of place-based experience is short. Take note, as you read, of your own implicit biases and assumptions that might stem from culturally imperialistic perspectives. Our goal in this article is to create awareness of this issue, so that real healing and understanding between Indigenous and Western science might begin to benefit future generations.

CONTEMPORARY ATTITUDES TOWARD NATIVE SCIENCE AND CULTURAL BURNING

A negative attitude toward Native or Indigenous science[2] is often held by practitioners of Western science. Particularly, critics of Indigenous science claim that cultural burning is not sufficient to make a difference

in wildfire reduction. Another common view held by Western science practitioners is that Indigenous burning and prescribed burning are either the same, or that Indigenous burning is simply a form of prescribed burning. However, both conclusions are culturally imperialistic, incorrect, and denote a pronounced misconception of Indigenous knowledge.

Nevertheless, this is progress, although not nearly enough. Native science is now recognized as real and valuable. Until very recently, Native science—along with the people who held it and the languages they spoke—were generally considered to be extinct. In actuality, they were still extant but had been repressed by decades of colonialism. Centuries of genocide and cultural suppression have led to the marginalization of Indigenous science, language, and cultural knowledge from both the sphere of modern, conventional environmental science and from wider public recognition. However, Native science has endured colonization and remains a robust body of knowledge that has been passed down through generations. An acknowledgement of the value of Native science and an acceptance of its concepts is a step toward removing cultural oppression.

Cultural imperialism, also called cultural colonialism or cultural oppression, is the imposition of various aspects of culture by one usually politically or economically dominant community onto another nondominant or repressed community. Assumptions that enable a practitioner of science to draw the conclusions outlined above are usually based on culturally imperialist perspectives that claim ownership over the words "science" and "expert."

In California over the last decade, there has been a movement led by non-Indigenous government agencies, land-owning organizations, and educational institutions toward engagement with Indigenous stakeholders, as well as a marked interest in incorporating stewardship principles rooted in Native knowledge. This is not surprising, given that the implications of anthropogenic climate change require innovative solutions that are beyond the scope of Western science alone. Yet these same groups struggle to build relationships with practitioners of Native science, and they fail to properly implement principles of TEK in their stewardship practices. As we noted above, we will examine the reasons for the breakdown between the sciences and provide strategies for closing the "gap" between the philosophical concepts of prescribed burning, managed wildfire, and cultural burning practices within the context of our changing climate.

WESTERN KNOWLEDGE AND INDIGENOUS KNOWLEDGE—WHO OWNS THE TERM 'SCIENCE?'

At the heart of the discussion around cultural burning and prescribed burning is the idea that prescribed burning is informed by "science" and cultural burning is informed by "Indigenous knowledge." In the eyes of most people raised within Western culture, this already puts these two types of fire on an unequal footing, as Western culture generally contends that "science" is nothing less than impartial fact. "Science" is generally considered the ultimate and unimpeachable authority on all matters environmental. However, the central question that needs to be asked is this—who decides what is and is not science?

The definition of science varies between dictionaries and institutions, but at its most basic 'science' is considered to be "knowledge about or study of the natural world based on facts learned through experiments and observation" (Merriam-Webster n.d.). Every culture and society has science and a culturally appropriate way to understand and communicate knowledge about the world around it. So why has it long been assumed that the only valid "science" is the body of knowledge and institualized practices created by historically male-dominated scientific practitioners descended from Western schools of thought? All scientific knowledge is a cultural product, inherently biased by the minds that produced it, and born of the process of science, which no culture owns. The terms and language we use around Indigenous knowledge and Western scientific knowledge need to be updated, as Indigenous knowledge is scientific and follows scientific processes of observation, experimentation, conclusion forming, and communication of results. Indigenous oral traditions and Western data sets can involve the same information, simply stored differently according to each culture's values.

The understanding and terminology involved in who practices and generates scientific knowledge needs to be reexamined. This step is key if Indigenous and Western science practitioners are to work together. This is also key if the larger processes taking place in our society—to

decolonize sectors and unsettle colonial and Western-centric thought which have deliberately excluded all other perspectives and ways of life—are to succeed. "Science" is so thoroughly colonized that all other cultures' forms of science have been excluded. In re-evaluating our notions of science, we must acknowledge that science is broader than Western schools of thought and we must acknowledge and work with other cultures' forms of science.

Currently, Western scientific knowledge is generally seen as the final authority, and is used to "confirm" the validity of Indigenous science. This creates a perpetual power imbalance that favors Western science and continues the disenfranchisement of Indigenous peoples. It must be recognized that both types of science are valid and deserving of respect, and that they are both cultural products. Western science tends to see itself as separate from culture, as if it is somehow above it. However, every experiment or study is conducted by human beings, raised in the context and values of their culture, with cultural biases inherent in the design of their theories and experiments. Ignoring this influence on the knowledge that is generated creates a false narrative of impartiality.

At a recent TEK conference, a participant made a comment about the differences between the sciences. He said that Western science needs to get a conscience, and Western scientists need to act and think with a conscience. Native people look at the whole system, and they see that system holistically, and have a symbiotic relationship with the creatures in it. For example, when the red ants close up shop for the year, that means the same for us; if you pick the nuts too early, then the birds think it is also time to harvest because you are harvesting. Indigenous people watch and observe changes in the behavior of animals and other species, 'reading' the ecosystem. The two sciences have two different mindsets, two different worldviews; they are like a two-headed snake, living in the same body, but with heads looking in opposite directions. What is needed is a "blending" of the sciences. Both systems of knowledge have strengths, and as some Indigenous people are now becoming Western scientists, some Western-minded scientists are beginning to include TEK.

No human is completely impartial or divorced from the context in which they live; this reality is recognized in Indigenous knowledge. Western scientific research prioritizes decontextualization and objectivity, whereas Indigenous knowledge is generally deeply contextual and prioritizes relationships. Both knowledge systems can work together, but each needs to be equally respected by those involved and both need to be seen as scientific. There should be no hierarchy of knowledge systems, and as Western science practitioners work more closely with Indigenous science practitioners, it should be emphasized that neither system of science has to validate the other, and that there may be areas of both agreement and disagreement. Not all differences need to be resolved or explained, but they do need to be respected. Indigenous science is what informs cultural burning.

Indigenous science is as diverse as its practitioners across the globe, while Western science seeks to homogenize practice and standardize procedure; thus, cultural burning may take many forms depending upon the group involved. Pile burns, broadcast burns, and other types of fire applied to the land are all elements of cultural burning and will be used by Indigenous groups differently, depending upon their ecosystem and the resources being cared for. The cultural burning discussed in this article reflects the practices and priorities of the North Fork Mono (Nium) of the Southern Sierras.

INDIGENOUS FIRE: CULTURAL BURNING VERSUS PRESCRIBED BURNS

Fire on the land comes in many shapes and sizes, the most threatening of which is out-of-control wildfire. Wildfire, together with other disasters, has created a psychological and mental anxiety called "solastalgia," or the psychic pain created by climate change (Albrecht et al. 2007), a neologism formed from a combination of the Latin word *solacium* 'solace/comfort' and the Greek root-word *algia* 'pain.' Society, as a whole, reacts to disasters like fires with hightened anxiety, and individuals respond even more so if they have lived through those disasters.

However, fire on the land is not inherently bad. Naturally occurring wildfires that can be managed are often left to burn if it would be benefical and the fire is not overly destructive. Calling them "managed wildfires," government agencies will let these wildfires burn out. Controlled fire is fire that is intentionally set and allowed to burn in a managed way to achieve certain goals. Both prescribed burning and cultural burning are controlled fire. Prescribed fire is fire on a landscape that has been

specifically targeted to reduce heavy fuel loads and lower the risk of uncontrolled wildfires. Under the provisions of a prescribed fire, broadcast burning can range from low intensity to moderate or high intensity. Pile burning after hazardous tree removal, or the mastication or crushing of dead or dying brush and tree limbs, creates a spot burn and ideally a means of reducing the chances of fire escaping.

While the purpose of prescribed fire is fuel reduction and the thinning of the understory in the actively targeted burn area, it does not stop dominant species (e.g., bear clover) on the forest floor from taking over. The goal of cultural fire is the return of resources, because when the resource returns, it returns in a reduced vegetative state and will remain in a thinned-out state for six to eight years, at which time it should be reburned. In order for that to happen, small scale burns are the norm. Conducting twenty to forty small-scale burns ensures that root systems are still intact and allows for the resources' immediate return. Agencies tend to build very large piles that burn hot and cook the soil, which does not allow for a quick recovery; nor do the agencies do anything with the ash after the burn. Cultural fire, when doing pile burns, is done with piles the size of beaver huts, not huge house-size piles.

Cultural burning is also done with a plan and with specific goals. Burn plans and burn strategies are in place before any burn. There are philosophical differences between prescribed burning and cultural burning. The size of the fires is also an important difference, as mentioned above. Cultural burning practices continue after the burn, where ash is mixed with top soil to create nutrients. The nutrients mimic ancestral midden soil layers or ancestral fires. In many cases, when prescribed burning is carried out, the intent of the burn and the size of piles involved is to see that there is no return of understory or floor coverage. The goal of cultural resource burning is just the opposite; here the intent is to have an immediate return of resources, measured in days, weeks, or a month or two.

Cultural burning is not intended to stop a wildfire; it creates a defined place or space in which to control a wildfire, and it becomes a defensible landscape. Cultural burning is about food sovereignty, creating an abundance of healthy, nutritionous native foods. Cultural burning enhances resources, ensuring that cultural resources are healthy for basket makers, and it rejuvenates medicinal plants for humans, animals, and insects. This is a restoration of resources for traditional Indigenous practices and for generational TEK that has been passed down from ancestral times, allowing for the continuation of a sustainable culture for future generations of Indigenous practitioners to come.

Cultural burning has three major effects—(1) ecological, as has been explained; (2) cultural, which has also been touched upon; and (3) social. Like the effects of "solastalgia," there is immense gratitude following a good burn. There is a feeling of something well done, but also something that generates its own power to escalate its own journey, and you were a part of it. Prescribed fire can also have a "good" feeling, especially when the boss praises the work and when the economic effects show that it was a worthwhile project.

There are benefits to all fires, even wildfire. But benefits have to be wanted, taken, and absorbed. If a landscape or forest has a canopy cover that is 80–90% thick and a wildfire reduces that to 10–20% although the ideal cover is 40%, then over-reforesting is not the answer.[3] But wildfires are still smoldering and funding for reforestation is already available. The benefits of prescribed burning are measured in dollars and cents; the more acreage an agency can burn, the more dollars are provided. The goal of an agency burn is economic; fuel reduction and decreasing wildfire intensity are important, but the main goal is to increase the productivity of the most valued timber product. The factors considered are not what belongs on the landscape; instead it is whatever will benefit the particular agency the most. When you ask representatives of a forestry agency what the fire applicator is burning for, they will tell you—acreage! The more acreage is burned, the more funding is reimbursed to expand the work.

There are challenges to prescribed burning; equipment and personnel need to be in place before a burn can happen. There are no fixed stipulations, but generally four to six firetrucks and twenty to twenty-five firefighters are needed. Next, of course, the right weather and conditions of humidity are necessary to maximize the applied fire. The larger the acreage, the more days it will take to accomplish the burn. This can create havoc, with too much smoke coupled with valley air pollution to bring on health issues and complaints. In the past, complainants have managed to put a stop to some agency burns. If an

agency is burning 500–600 acres at the rate of 100 acres a day, it will put a lot of smoke in the air. It also takes 5–6 days to get the burn done. If a burn has to stop after two or three days of burning, it takes two more days to put it out, creating a residual mess that is not easily reburned. The Dinkey Collaborative managed to convince the San Joaquin Air Board to allow agency burns to burn through. To achieve that sort of policy change was a great victory. Of course, if the agency would learn to burn smaller areas at a time, around 50 acres a day, they would not put that much smoke into the air. However, that would go against their objective, because they not only want to burn 500 acres, their goal is to burn 5,000 acres or more annually.

The major differences between prescribed fire and cultural fire is that prescribed fire manages fuels and burns according to the data (i.e., the size of the understory, ladders, number of trees per unit (stems), types of trees, percent of upper canopy, etc.). Cultural fire manages the whole system, including the extant medicinal relationships; it better serves the biodiversity, climate resilience, and promotes cultural survival.

THE PROCESS OF CULTURAL BURNING

Cultural burning involves a new terminology, but it is a very old practice. Indigenous peoples around the world have been using fire for centuries to sustain their way of living. In California, during historical times early ranchers claimed to have been taught by the Native people about the land and how to take care of it. They and others told of how the Indians set fire to the landscape when they exited the high mountains or on their way back from traveling over the Sierra Nevada mountain range (O'Neal 1953). What that typically meant was that the land was burned in late fall or early winter before the snow fell. This was not necessarily before the first snow, but before the heavy snow that drove people down out of the high hills because of the cold temperatures, or before any passes were closed for the winter. This meant that some precipitation may very well have fallen, but not to the extent that the ground or vegetation was soaked and could not be burned. Even today, fires are started via lightning or by humans in January; the only difference is that they will not burn with the intensity they would have in late summer or early fall.

Like prescribed burning, cultural burns also include broadcast burning. The term *broadcast burning* refers to fire applied to uncanopied or lightly canopied areas such as in grasslands, shrubland or chaparral, and oak woodlands (CAL FIRE 2019). Broadcast burning would be used for several reasons, such as the removal of invasive plants like star thistle, or the reduction of a dominant plant that may be native but has become overly dominant on the landscape, like tarweed. When tarweed is too thick, the native grasses are unable to flourish; similarly, once the tarweed is reduced, the native grasses immediately begin to return to the land. This type of eradication can and is done on meadows, non-wet ecosystems, and pasture/grazing lands. Some plants are native, but are interfering with the natural growth of other preferred native species. An invasive plant such as California dodder is not a introduced plant like the Japanese dodder; however, when it is invading the habitat of a native cultural resource it is considered to be an invasive parasite.

The application of cultural fire to cultural resources is a process of renewal—the end result is a resource that produces a product conducive to the cultural lifeways of the Indigenous practitioner and tribal gatherer. There are some 300 plant resources available to tribal practitioners in the North Fork Mono homelands in the southern Sierras; 200 are various species that provide food, fiber, medicines, teas, and cultural use products, all which sustain cultural practices. Therefore, fire or applied cultural fire is practiced in a careful and thoughtful manner in order not to destroy the vegetation, but instead to revitalize it. To ensure that the targeted plant resource burns hot enough, brush and dried limbs are added to stoke the flames and quickly burn the resource. Coupled with manicuring the trees and utilizing the dead or dying limbs as fuel, the added fuel will then have a positive effect on the trees with regard to nearby fire and smoke. They too will flourish in the aftermath, just as we as people get a haircut or manicure or pedicure and afterwards feel so much better because it boosts our self-esteem. Trees have spirits, and they feel better after being refreshed; they even look fuller and greener. When they are greener, they hold water better, become more resistant to wildfire, and hence help to ensure that our communities are more defensible.

It is important to emphasize that not all of the available resources are burned or targeted; instead, maybe six to eight species are targeted at a time, such as

sour berry, elderberry, redbud, deer grass, coffee berry, soap root, chaparral, willow, acorn oaks, pinenut trees, and Sierra plum. There is a general expectancy that medicinal plants—e.g., tobacco, yarrow, blood thinner fern, mint, angelica, joint tea, mushrooms, manzanita, and Pacific senacle—will come up in the burned areas. A blossoming of numerous native flowers is also the norm—lupines, owls clover, snow drops, buttercups, baby blue eyes, and pussy paws—these are a few of the plants that decorate the landscape a month or two after a burn takes place.

While there is an expectancy of a return of medicinal plants following a burn, what specific plants will return is not known. Seeds have often been dormant for decades, and centuries may have passed since the last time fire was on the land in a planned mode. Medicine plants are important to all creatures; all species—insects, birds, reptiles, animals, and humans all seek out medicines for whatever ails them—and without proper fire these medicines will not return. Whenever an animal or other creature is sick or ill and a veterarian or animal doctor is treating it, the first question is not "why" the animal needs treatment, but "what" medicines are they lacking? Is their source of supply not available, and why not?

BENEFITS OF CEREMONIAL FIRE

What is ceremonial fire and why is it practiced? Fire, like water and land, is sacred and revered as spiritual, and it is believed that the spirits of the land are always listening; while they know what we are doing, they ask what are "we" doing and why? Therefore, "we" must acknowledge this before we put fire on the land. We know two things—earth is our mother, and Creator is our father. We also know Creator created all things and gave life to all things. To give life is to give a spirit, to have life, one must have a spirit. Once our spirits leave our bodies, our bodies return to Mother Earth.

There are no benefits without an acknowledgement of the spiritual world, and ceremonies of any and all magnitudes are conducted to kick off the "burn" in a spiritual manner. The primary benefit of cultural burning is the renewal of life. Restoring the resource, removing the dead, dying, and parasite-ridden vegetation, and thereby rejuvenating the tree, shrub, or plant improves the capacity of that resource to absorb and hold water, and to keep water within its root system, thereby raising the water table and holding water closer to the surface.

A stage of regrowth follows cultural resource burning. Once the patch or section of burned resource begins to regrow, it grows at a slow rate, partly because it has been thinned. Slow regrowth and a thinned-out state means a growth period of 1 to 6 years, with full growth occurring at 6 to 8 years, and aging growth from 8 to 15 years. Mitigating factors include the intensity and amount of harvesting done. Harvesting is a form of manicuring and maintaining a resource. Burning enhances a gatherer's access to resources to harvest and apply traditional practices. Applying a second fire could occur after 8 to 15 years—sooner without the harvester, perhaps longer when gatherers are involved.

HOW CLIMATE CHANGE IS AFFECTING THE USE OF FIRE UNPREDICTABLY

Climate change and global warming are affecting the landscape quite severely in California and in the rest of the world as well. The fuel load on the landscape is considerable and has greatly contributed to the massive, destructive, and record-breaking wildfires in the grasslands, foothills, and forests. California has become a tinderbox, with uncontrolled fires created by the erratic climatic variations and unstable, unpredictable weather. We are currently in a 34-year-long period of drought with sporadic weather involving four to six year droughts with flooding or El Niños in between (Goode et al. 2018). This climate regime has wreacked havoc with the vegetation, particularly the oaks and conifers, allowing parasites such as mistletoe, California dodder, lichen, decay/tree rot, sudden oak death syndrome, and other such invasive threats to degrade our landscape. Without human interaction on the land, these dry-climate problems have contributed vastly to wildfire growth.

The unpredictable weather patterns have posed many challenges to finding windows in which to conduct "good fires." This drought-enhanced climate change affects native plants as well; it allows invasive plants to flourish and creates an environment for drier-climate native plants to become dominant on the land. With the use of cultural fire, the landscape and resources are given an opportunity to recover and be restored to a refreshed and purposeful existence.

RESTORING THE WATER

The Nium (North Fork Mono) creation stories were passed down generation after generation, telling us when our people lived in the metaphysical world. When the world was being made by Tie-now-wah Togu-pah-too (Creator), our people were animals, birds, insects, and reptiles. They spoke many languages, but the language they spoke the best was the language of ecology.

> Falcon and Coyote Goes Hunting: Falcon got caught on top of a great rock, coyote, mockingbird, mice, flicker, nuthatch all try to bring him down, they could not reach him, nuthatch did reach him but was too small to bring big Falcon down off the slick rock. So Coyote went down to the Chukchansi to get measuring worm. Measuring worm would not talk to him, so Dove went down. Dove could speak Chukchansi, dove was a messenger, he spoke several languages. Measuring Worm told Dove, *"When the Nium get their fires off the land, I will go up and get Falcon as the water rises."* He wrapped himself in a milkweed net and went up in two leaps, brought Falcon down, then everyone celebrated [Goode 2021].

Our stories are not myths, they are our original instructions on how to care for the land and water and the beings that live here with us. Many Indigenous cultures have such stories, which contain important ecological information and emphasize the importance of the natural relationships around us. There is additional nuance and meaning in these stories when they are told in their original language, nuance that is lost when they are translated into English. The linguisitc implications and cultural contexts embedded in Indigenous languages help shape a non-exploitative and holistically-focused worldview that is absent from the English language. Thus, keeping Indigenous languages and stories alive is not only vital for culture, but for the environment as well. In addition to restoration of the land and water, there must be 're-story-ation' as well.

Told in our language, in which people are not said to be separate from nature, our stories are passed down through the generations and are vital to continuing our cultural practices, including cultural burning. Cultural burning, cultural fire, ceremonial fire, each speak the same language, culture is TEK, TEK is spiritual, spiritual is ceremonial; all are acknowledging spirituality, cultural traditions, cultural practices, and traditional applications of fire on the land. The land needs fire, fire leads to water, water restores the resources—a relationship of connectedness.

In this article we have discussed the varied applications of cultural burning practices. The tribes, the cultural specialists, the traditional practitioners will tell you that when they are cooking outdoors, there is a special fire needed for traditional foods. The Chumash, Mono, Yokuts, Miwok, Pomo, Maidu, Yurok, Karuk, Pit River, Paiute, and all the other tribes up and down the state cook their special native foods of fish, shellfish, salmon, acorn, deer, and squirrel on or over special fires. The Mono use manzanita wood or live oak to get the right temperature to heat their soapstone rocks to cook the acorn; the Pomo put the salmon on sticks around the fire pit of hot coals; and the Nium throw a grey squirrel on hot coals whole, all cultural techniques using fire to sustain their traditional practices. Archaeological research has shown that the Miwok had extensive pits in which they cooked the Indian potato for their villages. After a grass fire, the Nium would go out and pick up roasted grasshoppers. In other parts of the world, Indigenous cultures use fire as their means of achieving food sovereignty. The Nium used fire to harden their arrow shafts, digging sticks, and spears. They and many other tribes not mentioned will tell you that they have been using cultural fire and ceremonial fire since time immemorial.

The renewal of water is a concept that is still misunderstood. Following a wildfire, the streambeds immediately widen, the water level rises, flows from where seep springs emerge, springs begin to overflow, and the meadows become knee deep in moisture. What does it mean that a stream widens? Trees may still be smoldering, fires may still be flaring up within the burned area after a wildfire, yet within a week or less, the green strip of streambed vegetation immediately expands three or four feet on either side of the waterway. In places where the burn was not hot but still blackened the vegetation, new shoots will immediately spring up. This is because once the "water suckers" are all gone, the water table will rise.

This same natural phenomenom is observed by ranchers in the fall when the oaks and other deciduous trees quit drinking water and go dormant; the ponds, springs, and water channels immediately start rising, overflowing, and/or becoming wetter, especially in

the morning. Another reiteration of this occurs when meadows are being restored; once the conifer encroachment is eradicated, the springs and streams begin to flow. Therefore, as Indigenous burners, we expect that by rejuvenating resources, removing the dead debris, and creating fresh, new vegetation and cultural resources with fire, the water will also be renewed.

CLOSING THE GAP

There is no uniformity in the issuance of burn permits and burn policies in the state of California. There are numerous challenges and barriers to all fires. As discussed earlier, a number of things (including the right window) have to be in place before an agency can conduct a prescribed burn. There is no uniformity among the various Air Board Districts in California. Permits, as well as the application process, are different in each county. For example, in one county, a form signed outside an office door is good for two years. In another county, you apply to the Environmental Health Department, pay your fee, and the permit is good for only one fire season. Some ten years ago, the State Air Board Director stated that the Air Board had a "Cultural Burn Permit." In one county, the best permit they had was an agricultural permit, but it did not have any items or spaces for Cultural Burning. However, that department was nice enough to help create or write in what was needed for a Cultural Burn.

Some counties have stipulations about what can and cannot be burned. Some counties charge $1, $2, $5, up to $25 for a permit. Some have a burn window, as well as No Burn Days. Humidity is not as big a factor for cultural burners as it is for agencies; however, wind is a bigger issue for cultural burning than for agencies. Burners understand the wind and have studied the wind all their lives. They know what time wind is coming and from what direction it will be blowing, and what type of wind to expect throughout the day. Thus timing is a major factor in when to light the fire and what to expect once the fire is going.

This brings the discussion to the Burn Boss, who is an individual who is qualified to plan, organize, and execute prescribed burns. There are ongoing debates in California at different levels of government as to who can be a Burn Boss, what training is needed, who controls such training and permitting, and so on. We argue that the difference between cultural burning and prescribed burning involves the same differences that are relevant in determining who, what, and why a burn boss is needed. One of the contentious issues is liability in the case of uncontrolled fires, and the necessity of having an individual and/or organization that can be assigned liability if the fire becomes uncontrolled. SB 332, currently in the California Legislature, would amend liability laws around burning to reduce financial risk; it could facilitate more cultural burning (SB-332 n.d.).

There is a very significant difference between Burn Boss and "Burner." Government agency fightfighters are igniters and suppression fighters, not burners. To be a "Burner" is a very prestigious title worldwide, comparable to (if not equal to) being a chief of an Indigenous tribe. In cultural burning we have "burn bosses," but they are cultural burn bosses as well as fire bosses. It takes years to become one, with rigorous long-term training, constant learning, and a continuity of experience. It is not easy and it is challenging—many of our young trainees get very frustrated, but there is a lot to think about, and it takes perseverence, calmness, knowledge, and experience to be a burner. It takes years to develop the characteristics of a good burner, and to know how to handle and understand fire. It is definitely not something that a federal or state agency can teach in a course or training session.

Another issue to highlight is funding, because grant funding is primarily designed toward using Western scientific data, with such questions as what is your cultural burn going to do for Western science? How is your cultural burn project going to benefit Western science? Can cultural burning be compatible with Western science? Is there a gap? Why can't prescribed burning and cultural burning coexist and work together?

There is a gap, possibly perpetuated by both Indigenous Burners and Igniters from Western science backgrounds and training. The difference, as we discussed earlier, lies in the tradition. The traditional practitioner has generational knowledge and a lifetime of experience; the fire ecologist attended a prestigious university to get his knowledge, then applies that knowledge over the course of a few fire seasons—these are the credentials that make him an expert. For a Native American, it involves "life-long learning," where you are brought along through your younger years training and learning and practicing your skills, until one day the

Indigenous community, the Indigenous tribe knows that you are who they say you are. No one has to proclaim you are a burner, or designate a Burn Boss for the day or for a specific event. When the burning starts on a cultural fire everyone already knows who the burn leader(s) are.

The North Fork Mono Tribe signed a Cost Share Master Agreement in 2018 with the Sierra National Forest (SNF) that will one day allow the tribe, and maybe other tribes, to conduct its own cultural burning on National Forest lands. The tribe has been engaged with the SNF for almost twenty years putting fire on such cultural resources as deergrass, soaproot, mint, and acorn-producing oak trees. Currently the tribe is utilizing the Master Agreement to "assess" the condition of meadows and restore a number of meadows. As the tribe progresses in their endeavors and builds upon their partnership, the door will open for more tribes to follow in their footsteps.

CONCLUSIONS

It is important that when well-meaning agencies or organizations seek to augment their land stewardship practices with Native science-based approaches like cultural burning, that they do so with the leadership and guidance of those who hold knowledge of cultural burning. Genuine respect for these pathways to knowledge is critical. To improve relationships with tribes and bearers of traditional ecological knowledge, Indigenous knowledge needs to be regarded as a legitimate expression of science.[4] Similarly, TEK leadership support and guidance needs to be compensated on a par with that afforded to any other scientific experts.

We emphasize that the most overarching difference between cultural burning and prescribed burning is that cultural burning is situated in a culture that is deeply rooted to the land which is being burned. Cultural burning has been a vital and necessary aspect of life for many Indigenous peoples throughout the state and world, and the practice is intertwined with food sovereignty, spirituality, medicinal resources, art, survival tools, and other cultural necessities. Prescribed burning, on the other hand, is guided by the knowledge of people who have only recently arrived on the land. The North Fork Mono have lived with their land for generations and formed a relationship with the many beings that live there. Cultural burn practitioners know how to burn because they have seen what the elderberry tree needs to produce the most berries, they know what types of sourberry shoots the weavers need to make baskets, and they have inherited stories telling them how burning is connected with Creator. Cultural burning does not exist as a separate practice, but is tethered to every aspect of a culture that is rooted in a way of living and thriving with the land.

NOTES

[1]While the term 'cultural resources' in Western thought most often refers to built structures, archaelogical sites, and other remnants of historical human activity, this article includes culturally important plants under the term. This is due to their central importance in the lifeways and culture of the Nium, as well as to the fact that many gathering sites of important plants involve historical populations of those plants, which have been stewarded by generations of Nium and are therefore historic sites as well.

[2]To read more on Native principles of science in North America, see Cajete (2000).

[3]Over-reforesting occurs when seedlings are planted by humans before the natural forest has had a chance to resprout following a burn. Most burns take 3 to 5 years to resprout. When the seedlings sprout from the natural seed bank, they will be healthier than what humans will try to replant. After the new, naturally sprouted seedlings are up, they can and should be thinned and replanted. Nature's seedlings will have stronger genes and create healthier trees than what humans plant.

[4]Supplemental references recommended by author:

Anderson, M. K.
2005 *Tending the Wild: Native American Knowledge and the Management of California's Natural Resources*. Berkeley, Cal.: University of California Press.
2018 The Use of Fire by Native Americans in California. In J. W. van Wagtendonk, ed. *Fire in California's Ecosystems, 2nd ed*., pp. 381–398. Berkeley: University of California Press.

Goode, R. W.
1992 *Cultural Traditions Endangered*. Eagle Eye Enterprises, Inc. Clovis, CA.
2013 *Burning Down to the Village*. Eagle Eye Enterprises, Inc. Clovis, CA.
2018 *California's Fourth Climate Change Assessment*. Editors: Lucero, S., J. Ganion. 69 pages. 1 of 18 Reports in the State Assessment. *Summary Report from Tribal and Indigenous Communities within California*. https://www.energy.ca.gov/sites/default/files/2019-11/Statewide_Reports-SUM-CCCA4-2018-010_TribalCommunitySummary_ADA.pdf.

Long, J. W., M. K. Anderson, L. N. Quinn-Davidson, R. W. Goode, F. K. Lake, and C. N. Skinner.
2016 *Restoring California black oak eco-systems to promote tribal values and wildlife*. General Technical Reports PSW-GTR-252, U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station, Albany, Cal.

Long, J. W., R. W. Goode, R. J. Gutierrez, J. J. Lackey, and M. K. Anderson
2017 Managing California Black Oak for Tribal Ecocultural Restoration. *Journal of Forestry* 115(5):426–434. https://doi.org/10.5849/jof.16-033.

Long, J. W., F. K. Lake, R. W. Goode, and B. M. Burnette
2020a How Traditional Tribal Perspectives Influence Ecosystem Restoration. *Ecopsychology* 12(2):12. https://doi.org/10.1089/eco.2019.0055.

Long, J. W., R. W. Goode, F. K. Lake
2020b Recentering Ecological Restoration with Tribal Perspectives. *Fremontia* 48(1):14–19.

REFERENCES

Albrecht, G., G.-M. Sartore, L. Connor, N. Higginbotham, S. Freeman, B. Kelly, H. Stain, A. Tonna, and G. Pollard
2007 Solastalgia: The Distress Caused by Environmental Change. *Australasian Psychiatry: Bulletin of Royal Australian and New Zealand College of Psychiatrists* 15(S1):95–98.

Aldern, J. D., and R. W. Goode
2014 The stories hold water: Learning and burning in North Fork Mono homelands. *Decolonization: Indigeneity, Education and Society* 3(3):26–1.

Blount, C.
1984 John C. Fremont, 1984. In *Cultural Resources Overview of the Southern Sierra Nevada*, Theodoratus Cultural Research, pp. 258.

Cajete, Gregory.
2000 *Native Science: Natural Laws of Interdependence* (1st ed). Santa Fe: Clear Light Publishers.

CAL FIRE Prescribed Fire Working Group
2019 *CAL FIRE Prescribed Fire Guidebook*. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/viewer.html?pdfurl=https%3A%2F%2Fwww.fire.ca.gov%2Fmedia%2F2qlel0gn%2Fcal-fire-prescribed-fire-guidebook.pdf&clen=3382911&chunk=true.

Goode, R. W.
2021 "Falcon and Coyote Go Hunting" Nium (North Fork Mono). North Fork, California.

Kinsman, J.
1894 *Joseph Kinsman Diary: 1873 to 1894*. MS on file in Archives of North Fork Mono Tribe, Clovis, CA.

Mayfield, T. J., and M. Margolan
1993 Introduction. In Frank Latta, *Indian Summer: A True Account of Traditional Life Among the Choinumne Indians of California's San Joaquin Valley*. Berkeley: Heyday Books.

Merriam-Webster
n.d. Science. Accessed September 13, 2021, https://www.merriam-webster.com/dictionary/science.

O'Neal, J.
1953 Two Blades of Grass Where Thousands Grew Before…. *Western Livestock Journal*. https://ucanr.edu/sites/UCCE_LR/files/180681.pdf

Phillips, George
1993 Zenas Leonard, Mountain Man Adventures with Joseph Walker, 1833. *Indians and Intruders in Central California, 1769–1849*. Norman: University of Oklahoma Press.

Senate Bill No. 332
n.d. Civil liability: prescribed burning operations: gross negligence. Accessed September 30, 2021. https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=202120220SB332

Wood, Harold W., Jr.
2019 *Chronology (Timeline) of the Life and Legacy of John Muir*. The Sierra Club. https://vault.sierraclub.org/john_muir_exhibit/life/chronology.aspx