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Livestock, Range, & Watershed

San Luis Obispo, Santa Barbara and Monterey Counties

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Can Cattle Grazing help Reduce Fire Fuels and Fire Hazard

Devii Rao

The widespread and severe wildfires in California during the past several years highlight the importance of understanding how land management practices such as cattle grazing affect wildfire risk. In a study conducted during the fall of 2020, we evaluated how much fine fuel (grasses and other plants) are eaten by cattle on rangelands, and how this may affect wild-fire behavior. These are preliminary results. We found that



about 1.8 million beef cattle grazed California's rangelands, which include grasslands, oak woodlands, and shrublands, in 2017. Our analysis showed that

cattle consumed vegetation across about 19.4 million acres of non-federal rangelands. The amount of fuel consumed per acre varied greatly based on region. The average amount of fuel removed across grazed rangelands in the state was 596 pounds per acre. Maintaining flame lengths below four feet is often cited as a critical threshold that allows fire fighters to safely access an area from the ground without heavy equipment. Fire behavior models developed for this study suggest that maintaining grassland fine fuels at or below 1200-1300

pounds per acre during spring and summer will keep flame lengths below four feet at wind speeds up to 40 mph, but lower fuel loads may be required during extremely dry conditions. These numbers are useful for interpreting the impacts of reducing fuel levels, but they still need to be experimentally validated in California. Cattle grazing plays an important role in reducing fine fuels on grazed rangelands in California. Without grazing we would have hundreds to thousands of additional pounds/acre of fine fuels on the landscape, potentially leading to larger and more severe fires. There are opportunities to improve fire safety in California by strategically grazing rangelands with high biomass that are not currently being grazed, or even by increasing grazing intensity on very lightly grazed areas. This paper has been submitted to Cal Ag Journal. The fire modeling portion is currently under revision, which may change the results of the fire behavior portion. You can find more information at: <https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=43533> This research was funded by the California Cattle Council and the authors include: Felix Ratcliff, Devii Rao, Sheila Barry, Luke Macaulay, Royce Larsen, Matthew Shapero, Shane Dewees, Max Moritz, Rowan Peterson, and Larry Forero

The California Oak Worm

Bill Tietje

It's getting to be that time of year again! Last year, the apparent damage the California oak worm causes our native coast live oak trees and the nuisance it creates can be a huge issue if you happen to be at a hot spot for the problem. Last summer and fall, the Master Gardener Offices received literally hundreds of calls. Here, in Q/A format, are the main concerns that came out of the phone calls.

Q: Will the Worms Harm the Trees?

A: No! Even complete defoliation is unlikely to harm a healthy tree. Oak trees and oak worms are both native to California oak woodland. Over millennia they have learned to live with each other. Like any parasite/host combination, it is not in the better interest of the parasite to harm its host. It sounds strange, but one could look at the worms as *benefiting* the tree by removing some foliage during a low-rainfall year, and therefore loss of water through transpiration. New leaves will grow on your oak trees next spring.

Q: Will the Worms “Attack” Other Than Coast Live Oak Trees?

A: Rarely! The caterpillars usually eat only coast live oak leaves. In an outbreak year, the caterpillars may feed temporarily on non-oak species.

Q: How Can I Get Rid of the Worms?

A: There is no practical way to get rid of the worms. Pesticide applications are usually not warranted and can be very expensive. Broad-spectrum pesticides would also knock down beneficial predator populations. BT (*Bacillus thuringiensis*), a biological control, can be sprayed onto the tree foliage. When the oak worms eat the leaves they die within a few days. However, for the control to be successful the timing of the BT application is critical—and of course, it's not easy or cheap to treat a large tree. These applications usually are not worth the effort and cost.

Q: How Long Will the Worms be Around this Year?

A: Typically oak worms feed from April to September.

Q: What’s the Prognosis for this Year (2021)?

A: California oak worm populations tend to build up over a couple years and then, if conditions are right, there is an outbreak year or two. The relatively dry winter this year followed by an early spring has resulted in high overwinter survival of eggs and early development of the eggs. This set of circumstances may jumpstart the production of worms—and, although it’s too early to say for sure, this summer and fall could see its share of oak worms! The good news is that the natural predators of the oak worm also build up when the worms are abundant, for example, parasitizing wasps that attack the eggs or ladybug larva that attack caterpillars when they are small. These and their other natural predators will not be able to knock down large numbers of worms, but they will help, and because the worms obviously eat themselves out of house and home, high levels of infestation should not happen year after year. The bottom line: there is an outbreak and then a depression. (Of course, Mother Nature doesn’t always abide by the rules!)

Q: Will the worms damage my home?

A: Well, not really. Although the worms may crawl onto your house or even into the house, they cannot damage the house. However, they can make a mess. The best thing is to keep any possible entrance closed and tolerate as best you can. More than likely, the California oak worm will be around for a year or so and then not bother again for at least several years.

For more information and if you have further questions, please type into your browser:

- UC IPM California Oakworm—ipm.ucanr.edu/PMG/PESTNOTES/pn7472.html
- **UC Oaks** website—<https://oaks.cnr.berkeley.edu/>
- *A field Guide to Insects and Diseases of California Oaks*, Ted Swiecki and Liz Bernhardt—<https://oaks.cnr.berkeley.edu/wp-content/uploads/2019/02/Field-Guide-to-Insects-and-Diseases.pdf>

Or, phone UC Master Gardener Help Lines:

Templeton	(805) 781-5939
San Luis Obispo	(805) 434-4105
Arroyo Grande	(805) 473-7190
Salinas	(831) 763-8007

Part 5: Oak Associations

Part 4A: Oak/Oak Worm Association



Eggs



Larva



Adult

Web Address:
ipm.ucanr.edu/PMG/PESTNOTE/S/pn7472.html

Evaluating the Role of Agricultural Carbon Markets in Financing Soil Health on California Ranches

Nicole Biggs, Jayce Hafner, Fadzayi Mashiri, Lynn Huntsinger, Eric Lambin

Introduction

90% of California is comprised of natural and working lands. Governor Newsom has set aggressive targets to both conserve land and mitigate climate change, using strategies like partnering with landowners on carbon sequestration. In this context, we explored new approaches to compensating landowners for building soil carbon. Specifically, we examined an agricultural soil carbon market called the Ecosystem Services Market Consortium (ESMC), set to launch in 2022. Through interviews with the architects of ESMC and with a diverse sample of California ranchers, we investigated food and agriculture companies' motivations for creating ESMC and how this carbon market could provide California ranchers with more funding for rangeland conservation.

Study Findings

Our research revealed several key considerations regarding ESMC and rangeland conservation. First, ranchers in the study were keen to support soil health on their properties and engage with ESMC, as long as the market was scientifically rigorous and paid them enough. Notably, how much ranchers would need to be paid for soil carbon to make participation worthwhile varied significantly across operations, in some cases requiring up to \$70-80/metric ton of carbon. From our interviews with ESMC members, we identified several factors motivating companies to develop the carbon market. One key motivation was to attract new forms of capital that could incentivize producers to adopt soil health practices like cover-cropping and grazing management. A second motivation was carbon insetting, a new approach to managing corporate emissions that addresses emissions from across companies' supply chains. In contrast to carbon offsetting, where companies purchase verified carbon credits to offset their emissions, corporations pursuing carbon insetting use strategies like investing in on-farm soil health practices. ESMC members highlighted several challenges to implementing the carbon market, including how to affordably scale rigorous monitoring, reporting and verification (MRV) systems and whether there is enough external demand for agricultural carbon offsets to support the market. Today, there is significant unmet demand for conservation financing and agricultural carbon markets could help to fill this gap. Looking at just two Farm Bill conservation programs—EQIP and CSP—we found that \$135M in applications remained unfunded in 2019, which can be understood as \$135M in unmet demand for conservation financing. ESMC could address this demand by providing additional income to producers for soil carbon sequestration. However, the income potential of carbon markets is dependent upon producers successfully increasing soil carbon, and augmenting soil carbon on California rangelands is challenging due to their biogeochemical characteristics (see this new literature review on grazing management and soil carbon). That said, beyond augmenting soil carbon, ESMC could support California ranchers' broader soil health and production goals by potentially providing a new source of conservation financing. Finally, while carbon markets can provide funding to producers who increase soil carbon, soil conservation practices can be expensive and onerous to implement and carbon

markets tend to put the upfront risk on producers. Given this, programs that provide technical assistance and conservation funding—including Farm Bill programs implemented by the USDA Natural Resources Conservation Service and private sector financing tools—are essential to scaling the adoption of soil health practices and should accompany the deployment of new carbon markets like ESMC.

About the Lead Authors



Nicole Buckley Biggs is a PhD candidate in the Stanford School of Earth, Energy and Environmental Sciences. She conducts research at the intersection of climate, conservation and agriculture policy. She previously worked for The Aspen Institute and The Nature Conservancy California, and earned her BA from Harvard University.



Jayce Hafner is the CEO and co-founder of FarmRaise. She earned a joint MS/MBA from Stanford in 2020 focused on agriculture and land use, and earned her BA from Hendrix College. Before Stanford, Jayce served as the Domestic Policy Analyst for The Episcopal Church and was a Fulbright Fellow in Trinidad and Tobago.

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Learn More

To read the complete study findings published in Ecology & Society go to: <https://doi.org/10.5751/ES-12254-260119> or contact Nicole Buckley Biggs at nbuck@stanford.edu.



Oak Tree Drought-care Strategies

Although there has been some mortality of oak trees attributable to the current drought, in the vast majority of cases, native oak trees will survive. Oaks are very drought tolerant.

Fertilization

Unless there is an obvious nutrient deficiency, which is extremely rare in native landscapes, any fertilization of an oak is excessive. In an urban landscape, the lawn and other exotic plants which are surviving there are more nutrient demanding than is the oak. In other words, if there are enough nutrients for these plants, there are enough for the oak. If it has any effect at all, fertilizer will cause the tree to produce more foliage, thereby increasing the amount of water needed by the tree to maintain this foliage. Fertilization also tends to cause pest outbreaks.

Deep Watering

If the soil under your oak 12-18 inches down is dry and crumbly, the oak is out of water. A deep watering will invigorate the drought-stressed tree. Perhaps it seems ill-advised to advise the watering of an oak during a drought. But think about it a minute. If you lose the oak, you lose 10% of the value of your house. Also lost are the many ecosystem services provided by this “keystone” structure (e.g., shade, soil nutrients, habitat). These take a very long time to replace. Deep watering of the drought-stressed tree is accomplished by moving a hose under the canopy of the tree during the day for a day or two at a low flow or trickle stream, such that the water percolates into the soil. Do this once or twice during the summer to early fall with at least a month between a watering to allow the soil to dry, reducing the likelihood that fungi will attack the tree roots.

Mulching

A prudent approach to the current drought and the maintenance of tree health is to conserve existing soil moisture as much as possible. Mulching under the tree helps to control moisture by keeping the soil cool and by suppressing weed growth. The best mulch is the oak’s natural leaf litter. But most commercially available plant-based mulches provide a similar benefit. Apply 3-5 inches of mulch under the tree canopy and avoid the piling of the mulch

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Coronavirus Information

We are facing a crisis like most of us have never seen before. The state of California has issued an order to shelter-in-place. All UCCE employees have been directed to work remotely. However, we are still available by phone and email. UCANR, and the San Luis Obispo office, lead by Dr. Katherine Soule, has put together a lot information about the coro-