

# Grazing for Change

Third Edition

Using Managed Livestock Grazing to  
Reduce Fire Fuel Loads



**This Family Could Save Your Family!**

# CONTENTS

- 3 Preface ~ CAL FIRE
- 4 Grazing Basics for Controlling Fuels
- 6 Building Functional Grazing Leases
- 7 Hungry Cows
- 8 Grazing for Multiple Benefits
- 9 Targeted Grazing Profiles
- 10 Hiring a Targeted Grazing Contractor
- 12 Multi-species Grazing
- 13 Profiles in Ranching
- 14 Red Flag Checklist
- 15 Wildfire Preparedness at Home
- 16 Other Vegetation Management Tools
- 17 Combining Tools for Success
- 18 Community Resources

Editor: Tracy Schohr, Livestock and Natural Resources Advisor, Plumas, Sierra and Butte counties, University of California Cooperative Extension.

Photography: Photos in the book taken by Tracy Schohr and guest contributors, where noted.

Publish Date: May 2021

**UNIVERSITY OF CALIFORNIA**  
Agriculture and Natural Resources





# PREFACE

*Garrett Sjolund, Assistant Chief,  
CAL FIRE - Butte County*

Each summer, California has thousands of acres of land burn causing millions of dollars in damage. The most destructive fires are the ones that stand out to most people: Thomas Fire (2017), Carr Fire (2018), Camp Fire (2018) and the recent 2020 Lightning Fires across the north state. However, each year hundreds of other fires ignite due to natural or human causes, but can be extinguished quickly due to the fuel conditions. This is where homeowners and land managers fit in, playing a role in reducing fire fuels and hardening your homes to withstand wildland fire exposure. This book created by University of California Cooperative Extension outlines tips to reduce fire fuels through managed livestock grazing, fire preparedness, and home hardening. The booklet also provides technical resources and case studies that can help you determine and implement fire prevention activities on your own property.

Fire behavior is directly linked to three factors: topography, weather conditions and fuels profile (vegetation). We can't change the first two factors, but through livestock grazing, fuels treatments, and prescribed fire, we can alter fuels profiles to reduce the threat of small or catastrophic fires. The continuity of fuels across a landscape (horizontally) and ladder fuels that connect understory vegetation to trees (vertically) can be altered to reduce fire intensity and threat of fire spread.

Managed livestock grazing with goats, sheep, and cattle is one tool homeowners, land managers, communities and public agencies can utilize to reduce fire fuel loads that can lead to catastrophic fires. Myself and other firefighters value livestock grazers to reduce the severity, continuity, and size of wildfires. When firefighters look at a landscape that has been grazed, we can see a decrease in the amount of fuels that is available to ignite from a spot fire and the threat of spread is significantly reduced because there is little accumulation, continuity, or height. Livestock grazing will not prevent fires; it changes fire behavior, creating an opportunity for firefighters to attack the fire before it becomes bigger, hotter and faster due to fuel accumulation. The accumulation of fuels often occurs where there has been lack of management or long-term exclusion of livestock grazing, allowing multiple years of plant growth that creates a hazardous condition when in the path of a fire.

California's wildfires have been growing in intensity, scope, and size with thousands of acres of expansive open spaces burning each year in the state. There is growing interest in actively working to create a more fire-resilient landscape. The resources in this booklet can help you take an active part in creating a more fire resilient landscape protecting homes, businesses, communities, and natural resources.

# Grazing Basics for Controlling Fuels

*Tracy Schohr, M.S., Livestock and Natural Resources Advisor Butte, Plumas and Sierra Counties, University of California Cooperative Extension; Leslie Roche, Ph.D., Specialist in Rangeland Management, University of California, Davis and Ken Tate, Ph.D., Specialist in Rangeland Water Quality, University of California, Davis*



Through the implementation of a prescribed grazing program, fire fuel loads can be managed on both small parcels and extensive landscapes. The use of cattle, goats, and sheep in combination with mechanical treatments (e.g. mowing) and prescribed fire can make property fire-resilient. Prescribed grazing is the controlled implementation of the timing, frequency, and intensity of grazing to achieve specific goals (Bailey, et al. 2019). Here, the focus is on implementation of prescribed grazing with the goal of reducing the accumulation of vegetation through defoliation or trampling, while also meeting other natural resource objectives (e.g. water quality). Prescribed grazing will not “fire proof” your property; rather, prescribed grazing can help you manage risk by reducing fuel loads and continuity of fuels and, therefore, change fire behavior (Davies, et al. 2010).

Grazing is a good option to reduce vegetative fuels that make up the 1-hour and 10-hour fuels. 1-hour fuels include vegetation that will dry within 1 hour (e.g. grass and leaves) and stems/branches that are less than one-fourth inch diameter. 10-hour fuels also change with weather conditions, but take longer to respond, such as larger brushes and small trees that have stems ranging from one-fourth inch to one inch in diameter (Nader, et al. 2007).

## Grazing Management

There are six primary elements described in the table that must be defined before initiating a prescribed grazing program intended for fire fuel load control. Defining the type of livestock is important to meet objectives, specific consideration of livestock foraging behavior. Cattle and sheep are a good selection to manage fine vegetation (e.g. grasses). If your property is predominately brush, consider using goats as they are browsers and consume a higher percentage of foliage from shrubs (Ferreir, et al. 2013). In addition, consider selecting livestock accustomed to consuming a particular vegetation type - foraging behavior is often a product of early life experiences that shape grazing distribution and foraging behavior late in life. (Howery, et al. 1997).

## Prescribed Grazing Program Elements

1. Type of livestock (e.g., cattle, sheep, goats)
2. Number of livestock (stocking density – head/acre)
3. Duration of grazing (stocking rate – head/acre/year)
4. Seasonal timing of grazing (e.g., spring, summer, etc)
5. Frequency of grazing (e.g., 1X, 2X per growing season)
6. Spatial distribution of grazing (e.g., fences, water)

The six primary elements of a prescribed grazing program are site-specific elements that can be influenced by parcel size, vegetation, personal preferences, and infrastructure (Bailey, et al. 2018). Grazing requires infrastructure that is dependent on parcel size and livestock species, such as type of fencing and cross fencing to create smaller more manageable pastures. Infrastructure considerations include: fencing, reliable drinking water, supplemental feeding locations, shelter, and livestock handling facilities. Livestock impact on natural resources is frequently determined by management, e.g. water availability (George, et al. 2007).

## Essential Aspects of Prescribed Grazing

- Nutritional requirements
- Supplemental feeding
- Animal health and production
- Lease/Contract/Agreement
- Emergency plan
- Mitigate potential negative impacts
- Plant health
- Consider other benefits from grazing

### Livestock Health

Before introducing livestock grazing to reduce fire fuel loads, there are a few essential aspects to consider that are briefly described below. The nutritional requirements of the livestock you are using should be considered, as growing and lactating animals have higher nutritional demands. These nutritional demands may require the livestock be provided with supplemental feeding (e.g. hay) and minerals to meet dietary needs. Broader animal health and husbandry should be factored in especially if you choose to purchase livestock. You should work with a veterinarian to develop a whole herd health plan, ensuring you have a client-patient relationship to address any potential injuries and illnesses.



Brett McNabb, DVM, MPVM, Assistant Professor, School of Veterinary Medicine, University of California Davis speaking at a workshop on cattle herd health.

### Adaptive Management

It is imperative to create an adaptive and comprehensive grazing program that considers not only the beneficial impacts of grazing, but also mitigates potential negative aspects (Briske, et al. 2011). Unmanaged livestock grazing with high or low stocking rates can lead to increases in invasive weeds, soil compaction, riparian degradation, erosion, loss of habitat for species, and other concerns. The negative impacts range from landscape level down to individual plant health, that can be impacted from intense defoliation (Olson and Richards 1988).



Cow with a mouthful of medusahead.

Proper grazing management can minimize spread and manage noxious weeds in rangelands (DiTomaso, 2000); for example properly timed grazing can help control yellow starthistle (Goehring, et al. 2010), Himalayan Blackberry (Ingham, 2014), and medusahead (DiTomaso, et al. 2008). Livestock grazing can enhance habitat for raptors, burrowing owls, grassland birds, and other species (Barry, et al. 2007). Additionally, wildflower displays and vernal pool ecosystems can be enhanced with managed livestock grazing (Marty, 2005). You can learn more in the case study section on page 8.

This booklet is a guide to spark your interest in the use of managed grazing as a tool to reduce fire fuel loads while managing ecologically sensitive landscapes. The resources, case studies and foundational principles discussed in the book can serve as a guide to help you determine options for fire fuel load reduction on your property.

## Additional Resources

The references cited in this book, and additional resources to implement a controlled grazing program, can be found at

[ucanr.edu/grazing\\_for\\_fire\\_prevention](http://ucanr.edu/grazing_for_fire_prevention)

# Building Functional Grazing Leases

*Carissa Rivers, M.S., rancher and rangeland manager*

Livestock grazing can be an effective and economical tool for owners and managers of larger landscapes to reduce fire fuel loads. As a landowner and property manager you have to take into account a vast number of considerations when developing a grazing lease. Every grazing lease will differ when considering a property's unique set of challenges. When creating a new leasing agreement, the landowner and the grazing operator should openly communicate terms and conditions and build a trusting relationship.

## **Paying, Paid or Free**

Livestock grazing is a business with costs and risks associated. When you are discussing terms and conditions, you should take a holistic approach considering livestock grazing needs, infrastructure costs, time, fencing, water reliability, forage quality, etc. There should be conversations regarding designation of responsibilities to create a manageable agreement and successful, long-term lease experience.

When developing a new grazing lease on property, taking a multi-year approach can provide the grazing tenant the confidence to invest time and resources in the property if they know they will be back for a few years. This is especially true when considering capital improvements and time invested in the property to initiate

grazing. Furthermore, if the property has sat idle for a number of years and grazing infrastructure maintenance has been deferred, there will be necessary costs incurred to re-establish livestock grazing.

## **Goals and Objectives**

As a landowner, you should have a list of goals and objectives that expand beyond your interest in the use of livestock grazing as a management tool. Some things you may want to consider include the time when you want livestock on the property, invasive species management, wildlife habitat management, water quality, or docile livestock compatible with recreation.

A livestock grazing lease to reduce fire fuel loads will reduce vegetation, but will not make your ranch "fire proof." When developing a managed grazing program, you should consider the "Residual Dry Matter" - the amount of forage left at the end of the grazing season, to support plant physiology, provide soil stability, and reduce the potential for erosion and other negative impacts that can result from intensive grazing. For more details, visit [ucanr.edu/grazing\\_for\\_fire\\_prevention](http://ucanr.edu/grazing_for_fire_prevention).

## **Lease Terms and Conditions**

Lastly, by outlining terms and conditions in a lease agreement, there should be no surprises. Common terms to include in a lease agreement include:



- Season of use (e.g. Nov.-June)
- Class of livestock (e.g. sheep, cows with calves, etc.)
- Stocking rate (e.g. 1 cow per 20 acres - site specific)
- Exterior fencing
- Livestock drinking water – access to wells, or note reliable streams, ponds, etc.
- Insurance
- Response time for sick animals or animals out on the road
- Rancher/lessee to provide the landowner/lessor with an operating plan. Any management changes must be based upon an extraordinary change of conditions such as severe drought or wildfire.

A lease is a two-way street; both lessor and lessee must strive to understand how the land resources may be managed to meet their combined goals. These key tools will aid in successful lease opportunities for the next generation.

As a landowner, you can find more resources on leases, basic essentials of annual beef cattle operations in California and business expenses by visiting [http://ucanr.edu/grazing\\_for\\_fire\\_prevention](http://ucanr.edu/grazing_for_fire_prevention).



Photos provided by Carissa Rivers.

# Hungry Cows

The Brown Ranch, located in Butte County near Oroville, spans from rolling grasslands to oak woodlands along Table Mountain Ridge. The ranch has experienced many fires, with highway frontage fires regularly starting from vehicles overheating, dragging a chain or someone recklessly tossing a cigarette butt. Larger fires in the region have also burned livestock forage, trees, grazing infrastructure and outbuildings, including the Cherokee Fire in 2017.

The 2017 Cherokee Fire was part of the Northern California Fire Storm, burning over 8,000 acres. The fire burned critical fencing on the Brown Ranch.

“The Cherokee Fire burned in October, right before the time to move the cattle from the mountains back to the valley. The Cherokee Fire destroyed all of our fences and we were not able to run cattle on one side of the ranch,” recalls Megan Brown, a sixth-generation family rancher.

The Brown Ranch seasonally grazes thousands of acres of annual grasslands in Butte County from November to May. During the summer months, the cattle are moved to cooler temperatures and live on irrigated pastures in Indian Valley, a one-hour truck ride away.

Since the Cherokee Fire occurred when the cattle were set to return to the valley from the mountains, it was impossible for the fences to get rebuilt in time. Consequently, part of the ranch was not grazed that year.

California grasslands can produce thousands of pounds of vegetative matter each year as illustrated in the 2018 photo on the area of the Brown Ranch that was not grazed post Cherokee Fire. Livestock grazing can convert potential fire fuels to nutritious meat. The 2018 and 2019 Brown Ranch photos show just how much cattle can reduce fuel loads!

“Cattle play an important role in fire prevention,” states Brown. “Our family’s managed grazing program will not prevent a fire; we just hope that it can reduce fuel loads that will save trees, wildlife, and create an opportunity for firefighters to get control of the fire with the reduced fuel loads.”



**“Our family’s managed grazing program will not prevent a fire; we just hope that it can reduce fuel loads that will save trees, wildlife and create an opportunity for firefighters to get control of the fire with the reduced fuel loads.”**

*- Megan Brown*



Photos provided by Megan Brown.

# Grazing for Multiple Benefits

## California Department of Fish and Wildlife



Livestock grazing, or excess vegetation removal, is a management tool the California Department of Fish and Wildlife uses across the North Central Region to protect important habitats such as vernal pools and to reduce fire fuels. Livestock grazing of Department lands can be beneficial, when appropriate prescriptions are outlined, and the grazed areas are monitored to reduce potential impacts to sensitive areas such as riparian zones by rivers and streams. Furthermore, grazing on Department lands is also used to manage invasive species, reduce thatch, and promote native plants.

“The Department selects livestock grazing operators who will partner with us, are flexible, have innovative ideas, and understand how to maintain the diverse botanical and wildlife resources with public recreation through grazing,” says Mario Klip, Ph.D., Senior Environmental Scientist Supervisor in North Central Region Conserved Lands group. “In the Northern Central Region, grazing is used as a management tool on over 35,000 acres, working with 11 operators on 12 units in six counties with likely more units becoming available in future years. We utilize moderate stocking rates, have adaptable plans and rely on progressive and collaborative ranchers to use grazing to maintain our lands, support plant diversity, and wildlife habitat, while reducing fire fuel loads.”

## The Nature Conservancy



The Nature Conservancy’s Vina Plains Preserve is located along Highway 99E at the Tehama-Butte County line. The Preserve has had a grazing management program for over 25 years. Grasslands in California have been invaded by exotic species, and livestock grazing is a key to reducing excess biomass, mimicking natural disturbance cycles, and maintaining diversity on the land. The Vina Plains Preserve is a 4,600-acre expanse of vernal pool grasslands renowned for its springtime wildflower displays.

Vernal pools are small depressions with impermeable subsoil that will hold water long into the spring, creating habitat for endemic plants and numerous invertebrates which support migratory birds, burrowing owls and other wildlife. Research has found grazing helps control invasive species and enables pools to stay wetter longer, thereby promoting biodiversity and the natural ecological functions of the pools. In addition to grazing at Vina Plains Preserve, CAL FIRE conducts closely timed prescribed fire training burns that also function to improve habitat and cattle forage.

“The Nature Conservancy works with a neighboring rancher to graze cattle on the Preserve from November through May each year,” states Andrea Craig of The Nature Conservancy. “The grazing program is a critical management element in order to help control medusahead and other annual grasses, reducing fire fuel loads, and improving wildlife habitat and biodiversity associated with these unique vernal pool ecosystems.”



# Targeted Grazing Profiles



“No place that we graze will be fire proof when we are done; it will all carry a fire. What we are doing with our grazing animals is changing the characteristics of the fire. We use goats and sheep for natural, ecologically sensitive control of weeds and brush, and efficient, cost-effective reduction of fuel for fire danger management. We are a mobile ranch; we pack up our animals and infrastructure everywhere we go to help utility companies, businesses, and homeowners.”

Brad Fowler, Owner  
The Goat Works  
[www.facebook.com/The-Goat-Works-Fowler-Live-stock-129033613833533](https://www.facebook.com/The-Goat-Works-Fowler-Live-stock-129033613833533)



“Each targeted grazing project is unique and has different cost factors such as terrain to install temporary fencing, water supply, variances in quality, and quantity of the feed. Healthy sheep and goats are key; sometimes we need to add supplements when we are at a project site. We take the time each spring to teach new kids and lambs about targeted grazing for fire prevention and to control yellow starthistle, blackberries, and brush.”

Nathan Medlar, Owner  
NM Ranch Services  
[www.facebook.com/nmranchgoats](https://www.facebook.com/nmranchgoats)



“Our managed grazing program returns to private and public lands year after year. With the annual treatments, we can see the impact that livestock has on changing the landscape by decreasing brush density, and increasing native perennial grasses, making the sites fire resilient. We use both sheep and goats, providing greater flexibility in fire fuel load management. The goats are good at eating brush and the sheep prefer the grasses; with mutli-species we can provide better services to landowners.”

Andrée Soares, President  
Star Creek Land Stewards, LLC  
[www.starcreeklandstewards.com](http://www.starcreeklandstewards.com)

# Hiring a Targeted Grazing Contractor

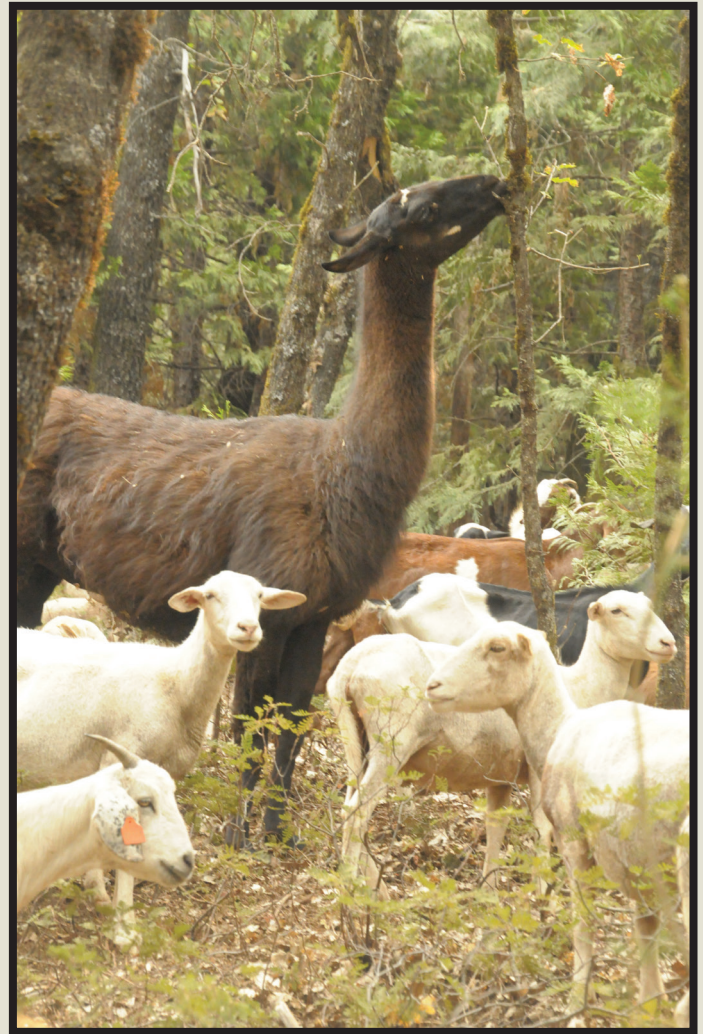
*Dan Macon, M.S., Livestock and Natural Resources Advisor Placer, Nevada, Yuba and Sutter Counties, University of California Cooperative Extension*

Given the ever-present threat of wildfire in California, many landowners and land managers are considering hiring targeted grazing contractors to help manage wildfire fuel loads. Targeted grazing can reduce fine fuels and ladder fuels to reduce wildfire danger in a variety of environments.

Targeted grazing is a cost-effective vegetation management alternative where other options are ineffective. Specifically, targeted grazing can be more cost effective on landscapes that are too steep, rocky or remote for conventional vegetation management (like mowing or chemical treatment), or in the urban-wild-land interface where burning is not an option.

## Why pay someone to graze? Isn't FREE grass enough?

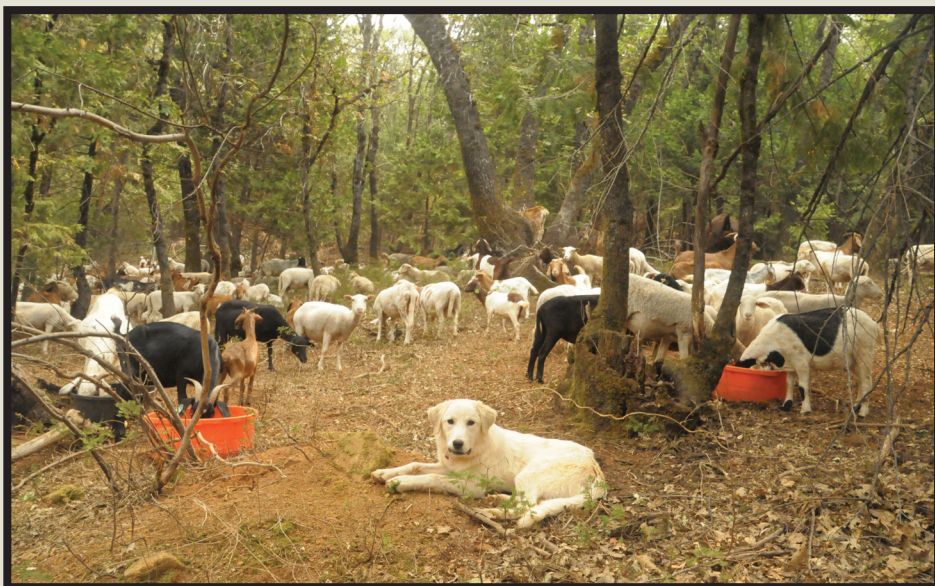
Targeted grazing is a very different business model than simply grazing for livestock production. Effective targeted grazing focuses on impacting target vegetation at exactly the right time for specific landscape or vegetation goals. Traditional livestock production, on the other hand, focuses on putting weight on animals or increasing reproductive success. Traditional livestock operations generate income from the sale of animals and animal products; these operations focus on body condition and the nutritional status of the animals at specific production stages. Targeted grazers generate income from vegetation management services; these operations may accept a drop in body condition or reproductive success to achieve desired impacts to low quality forage as long as this service is paid for.



Unlike equipment, which can be parked when not in use, livestock must be fed before they arrive on your property and after they leave. Part of the service that targeted grazing companies provide is the logistical planning necessary to keep their livestock “employed” throughout the grazing season.

## Goals are important!

Realistic landowner and land manager goals are important for successful targeted grazing applications. Targeted grazing for fire fuel load management will need to occur annually to reduce vegetative growth.



Recognizing this, many targeted grazing contractors will reduce their annual per acre charges in exchange for multi-year contracts.

Expectations are also important. Landowners who expect a uniform appearance to land treated with grazing (as if the land had been mowed) will likely be disappointed; grazing often leaves a patchy appearance on the landscape. Furthermore, grazing does not often provide the immediate visual effects of chemical treatment, mastication, or mowing. Vegetation treated with herbicide, for example, often shows immediate impact; grazing is a long-term management technique.

It is critical to realize there will still be vegetation left at the end of the targeted grazing contract, however the fuels removed through grazing will alter fire behavior, reducing flame length, minimizing embers and can prevent spot fires from igniting.

### Timing is critical

If targeted grazing occurs too early in the season, soil moisture may be sufficient for the targeted vegetation

to re-grow. On the other hand, the palatability of annual grasses and weed species may decline as these plants mature. Contractors often provide supplemental nutrition and other management techniques to impact this lower quality forage at the optimal time.

### What to look for in a targeted grazing contractor

Targeted grazing companies are service providers. Consequently, experience, responsiveness, and attention to detail are critical. Consumers should look for companies with experience in grazing projects in similar environments and situations. Ask potential contractors about experience level and for references.

Most targeted grazing contractors will provide an estimate on a per acre basis, allowing consumers to compare targeted grazing to other vegetation management options. In addition, contractors will provide an estimate of the project start date and duration. These estimates can be somewhat uncertain depending on year-to-year changes in vegetation quantity.

### Factors impacting the cost of a targeted grazing project include:

- Relative ease (or difficulty) of setting up infrastructure, including loading, and unloading facilities. Projects in steep or difficult-to-access terrain require more labor (and, therefore, are typically more costly).
- Access to livestock water. Easily accessible water can make the project less costly; projects without access to water may require the contractor to haul water to the livestock.
- Other risks, like vandalism, toxic plants, or proximity to high-value landscaping may increase the cost.
- Multi-year contracts are typically cheaper on a per acre basis. Livestock and targeted grazing staff become more accustomed to a particular property (and therefore more efficient) if the contract is for multiple years.
- Headache factors – like free-roaming pet dogs or neighbors who object to livestock or livestock guardian dogs – can increase the cost of a project.

Landowners and managers should contact targeted grazing contractors well in advance of the desired project start date. Targeted grazing contractors are busiest during the spring and early summer months; scheduling these jobs typically occurs in the prior fall and winter.



# Multi-species Grazing

Peggy and her husband Pete have been property owners in the Concow area since 1965, located in the foothills of Butte County. The Moak family has a long tradition of cattle ranching in Butte County dating back to the 1900s. In 2008, the Lightning Complex Fire burned most of the area surrounding the Moak home and property – right up to their back door! The family has always maintained defensible space and irrigated areas, which safeguarded their property with minimal loss in 2008.



Following the 2008 fire, the adjacent property owner logged and chipped the burnt forest on his land. Then Peggy and Pete purchased the adjacent 40 acres with an eye to controlling future wildfire vulnerability. Over the next several years they fenced the land and added some goats. Pete worked diligently to clear the remaining woody debris and brush that had grown up, first on the area closest to their home, then out from there. He cut back the dead brush, piled and burned, and limbed up the oaks and dogwood flourishing on the land.

Goats were a new addition for the Moaks, and like any landowner they had to take into consideration a number of factors before venturing into animal ownership, or leasing out their land for grazing. Infrastructure costs for fencing, irrigation, sheds and/or barns can be pricey – it's a long term investment. Some grant funding may be available through entities such as the Natural Resources Conservation Service. Once you have the animals, someone must be around to watch over them daily, especially if goats are kidding or cows are calving. There are feed bills in the winter, vet bills, and caring for weak or sickly animals.



The Moaks constructed sheds to house the goats, and smaller fenced enclosures to contain the goats at night. The herd grew to 35 or so, and they would sell off the yearlings at auction annually. After a few years, they experienced increasing issues with predation, beginning with local dogs, then bears, coyotes and mountain lions. In the summer of 2018, they decided to sell the goats and use cattle to control vegetation, since they are larger and less prone to predation, yet still consume grass and brush to maintain defensible space. When the Moaks decided to switch to cattle, they took a different approach. Now, they lease out the land to a local rancher, who manages 13 head on the property during the winter and spring. The Moaks provide fencing, livestock drinking water and the lessee is responsible for cattle health and management.

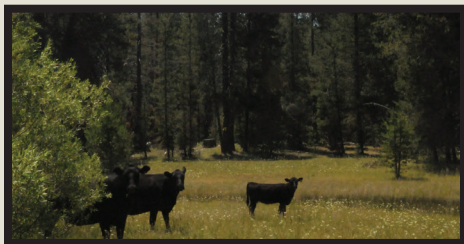
“On November 8, 2018, the Camp Fire hit Concow early in the morning,” recalls Peggy Moak. “The lack of dense forest or heavy brush fuel in the grazed area on our property lowered the fire intensity and flame height. We are confident our land management, which included livestock grazing and timber management, saved our home and outbuildings, along with my mother’s home and barns, a neighbor’s home, and my sister’s house across the road.”

In the aftermath of the fire, the pasture area greened up when the rain came two weeks later, and the dogwood, oaks and most conifers in the cleared areas survived. In the brushier areas with manzanita, which had not yet been cleared, the fire damage was more extensive. The Moaks are strong advocates when it comes to the merits of grazing to reduce fuels and mitigate fire danger in a way that is beneficial and self-sustaining when compared to other methods.

“Livestock grazing can be a very cost effective, long term means of reducing the fuel load, controlling brush, and maintaining defensible space on a larger scale,” states Peggy. “We are believers!”

Photos provided by Peggy Moak.

# Profiles in Ranching



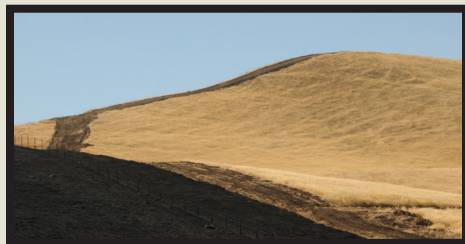
**Daley Ranch – Kyle Daley**

The Daley Ranch is a family ranch based in the foothills of Butte County that has been ranching for five generations. Each year November-May cattle graze the rolling grasslands, vernal pools, and oak woodlands that are the base of the Sierra Nevada Mountains. A portion of the Daley Family Ranch is a vernal pool mitigation bank, highlighting the ecological value of grazing that is used to promote endemic plant and wildlife species.

In the summer, most of the cattle move to higher elevations on private land and a U.S. Forest Service permit above Lake Oroville. In the forest, the cattle consume grasses and brush, including managing new vegetative growth within fire fuel breaks.

Many people associate goats as browsers, but the Daley cattle are born in the mountains and learn from birth to eat sweet birch (*Ceanothus integerrimus*), a brush that grows up to 13 feet tall.

Being exposed at birth and again as yearlings, to browsing by older females in the herd make the Daley cattle versatile. In addition, some of the Daley cattle will remain in the valley for the summer when the hills are a golden brown. The cattle will continue to eat the dry forage, which reduces fire fuel loads, but are provided a protein supplement to ensure nutritional health.



**Foster Family – Holly Foster**

The Fosters have experienced a serious fire on their ranch in Butte County once every decade since the 1980s. They take a proactive approach to creating defensible space around buildings, and by putting in fire breaks along all road frontage. Over the years, the family has improved dozer trails that facilitate cattle movement during the winter months and accessibility for fire equipment. They have worked with CAL FIRE on various fuel reduction projects over the years. Fosters also work with neighbors of smaller parcels who recognize the benefits of grazing to reduce fuel loads. They fence around their homesites and graze each year to reduce residual forage.

During both the Camp Fire in 2018 and the Humboldt Fire in 2008, you would find Bob Foster out on a bulldozer assisting CAL FIRE in putting in additional fire breaks. They've had numerous smaller incidents where a fire was either contained or put out with their equipment before fire personnel had time to respond.

The Foster Family also grazes for Butte Community College to reduce fire fuel loads, manage invasive weeds and promote native plants. They credit grazing, in combination with the fire breaks they put in, for mitigating the risk to the college during recent fires.



**Donati Ranch – Rocky Donati**

The Donati Family ranching operation spans multiple counties in the Northern Sacramento Valley, grazing on public wetlands, foothill oak woodland and the Sutter Buttes.

Donatis also works with neighbors to graze smaller parcels in the foothills of Butte County nearby or adjacent to larger parcels. When grazing these smaller sites, they maintain fences and work with the homeowner, who regularly checks the cattle, and provides a water supply off their home well. These small parcels can be a win-win situation; Donatis get grass for the cows and the landowner gets some rent to help towards paying taxes.

Donatis typically have a few cows at these sites for the winter and spring. They reduce vegetation around the house, and eliminate grass under oak trees by foraging and trampling, which eliminates ladder fuels that often catch trees on fire. Outside of Oroville they have had fires on oak woodland grasslands, and have seen how the grazing has prevented catastrophic losses to the oak trees.

Donati Ranch is taking a proactive approach to fuels management and are working with CAL FIRE to use prescribed fire in the spring to reduce brush cover that will improve livestock grazing forage and create fuel breaks to enhance fire protection for local communities.

# Red Flag Checklist

*Kate Wilkin, Ph.D., Assistant Professor of Fire Ecology, San Jose State University*



Early evacuations save the most lives, and preparation allows you to feel less overwhelmed in the moment. Preparation should happen before fire season starts! Wildfires start small and can become an emergency fast, especially in regions prone to wind-driven fires. This list is helpful for people who have prepared; those that have already done their Evacuation Plans, Family Communication Plans, Go-Bags, Defensible Space, and Home Hardening before fire season. The goal of this checklist is to get you prepared for quick and early evacuations on Red Flag Warning days. Since you may not have much time to evacuate, it is important to prepare in advance and use time wisely.

## Prepare to depart quickly:

- Review evacuation plan
- Review communication plan
- Charge phones, electronic devices, and weather alert radio
- Fill car gas tank or full charge if electric
- Park car in the driveway facing out for a quick exit
- Monitor radio, websites, and social media for fire news

## Gather evacuation supplies in one location:

- Medications, important documents, and pets
- Family “Go Bags”
- Pet “Go Bags”
- “Evacuation clothes” ready to be put on

## Remember six “Ps” for Immediate Evacuation

- People and pets
- Papers, phone numbers, and important documents
- Prescriptions, vitamins, and eyeglasses
- Pictures and irreplaceable memorabilia
- Personal computer hard drive and disks
- “Plastic” (credit cards, ATM cards) and cash

Source: CAL FIRE

**Alternatives to evacuations have been tested with mixed results; it is best to plan for an early evacuation.**

## Prepare your home BEFORE fire season and check on Red Flag Warning days:

- Take photos of every room, closet, and storage area to help with insurance and recovery process. Store in the cloud or with a relative out of the area
- Close fireplace screens and/or doors
- Remove flammable items from deck and from within 5 ft. of house and deck
- Connect garden hoses to outside taps and sprinklers
- Clear flammable vegetation away from water supply infrastructure
- Place ladder and hoses by house to assist firefighters
- If available, set up a portable gasoline-powered pump

## Evacuating:

If you feel unsafe, evacuate immediately. Prepare to take shelter if you cannot leave.

## Mandatory evacuation zones:

Evacuate immediately. Early evacuation is the safest, late evacuation causes the greatest loss of life.

## Voluntary evacuation zone:

Leaving during a voluntary evacuation order may make your evacuation safer and easier than waiting for a mandatory evacuation order. Take time to review evacuation plans, and prepare your house and vehicle for evacuation. Plan to leave early with family and animals.

## Near evacuation zones:

Review evacuation and communication plans, prepare your house, family, animals, and vehicle for evacuation.

## Before a wildfire:

If you live in an area that is difficult to evacuate, consider self-evacuating when wildfires are predicted to have rapid growth. Consider evacuating before wildfire ignitions during Red Flag Warnings and especially during high wind events like those that cause Public Safety Power Shutoffs.

# Wildfire Preparedness at Home

*Ryan Tompkins, M.F., Forestry and Natural Resources Advisor Plumas, Sierra and Lassen Counties, University of California Cooperative Extension*



In California, many rural properties fall within the wildland-urban intermix where low-density homes and ranch infrastructure exist within a matrix of pasture, agricultural lands, and wildlands. Many of the buildings and infrastructure in the ranch environment are older, constructed with wood, and are in close proximity to wildland fuels, namely grass, shrubs, and forest vegetation. Emergency response in the wildland setting is often delayed due to remoteness, accessibility, and the availability of firefighting resources. Reducing vegetative, woody, and man-made fuels is important for any rural resident or ranching operation.

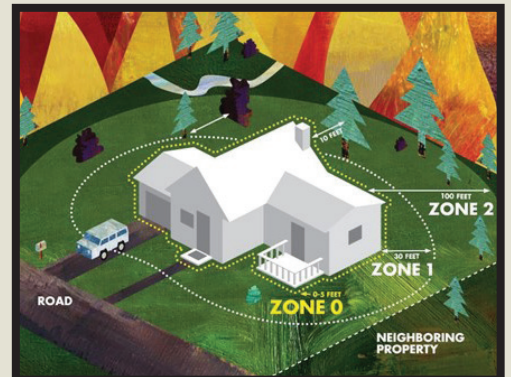
Zones	Width from home	General Theme & Practices
Immediate Zone	0 – 5 feet	<p><b>The “Non-combustible” area</b></p> <ul style="list-style-type: none"> <li>• Hardscaping is ideal for this zone; remove combustible vegetation.</li> <li>• Keep roof, gutters, and under deck free of leaf litter.</li> <li>• Trim dead branches overhanging roof or within 10 ft. of chimney.</li> <li>• Do not store firewood, furniture, or other combustibles against home.</li> <li>• Make sure fences or decks attached to the home are constructed with fire-resistant materials and/or designed to be resistant to ember ignition (e.g. fire resistant skirting around the underside of decks).</li> </ul>
Intermediate Zone	5 - 30 feet	<p><b>Prevent fire spread or intensity close to the home</b></p> <ul style="list-style-type: none"> <li>• Hardscaping or well-watered low-growing vegetation or lawn.</li> <li>• Minimize use of flammable mulch material.</li> <li>• Landscape shrubs spaced away from home and trees.</li> <li>• Trees well-spaced/pruned to eliminate branch contact with home.</li> <li>• Prune branches lower than 6 to 10 feet in height.</li> <li>• Do not store firewood, lumber, propane tanks, RV/cars, and sheds.</li> </ul>
Extended Zone	30 – 100 feet	<p><b>Modify fire behavior &amp; severity</b></p> <ul style="list-style-type: none"> <li>• Remove dead vegetation and reduce density of live vegetation.</li> <li>• Keep grass and forbs under four inches high using mowing or grazing.</li> <li>• Trees and shrubs should be well spaced (horizontal and vertical) with limbs pruned to a minimum of 6 to 10 feet in height. Do not prune branches more than 30 -50% of the total tree height.</li> <li>• This zone should be extended if your home is on a steep slope.</li> </ul>



*Barn with combustible wood siding has low susceptibility to surface fire with litter and vegetation removed.*

## Wildland Resident Fire Preparation:

1. Create and maintain defensible space around homes
2. Harden homes and outbuildings to be more resistant to fire ignition
3. Develop an evacuation plan for people, pets and livestock



*Source: CAL FIRE*

# Other Vegetation Management Tools

This booklet is focused on livestock grazing as a land management tool to reduce fire fuel loads. Below, we highlight other options that can assist you in reducing fire fuels. For more information on the vegetation management tools described here, please reference the community resources on page 18-19 for resources and technical assistance.



## Timber Harvest

Timber harvest events can range from small-scale efforts such as reducing trees around your home to large-scale efforts such as prescribed forest thinning on large landscapes. Timber harvesting can prevent the active spreading of fires from one tree crown to the next through the canopy.



## Pile and Burn

Woody debris from mechanical treatments or tree cutting can be piled and burned to reduce hazardous fuels. These piles can be small slash stacked by hand or large piles created by machines. Before burning, be certain slash is dry, there are favorable weather conditions, and you have safety measures in place. Be sure to obtain a burn permit and burn on an allowable burn day.



## Chipping

Chipping can be used to repurpose the vegetation that has been cleared around homes, across a property or along roadsides. Potentially hazardous fuels don't have to be removed from the property, but rather can be chipped and spread on-site away from homes and buildings.



## Mastication

A masticator is a large piece of equipment that grinds, shreds, or chops understory vegetation (brush) and small trees. Mastication breaks up fuel patterns by removing ladder fuels that can catch trees on fire and decreases combustibility by placing fuels on the ground. The chopped up vegetation will decompose on the land. This tool can slow the rate of fire spread during a wildfire, assisting suppression efforts.



## Prescribed Fire

The implementation of prescribed fire is an important tool to reduce fuels. The use of fire in predetermined conditions can provide a wide range of land management benefits, including decreasing fire fuel loads, improving livestock forage quality, reducing invasive species, and decreasing woody encroachment. The most effective prescribed fire treatments typically have an integrated approach, involving mechanical thinning followed by prescribed fire.



# Combining Tools for Success

The Hunters live in Yankee Hill, located in Butte County at the base of the Feather River Canyon where oak woodland grasslands transition to forested landscapes. The land has been in the family since 1948 and was inherited by Marie and her husband Scott in 2003. The decision to move to the 100-acre property was not easy; they knew it would come with lots of work and the threat of deadly fire – just three years earlier, Scott’s aunt had died in the Concow Fire in September 2000.

The couple spent weekends and holidays clearing overgrown vegetation on their property, including 10-foot high manzanita and poison oak. “When we started, we did not know the topography of the property, since it was so overgrown,” recalls Marie. In 2008, they added goats to their toolbox to manage the constant regrowth of vegetation following mechanical treatments. “My only livestock experience was raising rabbits as a youth, but I got a book and started studying goats, and I continue to watch and learn from them,” states Marie. At one point, she had over 90 goats. Today, the Hunters use a combination of cattle (seven cows with calves and a bull), goats (35 head), a bulldozer and a mower to reduce vegetation on their 100-acre property, minimizing the fuel loads. They have also invested in a water storage tank that can provide gravity flow water to livestock when power is lost on the property.

On November 8, 2018, Marie recalls seeing a plume of smoke rising early in the morning. That evening, the Camp Fire reached the Hunters’ property in Yankee Hill. It burned along two sides of the property through brush that had yet to be cleared. The fire meandered along on the ground floor where the Hunters had removed brush mechanically and grazed livestock. They had no loss of buildings, homes or trees despite 40-mph winds that drove the state’s most destructive fire. It was evident that their land management to reduce fire fuel loads worked!

Marie sold some of her hardy Spanish/Kiko/Boar goat offspring to others in the region looking to reduce fire danger by clearing brush on their own property. She enjoys sharing her lessons learned with new goat owners.

“Today we have a healthy piece of property, with defensible space, thanks to a combination of livestock and machinery, plus we have a reliable water supply,” states Marie. “We are prepared for fire and encourage others to be prepared, too!”



Before livestock and mowing



Goats at work



Following grazing and mechanical treatments

## Marie’s Favorite Tips to Reduce Fire Fuel Loads

- Know your environment and the needs of the livestock, be prepared to provide supplemental minerals and feed when seasonal growth is low.
- Cattle that prefer grass and goats that typically browse on brush, are a perfect combination.
- The yellowstar thistle is reduced with cattle who eat it early in the season and the goats who eat it after it has headed out.
- For multiple species on smaller property, you can get a weaner steer to graze and then butcher it if desired.
- Sometimes you have to help the livestock to do their job by mowing the old brush, which allows the goats to be able to keep it under control.

Photos provided by Marie Hunter.

# Community Resources



The Butte County Resource Conservation District (RCD) is a locally controlled, independent special district that is empowered to conserve natural resources by implementing projects on public and private lands and providing outreach about resource conservation. The Butte County RCD has a variety of grant-funded projects and programs to assist landowners with fire prevention and post fire restoration. They lead the Butte County Prescribed Burn Association, a landowner cooperative where neighbors burn to reduce fire fuel loads, improve wildlife habitat and reduce invasive plant species. The RCD assists property owners with restoration projects by providing technical assistance (design help, background science, and know-how) as well as grant funding to improve natural resources, including reducing fire fuel loads and post-fire projects.

www.bcrd.org - (530) 693-3173  
[bcrd@carcd.org](mailto:bcrd@carcd.org)



CAL FIRE in Butte County works with private landowners and community partners (e.g. Fire Safe Council) to conduct vegetation management. There is a variety of hand and mechanical treatments that CAL FIRE implements to reduce hazardous fuels to protect communities, homes and businesses. Current projects underway include prescribed fire, mastication, chipping, cut, stack and burn, dozers lines, dozers with brush rakes and others. These projects are funded in collaboration with landowners and through external grants to improve fire resiliency in the region. The CAL FIRE vegetation management program also meets with private landowners to discuss proactive fuel reduction projects including grazing, mechanical, and hand treatments on strategic properties to reduce the threat of catastrophic fires in the county. They also provide recommendations for commercial timber harvest used to promote forest health and to subsidize the treatment of merchantable materials.

Chief Gus Boston, Battalion Chief, VMP B2119  
 (530) 538-7111



The Natural Resources Conservation Service (NRCS) is under the United States Department of Agriculture and provides technical assistance and cost-share support to eligible landowners to reduce wildfire hazards. NRCS can assist with biomass management through grazing, mechanical, handwork, and prescribed fire. They will not provide funding for permanent exterior fencing, but can assist landowners with temporary fencing, cross-fencing, and livestock water development that can improve the effectiveness of prescribed grazing as a fire fuel load reduction practice. The Butte County Service Center works with farmers, ranchers, forestry landowners, and community groups to implement projects that improve natural resources, agricultural productivity, and reduce the threat of catastrophic fires.

Daniel Taverner, District Conservationist  
 (530) 693-3171, [daniel.taverner@usda.gov](mailto:daniel.taverner@usda.gov)



The Butte County Fire Safe Council provides wildland fire mitigation and recovery services to communities in Butte County. They work to create landscapes that are resistant to the devastating impacts of wildland fires. The Butte County Fire Safe Council is working with the town of Paradise on the use of grazing to control fire fuel loads. They also provide a no-cost chipping service for reducing fire hazards by chipping fallen branches, overgrown brush, and other vegetation across the county. The Fire Safe Council secures grants to conduct other projects across the county to reduce the risk of catastrophic fire through education and on-the-ground projects at residences, small parcels, and large landscapes.

Calli-Jane DeAnda, Executive Director  
[www.buttefiresafe.net](http://www.buttefiresafe.net) 530-877-0984

# UNIVERSITY OF CALIFORNIA

## Agriculture and Natural Resources

The University of California (UC) Cooperative Extension is the local UC connection, delivering the power of research in agriculture, natural resources, nutrition and youth development to improve lives and livelihoods in local communities. They conduct locally relevant research and extension programs to address community challenges focused on sustaining fire resiliency, agricultural vitality, enhancing natural resources, youth and leadership development along with helping communities shape sound public policy. The UC Cooperative Extension provides technical assistance through outreach materials, trainings, and site visits to help you implement fuel reduction, forest health practices, and home hardening. The UC Cooperative Extension has advisors across the state who have expertise in livestock, forestry, natural resources, invasive weeds, and more.

**Tracy Schohr**, Livestock and Natural Resources Advisor, Butte, Plumas and Sierra Counties.

(916) 716-2643, [tk schohr@ucanr.edu](mailto:tk schohr@ucanr.edu)

<https://ucanr.edu/sites/Rangelands>

**Ryan Tompkins**, Forestry and Natural Resources Advisor, Plumas, Sierra and Lassen Counties

(530) 283-6125, [retompkins@ucanr.edu](mailto:retompkins@ucanr.edu)

<http://ucce-plumas-sierra.ucanr.edu>

**Dan Macon**, Livestock and Natural Resources Advisor, Placer, Nevada, Sutter and Yuba Counties

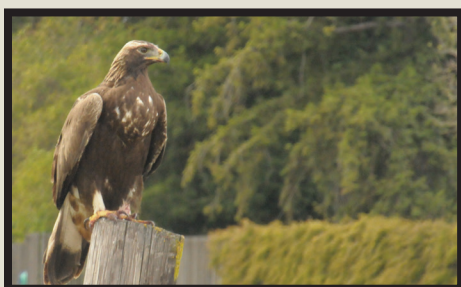
(530) 889-7385, [dmacon@ucanr.edu](mailto:dmacon@ucanr.edu)

<http://ucanr.edu/sites/Livestock>



## Appreciation

Funding for this project was made possible by a Renewable Resources Extension Act Grant 2019-2020. A special thank you to the guest contributors, grazing managers who shared their stories, and to the reviewers who gave their time to make this project complete. Reviewers include Wolfy Rougle, Holly George, Sam Brown, Katie Roberti, Lizzeth Mendoza, Susan Schohr, Grace Woodmansee, Pamela Kan-Rice and Marisa Stoller.





The University of California, Division of Agriculture and Natural Resources (UC ANR) prohibits discrimination against or harassment of any person employed by or seeking employment with UC ANR on the basis of race, color, national origin, religion, sex, gender, gender expression, gender identity, pregnancy (which includes pregnancy, childbirth, and medical conditions related to pregnancy or childbirth), physical or mental disability, medical condition (cancer-related or genetic characteristics), genetic information (including family medical history), ancestry, marital status, age, sexual orientation, citizenship, status as a protected veteran or service in the uniformed services (as defined by the Uniformed Services Employment and Reemployment Rights Act of 1994 [USERRA]), as well as state military and naval service.

UC ANR policy prohibits retaliation against any employee or person seeking employment for bringing a complaint of discrimination or harassment. UC ANR policy also prohibits retaliation against a person who assists someone with a complaint of discrimination or harassment, or participates in any manner in an investigation or resolution of a complaint of discrimination or harassment. Retaliation includes threats, intimidation, reprisals, and/or adverse actions related to employment.

UC ANR is an Equal Opportunity/Affirmative Action Employer. All qualified applicants will receive consideration for employment without regard to race, color, religion, sex, national origin, disability, age or protected veteran status.

UC ANR policy is intended to be consistent with the provisions of applicable State and Federal laws. Inquiries regarding UC ANR's equal employment opportunity policies may be directed to: Tina Jordan, Affirmative Action Compliance Officer and Title IX Officer, University of California, Agriculture and Natural Resources, 2801 Second Street, Davis, CA 95618. Email: [tljordan@ucanr.edu](mailto:tljordan@ucanr.edu). Website: [https://ucanr.edu/sites/anrstaff/Diversity/Affirmative Action](https://ucanr.edu/sites/anrstaff/Diversity/Affirmative%20Action)