



THE NEW FOOTHILL RANCHER

...Practical Information for Foothill Livestock Producers

Dan Macon, Livestock and Natural Resources Advisor

Placer—Nevada—Sutter—Yuba Counties



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It's That Time of Year Again – Are You Ready for Wildfire?

Now that July has arrived here in the Sierra Foothills, I'm back in the habit of looking up every time I hear a fire plane going over. How high is it as it goes over Auburn? Which direction is it heading? Can I see smoke on the horizon? Fire season is here!

With the arrival of fire season, I start carrying a fire tool and a back-pack pump in my truck. I've also set up a hose and pump system, which I can attach to the 210-gallon pickup tank I use to haul water to the sheep. I pay more attention to where I drive and where I park my truck when I check the sheep. And I look for safe zones where I could herd the sheep in the event of a fire.

Last month, we held both an initial training and a refresher course for our livestock access pass program (which covers Nevada, Placer, and Yuba Counties). Our program is the only multi-county program in California, which reflects the realities of ranching in the Sierra Foothills – many operations have leases in all three counties.

If you missed the initial sign-up and training for the livestock pass program, please contact me as soon as possible at dmacon@ucanr.edu or (530) 889-7385.

If you're interested in developing your own wildfire preparation plan for your operation, check out [Wildfire Preparation Strategies for Commercial Ranches](#).



Livestock Guardian Dog Updates

Livestock Guardian Dogs and Wildlife

By Dr. Carolyn Whitesell, Human-Wildlife Interactions Advisor, UCCE San Mateo-San Francisco and Dan Macon, Livestock and Natural Resources Advisor, UCCE Placer-Nevada-Sutter-Yuba



Two photos taken by the same game camera in the Tahoe National Forest study site during the grazing season.

Given the growing restrictions on lethal control of predators, ranchers are increasingly turning to nonlethal livestock protection tools, including livestock guardian dogs (LGDs), to protect livestock from predators. Despite this increased use, very little is known about direct and indirect interactions between LGDs and wildlife. Thanks to a small grant from the UC Sustainable Agriculture Research and Education Program (SAREP), we've recently expanded our work evaluating LGD behavior and interactions with carnivores and other wildlife species.

We conducted research in two study sites—1) grazing allotments in the Tahoe National Forest (TNF), where sheep were accompanied by a herder and grazed on open rangeland without fences, and 2) annual rangeland west of Auburn ("Auburn"), where sheep were rotationally grazed within portable electric net fence. Within each study site, we classified areas as grazed or non-grazed, and placed game cameras within each area. Cameras collected data on wildlife before, during, and after the sheep and LGDs were in the grazing area. In addition, we fit GPS collars onto sheep and LGDs to track their movements.

We recorded coyote, bear, and bobcat in the TNF grazing area and mountain lion, coyote, and bobcat in the Auburn grazing area. Despite the presence of these species, no sheep were lost to predators in either operation. In addition, we did not record any negative interactions between LGDs and recreationists or neighborhood residents. LGDs remained close to the sheep (within 0.25 miles) for at least 77% of the time. Across study sites, we found LGDs had a median distance to sheep of less than 100 yards.

We did not record any injured wildlife in the TNF site, despite recording fine scale overlap between LGDs, coyotes, and bears. In the Auburn site, however, we recorded one raccoon killed by an LGD and one lamb either stillborn or killed by an LGD. Those results demonstrate the potential negative aspects of using LGDs; however, as the same individual LGD was found with both the lamb and raccoon, this may be more reflective of variation in individual LGD behavior than LGDs in general. That individual LGD was three years old but this was the first time he was in with a lambing ewe—during the rest of the 2022 lambing season he was kept elsewhere. He may become more reliable with lambs as he matures, or he may never be trustworthy during lambing and should only be paired with adult sheep.

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We are currently analyzing the camera results and preparing for another year of data collection. We hope this work will help us better understand any potential differences in LGD impacts on wildlife between grazing systems. This information will have important implications for ranchers and land managers who are considering the use of LGDs. In addition, this research will further assist in understanding the tradeoffs associated with reducing the need for lethal control of predators.

Preliminary Results from the Last Field Season

As described above, we deployed game cameras in grazed and non-grazed areas of each of the two study sites (Table 1, Figs. 1 and 2). For the TNF study site, where there were no fences, we placed “grazing area” cameras where we assumed sheep would feed and nearly all cameras captured sheep. For the Auburn study site, where sheep were rotationally grazed within portable electric net fence, we placed “grazing area” cameras either within pastures or directly adjacent (within 100 yards) to grazing pastures.

For the TNF study site, the number of cameras deployed in non-grazed areas was limited by feasibility in access and geographic scope of grazing areas used by sheep bands not part of the study. For the Auburn study site, we deployed the maximum number of cameras that would fit in the 2022 grazing area given our study design of one camera per 1 km x 1 km grid cell.

Number of cameras deployed in:		
Study Area	Grazed Area	Ungrazed Area
Tahoe National Forest	16	12
Auburn	5	5

Table 1. The total number of game camera deployed in grazed and ungrazed areas of each of the two study areas.

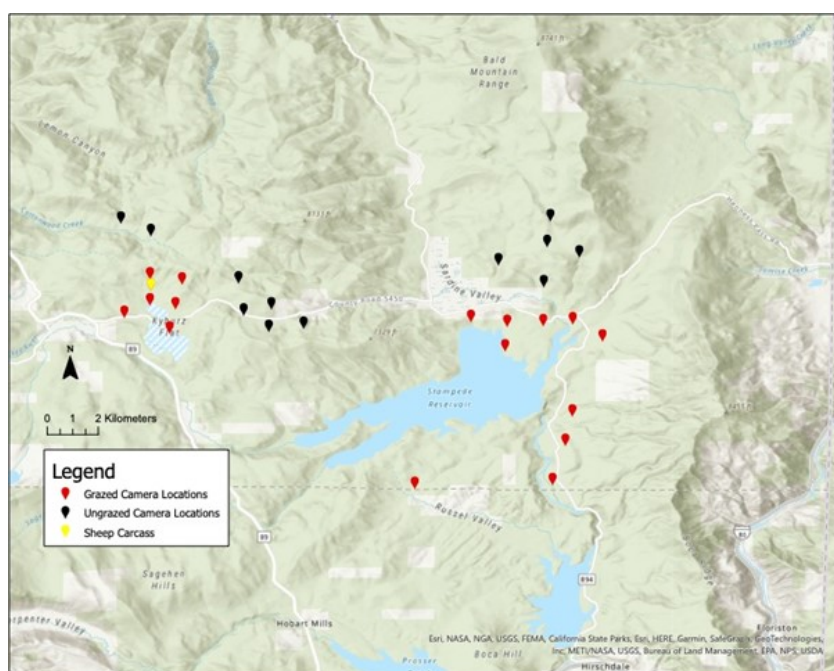


Fig. 1. Locations of cameras deployed in grazed (red) and non-grazed (black) areas of the TNF study area. The location of the camera facing the sheep carcass is in yellow.

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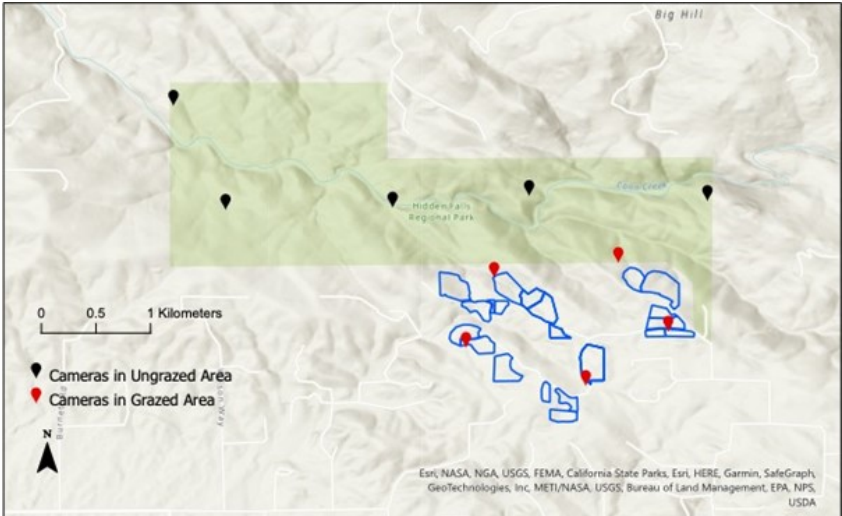


Fig. 2. Locations of cameras deployed in grazed (red) and non-grazed (black) areas in relation to sheep pastures (in blue) in the Auburn study area.

Tables 2, 3, and 4 provide a preliminary summary of the camera results (a more detailed statistical analysis is in progress). We will be using occupancy modeling to examine the following:

- 1. Is there a significant difference in capture rate per species in grazed versus non-grazed areas for each study site?
- 2. Is there a significant difference in capture rate per species before, during, and after LGD presence within each study site’s grazing area?

GRAZED AREA	Coyote	Deer	Gray fox	Bobcat	Skunk	Mountain Lion
Before (200 trap days)	15	43	16	4	0	0
During (645 trap days)	31	139	47	6	37	1

Table 2. The total number of camera captures per species per period within the grazed area of the Auburn study site. Note that the number of trap days varies per grazing period.

	Frequency of camera captures per trap day			
	Coyote	Deer	Gray fox	Bobcat
Before LGD presence	0.08	0.22	0.08	0.02
During LGD presence	0.05	0.22	0.07	0.01

Table 3. The frequency of camera captures per trap day per species within the grazed area of the Auburn study site.

	Bear	Deer	Bobcat	Coyote
Before	2	77	2	39
During	2	47	5	32
After	4	38	0	28

Table 4. The total number of camera captures per species per period (“Before”, “During”, “After” LGD presence) within the grazed area of the TNF study site.

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In the TNF study site, one adult sheep was lost to an unspecified illness, providing a unique opportunity to study the behavior of scavengers and the impacts of a carcass near sheep bedding grounds. We placed a game camera on the carcass for 8.5 days and will be discussing the results in detail in our next article.

For the TNF study site, we deployed GPS collars onto three sheep and four LGDs as they were turned out onto the pasture. Unfortunately, we encountered unanticipated challenges with the GPS collars. One GPS collar fell off of an LGD and was lost. In addition, the batteries on all collars did not last as long as expected and we were unable to re-catch any sheep during the grazing season to deploy new collars or replace the battery. The GPS collars did collect 7.5 days- worth of data for sheep and that was used for analysis. We were able to replace the collars on the LGDs fairly regularly, and we have LGD movement data for nearly the entire grazing season.

After we discovered that those GPS collars weren't going to be sufficient for our purposes, we regrouped and switched to a different brand ((Digital Matters Oyster collars). When the new collars arrived, we deployed them on LGDs and sheep in the Auburn study site as a test. The battery life and functionality of the new collars was a vast improvement and we will be deploying these new collars going forward. We will be fitting them on sheep and LGDs in the TNF study site in July 2022 for the continuation of this project.

From the collar data we were able to collect in the TNF study site, a preliminary analysis using hourly fix rates showed few instances when dogs were further than 500m from sheep during the day.



The mean and median distance between sheep and LGD was 318 m and 79 m, respectively, for one LGD and 176 and 70 m, respectively, for the second LGD used in the analysis. One LGD remained within 400m of the sheep 77% of the time and ranged more than 400 m from the sheep primarily at night. The other LGD remained within 400m of the sheep 89% of the time and mainly ranged far from the sheep during the day. Thus overall, the potential for negative interactions between LGDs and recreationists out of sight of the herder was low.

For the Auburn study area, we conducted an analysis of distance between sheep and one of the LGDs ("Elko") using fixes at 15 min intervals. The analysis showed the LGD remained within 400 m of the sheep 94% of the time, within 300 m 82% of the time, and within 200 m 52% of the time. Mean and median distance between Elko and sheep was 64 and 59 m, respectively.

Interestingly, despite one study area having fences and the other being open rangeland, the LGDs used in the preliminary analysis had similar median distances to sheep (ranging from 59 to 79 m).

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The Auburn study flock is comprised of Dan's sheep, and it encompasses a system of rotational grazing in small pastures enclosed by electric net fencing. This fencing presumably keeps LGDs within the pasture while physically excluding wildlife (although Dan has observed previous LGDs jumping out of these paddocks). When planning and conducting this study, we designated the Auburn study site "grazing area", "During" time period as the entire time when sheep and LGDs were present in the area. When deploying the cameras, some were placed in areas that were eventually fenced off within a pasture whereas others were placed no more than 100 meters from a fenced pasture but weren't themselves ever within the fence. Camera 53 was encompassed within a grazing pasture for approximately five days. The results of this camera generated interesting questions regarding potential impacts of LGDs on wildlife at an extremely fine spatial scale within a temporarily fenced pasture. When zooming in and reframing the time periods "Before" and "During" solely in relation to when the camera was within the fence, we noted the following:

Prior to the camera being fenced off, it captured regular gray fox visits but zero skunk visits. When the camera was fenced within the grazing pasture and for four days afterwards, no photos of wildlife were captured. Then the first skunk was recorded, and over the next month skunk visited the camera 12 times. The first gray fox returned to the camera within eight days of the sheep being moved and the camera proceeded to capture gray fox at a nearly identical frequency as before the sheep arrived. Prior to the camera being fenced, it recorded 15 deer over 40 days (median interval before deer visits was 1.5 days). After the sheep left, no deer were recorded for 58 days. While skunk appeared to be attracted to the pasture after sheep and LGD presence, there did not appear to be any shift in gray fox movements other than when the camera was fenced off, and deer appeared to have avoided the area after the sheep and LGDs. Next year, we'll explore whether the patterns captured by this camera represent any true impact of sheep and LGD on wildlife movements or not. Targeted rotational grazing with sheep (paired with LGDs) is a fire abatement strategy and as this tool continues to be used, it is important to understand its potential impact on fine scale wildlife movements within the pasture itself, not only in the general grazed area. This fall, we'll place more cameras directly within each fenced grazing pasture to assist in better examining these potential patterns..

A New Look at the Economics of Using Livestock Guardian Dogs



In March, between dog food and vaccines, we spent just over \$103 on our three livestock guardian dogs (LGDs). For the first part of April, our two older dogs (Bodie and Elko) were with our ewe-lamb pairs on annual rangeland west of Auburn. Our younger dog (Dillon) was protecting our rams. After we sheared the sheep over the third weekend of April, Dillon and Bodie went with the pairs to irrigated pasture; Elko stayed with a handful of late lambing ewes at our home place. During that time frame, we lost a lamb to disease, another to a fencing mishap, and a third due to an assumed case of thievery (by Dillon - see ["The Right Dog for the Job"](#)). We didn't, however, lose any sheep to predators - in fact, we haven't lost any sheep where they were protected by dogs for at least half a decade. But how do we know whether our dogs are a cost-effective livestock protection tool?

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Along with my colleague [Carolyn Whitesell](#) (UCCE Human-Wildlife Interactions Advisor in the Bay Area), I published a new peer-reviewed analysis of the economics of LGDs in the Western Economics Forum ([you can download the full paper here](#)). If you're not into reading journal articles (and who is, really!?), here are our key findings:

Benefits of Using LGDs

- o LGDs likely reduce the indirect, stress-induced losses associated with depredation (including reduced weight gains, lower conception rates, and increased labor).
- o Ranch-raised ewes may have greater value than purchased ewes given their local adaptation to management and forage conditions. In other words, a ranch-raised ewe is worth more than a purchased replacement ewe.
- o Sheep guarded by LGDs travel greater distances to forage in rangeland conditions, increasing grazing efficiency.

Cost Factors

- o Labor costs and dog:livestock ratios vary greatly in real-world settings. Maximizing labor efficiency, and determining the proper number of dogs by operation and season can reduce costs.
- o Successful bonding techniques are a key driver in LGD acquisition and development costs (and subsequent depreciation expenses).



Over the last several years, we've used trail cameras to get a better idea of the types of predators near our sheep, especially during lambing season. As you might expect, we've "trapped" lots of coyotes in our cameras, along with bobcats and gray foxes. We've also picked up mountain lions in our cameras - within a quarter mile of where our ewes are lambing. While I can't say with certainty how many lambs or ewes the dogs have "saved," I can say that I sleep easier at night knowing the dogs are on the job. Peace of mind and a good night's sleep are difficult to value economically - as Carolyn and I write, "While most commercial producers factor an acceptable level of predator loss into their economic decision-making process, the value of peace of mind (or the lack of human stress) is difficult to quantify."



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More about Sam the Cattle LGD



Just about a year ago, we started the process of bonding Sam, an LGD pup, with cattle. Sam's first home was at Likely Land and Cattle Company in Modoc County. Miles Flournoy worked with us to introduce Sam to some bottle calves during the summer and fall months of 2021. During Sam's time in Likely, he learned to stay with his calves – and we learned that we'd need to introduce naïve cattle gradually. Just before the end of the year, as the Flournoys were preparing to start calving out their heifers, it snowed heavily in Likely – and we jointly decided that electro-net fencing, snow, and calving heifers would be a challenging combination. Sam came back to Placer County.

Since January 2022, Sam has been with cattle at the Baser Ranch in Sheridan. The Baser family has been rotating heifer calves, and ultimately pairs, through Sam's paddock. Sam has taken to the heifers (and vice versa), but it's taken a bit longer for the protective mother cows to accept this big white dog in their pasture. Finally, this summer, the Basers report that the cows are becoming more comfortable with Sam. Just as important, they've reported seeing far fewer coyotes since Sam's arrival – even though Sam only had access to about 2 acres of

the 300-acre ranch; seems his presence has made a difference!

LGDs typically don't reach full maturity (especially behaviorally) until they are 18-24 months of age. Sam is now 14 months old – nearly full-grown physically, but still growing mentally. The Basers are trying him out in new environments (on irrigated pasture, with different groups of cattle). They – and we – are pleased with his progress!

Blue Oak Mortality Update

I've been receiving reports from local ranchers and other concerned landowners about blue oaks dying throughout Placer, Nevada, and Yuba Counties. As I've reported previously, we worked with Dr. Matteo Garbelotto, the forest pathology specialist at UC Berkeley, to collect wood samples to try to determine the cause of this die-off (here's a link to our article in [California Agriculture](#)). In short, Dr. Garbelotto and his lab determined that a family of fungi isolated in the samples we collected is capable of causing disease, and that this disease is worsened by drought conditions. In other words, drought and fungi combined cause more disease than either drought or fungi alone.

"Bottom line," says Dr. Garbelotto, "we need to make oaks as happy as possible, which is difficult because of climate change." Previous work at Berkeley suggests that oak genetics likely play a role – "some families or individuals may be more or less susceptible than others," he explains, adding, "On the other hand, for restoration purposes, collecting acorns from survivors in an area with significant dieback may be a way to restore woodlands with oaks."

I'm planning a workshop on acorn collection and oak planting this fall; in the meantime, there's a great UC publication on [Regenerating Rangeland Oaks in California](#), by Douglas McCreary.

Beale Air Force Base Pasture Leases Out to Bid

Winter pasture available for lease in Northern California. Six leases will be available for up to 5 years (a basic year and 4 one year option periods) at Beale Air Force Base, Yuba County: Lease A = 3,185 acres; Lease B = 3,065 acres; Lease C = 3,228 acres, Lease D = 801 acres; Lease F = 2,348 acres. A sixth lease, identified as Lease H = 819 acres, may be available this or the following year. All acreages given are approximate. To graze mature bulls, pregnant cows, or cows with suckling calf less than six months in age. Grazing season is November 1- May 31 with the possibility of an early start or extension, conditions permitting. Solicitation for the leases with a site visit date will be posted at [SAM.gov](https://sam.gov) in Aug 2022. For further information, contact Tamara Gallentine, 9 CES/CEIE, 6425 B St., Beale AFB, CA 95903; email: tamara.gallentine.2@us.af.mil or call 530-634-2738



Foothill Agricultural Water Use Survey

We are launching a survey of commercial agricultural operations in Placer and Nevada Counties to better understand how agricultural irrigation water is used, the types of crops it supports, and the economic and ecological impact of irrigated agriculture in the foothills. This survey will help provide an objective evaluation of agricultural water use in our counties.

This survey is being sent to raw water customers of the Nevada Irrigation District, the Placer County Water Agency, South Sutter Water District, and other producers in the two-county region. ***All responses will remain confidential and anonymous.*** Please complete the survey ***only if you are a commercial farming or ranching operation.*** Answer each question as accurately and completely as possible. The results of this survey will help inform future educational programs, local decision-making, and policy development.

If you're not a customer of any of our local water districts, or you you'd like to get a jump on participating, the survey can be completed online by going to the following link: http://ucanr.edu/foothill_ag_water_survey or by scanning this QR Code to go directly to the survey. If you would prefer a paper survey, please contact me at dmacon@ucanr.edu or (530) 889-7385.

Please note: if you lease your property to another individual or business, please work with your tenant to complete this survey. If you lease land, please coordinate with your landlord.



Workshop Schedule

Jul 31	Farmer-Rancher Picnic in the Park (Botts Memorial Park, Foresthill, CA) – Registration at https://surveys.ucanr.edu/survey.cfm?surveynumber=37693
Aug 19	Targeted Grazing Symposium (at California Wool Growers Annual Convention (Minden, NV) – join experienced targeted grazers, researchers, and others, for a half-day workshop on advanced animal care, risk management, fire behavior and grazing, and grazing low/variable quality forages. Register at http://californiawoolgrowers.org/calendar/annual-meeting/
Sep 30 – Oct 1	Beginning Farming Academy (in Auburn) – This 2-day intensive workshop is designed to help beginning farmers and ranchers understand the economics of farming and develop marketing, operations, and risk management plans. Stay tuned for registration details!
Oct 2022	Planting Oaks on Rangeland Workshop (in Penn Valley) – Stay tuned for details!

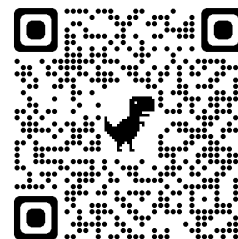
Can't Make the Webinar? Check out these Virtual Learning Opportunities!

Can't make it to a webinar or a field day? Wish you could remember what that speaker said during the workshop? Want to take a deeper dive into livestock guardian dogs? Or maybe you just want to see why Dan Macon and Ryan Mahoney decided they had faces made for podcasting!

Check out the [Ranching in the Sierra Foothills YouTube Channel](#),



Subscribe to our [Sheep Stuff Ewe Should Know](#) podcast
(also available on Apple Podcasts and Google Podcasts!)



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Thank you!

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