

2009

## Prevent or Reduce Fire with Goats: No Kidding!

Rachel Clark

*US Forest Service, rclark@nasw.org*

Follow this and additional works at: <http://digitalcommons.unl.edu/jfspbriefs>

 Part of the [Forest Biology Commons](#), [Forest Management Commons](#), [Other Forestry and Forest Sciences Commons](#), and the [Wood Science and Pulp, Paper Technology Commons](#)

---

Clark, Rachel, "Prevent or Reduce Fire with Goats: No Kidding!" (2009). *JFSP Briefs*. 147.  
<http://digitalcommons.unl.edu/jfspbriefs/147>

This Article is brought to you for free and open access by the U.S. Joint Fire Science Program at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in JFSP Briefs by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.



Goats at work in sagebrush. Credit: All photos courtesy of Kathy Voth, unless otherwise noted.

## Prevent or Reduce Fire with Goats: No Kidding!

### *Summary*

In the Wildland Urban Interface (WUI) methods for reducing fire hazards such as prescribed burns and mechanical thinning, may be less than ideal in terms of effectiveness, let alone in acceptance by community residents.

Kathy Voth may be a harbinger of change. Her work with goat herds to reduce and prevent wildfire provides another option for fuel managers. Goats vigorously eat fire prone vegetation like oakbrush, while trampling parts of the area to bare dirt—such areas treated by goats can stop a fire cold. Voth's results show the promise of using domesticated animals as part of our fire prevention workforce. In certain situations, goats may be able to save money, while creating new and effective ways of managing fire-prone landscapes.

## Key Findings

- Goats will eat and thrive on oak brush/mountain brush.
- Goats make significant changes in the fuel load.
- An actual fire (and fire behavior modeling) demonstrated that treatment areas will slow and stop a fire.

## Introduction

Fire prevention in the WUI can be a delicate and sometimes complicated process. Residents may have concerns about prescribed fire, and its perceived or real risks, as well as the potential for reductions in air quality. Using fire in the WUI can be a challenge due to those risks. Furthermore, other solutions, may also be less than desirable for residents. Applying herbicides, for instance, may raise the concerns of the community, while mechanical thinning may be expensive and difficult, especially in hard to reach places.

Kathy Voth has offered her own novel approach to the world of wildland fire management. She is working to help managers and planners consider using goats to reduce the risk of—and even prevent—wildfire. Voth is now the founder and owner of Livestock for Landscapes, LLC. (<http://www.livestockforlandscapes.com>) whose mission is to offer, “Information and Training for Turning Livestock into Land Management Tools.”

Goats can quietly eat shrubs in hard-to-reach places very close to human residences. They keep the air clean and residents feeling safe. Goats naturally and cheaply do with gusto, what humans have set up enormous and costly infrastructures to deal with—namely manage fire-suppressed wildlands to prevent damage to homes, wildlife and wildlands, and people. Still, managing a goat herd may not pique everyone’s interest or abilities. However, since goats eat fuel, they may be a viable option for managers and planners looking for a cost-effective fuel management technique in the WUI.



A home in the WUI surrounded by oakbrush.

The Joint Fire Science Program (JFSP) saw the value of Voth’s inspiration and funded her pilot work to see the potential contribution her research could make to managers and planners looking for new, more effective, and less-expensive fire management techniques. The results of her work confirm the promise of goats.

## Getting to goats for fire prevention

When asked how she hit upon using goats in fire management, Voth first hastens back to 1994 when she worked for the Bureau of Land Management. At that time, she was the Public Information Officer charged with handling the Storm King Fire in which 14 firefighters perished. “It changed who I am,” she says. “I worked with all the families and their communities to build a memorial trail with biographies for each of the dead. I walked around with tears in my eyes for a year.”

She continues, “I learned something important about myself in that experience: I knew I wanted to find other ways to help prevent fires.”

Then, in 1996, Voth moved to work at Utah State University. There she met Joel Godfrey who worked at Utah National Guard’s Camp Williams Training Facility.

“This place was a wildfire waiting to happen,” says Voth. “There are suburbs around it, thick vegetation, and accidental fires from artillery practice.” She and Godfrey recognized this fire risk, and began talking about ways to reduce that risk.

Meanwhile, they also got to talking about goats (Voth had a pet goat, and both were interested in using goats as pack animals). It was in that conversation—set amid the fire-prone Camp Williams Base—that the two hatched the plan to wed goats to the landscape with the intent of curbing fire danger.

*“I learned something important about myself in that experience: I knew I wanted to find other ways to help prevent fires.”*



Goats work the Prescott National Forest. Credit: Mike Creach.

Their idea was supported by previous research on goats in fire management, some of which recalls Voth, “showed that if you graze goats on oakbrush three times in a season, the phenotype of the brush actually changes.” It goes from very dense, very fire prone material, to little

*“I really wanted to find a way to put all this information into one place, so if anyone wanted to use goats for fire management, their job would be straightforward”*

stands of separate brush or “park-like” stands. Essentially the goat grazing changes the brush from dense shrubs to a mosaic of patches that are, she says, “better for people and wildlife.”

To begin with, Voth’s work began as a pilot project supported by bits of funding left over from other projects at Camp Williams and a little out-of-pocket moneys to support their original herd of 11 goats. But early in her efforts she found that there

were very few sources of information on keeping goats and moving them according to shrub characteristics, let alone, using them to manage the landscape.

“I really wanted to find a way to put all this information into one place, so if anyone wanted to use goats for fire management, their job would be straightforward,” she says.

After two years of piecemeal funding, Voth had an armload of knowledge about how to start, maintain, and shepherd a small herd of goats with the specific goal of reducing fire risk.

“We knew how to set up a fence, move the goats easily, set up watering systems, breed the does, and manage the kids,” says Voth. But finally, to go any further, Voth needed funding. In 1999–2000 she received a grant from the JFSP that allowed her to get the help she needed. From then on, the data gathering aspect of her project achieved a new level.

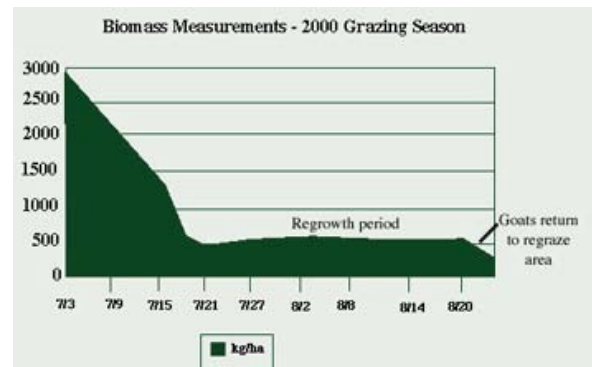
## Experiment, goats, and fire unite

Voth and her colleagues quickly put all they had learned to work, and the goats soon found themselves part of a fire reduction experiment. With a design planned to see whether goats can actually reduce vegetation biomass and subsequent regrowth, the goats began treating different replicated enclosures on the Camp Williams base.

The crew set up six research pastures on the Camp Williams Base. Each was 200 feet by 200 feet with a fence line down the middle to create two 100 x 200 foot paddocks. Pastures consisted of about two-thirds gambel oak, in three different growth phases: juvenile, adolescent, and mature. They classified the vegetation according to height.

The researchers divided the main goat herd into three smaller herds, which totaled about 2,000 pounds body weight. This made it easier to ensure that the pastures were grazed about equally, knowing that heavier animals eat more than lighter-weight animals. The goats grazed the research pastures from late June through August. Goats had time to browse vegetation down to 95 percent of pre-graze

levels. Then the goats were moved to the next experimental pasture.



Graph depicts the drop in vegetation biomass after goats are introduced to the research pasture.



Photos showing two treatment enclosures before (top) and after (bottom) goat treatment.

Early in the process, the team had results they were excited about. The vegetation reduction experiment, for instance, showed quickly that goats are very successful at reducing biomass. For the 2,000 pounds of goats (about 17 animals) to graze down one paddock to 95 percent of original biomass levels, it took only about 10 to 14 days. That pasture was allowed to regrow for four to five weeks, then goats came in again, and took just a few days to bring the vegetation back down to those levels.

The team also saw dramatic visual changes in the appearance of the vegetation. Plus, they measured more than a 1,000 percent increase of bare ground in the plots. Bare dirt, Voth says, is probably a great “mechanism for slowing or stopping a fire.” But bare dirt rarely stays bare for long. Each year after the goats left and fall precipitation arrived, grasses and forbs resprouted, doing a great job of preventing erosion on the sites and providing important forage in fall and spring for wildlife.



Close up of oak stripped brush in treated area.

“Then on July 16, 2001 it was like Christmas,” says Voth, referring to the start of an accidental fire on the base. “An artillery training exercise ignited a fire, which spread quickly to where the goats had been working. All of a sudden we had the perfect opportunity to see whether the treatments worked.”

“It was exactly the kind of fire Joel (Godfrey) and I had anticipated on the Base,” she says. “It was an accident, and it spread fast because of the fuel, heat, and wind. Sean Hammond and Nathan Baird who were working the project when the fires started, cut the fences and ran the goats to safety zones, one at an ammunition storage point and another cleared area where firefighters protected them by spraying down nearby vegetation.”

“The fire took four days to burn out and burned vegetation on 12,000 acres.” says Voth, “We had been given this incredible chance to see the huge effect of the goats, even in the comparatively tiny enclosures they had grazed.”

For starters, National Guard staff saw 15-foot flames drop to only 3 feet at the goat-treated sites. The sites stopped the fire completely; they simply didn’t burn. Even areas that had been grazed by the goats a year earlier, did not burn. What’s more, the areas behind the treated plots did not fully burn; they only scorched—further affirming the preventive power of the treatments.

*Why are goats so effective? “They are like machines when it comes to eating down the brush, plus they trample the site and leave plenty of bare dirt. Yet in the fall when we get a little precipitation we see a return of grasses and forbs useful in preventing erosion on the site,” says Voth.*

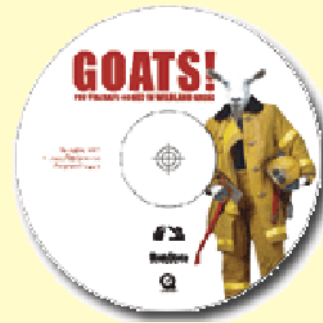
Why are goats so effective? “They are like machines when it comes to eating down the brush, plus they trample the site and leave plenty of bare dirt. Yet in the fall when we get a little precipitation we see a return of grasses and forbs useful in preventing erosion on the site,” says Voth.

Still it was a big fire and these were comparatively tiny treatments. Voth writes in her CD, “Our small treatments did not stop the fire...indicating that the success of this tool, like any other fire management tool depends on its placement and size.”

## Use goats, get results

So why aren’t more people using goats?

For starters, most managers and planners are likely unfamiliar with goats as a viable option, let alone with the actual logistics of maintaining and using a herd for fire management. And until recently, little information was available to suggest how much fuel to remove with the goats, whether it even works, or models to use to support the work. Besides, says Voth in her CD Handbook, “...finding



### GOATS! For Firesafe Homes in Wildland Areas

Kathy Voth’s CD Handbook is titled, *GOATS! For Firesafe Homes in Wildland Areas*. It contains an online handbook with everything one needs to get started, including an easy-to-use handbook. She writes, “The purpose of this handbook is to help managers with the “hows” of managing goats for fuel reduction and to provide some information on the results you can expect.” The CD offers:

- Step-by-step directions for measuring vegetation and for setting up a fence
- A tool to help estimate costs for using goats
- Information on selecting potential locations where this type of treatment might work.
- Information more specific to livestock producers who are caring for animals, to aid in development of the industry and to assist communication between fire managers and goat producers on best management practices.
- A treasure trove of videos demonstrating everything from modeling the effects of goats in fire prone areas, to a Federal Emergency Management Agency video on her work with goats, to building an electric fence, to kidding—that magical season of welcoming young.

Order the CD at: [www.livestockforlandscapes.com](http://www.livestockforlandscapes.com).

an ample supply of goats and a herder with the necessary experience is difficult.”

Yet, her work addresses all these issues and more. Most important, it clearly demonstrates that goats can rapidly create an effective fire break, gives information on how long it will take for fire prone regrowth to reappear, and how often an area may need to be retreated with goats. It shows that goats may be effective in different sorts of areas, including the wildland urban interface and in pine forest and sagebrush communities, along with prescribed burning.

### Get your goat: A community example

For many managers and planners, using goats to manage fuel may not seem like the first or most obvious solution. But Voth’s work suggests it may be a real option for some. She is now working to bring more and better information to people about using livestock for land management.

She writes in the CD, “The purpose (of the CD) is to aid in the development of a (an) infrastructure for the use of goats for fire fuels reduction... It includes many suggestions steps.” These include how to start and manage a herd, creating a fuel management plan, help in determining whether a particular area is a likely place for goat management, creating a business plan, and more

“There are currently not nearly as many service providers as there are communities who need them. To increase the speed with which the industry develops and to ensure that it grows professionally and credibly, (the CD)

contains information to help aspiring goat producers get off the ground.”

Voth adds, “The goats protect houses, and they easily provide firefighters a safe place to fight the fires from. The goats can help make it safer for the firefighters and for communities.”

To that end, she reports on an initial project joining goats with an at-risk community of homes nestled in the heart of fire-prone Utah. The Woodland Hills community is surrounded by oakbrush and scrub. Once Voth explained to community members the possible power of goats to reduce fire danger, they applauded the plan. Voth coordinated with the town council and their fire department and soon a herd of 30 goats were heartily tending vegetation near the homes. Community members helped build the fencing, took care of basic goat maintenance like watering, and learned what the vegetation would look like when the goats were “finished” in an enclosure. That’s when they would call Voth and her team, who would drive the three hours to move the goats.

“It worked perfectly,” says Voth. “It was easy, cheap, and fun for everyone. The kids (the human kids) loved it!”

“My years of experience of working with goats this way has been so inspiring that I started Livestock for Landscapes to help people see the benefit of using livestock

### Management Implications

- Goats are a viable option to reduce fire risk in some areas, especially in the wildland urban interface. Consider goats as a choice when making management and planning decisions.
- Goats keep air clean, can help minimize the need for burning, and may be an attractive option for community members concerned about prescribed fires.
- Managing goats can be simplified with the accurate and clear information available on the CD described above.
- Use the information to decide whether the cost and effectiveness of using goats in your area makes the most sense.

to manage land. The goal is to help people understand the animals and their eating habits, and use this knowledge to benefit them and the landscape.”

### Further Information: Publications and Web Resources

*GOATS! For Firesafe Homes in Wildland Areas.* CD.

Order at: [www.livestockforlandscapes.com](http://www.livestockforlandscapes.com). **Note:** Many additional references and support materials are available in the References section of the CD.

Pearson, H.A., and A. Martin Jr. 1991. Goats for vegetation management on the Ouachita National Forest. Using goats to manage forest vegetation, a regional inquiry. Eds. S.G. Solaiman and W.A. Hill, 59-71. Tuskegee, AL: Tuskegee Univ Ag Exper St.

Tsiouvaras, C.N., N.A. Havlik, and J.W. Bartolome. 1989. Effects of goats on understory vegetation and fire hazard reduction in a coastal forest in California. *Forest Science*. 35(4): 1125-1131.

Green, L.R., and L.A. Newell. 1982. Using goats to control brush regrowth on fuelbreaks. USDA Forest Service. Gen. Tech. Rep. PSW-59. 13p. and Green, L.R. 1977. Fuel reduction without fire—current technology and ecosystem impact. Symposium on Environmental consequences of Fire and Fuel Management in Mediterranean Ecosystems, Palo Alto, CA. (August 1-5, 1977).

Davis, G.G., L.E. Bartel, and C.W. Cook. 1975. Control of Gambel oak sprouts by goats. *J. Range Manage.* 28:216-218.

*“The goats protect houses, and they easily provide firefighters a safe place to fight the fires from. The goats can help make it safer for the firefighters and for communities.”*

## Scientist Profiles

Kathy Voht runs Livestock for Landscapes, LLC, providing training and information on how to take advantage of natural animal behaviors to turn livestock into inexpensive and efficient landscape management tools. Her past experience includes 12 years with the Bureau of Land Management in outreach, education and research.



Kathy Voht can be reached at:  
6850 W CR 24  
Loveland, CO 80538  
Phone: 970-663-6569  
Email: [kvoht@livestockforlandscapes.com](mailto:kvoht@livestockforlandscapes.com)

## Collaborators

Joel Godfrey, Doug Johnson, Sean Hammond, John Malecheck, Beth Burritt, and Fred Provenza, Utah State University

G. Allen Rasmussen, Texas A&M Kingsville

*Results presented in JFSP Final Reports may not have been peer-reviewed and should be interpreted as tentative until published in a peer-reviewed source.*

**The information in this Brief is written from JFSP Project Number 99-1-3-02, which is available at [www.firescience.gov](http://www.firescience.gov).**

## An Interagency Research, Development, and Applications Partnership



JFSP *Fire Science Brief*  
is published monthly.  
Our goal is to help managers  
find and use the best available  
fire science information.

Learn more about the  
Joint Fire Science Program at  
[www.firescience.gov](http://www.firescience.gov)

John Cissel  
Program Manager  
208-387-5349  
National Interagency Fire Center  
3833 S. Development Ave.  
Boise, ID 83705-5354

Tim Swedberg  
Communication Director  
[Timothy\\_Swedberg@nifc.blm.gov](mailto:Timothy_Swedberg@nifc.blm.gov)  
208-387-5865

Writer  
Rachel Clark  
[rclark@nasw.org](mailto:rclark@nasw.org)

Design and Layout  
RED, Inc. Communications  
[red@redinc.com](mailto:red@redinc.com)  
208-528-0051

The mention of company names,  
trade names, or commercial products  
does not constitute endorsement  
or recommendation for use  
by the federal government.