

## USING GOAT EMPLOYEES AS PART OF YOUR VEGETATION MANAGEMENT PLAN

Ashley Collins and Kim Carr, WV LTAP

Controlling invasive weeds is a routine maintenance task for roadway agencies and landowners, and both groups are always searching for better, cheaper, and more environmentally friendly methods for completing the task. One solution being used is employing various sized herds of goats to eat unwanted brush and weeds, a technique known as conservation grazing. Superb climbing skills and environmentally friendly

characteristics allow goats to be the perfect candidate for removing unwanted brush. Using goats for weed control offers an alternative that minimizes pollution, reduces energy consumption, and helps prevent the growth of new weeds.

Unlike a mower or tractor, goats do not disrupt existing soils. The use of hired goats can even benefit other domesticated mammals and wildlife by maintaining their



The goats at this Carroll County Maryland site enjoy their work of eating the woody vegetation. Photo courtesy of the US Fish and Wildlife Service.

### IN THIS ISSUE

Pages 1 - 3  
Using Goat Employees as Part of Your Vegetation Management Plan

Pages 4 & 5  
Evaluating Products For Roadway Dust Control

Page 6  
Congratulations to Another Round of Roads Scholar I Graduates

Page 7  
Using Native Plants for Roadside Revegetation

Page 8  
Upcoming Training

*Country Roads & City Streets* is typically published quarterly. The purpose of this newsletter is to provide information that is beneficial to decision makers, elected officials, and roadway construction, maintenance and management personnel.

The material and opinions included in this newsletter are those of the West Virginia LTAP and do not necessarily reflect the views of the Federal Highway Administration or the West Virginia Department of Transportation. Every effort has been made to ensure the integrity and accuracy of both original and borrowed material; however, the West Virginia LTAP does not assume responsibility for any information that is found to be incorrect.



The West Virginia LTAP is part of the National Local Technical Assistance Program, which is funded by the Federal Highway Administration. West Virginia LTAP also receives funding from the West Virginia Department of Transportation.

### **MISSION:**

The mission of the WV LTAP is to foster a safe, efficient, and environmentally sound surface transportation system by improving skills and increasing knowledge of the transportation workforce and decision makers.

To help achieve this mission, training, demonstrations, personalized technical assistance, and resource materials are provided.



This photo taken on June 2, 2011 depicts a bog turtle at the Carroll County Maryland site. Photo courtesy of the US Fish and Wildlife Service.

natural environment. A real-life example of this is the use of goats for vegetation management in wetlands located in Carroll County Maryland. Overgrown vegetation led to the decline of the bog turtle, a species listed as threatened by the Federal Endangered Species Act. In July 2008, as part of an experiment, Service biologists introduced a group of hired goats to graze the area in a bog turtle habitat site. The goats cleared away woody vegetation and opened up canopies, allowing the bog turtles to eat, reproduce, and hibernate.

Julie Thompson Slacum, Division Chief, Strategic Resource Conservation, with the United States Fish and Wildlife Service, did the photo-monitoring for this experiment. She indicated that the goats did a wonderful job the two years they were on the habitat site, and since they prefer woody vegetation over herbaceous vegetation, they do a really good job at sites that have monocultures of multiflora rose and smaller trees.

One important aspect of the grazing goats is that they did not cause damage as a machine would have. Had a heavy duty

mower been used to clear the vegetation instead of the goats, the tires would have embedded ruts that could have destroyed the area's hydrology and further endangered the bog turtle.

Goats have a tendency, though, to be great escape artists due to their ability to climb, jump, crawl, and roam at great lengths. Although these characteristics are beneficial in making goats very successful at clearing unwanted brush, especially on hillsides that may be difficult to mow or brush hog, these characteristics also pose a negative while goats are on the job. How can landowners and roadway agencies contain their goat employees without the probability of escape? For small herds of goats, some landowners are using welded cattle wire panels. For large herds of goats, one answer is using the same material, but the panels are woven together as opposed to being welded. Once goats have finished clearing the wanted area of weeds, these entrapments are easy to move to a new job site.

Some landowners are using water, such as streams or rivers, as a boundary to control



This iStock photo depicts a curious goat who may be trying to figure out how to get the rest of his body through the fence.

their goats' escape tactics. Goats detest getting their bodies wet and will avoid doing so. Another containment solution is to use an electrical fence. A six-strand high tensile electric fence provided the containment solution during the 2008 experiment in Maryland.

The idea of employing goats for invasive plant control is becoming more common. In many cases, goats can eliminate the need for machinery or herbicides, which means a chemical free method for vegetation control. Using goats for conservation grazing can provide roadway agencies with a viable alternative that is often a win-win solution for all involved. This is one solution that can benefit roadway agencies and the environment. When groups work together, the environment and endangered species can be protected and infrastructure needs can still be met.

For more information on the proper practices and procedures for invasive plant species control through grazing, please see **page 50 of the National Cooperative Highway Research Program (NCHRP) Synthesis 363: Control of Invasive Species** ([http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp\\_syn\\_363.pdf](http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_syn_363.pdf)). Included in the next column are a few specific examples from this report of using goats for weed control.

The WV LTAP would also like to hear if your agency has used goats for vegetation control and if so, what your experience has been.

## EXAMPLES INCLUDED IN THE NCHRP SYNTHESIS 363:

The following text and specific examples were taken from the **NCHRP Synthesis 363: Control of Invasive Species** report.

*Two angora goats were hired to eat a yellow-flowered noxious weed that was growing along the banks of the Yellowstone River. The goats preferred eating the top part of the leafy green perennial where the flower buds form, thus preventing blooming and subsequent spread.*

*In Albuquerque, approximately 1,000 goats were brought in to clean up weeds along the Rio Grande. The district biologist reported that "tightly managed and limited use of goats is a really good and ecologically sound way to manage vegetation without having to use herbicides or fossil fuel for mowers" and leave the native grasses to flourish.*

*Goats can help an agency reduce its dependence on fossil fuels and, because goats, unlike mowers, do not start brush fires with sparks from their motors, they have been used extensively since the fires of 1990 in the Oakland–Berkeley Hills, California area to safely manage the growth of undesirable vegetation by clearing dense undergrowth, including the highly flammable manzanita.*

### Sources for this article

"Goats and Weed Control." <http://www.noble.org/ag/livestock/goats/index.html>

"Using Goats for Vegetation Management." <http://www.noble.org/ag/livestock/goatvegetation/>

"Hungry Goats Restore Bog Turtle Habitat." <http://www.fws.gov/endangered/news/>

National Cooperative Highway Research Program (NCHRP) Synthesis 363: Control of Invasive Species [http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp\\_syn\\_363.pdf](http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_syn_363.pdf)

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# EVALUATING PRODUCTS FOR ROADWAY DUST CONTROL

Kevin Butler, Former WV LTAP Technical Assistant



Photo from the LTAP Graphics Collection, Indiana LTAP, depicting a country road in the fall.

The West Virginia Division of Highways (WVDOH) has approximately 14,000 miles of aggregate surfaced roadway. Dust that is expelled from these roads is a nuisance that road officials would like to minimize for citizens. Air borne dust also generates safety, health, and environmental concerns, such as reduced visibility, respiratory hazards associated with dust inhalation, blocked drainage systems, and potential damage to vegetation. Air borne dust also indicates that surface deterioration is occurring.

At the WVDOH's current funding levels, it is anticipated that state owned roadways will not be paved for the purpose of dust control. The good news, though, is a variety of commercial products are available for dust control. These products work by: 1) attracting moisture, 2) binding dust particles together, 3) sealing the surface, or 4) some combination of these effects.

Chloride salts are moisture attractants, which work by drawing moisture out of the air during periods of high humidity, particularly at night. They also reduce the evaporation rate of water during hot-dry periods. Moisture in the gravel road surface tends to hold the dust on the road surface, although there is no physical bonding. Physical binders for dust control involve the application of organic or synthetic compounds that bind the dust particles together and attach them to the larger aggregate. Some of these binding materials produce a surface similar to an asphalt emulsions treatment, but at a lower cost. Surface sealants work by either adhering or agglomerating the surface particles together and often form a semi-rigid film on the road surface.

In 2010, a research project was conducted under the direction of Dr. John Zaniewski, a professor at West Virginia University and director of the West Virginia Local Technical Assistance Program. The roadway that was used for this research project was located in Wood County in the WVDOH's District-3 area. The purpose of this research project was to evaluate the effectiveness of five commercially available dust palliatives for use on secondary gravel roads maintained by the WVDOH. Dust control products included in this study were: a petroleum emulsion with polymer, synthetic organic fluid, calcium chloride, bituminous resin pitch, and lignin sulfonate. Three methods of field testing were used which included a mobile dust sampling device (Figure 3), soil silt fractions, and moisture analyses.



The mobile dust collector was used to determine the amount of dust released from the roadway when driven over.



As part of this study, samples were collected for lab analysis.



This photo shows calcium chloride being applied to the test route. This product proved to be the most effective of the five tested for this project.

## CALCIUM CHLORIDE

Results of field testing indicated that calcium chloride proved to be effective at controlling dust. It was also economical and easy to apply. The calcium chloride produced minimal impact to traffic and the treated roadway sections did not require any curing time before being opened to traffic. Based on visual observations, no product runoff was observed and the calcium chloride appeared to have minimal environmental effects. However, for long-term storage of this product, it is recommended that the calcium chloride solution be kept in plastic tanks to minimize corrosion.

## A PETROLEUM EMULSION WITH POLYMER AND BITUMINOUS RESIN PITCH

Both the petroleum emulsion with polymer and the bituminous resin pitch had very long curing times, required multiple applications, and received complaints from passing motorists and residents living adjacent to test sections. These products splashed onto passing vehicles where pooling occurred on the roadway and were difficult to remove from the undercarriages and exteriors of vehicles. Among the tested products, the petroleum emulsion with polymer and the bituminous resin pitch created the most concern for environmental impacts. Based on visual observations, these two products were highly flowable after application. Both remained tacky for days and were also very odorous for approximately two weeks after application.

## LIGNIN SULFONATE

Lignin sulfonate is a byproduct of the process involved with reducing wood pulp to paper. The sulfonate component acts to break down soil particles and the lignin acts to cement the particles together. Sulfur in the vapors released after application produces an objectionable odor that lasts while the product cures. The curing time is typically eight to twelve hours, but may be longer depending on weather conditions. Prior to complete curing, the product is susceptible to being washed away by rain, potentially creating an environmental hazard.

## SYNTHETIC ORGANIC FLUID

There were no observed constructability issues with the synthetic organic fluid, and like the calcium chloride, the roadway sections treated with this fluid did not require any curing time before being opened to traffic. Additionally, no product runoff was visually observed. Since the synthetic organic fluid is a relatively new product, no storage concerns have been recorded; however the potential for creating problems associated with long-term storage should be considered.

## RESULTS

The results of this field evaluation and research project are that of the five commercial products tested as part of this research project, calcium chloride is the preferred choice for dust control. This conclusion was based on the cost, ease of application, impact on traffic, impact on the environment, and long-term storage capabilities.

For more information regarding this project or roadway dust control in general, please contact John Zaniewski at [John.Zaniewski@mail.wvu.edu](mailto:John.Zaniewski@mail.wvu.edu).

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## CONGRATULATIONS TO ANOTHER ROUND OF ROADS SCHOLAR I GRADUATES!

The WV LTAP staff is excited to share that thus far in 2011, we have 26 more Roads Scholar I graduates! We are so proud of each of these individuals and their dedication to keep learning. We wish them all the best and look forward to even more graduates!

### *City of Huntington*



Front Row, Left to Right: Vincent Early, Michael Tennyson, Robert Reynolds, Douglas Blake, Tony Johnson, Bobby Davis, Clyde Day, II  
Back Row, Left to Right: James Stewart, Bernard Craighead, Robert Hunter, James Copley, Michael Pennington, Steven Streets, Everett Adkins, Brian Dequasie, Paul Sowards, Randy Kipp, Brady Wysong, Jr.

### *West Virginia Division of Highways*



Front Row: Graduates Marilyn Smock and George Ramella  
Back Row: Lori Jarvis (WVDOH - D1 Technician Coordinator) and Graduates: George Fisher, Thomas Hively, and Rob Wilkinson.



Graduates Leon Mongold and Charles Shears, Jr. display their RS I certificates presented to them by the WVDOH D5 Engineer, Lee Thorne.

# USING NATIVE PLANTS FOR ROADSIDE REVEGETATION

Kim Carr, WV LTAP (Information for this article taken from FHWA documents and the website, [nativerevegetation.org](http://nativerevegetation.org).)

Lessening negative impacts to the environment is an essential component of balancing the building and maintaining of roadways. One practice that can be beneficial to roadway agencies and the environment is using native plants for roadside revegetation. This article provides a brief summary of using native plants for roadside revegetation, along with information for resources that are available through WV LTAP or online sources.

## NATIVE PLANT REVEGETATION

According to the January 2011 Federal Highway Administration (FHWA) report, *Current and Innovative Solutions to Roadside Revegetation Using Native Plants*, “native roadside revegetation involves establishing or re-establishing appropriate plant material on areas disturbed by road construction projects.”

## POSITIVES OR DOWNFALLS

According to this same report, using native plants for revegetation has gained increased attention as people realize the many benefits they provide. Some of these benefits include: soil and slope stabilization which helps reduce erosion; improved water quality; an increase in the natural beauty and aesthetics of an area; carbon sequestration; weed suppression; reduced maintenance costs; and enhanced wildlife habitat. Furthermore, given the sheer number of road and highway improvement projects conducted annually by local, state, and federal agencies, these benefits are realized on a very large scale. On the negative side though, when revegetation efforts fail, the costs and consequences can be equally significant, resulting in erosion and slope failures, water contamination, weed infestations, decreased landscape aesthetics, and costly redesign and implementation efforts.

One of the main challenges in achieving successful roadside revegetation using native plants is that each project has to be looked at individually. There is no one-size-fits-all technique or approach that can be applied to every project. Designers and contractors must have specific knowledge of local conditions and techniques; however, this may not be sufficient to ensure a successful revegetation effort. Oftentimes, the nontechnical aspects of the process are equally important, such as good planning, communication, oversight, and monitoring.

## OTHER RESOURCES

In addition to the *Current and Innovative Solutions to Roadside Revegetation Using Native Plants* report, several other documents on this topic are available as PDFs for free download at [www.wfl.fhwa.dot.gov/programs/td/publications/](http://www.wfl.fhwa.dot.gov/programs/td/publications/).

Another resource is the DVD *Successful Roadside Revegetation Using Native Plants* (FHWA-WFL/TD-011-002). This DVD showcases the various native plant revegetation techniques that were successfully used in several roadway projects including projects in Glacier National Park (Montana), Cascade Lakes (New York), and the

Molly Stark Scenic Byway (Vermont). This DVD is available for loan from the WV LTAP lending library. It is also available to view online at [www.nativerevegetation.org](http://www.nativerevegetation.org) by clicking the *Art and Science of Revegetation* video link.

This website also has a wealth of information for both experienced and inexperienced revegetation practitioners. Protocols for propagation of native plants, information on soil surveys and optimum times for planting are just some of the numerous resources available.

The WV LTAP staff realizes the importance of helping transfer information that can help agencies accomplish their roadway maintenance and construction goals, while also being conscious about mitigating negative impacts to the environment. With that in mind, this edition of *Country Roads and City Streets* has focused on three different processes, including using livestock for vegetation management, reducing dust on gravel roads, and using native species for revegetation.

This photo from iStock depicts Black Eyed Susans, a plant native to West Virginia.





### ATSSA FLAGGER CERTIFICATION CLASS

August 16, 2011 • 8:00 AM - 1:00 PM • WVU Coliseum/Jerry West Lounge, Morgantown, WV  
Fee: \$25 per person for state or local government agencies  
\$50 per person for private agencies

Flaggers are the first line of defense when it comes to the safety of workers, motorists, and pedestrians in a work zone; they operate as the de facto safety officer on many work crews and have one of the most important jobs in the work zone. This course teaches each attendee the proper way to set up a work zone and the proper methods and behaviors for being a competent flagger. Each participant that successfully passes the class receives a four-year nationally recognized ATSSA flagger certification.

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Email: \_\_\_\_\_

Return by Fax to 304-293-7109 or email kim.carr@mail.wvu.edu.  
If mailing a check, please use return address below.

#### Workshop Fees and Payment

Registration fee \_\_\_\$25 or \_\_\_\$50

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#### MARK YOUR CALENDAR.

The **Snow and Ice Control Workshop** is scheduled for Wednesday, September 28, 2011 at the Days Hotel Conference Center in Flatwoods, WV.

