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Off-Highway Vehicle Trail and Road Grading Equipment

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7E72A49—Grooming Equipment for Cycle Trails

Contents

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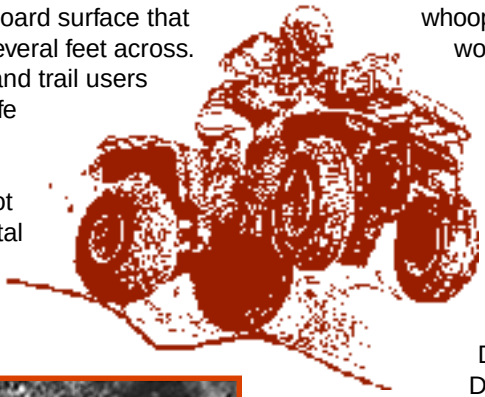
Introduction

The Missoula Technology and Development Center (MTDC) was asked to find a good way to maintain a 40-mile (64-k) motorcycle and all-terrain-vehicle (ATV) trail on the Francis Marion National Forest in coastal South Carolina. Heavy use leaves a washboard surface that progresses to mounds and gullies several feet across. These are called "whoop-de-doos," and trail users find them both unpleasant and unsafe (Figure 1).



The problem of whoop-de-doos is not unique to this trail in the sandy coastal plain of South Carolina. We began the project by asking off-highway vehicle (OHV) trail managers throughout the Forest Service how they were maintaining their OHV trails. Several National Forests had developed prototype lightweight graders that could be towed behind ATV's, effectively removing whoop-de-doos with routine maintenance. MTDC worked with two of these Forests to further improve and evaluate these prototypes, tested them in South Carolina, and looked to the open market for similar equipment.

Figure 1—Evaluating equipment that effectively cuts the mounds and fills the depressions on washboard trails is what this report is about. This trail has been partly graded to remove the whoop-de-doos.

This report focuses on three pieces of equipment tested in South Carolina: a modified trail rock rake suggested by Cam Lockwood on the Angeles National Forest, CA; a trail drag designed by Dick Dufourd and Kim Larsen for use on the Deschutes National Forest, OR; and an Ultra Light Terrain Grader manufactured by The Shop Industrial, Lively, Ontario, Canada.

We found all three pieces of equipment suitable for OHV trails in sandy or pumice soils. They can all be pulled with ATV's. OHV trails are wider, typically at least 4 feet (1.2 m), than hiking or equestrian trails, and have fewer curves. All of the equipment would have functioned better on trails had the equipment been narrower.

The trail rock rake and the Ultra Light Terrain Grader worked exceptionally well on narrow roads like those found in campgrounds, and for grading parking lots. They are a realistic and affordable alternative to full-sized graders for such applications.

In less detail, this report includes other ways that OHV trail managers are maintaining their trails. These include the TrailPlane developed by Mil Lill and used by the Cycle Conservation Club of Michigan; various drags, harrows, cultipackers, and rollers; and other techniques field personnel told us about.

In heavier or rocky soils, on steep trails, and where rutting and erosion is severe, heavier equipment is needed. In these situations, small crawler dozers such as the SWECO 480, small tracked excavators, or small utility tractors do the trick. We give this equipment only cursory coverage in this report. To learn more about this heavier equipment, refer to a 1996 report from the San Dimas Technology and Development Center, *Mechanized Trail Equipment,* 9623-1207-SDTDC. See page 20 to find out how to order a copy. The San Dimas Center is also producing a video about using mechanized trail equipment. It should be completed in 1999.

Equipment Evaluations on the Francis Marion National Forest

This project's objective was to identify equipment that could effectively grade motorcycle and ATV trails in sandy soils. Grooming would smooth out the bumps, flatten mounded berms, and eliminate ruts.

The 40-mile- (64-k)-long Wambaw Cycle Trail is on the Francis Marion National Forest, north of Charleston, SC. It receives heavy use by both motorcyclists and ATV enthusiasts. The topography is flat, the soil is sandy, and the trail winds through mostly pine forest. Curves are tight, designed to appeal to motorcyclists (Figure 2).

The soils and topography presented relatively easy working conditions, so we looked at lightweight equipment that could be pulled by an ATV. Why? ATV's cost less than tractors, and are more widely available on Ranger Districts and through volunteer groups. We wanted to see if this lightweight equipment could do the job.

Figure 2—Typical section of the Wambaw Cycle Trail. The trail was designed for motorcycles, but ATV's are also allowed.

Trail Rake

Cam Lockwood, trail coordinator for the Angeles National Forest in southern California, proposed that MTDC modify a flexible-tooth landscaping rake manufactured by York Modern Company. Lockwood wanted hydraulic controls that would swivel the rake's blade from side to side, raise and lower the wheels for the proper amount of cutting action, and help transport the rake over pavement, rocks, or other obstructions.

We fabricated two prototypes, one for the Angeles National Forest and one for testing on the Francis Marion National Forest (Figure 3). We started with a York Model TA-26, added a hydraulic snowplow power pack, two hydraulic cylinders, a heavy-duty steel battery box, and a gel battery designed to withstand rough treatment. We modified the trailer hitch to accept a $1\frac{7}{8}$-inch (48-mm) ball on an ATV.

The controls raised and lowered the wheels to set the depth of cutting. Adjusting the blade's angle was easy and positive with the hydraulic setup (Figure 4). The hydraulics failed because of a design flaw in the power pack. After talking with the manufacturer, we corrected the problem.

The wheels can be adjusted either to "float" with the terrain, or to be held at different heights, depending on the degree of soil cutting desired. The maximum amount of cutting action is obtained in the float mode.

The rake worked quite well in our limited field tests. The flexible spring-steel tines cut the mounds and filled the depressions in the trail. With the spaces between tines, not as much material was sidecast. To a greater degree than the other two graders tested, the rake pulled berm material back into the middle of the trail (Figure 5), especially with two passes down the trail.

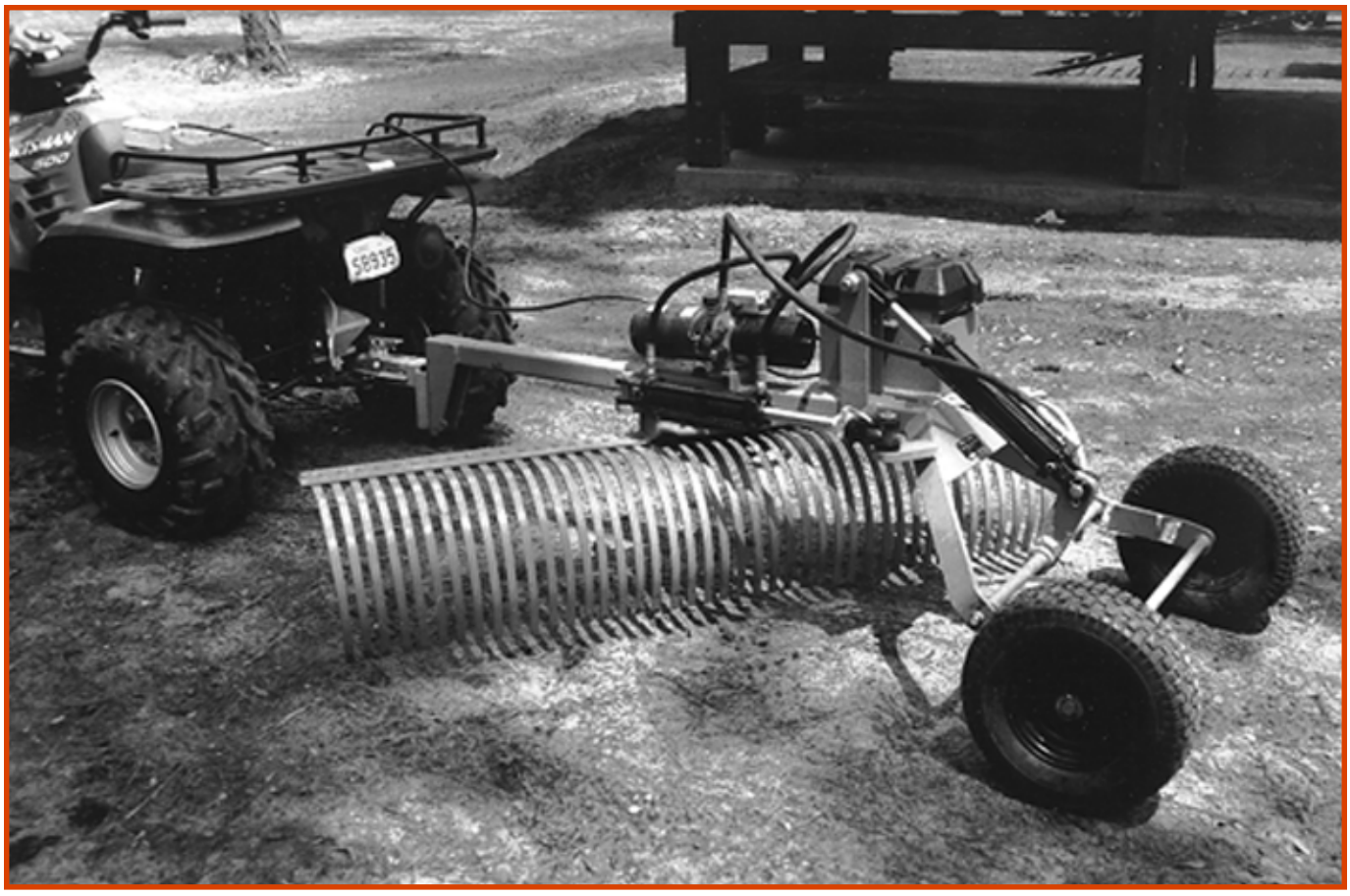


Figure 3—MTDC's trail rake begins with a York landscaping rake, with hydraulics for swiveling the rake and for raising and lowering the wheels.