

United States  
Department of  
Agriculture

Forest Service

National Technology &  
Development Program

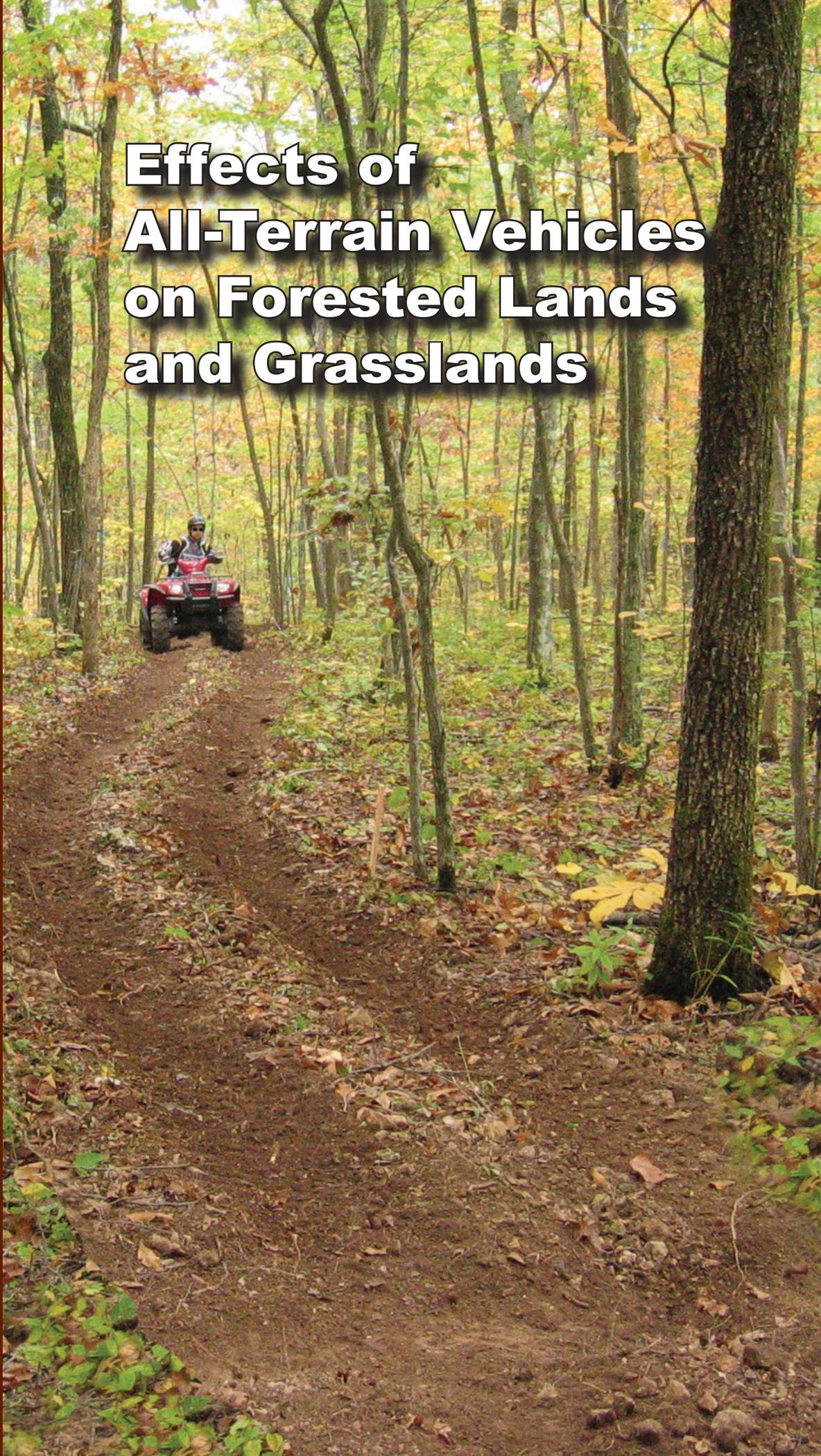
Recreation  
Management

0823 1811—SDTDC  
December 2008



U.S. Department  
of Transportation  
Federal Highway  
Administration

# Effects of All-Terrain Vehicles on Forested Lands and Grasslands





## **Acknowledgments**

Without the spirited cooperation and volunteer contributions from many forests, other Federal agencies, industry, and volunteer organizations this project would have been impossible to complete. We offer a special thanks to: The Minnesota Department of Natural Resources, The Federal Highway Administration, The Specialty Vehicle Institute Of America, The National Off-Highway Vehicle Conservation Council, and all of the participating forests.





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December 2008

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## EXECUTIVE SUMMARY

One goal of the Forest Service, U.S. Department of Agriculture, is to provide outdoor recreation opportunities with minimized impacts to natural resources (USDA Forest Service 2006). All-terrain-vehicle (ATV) use on public lands is a rapidly expanding recreational activity. An estimated 11 million visits to national forests involve ATV use. This constitutes about 5 percent of all recreation visits to national forests (English 2003). When repeated ATV use occurs on undesignated trails, the impacts can exceed the land's ability to rehabilitate itself. The challenge for recreation managers is to address the needs—and conflicting expectations—of millions of people who use and enjoy the national forests while protecting the land's health and integrity.

In addition to a new travel management policy that restricts travel on undesignated trails, the Forest Service studied previously unused trails to determine the effects of ATV traffic on the natural resource. The study's three main questions were: Are natural resources being affected by ATV use; to what degree are natural resources being affected; and does the ATV's design make a difference in the effects? To answer these questions on a nationwide scale, the study was performed at seven locations within representative ecoregions. The ecoregions included Desert, High-elevation Western Mountains, Gulf Coastal Plains, and Eastern Broadleaf.

Yes, natural resources were affected by ATV traffic. At all seven locations, some portion of the previously unused trail transitioned from a low to medium disturbance class in 20 to 40 passes. Medium-disturbance occurred when two of the following three conditions were present: sixty-

percent loss of original ground cover, trail-width expansion to 72 inches, or wheel ruts up to 6 inches deep. At each location some portion of the trail transitioned from medium to high disturbance in 40 to 120 passes. High disturbance occurred when two of the following three conditions were present: more than 60-percent loss of original ground cover, trail width exceeding 72 inches, or wheel ruts deeper than 6 inches.

Disturbance levels were caused by three independent variables: sites, trail features, and vehicles and tires. There was a statistically significant difference between the number of passes required to transition from the low to medium disturbance class for the seven sites. Desert and Eastern-broadleaf ecoregions were the most susceptible to ATV traffic, and the Gulf Coastal Plain ecoregion was the least susceptible. Each ecoregion trail section that required wheel-spin or slip moved quickly to increasing levels of disturbance. Compared to tight-radius curves, nearly eight times as many passes were required to produce equal impacts on straight sections, and nearly five times as many passes were required for uphill or downhill sections.

There were no statistically significant differences for the sport and utility ATVs equipped with either original equipment manufacturer tires or after market tires with  $\frac{3}{4}$ -inch lugs. The study concluded that the impacts from the four combinations of vehicles and tires were indistinguishable.

Following any level of disturbance, runoff and sediment generated on the ATV trails increased by 56 percent and 625 percent, respectively, compared to the undisturbed forest floor. ATV trails are high-runoff, high-sediment producing strips on a low-

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runoff, low-sediment producing landscape. Frequent diversions of the trail runoff onto the forest floor will reduce the amount of sediment and runoff as it infiltrates into the forest floor.

The study demonstrated that ATV traffic does have an impact on natural resources. The levels of disturbance can be reduced by proper trail design and maintenance and by focusing efforts on trail sections that require extra attention. Application of this study should assist managers in planning, designing, and implementing decisions related to ATV management.

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## INTRODUCTION



As the United States population has grown, so has all-terrain-vehicle (ATV) use on national forests and grasslands and other public lands. Annual sales of ATVs have increased over 272 percent since 1994 to an estimated 876,000 units in 2005 (Specialty Vehicle Institute of America - Special Report Summer 2006). ATVs are a popular choice for outdoor recreation. According to a national survey on recreation and the environment, about 36.3 million people participate in off-highway driving or ATV or motorcycle use (Cordell et al. 2001). An estimated 11 million visits to national forests involve off-highway-vehicle (OHV) use—or about 5 percent of all recreation visits (English 2003).

Unauthorized trails from motorized use cause much of the natural resource [impacts] and some of the public safety concerns on national forests. Unauthorized trails are a major problem for forest managers. For example, Lewis and Clark National Forest personnel in Montana currently estimate that the forest has 1,348 unauthorized roads and trails extending for 646 miles (Robertson 2003). The increased use of ATVs on public land has meant that even the small percentage of riders who desire to travel off trails and roads can have considerable effects on the natural resources around them.

Paterson 2003 states that equipment modifications designed to enhance vehicle performance have caused many of these effects. A disproportionate effect from irresponsible OHV—particularly ATV—use is possible because motorized vehicles are powerful, can travel many miles quickly, and can damage sensitive resources easily.

The magnitude of effects varies depending on local characteristics of the landscape including slope, aspect, soil susceptibility to erosion, and vegetation type (Stokowski and LaPointe 2000). The land may be able to rehabilitate itself after the effects from a few ATV rides across a meadow, but multiple passes across the same area often result in a reduced or complete loss in the capacity for natural rehabilitation.

Sustaining and enhancing outdoor recreation opportunities with minimized impacts to natural resources is Goal 4 in the FY 2007-2012 USDA Forest Service Strategic Plan. The expected outcome is a variety of high-quality outdoor recreational opportunities on the Nation's forests and grasslands that are available to the public. (USDA Forest Service 2007).

Recreation visitors expect a great deal from their national forests and other public lands in terms of settings, experiences, facilities, and services. The challenge for recreation managers is to address the needs and conflicting expectations of millions of people who use and enjoy national forests while protecting the health and integrity of the land. Increased pressure from growing populations, coupled with advances in recreation technology, will continue to challenge public land-management agencies, State and local governments, and private landowners (USDA Forest Service position paper 2003).

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The Forest Service has responded to these pressures by establishing a new travel management policy. The Forest Service also conducted a study to determine the effects of ATVs on the natural resources. This publication documents that study and provides field managers with information and tools to make good, science-based decisions in managing the effects of ATVs, as they implement policies and plans related to travel management in the national forests and grasslands.

Chapter 1 discusses the methodology behind the study, as well as, its design and implementation. It also discusses the assessment tool used to measure the effects on natural resources.

Chapter 2 includes an analysis of the data collected during the test period and answers the three questions that framed the study:

1. Are natural resources being affected by ATV use? In other words, is change occurring?
2. If change is occurring, to what degree are natural resources affected?
3. If natural resources are affected, does the design of the ATV (or the way that it is equipped) make a difference?

Chapter 2 also contains a discussion of ATV performance, rider behavior, and their effects.

Chapter 3 includes descriptions of the settings and habitats for the seven study sites. The changes to natural resources as a result of repetitive ATV traffic also are included.

Chapter 4 contains recommendations to assist managers in planning, designing, and implementing decisions related to ATV management.