

# Shenandoah White-Tailed Deer: Ecology and Management Implications

natural resources to maintain and perpetuate their inherent integrity. Specific natural resources in particular parks can pose difficult management problems, and the white-tailed deer population in Shenandoah National Park (SNP) is a good example. It also demonstrates how the NPS has responded to the challenge.

Visitors to SNP often comment on the scenic vistas along the 105 mile Skyline Drive, and on the white-tailed deer along the roadsides. Of all the natural resources SNP has to offer its nearly 2 million annual visitors, this deer is one of the most observable resources in the Park. High concentrations of deer exist near campgrounds, picnic areas, and along the grassy roadsides of Skyline Drive. Visitors enjoy seeing these deer but Park personnel are apprehensive about visitor safety. The number of deer-motor vehicle accidents in the Park is high each year (15 in 1980, 36 in 1981, and 29 in 1982); visitors who stop along the road to watch deer may cause traffic jams and unsafe driving conditions.

Park administrators, in an effort to obtain sound biological information on which to base white-tailed deer management practices, initiated a short term research project with the Virginia Cooperative Wildlife Research Unit at Virginia Tech to study the population characteristics and ecology of SNP white-tailed deer. The distribution and movement patterns of deer in the Park were the major study objective. A second goal was to determine the nutritional condition of deer and to evaluate the impact of these animals on their habitat – especially on the native vegetation. Collection of field data was completed in December 1982.

## Study Procedures

To accomplish the first objective it was necessary to monitor the movements of individual deer within the Park. Two study areas were established in regions of the Park where high deer populations were known to exist; 25 animals within each area were live-captured, fitted with numbered, colored collars for easy identification, and released. Subsequently, when a collared deer was sighted along the Skyline Drive or along a trail, the individual identification number of the deer and the location of the sighting were recorded. Over time, as the number of sightings for a particular deer mounted, movement patterns became apparent.

Park rangers in the interpretive division introduced the study to visitors during formal programs and informal conversations. The response from visitors was positive, and once informed about the research, visitors made a valuable contribution by reporting sightings of collared deer.

Most of the 50 deer were captured on or near the Skyline Drive, but a total of seven were captured in backcountry areas two or more miles from the Drive. Because these animals were not as likely to be sighted as deer along the Drive, these seven animals received a colored collar with a small radio transmitter attached to it. This enabled researchers to monitor the daily movements of these deer and to approach them unnoticed for visual observations. Careful observations helped researchers determine which Park

Four of the deer captured along the Skyline Drive also received radio-collars. This was important for a number of reasons. Daily monitoring of deer in the backcountry and along the Skyline Drive allowed researchers to determine how these animals interacted. Also, the areas over which they ranged in the course of their daily activities (home ranges) could be compared. Locations of deer originally captured along the Skyline Drive could continue during times when they were not highly visible, such as during fawning and cold winter weather.

## Seasonal Movements

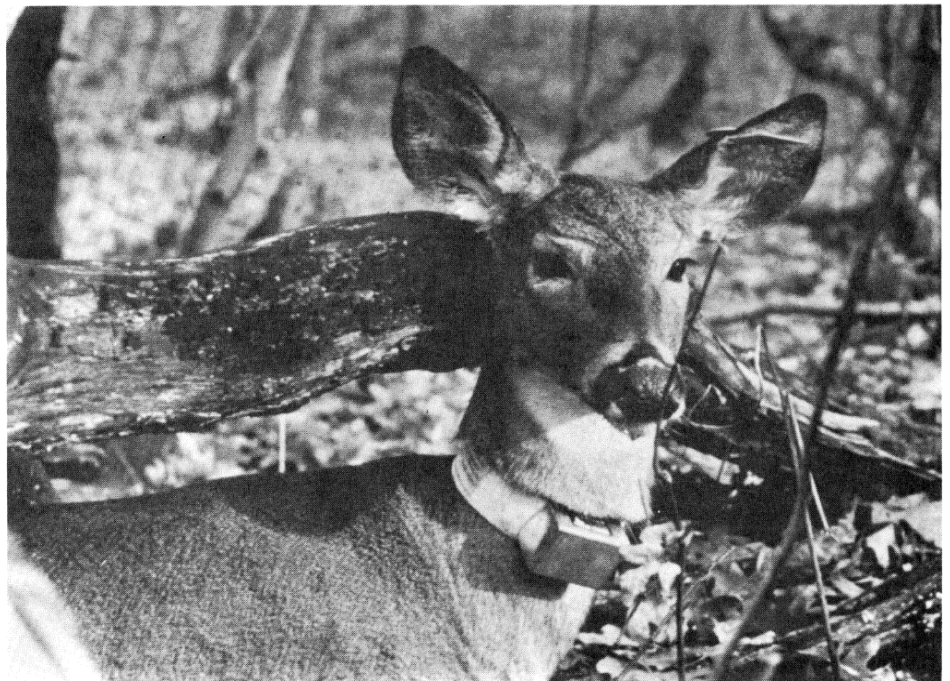
Some deer originally captured in the backcountry occasionally moved out of and back into the Park. During late summer, when daily movements were greatest, these deer frequented areas near the Skyline Drive. For example, one adult doe captured two miles from the Skyline Drive in October 1981 and who used only backcountry areas throughout the fall, winter and early spring, moved more than three miles to have her fawn in a lush area directly along the Skyline Drive. Also, some deer originally captured along the Skyline Drive moved as much as three miles into the backcountry and thus to lower elevations for short periods during severe winter weather, only to return to a particular area along the Drive when atmospheric conditions improved.

These data seem to indicate that the high concentrations of animals found along the Skyline Drive and those found in the backcountry do not constitute distinct populations. Rather, deer in the Park apparently exist along a continuum. At one extreme are deer that spend all of their time close to the Skyline Drive; at

the other, deer that spend all of their time in the backcountry. The deer population in Shenandoah NP probably has representatives all along this gradient, with a high concentration near, but not at, the extreme by the Skyline Drive, a smaller concentration near the extreme of the backcountry, and an intermediate level at the center of the continuum. Rather than a clear separation of populations, there appears to be a gradation and interaction of deer from the Skyline Drive and into the backcountry areas.

Though there is some interaction of deer throughout the Park the home range of deer associated with the Skyline Drive is considerably smaller than the home range of deer associated with the backcountry. This is true for bucks (average home range of 7.2 km<sup>2</sup> in the backcountry vs. 3.3 km<sup>2</sup> near the Skyline Drive) and does (3.8 km<sup>2</sup> in the backcountry vs. 1.2 km<sup>2</sup> near the Skyline Drive), and likely results from the year-round availability of grass for forage along the Skyline Drive. Deer that were killed by cars along the Drive were necropsied to determine nutritional condition and were often found to have stomach contents of up to 60 percent grass.

Deer have a great impact on their habitat throughout the Park, and this impact is especially noticeable near the Skyline Drive where abundant grass supports artificially high deer populations year-round. Woody browse is used extensively by deer in the backcountry and especially in wooded areas along the Skyline Drive. Enough deer are likely removed from the Park's population each year through predation, road kills and hunting of animals that move outside the Park boundary to prevent gross over-use of the habitat, but the impact of deer on native vegetation still is greater than it would be without man's influence on the animal's habitat. (While the Park contains



*Visitor pleasers* are these perky white-tailed deer, highly visible along the Skyline Drive. Radio collars help park management keep track of their movements.

## Shenandoah (Continued)

about 300 mi<sup>2</sup> of land, it is long (105 mi) and narrow (2-10 mi) and so has over 500 mi of boundary with private and state owned land open to hunting.)

### Management Strategies

The options for managing the SNP deer population range from hands-off management to severe cropping of the population in high concentration areas. Regardless of the management strategy selected, the high concentrations of deer along the Skyline Drive should not be managed separately from the other deer in the Park. Instead, the habitat provided for deer as a result of human impact (along roadsides, in campgrounds, etc.) might be modified so that its appearance and composition is no more attractive to deer than the backcountry areas, which

more closely represent the native Blue Ridge Mountain conditions that the Park was established to protect. Visitors could then be encouraged to leave their cars for short hikes so that sightings of deer would occur in a more natural environment.

It may prove feasible to manipulate forested regions in high visitor use areas so that they are maintained in natural, early successional stages which are very attractive to deer. There is ample evidence that native American Indians did this, and modern day visitors can benefit in the same way. This type of management would increase the likelihood of visitors' seeing deer along high-use trails near the Drive while decreasing the likelihood of deer-motor vehicle accidents along the Drive.

*Vaughan is Unit Leader of the Virginia Cooperative Wildlife Research Unit, USFWS; Scanlon is a Research Technician with the Unit.*

## Coyote Study Underway At Lava Beds Monument

By Suzanne Shoemaker

Local ranchers have long contended that Northern California's Lava Beds National Monument (LBE) and adjacent Tulelake National Wildlife Refuge (TLNWR) protect and harbor coyotes responsible for livestock depredation on surrounding lands. Similar claims are made concerning other wildlife sanctuaries in the western United States. Based on current knowledge, management personnel can neither confirm nor deny these claims.

A radio-telemetry study currently is underway to investigate daily and seasonal movement patterns of a protected population of coyotes on LBE and

TLNWR, in particular, to learn if these coyotes make regular excursions off the protected area.

Food habits of coyotes on undisturbed rangeland (LBE) are being compared with those on irrigated cropland (TLNWR) by scat analysis. A concurrent study of the relative abundances of small mammal prey in representative habitat types will aid in determining coyote food preferences.

It is hoped this information will shed light on the extent to which land use practices have altered coyote movements and food habits on the study area.

*Shoemaker is a graduate student working with David de Calesta, associate professor of Fish and Wildlife at Oregon State University.*



**Burying the trap** for coyotes at Lava Beds National Monument are Dave deCalesta, left, and Graduate Assistant Gary Whitmer. Jaws of the trap are padded to prevent injury to the coyote, and a bag of tranquilizer is attached. Chewing the bag calms the animal and makes it less likely to injure itself while it awaits tagging and release.

## Information Crossfile

**"The western United States** has scores of volcanoes likely to erupt in the future; some of them may be waking from long slumbers."

This is the "overline" on "Volcanoes to Keep an Eye On," by Richard A. Kerr, an article appearing in the "Research News" section of the August 12 issue of *Science* (Vol. 221). The report is based on a recently released preliminary list of more than 35 U.S. volcanoes likely to erupt in the future. The report, by R.A. Bailey, P.R. Beauchemin, F.P. Kapinos, and D.W. Klick, is titled *The Volcano Hazards Program: Objectives and Long-Range Plans* (USGS Open-File Report 83-400, 1983), and it cautions that Mount St. Helens could be "only the harbinger of renewed volcanic activity in the western United States."

Kerr's article describes 75 centers of activity arrayed in linear bands extending from the north-south trend of the Cascades in Oregon and Washington eastward through Idaho to Yellowstone, and south-eastward along the entire California-Nevada border. Another band curls from southeast Utah throughout Arizona and New Mexico.

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**"The interactions** of acid rain, acid soil, and vegetation need to be carefully examined on a watershed basis in assessing benefits expected from proposed reductions in emissions of oxides of sulfur and nitrogen," according to Edward C. Krug and Charles R. Frink. Their article, "Acid Rain on Acid Soil: A New Perspective," appeared in the August 5 issue *Science* (Vol. 221). Krug is an assistant soil scientist at the Connecticut Agricultural Experiment Station and Frink is chief of the Department of Soil and Water and vice director at the Station.

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**The massively destructive** spruce budworm, villain of defoliation outbreaks in every western state except California in the past 60 years, is the object of an accelerated research and development program jointly entered into by the U.S. and Canada in 1977 and now in the fifth year of a six-year charter. A report on the progress of this research — building on 30 years of studies by Federal, State, and local agencies and institutions — appeared in the March 1983 issue of USDA/FS *Forestry Research West*.

The story, by Sam Frear, tells of 300 studies that will be completed by 1984, providing data on budworm populations, damage evaluation, stand dynamics and prognosis, economic impacts, sustained biotic controls, suppression strategies, and pest management systems. A technology transfer working group has concluded that the most effective information base at the end of the program will be a three-volume user's manual. The documents will summarize the basic entomological and host tree research effects on, and guidelines for, protection of individual trees and stands, and the implications of the budworm on a forest and regional basis for forest planning and policy.