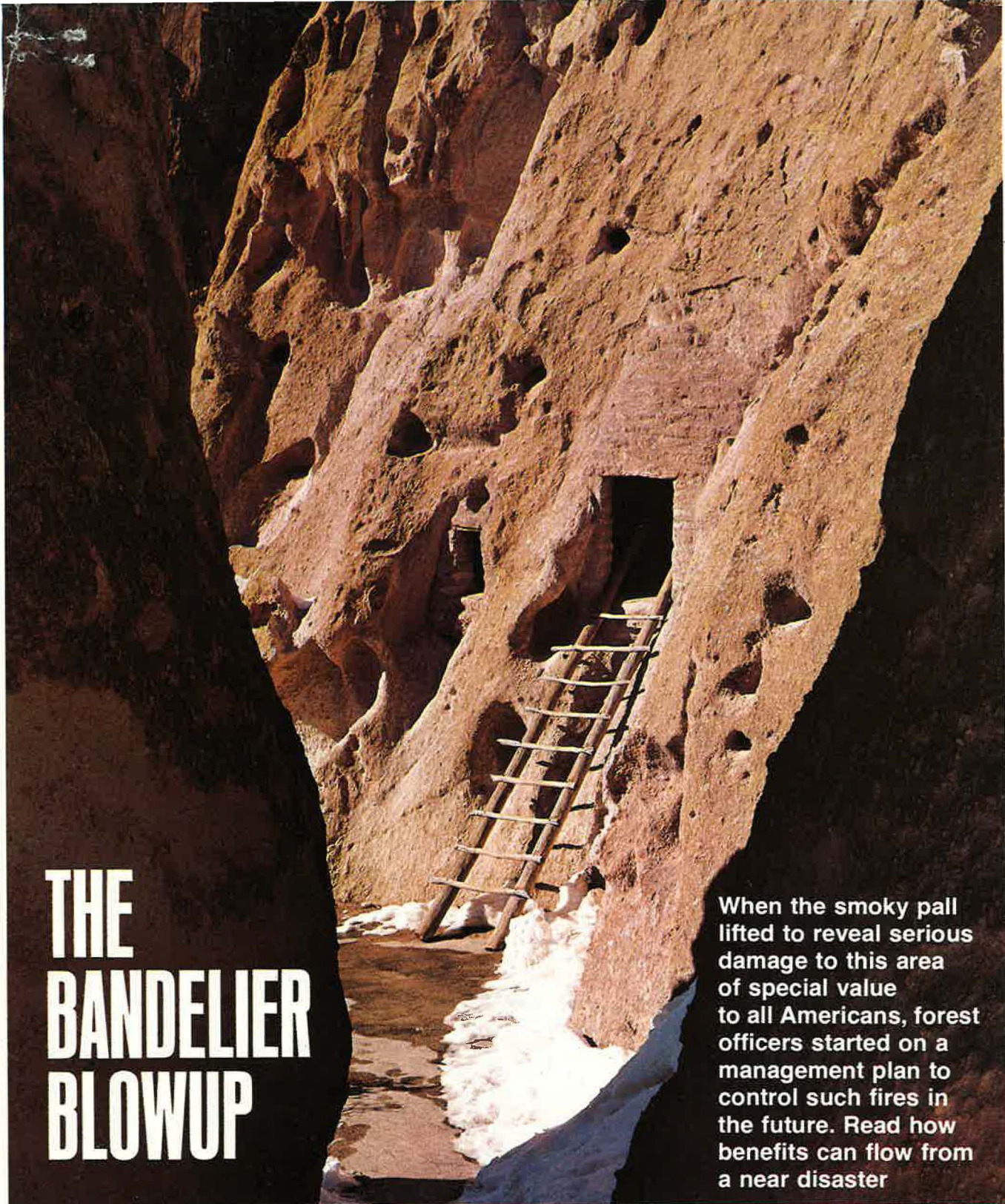


TV



THE BANDELIER BLOWUP

When the smoky pall lifted to reveal serious damage to this area of special value to all Americans, forest officers started on a management plan to control such fires in the future. Read how benefits can flow from a near disaster

Ed Cooper



by John C. Armistead

ON THE AFTERNOON of June 16, 1977—a dry, breezy day—a man-caused fire was touched off in a high, forested meadow called La Mesa, not far from the city of Los Alamos in north-central New Mexico. The fire spread rapidly,

driven along by high winds and low humidity across the pink volcanic mesas that form the Pajarito Plateau of the Jemez Mountains.

Within a couple of days, the fire had blown far from its point of origin in Bandelier National Monument (administered by the National Park Service) to the Santa Fe Na-



State road 4 separates Los Alamos National Laboratory land, on the right, from Bandelier National Monument. Building is part of the explosives testing and storage facility

John C. Armistead

tional Forest (administered by the U.S. Forest Service), onto lands of the Los Alamos National Laboratory (administered by the Department of Energy), and into some privately owned holdings. Altogether, 15,200 acres of forest and other vegetation were burned before a humid air mass moved into the area and produced thunderstorms. Rains and diminishing winds helped the suppression forces to contain the fire by June 23.

One Park Service employee died of a heart attack. Trees, shrub growth, low vegetative cover, and wildlife suffered losses. Fighting the fire was a costly operation for the government agencies.

When fire touched the Department of Energy land, officials were gravely concerned for the safety of the firefighters and the security of the sensitive research done by Los Alamos National Laboratory, one of two nuclear weapons design laboratories in the United States.

The laboratory is north of a state highway adjacent to Bandelier Na-

tional Monument, but the highway corridor was no barrier to the wind-driven flames. They jumped it and headed toward buildings containing explosive material associated with both nuclear and conventional weapons research. The explosives testing and storage areas got some heat from the fire, but there were no injuries to people or heavy structural damage; only a small part of the 27,000-acre laboratory was burned.

Bandelier National Monument, although only a roadbed away from the laboratory land, is worlds away as far as use and purpose are concerned. Established in 1916, the Monument is a rich repository of archaeological ruins, perhaps the largest concentration of prehistoric Indian ruins in the Southwest. It also is popular with hikers, naturalists, campers, photographers, and thousands of tourists; the Monument's attractions and natural beauty are magnificent.

The fire did minor damage to seven ruins in the more remote forests of the Monument, and a few

were damaged by firefighters and bulldozers attempting to contain the flames. Because the fire burned thick brush, Park Service officials later observed that it actually helped uncover some 100 previously unidentified ruins, bringing to 700 the number of known sites.

The area of National Forest and Department of Energy land swept by the fire amounted to less than one-third of the total acreage burned. Ten thousand acres of Bandelier were burned in varying intensities.

The city of Los Alamos, with a population of about 20,000, is but a few miles from the point where the Forest Service, Park Service, private, and Department of Energy properties converge along the rocky, steep, and heavily forested slopes of the Jemez Mountains. Firefighters had to balance concerns for the safety of Los Alamos citizens, the more than 6,000 laboratory employees, sensitive national laboratory structures, the delicate nature of Bandelier Monument, and the beauty and resources of the National Forest and

ARCHAEOLOGY AND LA MESA FIRE

the surrounding private lands.

La Mesa fire was not exceptionally large, according to Ed Collins, the Forest Service liaison officer with the Department of Energy in Los Alamos. Nor was the mix of jurisdictional problems among the agencies involved particularly complex.

But perhaps the uniqueness of La Mesa fire is where it happened and when. It created an opportunity for people to learn a great deal about fire management and fire plans, the preservation of archaeological ruins, the ability of plants and animals to adapt to the burned area, the survivability of certain plants, and the realization by people that the time had come to provide more safety for the residents of the area. The conflagration encouraged better exchange of information and cooperation among the Forest Service and Park Service personnel and the scientists at the Los Alamos laboratory. The Department of Energy, of course, has been part of this improved exchange.

Bandelier National Monument, site of most of the post-La Mesa fire studies, is a plateau furrowed by deep canyons which extend from grassy plains along the Rio Grande (at little more than 5,000 feet elevation) up through juniper, pinyon-juniper, and ponderosa pine to the 10,000-foot-high mountains covered with mixed conifers. The Park Service policy of total suppression of fires at Bandelier for the past 40 years had encouraged many even-aged stands of trees and heavy fuel accumulations—ideal conditions for wildfire to break out in this plateau country susceptible to frequent lightning. And the time and conditions also were right for the design and implementation of a fire-management plan. The Park Service decided to take action in 1975.

Terry Foxx, a fire ecology consultant living in White Rock, a small community near Los Alamos, and Loren D. Potter, professor of plant ecology at the University of New Mexico, received approval of their proposal to conduct the fire-management study, which was to be initiated in 1976 and completed by November 1977. The primary study

(Turn to page 60)

What is the significance of Bandelier National Monument to readers of *AMERICAN FORESTS*? It is a priceless heritage of historic and prehistoric Indian sites. In addition, its diversified forest and other vegetative cover attract the botanist; its wildlife, the zoologist; and its numerous recreational and scenic riches, the recreationist and photographer. But Bandelier is most famous for its wealth of archaeological ruins.

It was named for Adolph F. A. Bandelier (1840-1914), an American archaeologist born in Switzerland. He did research in New Mexico during the 1880s and wrote about the lives of the early Indians.

The intense La Mesa fire which swept through a part of Bandelier National Monument in June of 1977 was especially destructive. But it had one beneficial effect—it provided new study sites for archaeologists. Before the fire, the known number of prehistoric sites was about 600. There are now 700 identified Indian ruins. This abundance of ancient Pueblo Indian dwellings makes Bandelier one of the largest, most concentrated locations of aboriginal settlements in the Southwest.

When the fire burned brush from the mostly buried ruins, archaeologists discovered an additional 100 sites in remote higher elevations of the Monument where the forest is most dense. Inasmuch as the ruins were covered, the fire damaged them only slightly or not at all. But bulldozer operators cutting fire line did destroy several sites. Overall, no significant sources of data were lost, and the archaeologists' efforts to date the new finds were not hampered.

Archaeologists were able to accompany fire crews along many fire lines to look for ruins. Later they made excavations to determine the structures, contents, and ages of the ruins.

They were once settlements occupied about the same time as the other ruins in Bandelier—from about the 12th century to shortly before Spanish exploration in the Southwest in the 1500s. Artifacts, such as pottery and stone tools, indicate that the occupants were the same Indians who lived in the other, well-known settlements a few miles away in the section of Bandelier nearest the visitor center.

To an untrained eye, the scattered blocks of tuff (a form of volcanic rock) among the ponderosa pines might appear insignificant. The archaeologists, however, were able to identify the sites, and Park Service personnel were surprised and delighted to know of the presence of so many more remains of the extinct culture in the Monument.

La Mesa fire burned away thick brush, revealing previously undiscovered ruins

National Park Service



106th Annual Meeting of the American Forestry Association

October 11-14, 1981
Hilton Inn,
Santa Fe, New Mexico

Theme: *Southwest Resources: People, Land,
Water, and Energy in Precarious Balance*

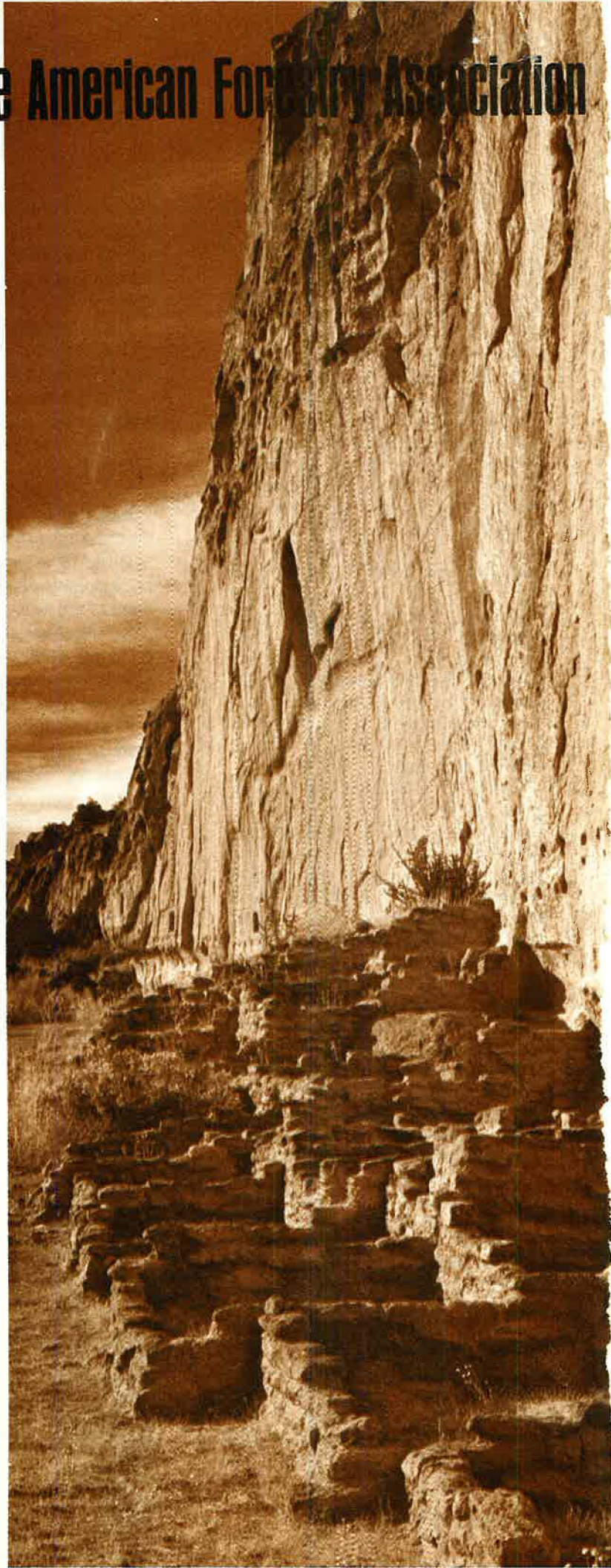
GENERAL INFORMATION

ACCOMMODATIONS: Headquarters hotel for the AFA Meeting is the Santa Fe Hilton Inn, 100 Sandoval Street, Santa Fe, NM 87501. Telephone (505) 988-2811. Rates are \$55 for a single room; \$70 for a double room. Rooms have also been reserved for AFA members at the Inn of the Governors, Santa Fe, NM 87501. Telephone (505) 982-4333 (\$40 single; \$48 double), and at the Inn at Loretto, 211 Old Santa Fe Trail, Santa Fe, NM 87501. Telephone (505) 988-5531. (\$56 single; \$66 double). Both of these excellent hotels are within a short walk of the Hilton. (Please identify yourself as an AFA registrant when you make your hotel reservations.) Santa Fe also has a variety of other hotel and motel accommodations within a short walk or drive of the Hilton. For information, consult your travel agent or write to the Santa Fe Chamber of Commerce, P.O. Box 1928, Santa Fe, NM 87501.

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Bandelier National Monument, Photo courtesy of New Mexico Tourism and Travel Division, C&TD.



The Bandelier Blowup (From page 31)

had six parts: 1) researching the complete fire history of the Monument, 2) correlating the fire history with climatological data, 3) measuring the standing forest biomass, 4) determination of fuel loading in selected areas, 5) estimating vegetation succession from a variety of stands of various ages to determine normal recovery after fire, and 6) determining the influence of fire

upon the growth rates of the dominant tree species.

But before the study could be completed, La Mesa fire swept through the area, burning 11 of 13 previously measured study plots. The fire enabled the researchers to remeasure the plots in the burned areas and draw definite conclusions from actual "experimental" evidence rather than from inference or hy-

potheses of what might have happened in a make-believe fire. Foxx and Potter could not have asked for a more appropriately timed "experiment." They now had excellent before-and-after data upon which to complete their study for the Park Service.

Foxx, Potter, and scientists in the environmental research groups of the Los Alamos National Laboratory (who have done, among other research, extensive studies of migration of deer and elk since the fire) shared their findings about its impact upon many aspects of flora and fauna, and confirmed long-standing ideas about such impacts. The laboratory land is designated one of five National Environmental Research Parks, and scientists throughout the nation have been encouraged to conduct a variety of research projects in the area.

Research in Bandelier and on laboratory property since La Mesa fire has indicated that some grasses and plants are growing better in the burned areas than in unburned areas, a result attributable at least partly to increased soil nutrients and fungal sterilization. Stands of ponderosa pine, the dominant tree in the area, should prosper now that the fire did extensive thinning. The shade-intolerant ponderosa needs such thinning to maximize photosynthetic activity. And the burned areas most likely will provide better seedbeds.

The thicker growth of grasses and shrubs in some areas has increased the browse for deer, elk, and other animals. Meadows in Bandelier show indications of much more winter grazing by elk and deer compared to prefire years. Some of the grass and plants are exhibiting indications of "gigantism," much-enlarged growth, as a result of the fire.

Soon after the fire, grass seeds were spread by helicopter over large areas of Bandelier, Forest Service land, and on selected laboratory study plots. Best germinators among the native grasses so far have been sheep fescue and slender wheat grass. There has been no reforestation yet on Bandelier, although the Park Service has authorized a study, also by Foxx, to determine whether or not planting should be done, where, and how to ensure survival of the young trees.

The problem is that some varieties of grass, including the ones used in

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myriad bird species, including some, like the pinyon jay, that use it exclusively at certain times of year. Pinyon nuts and juniper berries are valuable wildlife foods, and research in Colorado indicates that mule deer often feed extensively on juniper foliage. Heretofore the pinyon-juniper community was viewed only as a shelter for deer, but it apparently serves as an important food source for wintering herds as well.

Livestock grazing is an important use of pinyon-juniper forests. Range scientists say as much as 90 percent of the total pinyon-juniper forest in the Southwest is grazed. However, forage production is often poor because of excessive use by livestock. Because of the relatively mild climate, many pinyon-juniper areas are grazed yearlong. Because thick tree canopies cut off sunlight required for undergrowth, forage production in many places is far from optimal. Shallow, rocky soils on many sites also prevent forage growth, and precipitation is often very light, especially in lower juniper stands.

Because of poor forage production, land managers and stockmen are often at odds over the pinyon-juniper ecosystem. The popular attitude has been, and still is, that the habitat can be improved by converting certain areas to forage species.

Burning has been an important tool in eradicating trees, but conditions must be just right for fire to carry through the crowns. With a strong wind and high air temperatures, however, the pinyon-juniper forest will burn frightfully fast. Lightning-caused fires annually burn off much woodland acreage, and prescribed (intentional) burning is done on public land.

The most common technique in eliminating pinyon-juniper is the "chaining" method. A huge ship-anchor chain with links weighing 90 pounds or more (in one version railroad-track sections are welded across the links) is stretched between two powerful bulldozers, usually D-8s. The machines drag the chain across the forest and level trees as a scythe mows grass. No tree withstands the chain. After chaining is complete, selected seeds are sown on the disturbed area by hand or from the air. Sometimes the bulldozers make another chaining pass in the reverse direction to cover the scat-

tered seed.

From 1960 through 1972, a half million acres were chained in eight states. Utah topped the list with 257,000 acres, followed by Colorado with 93,000, Arizona with 61,000, New Mexico with 46,000, and Nevada with 43,000.

Chaining's results are not pretty, and the technique draws heavy criticism from the public. Unlike clearcuts, chainings produce few or no wood products from the treatment area. The entire operation is accomplished with improved forage as the objective.

Though chainings are prescribed to benefit both livestock and wildlife, public land agencies have been severely criticized for conducting clearing projects largely for the benefit of cattle. Early chainings were done in huge land masses, followed by seeding with crested wheatgrass, the favored forage species. Cows were usually the only benefactors, since deer preferred other browse species and were reluctant to utilize

the large openings where shelter was lacking. Nowadays, however, because wildlife habitat is an important consideration, chainings are designed with wildlife as a priority. Browse species such as bitterbrush and four-wing saltbush are planted to sustain deer herds, and chainings are designed to be esthetically pleasing as well as conducive to wildlife feeding patterns. Smaller chainings are the rule, and islands of trees are left intact for wildlife cover.

Mankind continues to view the huge expanses of pinyon-juniper with mixed emotions, particularly since the forest is aggressive and quickly encroaches on land that will support it. This unique ecosystem will always be an important feature of the Southwest. As we learn more about it, we may come to appreciate it as something other than a lowland stand of trees alongside the highway. I hope so, for it is a marvelous community with a special earthy beauty. It deserves our attention and admiration. ■



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seeding the burned areas, might compete heavily with the seedling trees for soil nutrients and moisture. Small plots of the rich grass might actually have to be removed to enhance survivability of the seedlings.

The Forest Service in 1980 began reforestation on its own land, and in 1981, depending on soil-moisture content, planned to begin planting up to 40,000 trees on Department of Energy land.

Bandelier Monument Supervisor John Hunter notes beneficial changes that have resulted from the fire. "We drew on archaeologists from the School of American Research, the Museum of New Mexico, the Park Service, and from the Santa Fe area for La Mesa fire. But the archaeologists were not used to being on the fireline. We've since taken steps to remedy the situation," explained Hunter.

"The use of archaeologists, trained to operate in firefighting environments, has become a standard procedure for areas such as Bandelier. Park Service archaeologists are being trained in the methods and problems of firefighting, and how historic and prehistoric sites can be protected consistent with fire-control efforts and safety of personnel. Firefighters also are being trained to identify such sites and to protect and save them as they go about the business of containing fires."

The abundant grass in the Monument serves to help protect watersheds as well as provide good forage. Fuel loading (accumulations of dead wood and dangerously thick growth of trees and other plants) has been reduced, and Monument employees have been prescribe-burning selected areas to help reduce the possibility of another fire as devastating as La Mesa. The accumulations of fuel made the 1977 fire extremely hot and damaging.

"We want to try to minimize outbreaks of fire and damage potential. The real danger comes in the often dry summer months, which are our peak visitor months. The Park Service priorities are to safeguard human life, protect park facilities and improvements, and to protect and preserve the archaeological ruins," said Hunter. "Our fire plan is in operation."

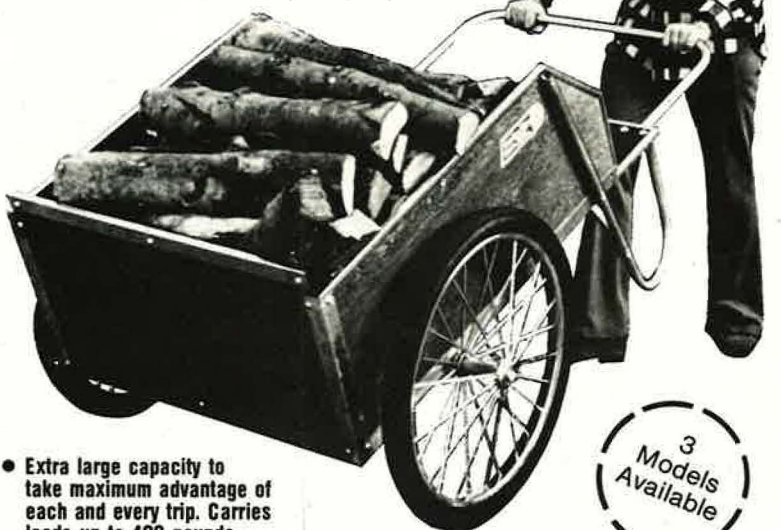
La Mesa fire reduced visitation in the 36,000-acre Monument for a

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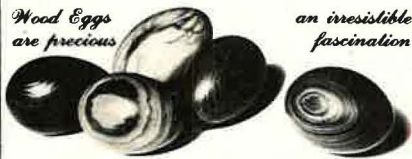
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brief time, as some areas were temporarily closed to visitors. The odor of charred trees and scorched soil still hangs heavy in the devastated parts of the Monument, and hikers are reminded of the high cost of man's carelessness. Park Service officials believe that closing parts of the Monument in extremely dry months is only partly effective. Hikers will penetrate into the backcountry even if it is off limits. The key is to minimize the extent of damage if fire should break out.

"I guess you can't expect everything to get back to normal too soon after a fire like La Mesa," adds Hunter. "The weather before the fire was hot and very dry. After the fire, because of the blackened soil, thunderstorm patterns over some stretches of Bandelier were changed. More heat from the black soil caused more storms and heavy rain, which prompted flooding. The rains and lack of brush in the burned areas led to destruction of picnic areas, hiking paths, and footbridges. We had just spent two years improving all those things."

The rains helped the initial grass-seeding efforts, however, and enhanced the survival chances of many of the plants and young trees. The last major flood in the Monument was in 1978. "You learn to live with trade-offs," said Hunter.

Hunter explains that the Park Service has left the thousands of dead trees standing in Bandelier, whereas the Department of Energy permitted harvesting of the trees burned on its property. "We left the trees to help retain some moisture in the ground and thereby encourage revegetation of the burned areas. The Department of Energy did not have the massive burn we had."

Ed Collins comments that fire-management efforts have been increased by the Forest Service too, as stands of trees and brush have been and are continuing to be thinned in areas along the west (mountain) side of Los Alamos where terrain will permit it. "Some residents are disappointed that trees have to be removed and brush cleared in their neighborhood, but we have a responsibility for the safety of the people and proper use of the forest resources. Without such thinning, the fire hazard would be much greater.

"Had the winds shifted toward town in La Mesa fire and pushed

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flames along the West Jemez Road and up the mountain slopes behind the town, containing the fire would have been extremely difficult, if not impossible," Collins observes. "The firefighters might not have been able to get equipment across the rough terrain to set up fire camps and meet the fire. And the thick stands of trees right behind the houses of Los Alamos almost certainly would have fed the flames and courted disaster."

Although the Forest Service and Department of Energy have cut fire and fuel breaks along much of the west side of Los Alamos and along laboratory property, stand thinning is not continuous. "Either because terrain prevents it, or because some agency other than the Forest Service has control over the land, some areas still are dangerously thick with trees and brush," said Collins.

He adds that a comprehensive plan has been put together by the Santa Fe National Forest so firefighters unfamiliar with the Jemez Mountains part of the forest can refer to the fire plan and get detailed guidance as to how to fight a fire effectively. Many northern New Mexico fire-control crews were fighting fires in other parts of the United States when La Mesa disaster started, and crews not familiar with the area were brought in. "If we had had as complete a plan then as we do now, some aspects of fighting the fire might have gone much better. In fires like La Mesa, we can't afford to waste time or have any confusion in communications or actions. Our fire plan is designed to prevent such problems," said Collins.

The lessons learned, Collins thinks, will be remembered, and the agencies will see to it that better fire management will help prevent another fire as damaging as La Mesa. Fires are not all bad, as long as they are controlled and benefit the forest and its inhabitants. La Mesa fire heightened this awareness among fire ecologists and specialists.

As the tourist drives for miles along New Mexico state road 4, which separates Bandelier National Monument from the Los Alamos National Laboratory, the black skeletons of what used to be beautiful ponderosa pines are a very visible, very sad foreground for the blue New Mexico sky. But mixed with the charcoaled remains are signs of new life. Beneath it all is new knowledge and lessons learned.



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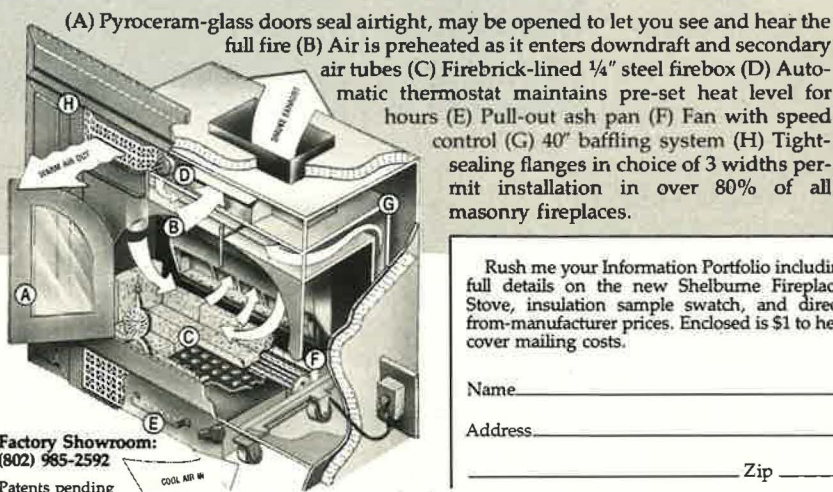
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Saving the Past . . .

(From page 28)

American citizen is its value as an interpretive display or tourist attraction. It may be a well-known developed site representative of an important era in American history, such as Plymouth Colony, Gettysburg Battlefield, or a California mission. Or it may be an equally famous prehistoric site like Colorado's Mesa Verde or Hopewell Mounds in Ohio. Increasingly, lesser-known sites are being developed in order to graphically illustrate a period of history or a way of life.

A recent outstanding example of the interpretation and use of an archaeological site is the Miwok Trail on the Stanislaus National Forest in California. This site illustrates the ancient culture of the Miwok Indians, using signposts placed along a developed trail to explain the Miwok's traditional way of life and the forest environment in which they lived. The Forest Service worked with the local Indians to identify and sensitively interpret important aspects of Miwok life. A 73-year-old Miwok, Brown Tadd, served as on-site advisor and supervisor, teaching Forest Service personnel to build the replicas of the traditional dwellings and sweat lodge which are stops along the trail. He is employed during the summers as interpreter at the site, teaching visitors about Miwok folklore. The Young Adult Conservation Corps was employed to construct the trail. And hundreds of visitors to the Forest view and enjoy the trail while they actively participate in a valuable learning experience.

A future interpretive site has been proposed at Nuvakwewtaqa, Chavez Pass, in the Coconino National Forest in Arizona. This huge site is one of the more important archaeological localities in northern Arizona. It consists of three large pueblos dating between A.D. 1275 and 1400, with subsidiary features that include petroglyphs, agricultural areas, trash deposits, and earlier pit-house sites. Under the preliminary interpretation plan developed by the Coconino, visitors would make reservations for week-long visits to the site. During that time, they could choose to participate in excavation under the supervision of a trained archaeologist, or they could live in the pueblo, learning the skills of the ancient residents from mod-

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