

Burning Questions

Sifting through the ashes for a verdict on Yosemite's 'prescribed burns'

By RICHARD MONASTERSKY

Staffers at Yosemite National Park geared up for throngs of tourists this summer as they prepared to celebrate the park's centennial. For a week and a half in August, however, Yosemite Valley lay unnaturally empty. Severe forest fires, ignited by lightning, had forced officials to close the park for the first time in history.

Only two summers ago, an epidemic of wildfires plagued another precious wilderness area, Yellowstone National Park in northwestern Wyoming. Ultimately spreading through 793,000 acres inside the park, the Yellowstone conflagration sparked a national controversy over the Park Service's view of fire as a vital, primeval force in the cyclic rejuvenation of wilderness ecosystems (SN: 11/12/88, p.314).

While almost all national parks share the ultimate goal of restoring fire's natural role to the greatest extent possible, officials at Yosemite and Yellowstone have developed individualized strategies that reflect vastly different local conditions. At Yosemite, managers routinely burn parcels of the forest — in part to reduce the risk of uncontrollable future fires, and in part to encourage a more natural mix of forest vegetation. Yellow-

stone does not conduct these so-called "prescribed burns."

Fire experts now believe that Yosemite's August infernos, fought from the beginning, could not have been avoided. But the wildfires alarmed many who have experienced the region's awesome beauty, once again drawing public attention to fire-management policies. Park officials, while recognizing the serious disruptions caused by the blazes, see the behavior of these wildfires as an unprecedented opportunity to assess the effectiveness of their fire strategy. Some are pondering the need to intensify prescribed-burning efforts. They are also questioning the feasibility of the program's long-term goal.

"In a way, I think this Yosemite fire is going to be the first real test of the extent to which the program has really made a difference," says David J. Parsons, a research biologist at the nearby Sequoia and Kings Canyon National Parks. This park pair sits along the backbone of the Sierra Nevada about 50 miles south of Yosemite, and all three parks have a vigorous program of lighting intentional fires, with the goal of eventually letting nature's own fire cycle resume as much control as possible.

Prescribed burns represent an attempt to reverse the efforts of previous generations of Californians, who eliminated most natural fires from the Sierra. Between World War I and 1970, government fire crews actively battled any blazes erupting in these forests. Prior to that, white settlers had smothered fire's natural role in the Sierran forests by moving in huge herds of sheep for grazing.

Before sheep tromped through the Sierra, low-intensity fires swept across much of the middle-elevation forest every decade or two, cleaning out dead wood. These frequent burns, usually sparked by lightning or Native Americans, kept the forest open and airy. But the sheep grazed away forest grasses and packed down pine needles on the ground, discouraging low-intensity fires by making the ground cover less flammable. Naturalist John Muir, who herded in this region during his youth, later decried the environmentally destructive impact of sheep, calling them "hoofed locusts."

With fires largely suppressed over the last century, dead wood and needles have accumulated on the ground while middle-aged trees have risen unimpeded toward the forest canopy — the ceiling of leaves and needles formed by older, taller trees. Ecologists fear that these changes have altered vegetation patterns and the mix of tree species, creating a type of forest that did not exist before white settlers arrived. The accumulation of "fuel" has also set the stage for unnaturally severe fires to sweep through.

In recent decades, concern over such shifts—which threaten many other public lands where fires have long been sup-



Courtesy Yosemite Collections, NPS

Flames from the A-rock fire this August spread over the forest floor at night. This blaze, the largest of the 1990 wildfires, climbed up into the treetop canopy at times, killing thousands of acres of trees.

pressed — has forced a revolution in thinking within the U.S. Park and Forest Services. Those agencies, which once emphasized the destructive potential of forest fires with publicity campaigns featuring such symbols as Smokey the Bear, today recognize that the forest can actually benefit from some burning. Within practical limits, park officials now seek to restore fire to its “rightful” place in the ecosystem.

Most of the land in the Sierra parks is high-elevation forest, where fuel accumulates more slowly and granite outcrops break up the tree stands. In this area, the pre-1970 suppression efforts had little effect. Managers can thus allow lightning fires to burn under careful supervision there if the fires meet a long list of criteria designed to protect people and property.

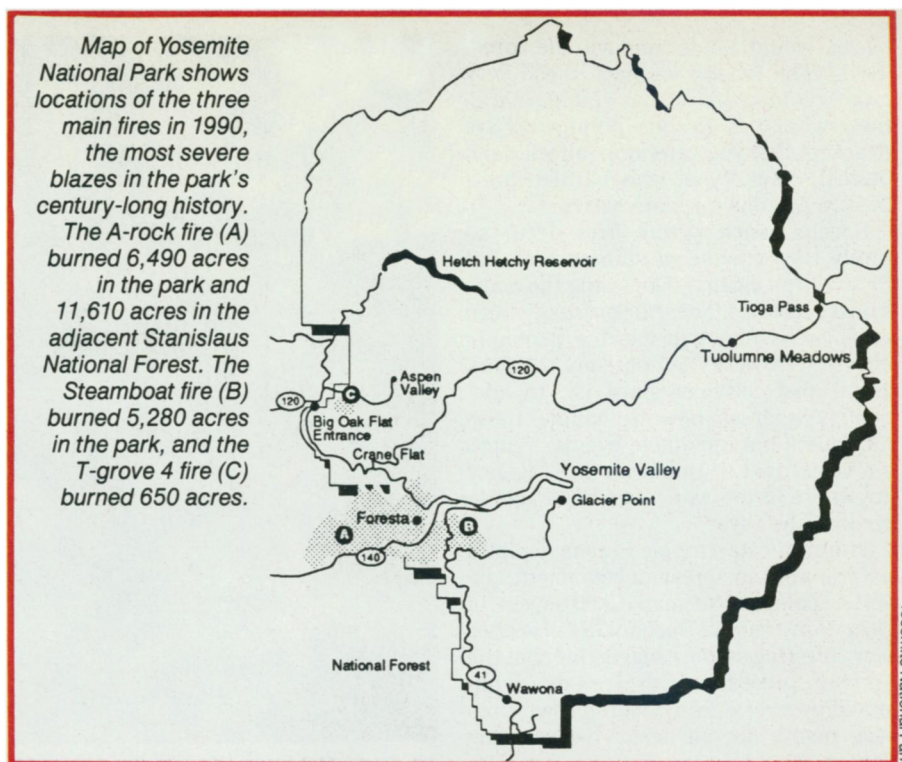
But managers have less latitude in the middle-elevation forests, where unnaturally high fuel levels make the practice too risky during most times of the year. This is where prescribed burns come into play.

Concentrating on small patches at a time, workers light fires to burn the dead wood and needles, and to kill understory trees — young and middle-aged trees that don’t reach the canopy. Over the years, by igniting one or perhaps two prescribed fires in each targeted area, they hope to reduce the forest fuels to a safe level so that future lightning fires can be allowed to take their natural course in these middle-elevation regions, which make up about 10 percent of the Sierra parks. In short, the intentional fires in those areas represent a means, not an end.

On Aug. 7, intense thunderstorms lashed Yosemite’s western edge, sparking more than a dozen blazes. Despite intensive firefighting efforts, several of the blazes grew uncontrollably, destroying the community of Foresta near the park boundary. The largest of these, called the A-rock blaze, burned 18,100 acres before fire crews brought it under control on Aug. 21; another, called Steamboat, ran through 5,280 acres. Together, they swept through about 2 percent of the park.

The fires of 1990 have earned a place in Yosemite history books not only because they scorched a sizable chunk of real estate but also because they burned with a severity that caught many park officials by surprise. “I’ve never seen anything that intense,” says research biologist Jan W. Van Wagten-donk, a veteran of 18 years at Yosemite.

“This is the first really severe year we’ve had in Yosemite in recent history,” adds Stephen Underwood, Yosemite’s fire-management officer. “We have had some severe fires in the past, but nothing with this many acres burned in crown fires.”



Crown fires — among the most lethal forces in the forest — occur when flames reach into the canopy and torch the leaves or needles on the uppermost branches. Most fire researchers believe such severe fires generally did not occur in the Sierran mixed-conifer forests until white settlers unwittingly altered the ecosystem. Before then, they say, flames stayed close to the ground and moved swiftly, earning the name “caretaker fires” because they cleaned the forest floor and killed small understory firs and cedars. Such low-intensity flames rarely killed the old pines or sequoia forming the canopy.

By keeping understory trees generally short, caretaker fires tend to deny flames a path for climbing from ground to canopy. Theoretically, prescribed burning should work in a similar fashion, preventing crown fires by reducing dead wood on the ground and by killing understory “ladder fuel” trees that have risen dangerously close to the canopy during the last century.

That theory has held for all Yosemite fires in previous years. But this summer sprang some surprises, says Van Wagten-donk. In one case, extreme winds descending from a thunderstorm blew across the A-rock blaze with gusts of 60 miles per hour, propelling a crown fire through 2,000 acres of forest that had previously burned during prescribed fires.

Van Wagten-donk, like many other fire specialists, had expected the prescribed burns to prevent such a blowup. “We had all thought that when the crown fire got to an area that had been prescribed-burned, it would drop to the ground,” he recalls. “I had thought that without the

large amounts of surface fuels there, there would not have been enough heat to sustain a crown fire.

“But it didn’t care *what* was on the ground.”

Under less extreme wind conditions, the system worked as in the past: Crown fires lost intensity and dropped to the ground when they hit a treated patch of forest. Without Yosemite’s 20-year history of prescribed burns, firefighters would have had even more difficulty controlling the 1990 blazes, Van Wagten-donk says.

So what’s the verdict? Did Yosemite’s burn program pass its trial by fire?

Van Wagten-donk offers a mixed judgment: “In a sense, yes, in that the fires would have been much more widespread had we not done the burning. But also in a sense, no, because it did not stop the running crown fire.”

The lesson he draws is that no strategy can prevent all such extreme events.

Fire ecologist Kevin C. Ryan disagrees with the idea that the Yosemite fires signal even a partial failure of the prescribed burning program. Ryan, who works with the Forest Service’s Inter-mountain Fire Laboratory in Missoula, Mont., stresses that such treatments should not be expected to provide total protection against intense crown fires. The planned fires can only reduce the risk, he says; a chance always remains that extreme winds will develop and whip wildfires into a frenzy.

Stephen J. Pyne, a fire historian at Arizona State University West in Phoenix, maintains that the only way to protect completely against such uncontrollable

blazes would be to remove the forest itself. "The reason we have these very large wildland fires is that we still have all these wildlands. At some point, you have to accept that you can't stop [all wildland blazes]," says Pyne, who battled forest fires in Arizona for many years.

Because such severe fires occur so rarely, they may seem unimportant. But Pyne warns against dismissing the occasional extremes. These fires usually burn large areas and can exert a profound effect, he says. Pyne contends the Park and Forest Services have yet to adequately address how to handle these infrequent but inevitable events. "That's an issue that I think no fire agency anywhere in the world has been able to resolve," he says.

But even catastrophic fires may play a natural role in forest development, asserts ecologist Norman Christensen of Duke University in Durham, N.C. He cites new tree-ring studies suggesting that the Sierran mixed-conifer forests occasionally experienced severe crown fires long before anyone began suppressing flames.

"People want to look at [the 1990] fires and say that they are unnatural. That's not true. They may be a critical, if not essential, part of the wilderness," Christensen says.

Whether or not intense burns seared the prehistoric Sierra, Underwood acknowledges that he and other Yosemite officials may have to accept that blazes like this summer's will recur. But Underwood doesn't worry about the threat of too much fire. Rather, he is concerned about its general absence in the park.

Over the last two decades, Yosemite's fire crews have conducted prescribed burns on about 28,000 acres, roughly half of the area needing treatment. During the next decade, Underwood hopes to ignite controlled fires in the remaining portions and reburn some previously treated areas. But keeping up with the forests' natural fire cycle would require treating at least twice as much acreage each year as is currently feasible, he says. (Aside from severe financial restraints, parkland burning must be limited to keep from fouling vistas and violating air quality standards.) So, in spite of the program's progress, fuels will still accumulate to unnatural levels and the forest fabric will continue to shift away from its primeval state.

"Ecologically, I think these changes [from the lack of fire] may have a greater impact on the total number of amphibians, reptiles, mammals and plant species than these two fires [have had]," Underwood says.

Reestablishing natural fuel levels at Sequoia and Kings Canyon poses an even



Using a "drip torch" containing a mixture of diesel fuel and gasoline, a Yosemite staffer ignites a prescribed fire.

Courtesy Yosemite Collections, NPS

tougher challenge because 100,000 acres there need treatment. So far, workers in these parks have burned about 25,000 acres.

If practical and aesthetic limitations make it impossible for managers to burn as large an area as they had planned, they will have to settle for a scaled-back program focusing on burning particular areas — such as sequoia groves, which depend on periodic fires to reproduce.

But Underwood says his fire-management program is still in its experimental stage and he's not ready to alter its overall mission until more data come in. "This program has only been in effect 20 years, and we're learning a lot more about it," he argues.

Larry Bancroft, who helps fashion fire policy at Sequoia and Kings Canyon, says the long-term goal there remains one of gradually expanding the area where lightning fires are permitted, to include much of the mid-elevation forest. But he adds that he may not live to see that goal achieved.

With fuel piling up faster than prescribed burning can remove it, can officials at the Sierra parks ever hope to restore nature's original fire cycles?

"That is a nice goal to have, but it could well be unrealistic," says Christensen, who chaired a 1986 committee that reviewed the fire plans for the three parks.

Even if controlled burning succeeded

in returning fuels to a natural level, several factors would still force fire crews to suppress lightning fires in much of the middle-elevation forest. Flames do not respect property lines; they can easily spread outside the park to threaten nearby communities or harvestable stands of timber in adjacent national forests. This means that managers must exercise extreme caution if they allow fires to burn near park boundaries. In addition, the enormous number of tourists visiting the Sierra parks during the fire season will continue to force managers to smother many natural blazes.

Christensen's review panel raised another potential problem: too few natural ignitions. In prehistoric times, lightning fires started in lower-elevation scrubland far outside the parks and then spread up into the forests. Native Americans also sparked many blazes to cultivate grasses that attracted game. With firefighters now suppressing those scrubland fires, Christensen concludes that park managers will always have to light prescribed fires to supplement natural ones.

"It's a worthy goal to try to accept as many natural fires as possible," he says. "But it's unrealistic to say it's going to be possible to eventually just turn this area back over to [the fire cycles of] nature. I think it's important for the Park Service to acknowledge that."

Underwood and other fire managers at the Sierra parks find themselves playing an odd role these days: that of fire salesmen. They are trying to convince the public and various authorities that the parks need to burn on occasion, even though fires produce some smoky side effects that may not square with the desires of visitors or nearby residents. And if Christensen proves correct, the treatment program will have to continue for as long as these wildland forests exist. The only other way to avert a serious fuel buildup would be to allow selective logging within the park.

Underwood remains hopeful that taxpayers will accept more prescribed burning — if not for ecological considerations, then for monetary reasons. The Sierra parks spend about \$30,000 annually on prescribed burning, whereas the federal government poured more than \$13 million into fighting this summer's lightning fires at Yosemite. While it's now apparent that prescribed burning cannot eliminate such severe conflagrations, the treatments can reduce their frequency and make them more controllable when they do occur, Underwood says.

Like Yellowstone's flames two years ago, the wildfires at Yosemite teach that wilderness preservation carries a price tag. Keeping our wildlands means accepting nature's dictum: Sooner or later, these forests must burn. □