
Squaring the Triangle: Fire at San Carlos

By Stephen Pyne

On April 19 2014, a small storm cell passed over the Nantanes Plateau, shedding virga and dry lightning. The next day a fire was sighted among grass and shrubs above Skunk Creek. Two days later smoke spindled up through the pine forest around Bloody Basin. When the fire and forestry staff of the San Carlos Apache Reservation gathered, the Skunk Fire had scooted to 60 acres and the Basin Fire had barely held beyond a snag and scorched ground.

The group gathered around a table blanketed with two detailed topographic maps, exchanging confidences and opinions like a covey of physicians over a problem patient. Where, Duane asked, do we draw the box? Until recently such a question would never have been asked: response to a reported smoke would have been automatic. Both fires would already be out by now, or nearly so, as engines, hand crews, and maybe aircraft attacked it. That was still a live option. Now, Duane, Dee, Clark, Kelly, Bob, Dan, Bear, and later, Nate, poked and pointed and passed questions.

The San Carlos fire cadre viewed the reported smokes less as problems or threats than as complicated opportunities. Though larger, the Skunk held lesser interest. A high-pressure ridge had rolled through since the fire began, raising temperatures and stirring blustery winds. Were the fire primed to burn, it would have reached a thousand acres instead of 60. It was, as its name implied, just skunkin' around and offered fewer options to manage. The

Basin Fire burned, if unsteadily, in country that badly needed burning. Whether this fire, at this time, was the right fire for that job occupied the conversation.

They discussed quietly, each offering thoughts in turn, pointing to the map, pausing often, a conversation of silences as much as of utterances, tracing terrain, searching for consensus, not yet ready decide a course of action, trying to match the fire with landscape features not documented on maps and with purposes not coded into dispatch software, probing like the flames of the Basin Fire as it desperately foraged for fuel. Where might they "draw the box"? They studied old roads, trails, rims and ridges, natural fuelbreaks of any kind. Any roads would have to be improved since lava flakes and basalt cobbles would shred engine tires. They would need to move "heavy iron" in the form of bulldozers and graders to do it, but that too was an opportunity because it would allow them to upgrade their infrastructure even as they reined in the fire. Bear recalled an abandoned trail. Dee lamented that the ideal solution might be the old military road that cut through the Nantac Rim. They traced a contour that, if joined by a handline, could tie two existing fragments together; for that they could use a shot crew, specifically the Geronimo Hotshots, San Carlos' own.

They proposed, in brief, to adapt policy options that allowed fire officers to confine and contain wildfires. They were neither direct-attacking the fires nor leaving them to burn, but loose-herding, boxing-in and burning-out wild fire, and by doing so they were devising a

surrogate for prescribed fire, much as prescribed fire had been promoted as a surrogate for natural fire. In this they were part of a trend throughout the West: the policy was latent in the 1995 federal common policy for wildland fire or for that matter with reforms that dated back to 1968 for the National Park Service and 1978 for the Forest Service. What made San Carlos interesting is that they were applying those permitted principles on a serious scale on the ground. Still, some tension was in the air. The best way to prevent a fire from going bad was to hit it when it started, and operations were instinctively geared to act, not to ponder.

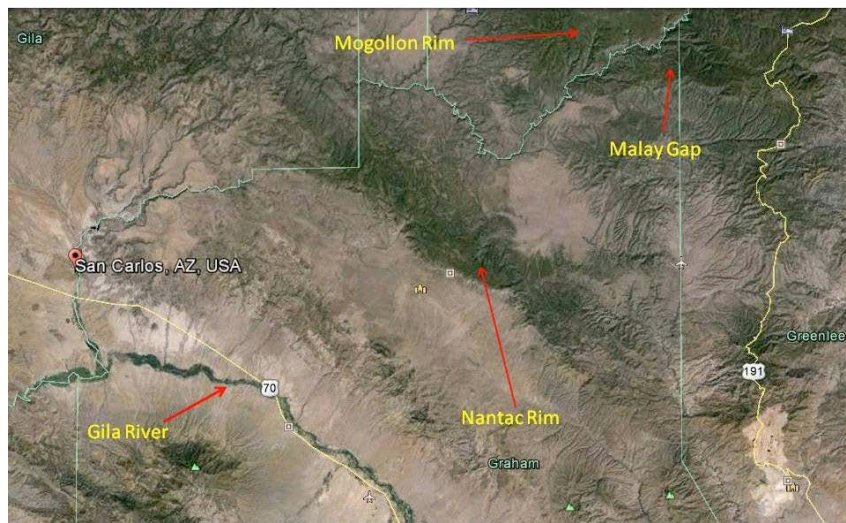
They decided they needed more intel. Two crews were dispatched to each fire to document, locate, take measurements, order a spot weather forecast, and assess the potential for spread. A grader was noted, parked not too far from the Basin fire. A bulldozer, now in the shop, would be dispatched before the morning was out. Another weather system, more powerful, was forecast to rumble through in another day, perhaps with rain, certainly with strong winds and a drop in temperature. It would determine if the Skunk could do more than scuttle through scrub, and if the Basin could burn through the forecast evening frosts. Today's intel and the coming front would decide. For now it was enough to confine and contain.

If the fires survived, they would move from statistics to operations. They would go from a threat to an opportunity, from sand gagging the gears to a lubricant. Their management became interesting in the same way that radio-tracking a

bear is more interesting than killing it. Instead of automatically responding to chance ignitions, fire officers could manage by choice. That Easter Sunday weekend the resurrection of free-burning fire on the San Carlos was underway.

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The San Carlos Apache Reservation sprawls, crudely gerrymandered, over 1.8 million terraced acres and many millennia of terraced time.ⁱ



Satellite image of the San Carlos Apache Reservation. Modified from Google Earth image.

Geologically, it presents a series of landscape steps crusted and filled with volcanic outflows. Each terrace replicates and lowers the one above, until the coherence of the rims and plateaus fragments into isolated peaks and valleys. The highest terrace is the Colorado Plateau in the northeast, edged by the Mogollon Rim; its lowest point, the sky islands and valleys of Basin Range to the southwest. The highest terraces are flat and filled with basalt. The lowest valleys are stony pediments, sinking into the floodplain of the Gila River.

Ecologically, the terracing appears as roughly contoured life zones. The Mogollon Rim boasts a robust ponderosa pine forest,

grading into mixed conifer. The middle terrains are mixtures of woods and grasses; the basaltic terraces range from prairie to high-desert grasslands. The lowest landscapes are Sonoran desert, degraded into creosote. About a third is woodland; a quarter, grassland; a fifth, desert; some 13 percent ponderosa; and the tiny remainder, human communities of some kind.

The heart of San Carlos is the Nantac Rim, a miniature of the Mogollon Rim, slashing through the middle of the reservation from northwest to southeast. Along it, ponderosa pine flourish, while the terraces that flank it are grasslands—Big Prairie to the north and Antelope and Ash flats to the south. Near its center lies Point of Pines, where a stringer of ponderosa reaches into Big Prairie. It rests at a kind of eco-librium mid-point for rock, biota, and human history.

The human history, too, appears layered, terrace by excavated terrace. In part, this simply reflects the source of the evidence from archaeological excavations, digging down through layered culture upon culture. Instead of cascading across space, eras pile one on top of the other. But people have actively made terraces as well. Ancient agriculturalists terraced hillsides to hold soil and water, 20th-century mining terraced whole mountains to strip off ore, and archaeologists reversing the process have pulled back layer after layer by terraced pits.

Yet, a great fact of the reservation is that it runs cross-grained to that texture of time and space. Drive from San Carlos, the tribal headquarters near where the San Carlos River joins the Gila, to Point of Pines, its operational core, and you pass through Sonoran lowlands up through the foothill-flank of the Gila Mountains to the Antelope and Ash flatlands, rich with high-desert grasslands, and then through Barlow Pass over the pine-clad Nantac

Rim and onto the sweeping plains of Big Prairie. Continue from Point of Pines to Malay Gap, and you rise through a lesser plain, clothed with juniper savanna, and up to the Mogollon Rim itself. Unless you follow the Gila River, to move around the reservation is to step up and down terraces of some sort.

So it is with San Carlos history: it moves in jumps and over barriers rather than along worn pathways or the meandering floodplains of mainstream narrative. Peoples come and go, sometimes abruptly, the strata of eras piled one on another. But as they cross the grain of place, they can pick up quirky and unexpected adaptations that can evolve into telling traits. That cross-texturing of land and history has created nooks and niches with unexpected outcomes that can hold larger, even national significance. This has happened more than once in the past. And it seems to be happening to its wildland fire program today.

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Its setting is classically southwestern. That means the scenery is broken with peaks, plateaus, valleys, gorges, amid an arid to semi-arid climate that leaves its rocky exoskeleton starkly visible. It means its history is full of sharp human entries and exits. And it means there is plenty of fire.

The broken, terraced terrain; the mixed, middle biomes between valley desert and mountain forest; the annual rhythm of spring drought followed by summer monsoon—all are ideal for sparking fires, frequently by dry thunderstorms. San Carlos averages roughly a hundred such fires annually, with some years showing much less and some far more, and it stands close to the epicenter for lightning fire in North America. If it were a pond and you tossed a stone at Nantac Rim, the resulting ripples would align roughly with the density isolines for naturally ignited forest fires. Like

the landscape, its fires burn patchily. In the past, the land burned from the sheer numbers of starts, and when dry years followed several wet ones, from lingering fires that could creep and sweep over many weeks. Only central Florida approaches that intensity of natural burning.

The record of fire is continuous; the chronicle of people, less so; and how they interacted, almost unknown. The terraced history exposed by archaeology begins with an Archaic culture of big-game hunters and foragers. Then, corresponding roughly with the rise and fall of the Roman empire, a Mogollon culture appears and continues until the mid-15th century. The Mogollon exchanged not only goods but styles of pottery and housing, and no doubt other ideas, with the desert Hohokam to the west and the cliff-dwelling Anasazi to the north. The Anasazis began migrating into the region during the 10th century; by the 11th, as Europe commenced its cycle of crusading, they were dominant, and clusters of pit houses became suburbs to Anasazi complexes. Then, suddenly, they all—Anasazi and Mogollon both—vanished during the 15th century. When the westernmost bands of Apache began filtering through the landscape, sieving through mountains and mesas from the Great Plains, perhaps a century before the first Spanish *entrada*, they passed through a landscape of ghosts. The chroniclers of Francisco Vazquez de Coronado in 1540 called the land a *tierra despoblada*, a place abandoned, a land emptied of people. The small bands of Apache

hunter-foragers still dribbling into the land seemed to melt into the scenery.

For a millennia, however, from 400 AD to 1450, the human population had been sufficiently dense to carve agricultural terraces and erect stone pueblos. How those cultures affected the prevailing fire regime is unknown: the earliest fire-scarred trees come later. But deal with fire they had to, because it was all around them. When they left, whatever lines and fields of fire they established fell into ruin as fully as their kivas and apartment houses. Until the Apache established themselves, the land went feral, and the abundant sparks of nature reclaimed and remade the scene. Until Europeans arrived, or more significantly, until the modern era that followed Mexican independence and then the Mexican War that ceded the region to the United States, the characteristic fire regimes were those negotiated between the light-on-the-land Apache and the heavy rhythms of lightning.

Ethnographers and ethnobotanists are adamant that the Apaches did not burn widely: they didn't need to. What they wanted from the habitat—edible wild grasses, game animals, shrubs for baskets, many dependent on routine burning—they got freely from a land drenched



*Aerial view of the 2014 Skunk Fire as it burned along the Nantac Rim.
Photo: Dan Pitterle*

with flame. They burned some horticultural plots for special crops, they burned patches (some large) to attract preferred fauna by greened-up pasture and fly-retarding smoke, they burned during raids to alarm enemies and to cover tracks, and they undoubtedly left fire as litter. But human numbers were small, fire numbers large. The Mogollon peoples had sculpted surface lava into stone villages; the Apache assembled shrubs and twigs into wikiups; and so with their fire regimes. There are plenty of peoples of comparable technology—many Aboriginal bands in Australia, the congerie of tribes in California—who burned both meticulously and extensively. The existing evidence suggests the western Apache did not.ⁱⁱ

Their primary contribution to the region's fire regimes was not to add ignition so much as to remove barriers to fire's free propagation. Specifically, they stalled the spread of European livestock. Instead of raising flocks and herds, they let the missions and Mexicans do it, and then raided them. It was only after the Apache wars sequestered the remaining tribes onto reservations in the late 19th century that livestock exploded and the regional fire load crashed. Across the Southwest the slow-combustion of cattle in particular beat back the fast-combustion of open burning. The break in fire history is as abrupt and distinctive as the abandoned dwellings of the Mogollon and Anasazi. Like the Apache, free-ranging fire retreated to reservations or isolated locales spared the general crush of cattle.ⁱⁱⁱ

San Carlos was first gazetted as a reservation in 1872 and became a collective for various Apache bands that had little in common save

their language. The Yavapai, the Tontos, the Chiricahuas, and fragments of other bands of the western Apache were rounded up like mavericks and put into a common corral. The experience was wrenching. Most had no ties to their new estate. They had no cultural continuities that could bond them to the land. The old ways often had little value: they would have to rebuild a new culture, find new stories to pass on their inherited wisdom, relocate from their sacred mountains to the desert hills of San Carlos' lowland administrative post. The unsettled demography and scrambled culture meant that whatever fire practices they had known in the past would have to be reconstructed in a setting over which they did not control the basics of their existence.^{iv}

The gathered groups were fed ration beef, and then granted cattle to slaughter or raise. It made sense to grow the beef on site, so herds came to San Carlos itself, as throughout the Southwest, although most arrived through trespass from herders outside the border. Some order was instilled by establishing a leasing system for the Anglo ranchers, which continued until 1933 when the tribe began reclaiming control. San Carlos' flatlands were prime grazing land, and the herds were large; the resulting ranches were among the last driftwood deposited from the storm surge of the Texas cattle industry; and here, like nearly everywhere, abusive overgrazing was the norm. A ruinous cattle rush that had degraded landscape after landscape in the American West came to the desert grasslands, forest savannas, and high prairies of San Carlos. The fire regime that had prevailed for centuries, however modified by the Apache, was eaten and trampled away.^v

At the same time notions that fire ought to be actively suppressed added to the pyric loss. The Bureau of Indian Affairs developed forestry programs to promote timber industries, and foresters at San Carlos did what foresters everywhere did: they fought fire. Between intensive grazing and active firefighting, the lavish ignitions could no longer roam with the insouciance of black bears or the free flow of the wind. Increasingly, the land became, for fire, a *tierra desplorada*.

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The BIA established a branch of forestry in 1910, but it was not until the reforms of the Indian Reorganization Act of 1934 that San Carlos felt its presence. The CCC added muscle, committed to fire control as much as to erosion control, building fire roads and towers as they did rock check dams. The tribe began reclaiming ranching leases and looked to forestry to enhance its economic development. In the 1950s commercial logging developed. The postwar era set San Carlos on the path that led, ultimately, to the April 23 briefing.^{vi}

Its foresters were conscious that they managed tribal lands "in trust" and accordingly transplanted the prevailing practices of their day to San Carlos. But even as modern forestry arrived, its norms were being challenged. When he came to Arizona in 1948 as regional forester for the BIA, Harold Weaver gave voice to the concern that fire exclusion was disrupting the land as fully as the overgrazing that



San Carlos Apache firefighter trainees for the 2014 season. Photo: Dan Pitterle

accompanied it. He also discovered that parts of San Carlos had apparently been spared.

He found in Malay Gap, along the Mogollon Rim, at the far northeastern corner of San Carlos, a place that seemed relatively unscathed by hoof, ax, or removed flame. There, fire-scarred ponderosa suggested that surface fires had returned at least every seven years over several centuries and had bequeathed a forest so magnificent that "it is hard to see how she can be much improved on." The fire challenge at San Carlos was to propagate that old regimen of burning, not to find better ways to knock it out. Weaver urged controlled burning of the sort he had helped pioneer in the Colville and Warm Springs reservations of Oregon and which Harry Kallander, north of the Black River at Fort Apache Reservation, was introducing. But just as simply removing cattle dramatically unburdened the land, so ceasing to suppress the fire that nature so lavishly strewn about the landscape, would help. In fact, lack of resources meant that places like Malay Gap could perpetuate something like the old ways. Major burns had washed over Malay in 1943 and 1946, just prior to Weaver's tour.^{vii}

Mostly, though, prescribed fire meant burning the slash generated by the emerging timber program. Instead of adopting the Weaver agenda, San Carlos committed to fire control, which paradoxically acted not as a drain on the tribal economy but as a stimulant. The San Carlos Apaches heavily staffed the Southwest Forest Fire Fighters (SWFF) program, fielding as many as 800 men a season. Those paying jobs were a significant source of otherwise scarce income; they did for the feeble money economy of the reservation what migrant farm labor and remittances did elsewhere. At the same time, San Carlos forestry built up its own suppression infrastructure. It acquired engines. It erected lookouts and founded an aerial reconnaissance operation. It built a modern radio network. It developed a spider web of fire roads. It had access to bulldozers and airtankers. It built a fire camp at Point of Pines, complete with a helitack crew. In 1991 it founded the Geronimo Hotshots, over which the tribe assumed control in 1996. Prescribed burning was mostly limited to activity fuels, which is to say, logging slash.

Even as reforms swirled in the convective plume that promised a national fire revolution to reinstate fire, a trend with which its natural and ethnographic history would seem to align perfectly, and for which Harold Weaver had become a prophet, San Carlos hardened its commitment to serious fire suppression. The 10,000-acres Black River wildfire of 1971, not a scheduled prescribed burn on Ash Flats, defined the thrust of the program. In 1972 Tall Timbers Research Station sponsored a field tour to San Carlos and Fort Apache reservations, with Weaver among its company, and noted that any attempt at prescribed burning was failing to keep pace with the wildfire threat; the failure to install a vigorous fire restoration program would only lead to more blowouts. Yet it was a hard choice. Fire suppression was the national norm, and if

nothing else, firefighting meant money. Its crews were one of the few exports the tribe had. Big burns brought in big bucks, and while prescribed burning and managing wildland fires would still hire crews, one of their objectives was to reduce dollars spent.

The 2000 National Fire Plan funneled more funds toward equipment and fuels.^{viii} But it also required a plan. The plan would have to reconcile fire practices with land use, which is to say, the forest management plan (and environmental assessment, and Tribal Strategic Plan), but also with reformed national fire policy, first articulated in 1995, and then reaffirmed in 2001. One of the difficulties with those policies was that they encouraged and made possible an active program of fire restoration but did not mandate it. Instead of seizing on the possibilities proposed in the 1995 policy, San Carlos had taken over the Geronimo Hotshots. After 2001, however, the latent prospects of policy met the right personalities, the tribal council expressed interest in more traditional attitudes toward their natural estate, and the resulting Wildland Fire Management Plan of January 2003 announced a new era.^{ix}

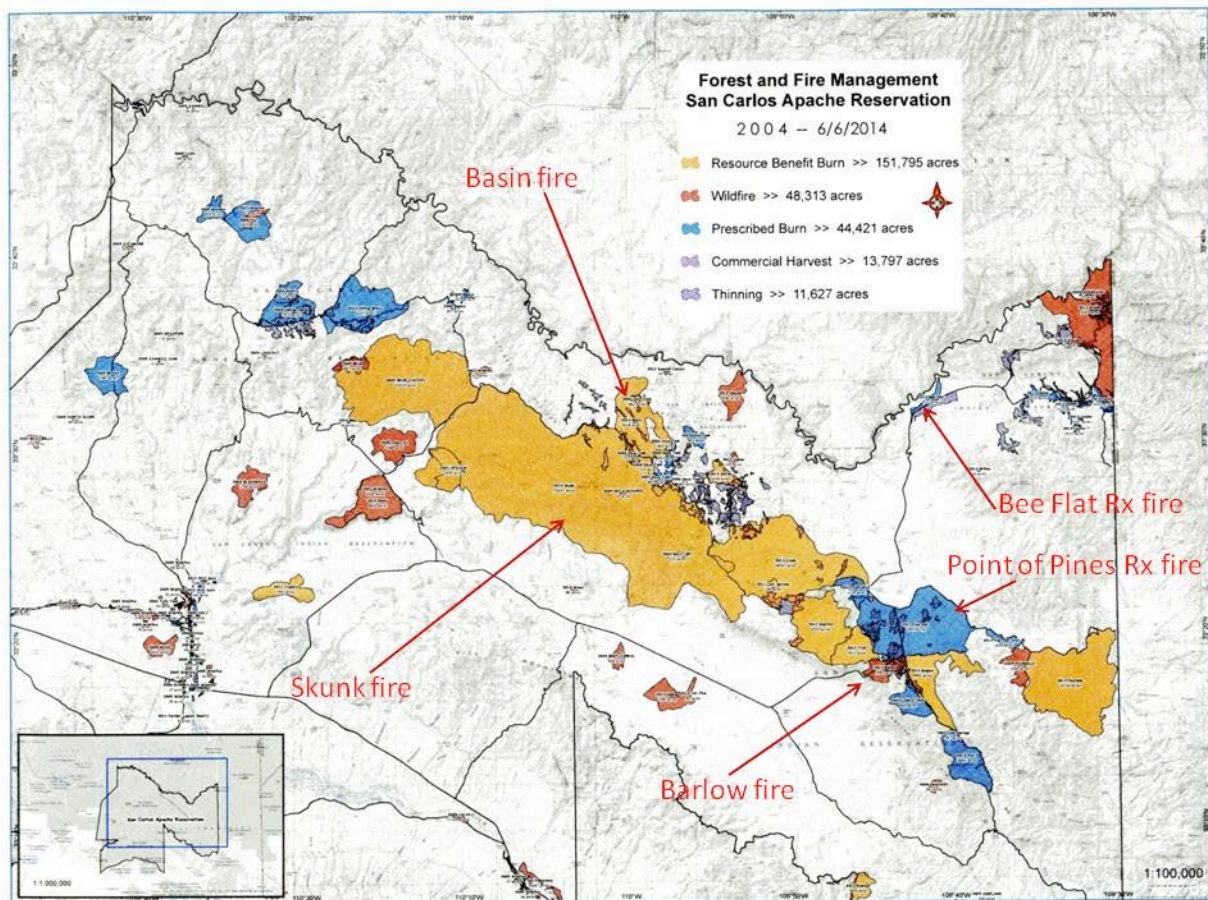
The fire program picked up the pace of slash burns, but quickly appreciated that more was needed. If fire spread is a question of surfaces, fire management is an issue of edges. The more surface relative to volume a fuel particle has, the faster heat and moisture transfer, such that small fuels burn more readily than large ones. Similarly the more edge relative to area a burn plot has, the more complex its control. The fire program burned 600 acres at Baskin Tank in 2006, and 2,500 acres at Dove Tank; but even amid logging slash or chained juniper, approval could take several years and cost serious dollars. And they were only treating new fuels they created, not landscapes. The San Carlos fire

program had to enlarge the size of the sites beyond individual plots and quicken the tempo of treatments.

Most clustered along the Nantac Rim. Beginning with reconnaissances in 2005, and plans in 2007, they turned to the Hilltop region. Between 2008 and 2010, with help from aerial ignition, they burned off three big blocks that added up to 14,000 acres. In 2009 they confined-and-contained the 20,000-acre Bear Canyon Fire, even as they attacked 45 new starts. In 2011 the Maggie Fire added another 5,000 acres. In 2012 the Trail and Shorten fires brought in 8,000 acres more. Managing fires in this way reduced costs by an order of magnitude. Meanwhile, like the rest of the Southwest, bleached by a long-wave drought,

wildfires blotched woodlands north and south of the rim on the order of 500–4,000 acres.

Then came 2013. Early on they set three prescribed burns, a few thousand acres each in woodland savanna, along with the complex 13,000-acre Pine Salt burn around Point of Pines. The wildfires arrived on schedule. An "annoying" fire burned through salt cedar near Bylas along the Gila River. Two fires broke out in the high country. The Fourmile Fire burned toward the reservation's eastern border through a "scabby transition zone," not easily attacked nor worth risky suppression. Fire managers backed off to roads or barriers, burned out, watched, and otherwise confined and contained. The Creek Fire on the north flank of the Nantac threatened the Dry Lake Lookout



Fires and other forest treatments on the San Carlos Apache Reservation from 2004 to 2014. Note the cluster of fires along the Nantac Rim. Courtesy: San Carlos Apache Forestry and Fire.

and RAWs unit, some commercial timber, and Point of Pines; but even in the height of fire season, there were options other than going toe-to-toe, and fire operations backed off, burned out selectively, used previous burns as cold trails, called for some air strikes near developments and canyons where the fire might bolt, and generally herded it to good effect. Though its fire behavior specialist, Bil Grauel, then handling the wildland fire decision support system for the burn, complained to Duane Chapman, fire management officer and former superintendent of the Geronimo Hotshots, that he "couldn't model the damn thing if he [Duane] was going to herd it all over the landscape." The Creek Fire put 18,000 acres into the black. That year San Carlos had the largest fires in the state. What Grauel said about the Fourmile Fire epitomized the season: "Along with the fire, they decided that 14,000 acres was about right." That statement's odd phrasing, and the attitude it conveyed, could stand for the program.^x

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Fire management at San Carlos is under the Mogollon Rim and under the national radar. Like all programs it has its liabilities and its assets. How they balance says a lot about how the program actually looks on the ground.

The liabilities are numerous and obvious. Many, like patchy support, are shared by all fire organizations, and like metastasizing juniper woodlands, by those throughout the western U.S. Some, like short-changed funding relative to federal neighbors, belong to reservations and the oft-poisonous co-dependency between tribes and the Bureau of Indian Affairs. A few are specific to San Carlos. The tribe's instincts to turn inward into a kind of cultural as well as economic autarky. The long reliance on fire suppression as a seasonal revenue stream. The lack of Apache traditions for landscape-scale

burning. The attitudes of neighboring landowners more cautious about free-ranging fire and far-reaching smoke. The collapse of the SWFF program as trainees failed physical and drug tests. The way social pathologies seem to channel into land degradation.

But the program's assets may be greater. Over the past 20 years, livestock numbers have shrunk dramatically, and today are perhaps 20% of what they were previously. That has freed up grass to carry surface fire. Tribal autonomy allows it a freedom to maneuver not available to the national forests to its east, west, and south. The lack of major cities, or even exurbs, means the interface is a minor concern. If Apache culture lacks traditions of burning, it also has a tolerance for allowing natural processes to work their own destinies, which can translate into flexibility in handling the fires nature starts. A small timber program means the tribal economy can absorb some burned stands as a price of building resilience into the land and preventing savage wildfires; reduced cattle stocking means it can accept burns that take away winter range. The land is so fire-sated naturally that reform does not depend on fire lighting; it's enough to modify fire fighting. Even isolation and lack of attention has its merits. If insularity means San Carlos doesn't get much outside support, it also means it doesn't get much outside scrutiny.

It means San Carlos lives for the present in a sweet spot. It can do things its neighbors can't. It can turn its relative poverty into a wealth of opportunity. It can replace ever-more-encumbered prescribed burning with hybrid fires in which burnouts and free-burns from natural ignitions fuse. In the past, decisions about fires were boxed in by the demand to suppress them as quickly as possible. Now starts like the Skunk and Basin fires allow fire managers to draw their own boxes. That grace period won't last, but it grants San Carlos a time

to stabilize its program so that, when something does go wrong, as it inevitably will, its fire program will survive.

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On 6 June 1946 Emil Haury of the University of Arizona, one of the premier archaeologists of his day, was busy erecting a field camp at Point of Pines, what would become over the next 14 years a celebrated summer training site for students of southwestern archaeology. At noon he received a call from Paul Buss, the San Carlos forester, with a request to aid in fighting a fire at Malay Gap. "An unwritten law in the wilderness country," Haury sternly noted, "says that when the forest begins to burn, all able-bodied men must pitch in to help bring the fire under control, no matter what they are engaged in at the moment." Six members of the company made the trek to Malay, "about as remote as any place could be."^x

Amid a "totally strange country, extremely rough, and heavily timbered," Haury and his students struggled to cut line during the late afternoon. One student found himself trapped in a "fire circle" and barely escaped with his life. That night, with aching muscles, they struggled to sleep while immersed in smoke "from which there was no escape." The "eeriness and gloominess of the situation, the crashing of burning trees, the sharp riflelike cracks of exploding rocks around us, and, the next day, faced by a roaring wall of fire racing up the hill to our temporary camp, were enough to sear the words *forest fire* deeply in any mind." Meanwhile, several score Apaches on the scene exhibited "no special concern." Without strong direction, the archaeologists "lost heart" and asked to be released. From Point of Pines they could watch the smoke billow up for some days, apprehensive and grateful that it was so far away. "I will say," Haury concluded, "that

no baptism by fire, literally, was ever more exhausting and frightening."^{xii}

What happened that inaugural summer was repeated in the years that followed more often than Haury wished. He came to view fire as a serious inconvenience. In 1950, the group was called out "frequently" to lightning fires, which "sorely interrupted" their work schedule. In truth, fire became the secret catalyst for some of their major discoveries. They tracked the history of the built landscape through hearths. They traced the historic mingling of peoples through cremations. In 1950, that summer of fire, they followed gopher mounds to charcoal and carbonized corn, which led them to "the very thing we were looking for," evidence of a "conflagration." Charcoal is nature's great preservative. When they excavated a pueblo with 20-plus rooms burned, they had a mother lode of how the Mogollon culture lived, what they ate, and when they flourished, and in the form of scorched skeletons who they were. The next summer they attended fire school, had even more call-outs for fires, and at one point had to devise evacuation plans. Fire good, fire bad—student archaeologists were learning the real lesson of Point of Pines.^{xiii}

They uncovered some startling finds. In the 13th century, the Mogollon and Anasazi cultures had met in an awkward mingling and occasional fusion best exemplified by the emergence of a square kiva. The kiva was Anasazi; the squared corners, Mogollon. The square kiva came to stand for the prehistoric world of Point of Pines, and it might foreshadow the modern world of fire management there as well. Kivas come in circles; fire, in triangles. The Mogollon built out of rock, the moderns out of the triangle of ingredients that make fire—heat, oxygen, fuel; terrain, vegetation, weather; fire lit, fire fought, fire herded. Prehistoric San Carlos managed to

square the circle of their times. Contemporary San Carlos is squaring the triangle of theirs.

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As the Mogollons rendered an idea into stone, so San Carlos fire must transfigure its innovations into institutions. It has happened before. Twice, in fact, San Carlos has succeeded in transforming a mangled scene into a model system.

The first involved the wreckage of its heritage of free-range ranching. In the 1930s, as the tribe began reclaiming leases, it also became the site for the first national experiments in artificial insemination under John Lasley of the University of Missouri. The numbers of scruffy stock came down, the quality of the remaining Herefords went up. By the 1950s a model ranch, the R100, combined breed improvement with range management on Ash Flat under the direction of the University of Arizona. Meanwhile, Emil Haury helped turn generations of free-range pothunting into an academic discipline, and underwrote an archaeology suitable for a research university, again the U of A. Its peculiar isolation made San Carlos reservation ideal for both purposes.^{xiv}

Now it may be fire's turn. Abusive practices—in this instance, fire exclusion—are being transmuted into an exemplary exercise in fire restoration. The old Point of Pines fire camp, once a high scorch-mark in the era of fire fighting, could be remade into a training ground for fire lighting. The Prescribed

Fire Training Center in Florida has as its motto, Every day is a burn day. Active prescribed burning is far trickier in the West, but San Carlos doesn't have to wait for the cumbersome protocols of fire by prescription. The land is sated with natural ignitions that only need to be brought under a system of management. San Carlos doesn't have to rely on fire lighting to reinstate a more resilient fire regime. It need only modify its acquired habits of fire fighting.

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It's hard to predict the future.

The staff at San Carlos focused on the more interesting Basin Fire. They drew the box, and the contours of their burnout looked for a while like a folding protein as it absorbed old prescribed fires and patches of wildfire before stopping at 6,018 acres. When weather moderated about a week after Easter, the staff ignited the 1,228-acre Point of Pines prescribed burn to clean out thinning around the camp before rotating those crews into the 524-acre Bee Flat burn to restore juniper savanna. A wildfire started at Willow and was suppressed at 21 acres. Another started in grassy scrub at



Crews brushing out on the Skunk Fire. Photo: Dan Pitterle

Rimrock and was boxed in at 1,826 acres. The Barlow Fire broke out along the main road through the Nantac, burned hot, and was fought hard to a tough 1,483 acres. And the Skunk began to move.^{xv}

It was 30 acres at the end of April, and 80 on May 11. Then a mild cold front passed over and strong northers pushed the fire to 1,822 acres and put flame on the grassy plains to the south of the Nantac Rim. Here it found a fuse it could burn along while prevailing southwesterlies could drive it onto the rim. The fire was filling in a long blank spot in the need-to-burn map of San Carlos. From the 11th to the 21st the Skunk Fire rose and fell, making daily runs as high as 6,336, 9,248, and 4,254 acres. The San Carlos staff ran along beside it, using roads and burnouts like drovers holding a stampede. They put a crew in to prep a repeater station before the flames arrived. The fire front continued to spread, unusually for the Nantac, to the northwest. San Carlos called for a Type III short team to help with logistics, although the newcomers had to be constantly educated into what San Carlos wanted (and didn't want, an expensive air show). They thought Kidde Creek might hold the progression; it didn't. They continued to burn out along 1500, the main road along the rim. They downsized to a Type IV crew, used some helidrops to help hold the burnouts and called in some retardant from small airtankers. On the 27th the fire rushed over 4,879 acres before pausing. At Rocky Gulch they pinched off the front and began burning out the interior with aerial ignition. That accounted for the last big burn—14,087 acres on June 2. The fire perimeter now ranged over 92 miles, roughly 22 miles long and 8 miles wide. When the smoke settled, the Skunk Fire had blackened 73,622 acres and tied in with the 2009 Bear Canyon and 2004

Upshaw fires to the northwest and the 2013 Creek Fire to the southeast. The summer fire season—with its normal dry-lightning fire busts—was still weeks away. Staff were already wondering how to handle the reburns that would be essential to turn a spate of fires into a functioning fire regime.^{xvi}

Meanwhile, lightning had kindled the Black River Tank Fire along the border with Fort Apache reservation. Fort Apache tried to emulate the San Carlos strategy, but instructions were confused, and an air attack operation saturation bombed to hold the burn to an expensive 3,244 acres. What San Carlos had accomplished depended on the dynamics of its people, not just the dynamics of fire burning through pine, juniper, and grass. Fire behavior is fire behavior and universal, but behavior towards fire is specific to cultures and not transferable with algorithms. Box and burn is not a simple tool, like a Neptune airtanker or a D6 caterpillar that can be dropped into any landscape. It is a negotiation between fire and fire managers. Like all things human it has to be learned, but unlike many it is not something easily taught.

Steve Pyne

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- ⁱ Useful background information is available in Dan Pitterle, ed., "San Carlos Apache Indian Reservation Wildland Fire Management Plan. *Programmatic Environmental Assessment*. EA No. FO-SCA-EA-02-02 (January 2003) and Dan Pitterle, ed., "San Carlos Apache Indian Reservation Wildland Fire Management Plan" (January 2003).
- ⁱⁱ Observations on western Apache fire practices from conversation with Seth Pilsk.
- ⁱⁱⁱ The best summary of fire from tree-rings in recent centuries is Mark Kaib, "Fire history in Mogollon province ponderosa pine forests of the San Carlos Apache Tribe, central Arizona," MS thesis (University of Arizona, 2001). For contemporary developments, see Kim Kelly, et al, "Restoring and maintaining resilient landscapes through planning, education, support, and cooperation on the San Carlos Apache Reservation. A Historical, Cultural, and Current View" (May 8, 2013)
- ^{iv} Thomas Sheridan, *Arizona*, rev. ed (University of Arizona Press, 2012) gives the barebones chronology. For background ethnography, see Richard J. Perry, *Western Apache Heritage. People of the Mountain Corridor* (University of Texas Press, 1991). A famous inquiry into Western Apache relations with their land is Keith Basso, *Wisdom Sits in Places. Landscape and Language Among the Western Apache* (University of New Mexico Press, 1996), which raises interesting questions about how these peoples built, and rebuilt, their cultural connection to the lands they were given.
- ^v For a synopsis of grazing history, see Harry T. Getty, "Development of the San Carlos Apache Cattle Industry," *The Kiva* 3 (3) (February 1958): 1-4; and Harry T. Getty, *The San Carlos Indian Cattle Industry*, Anthropological Papers 7 (University of Arizona, 1963).
- ^{vi} On the timber industry, see Jack August, Jr., Art Gomez, and Elmo Richardson, "From horseback to helicopter: a history of forest management on the San Carlos Apache Reservation" (American Indian Resource Organization, Inc., 1984).
- ^{vii} Harold Weaver, "Fire as an Ecological Factor in the Southwestern Ponderosa Pine Forests," *Journal of Forestry* (Feb 1951), pp. 93-98, quote from p. 95.
- ^{viii} Harold Biswell et al, "Ponderosa fire management. A task force evaluation of controlled burning in ponderosa pine forests of central Arizona." Misc. Publ. No. 2 (Tall Timbers Research Station, 1973). For a brief chronicle of significant events in fire management, see also Kim Kelly et al, *op. cit.*
- ^{ix} See Pitterle, ed., "San Carlos Apache Indian Reservation Wildland Fire Management Plan" (January 2003).
- ^x Quotes and numbers from William Grauel, email to author on Sep 11, 2013.
- ^{xi} Emil W. Haury, *Point of Pines, Arizona. A History of the University of Arizona Archaeological Field School*. Anthropological Papers of the University of Arizona, No. 50 (University of Arizona Press, 1989), p. 15.
- ^{xii} Idem
- ^{xiii} Ibid, pp. 58, 63.
- ^{xiv} J. F. Lasley, J. T. Montgomery and F. F. McKenzie, "Artificial Insemination in Range Cattle: A Preliminary Report," *Journal of Animal Science* (1940): 102-105 for the technical origins. On the square kiva, see Haury, *Point of Pines*, p. 46.
- ^{xv} William Grauel, "Long Term Weather, Fire Behavior, and Risk Assessment. Skunk Fire. San Carlos Agency. June 5, 2014" gives the most useful chronology and description of conditions. The basics were supplemented by discussions with Dan Pitterle, Bob Hetzler, and Duane Chapman.
- ^{xvi} Statistics on the Skunk Fire from Bureau of Indian Affairs, San Carlos Agency, "Skunk Fire. Day 48. Incident Action Plan, Thurs, June 5, 2014."