PLANET POSITIVE

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The Case for Destroying Old Forest Roads

Can demolishing abandoned dirt paths point the way to a more sustainable future?



A logging road in Montana's Lolo National Forest. America's woodlands are carved up by obsolete roads that fragment wildlife habitat and degrade fragile ecosystems. Now ecologists are calling in bulldozers to rip them up.

Tailyr Irvine

By Ben Goldfarb

Photographs by Tailyr Irvine

Drive high enough into western Montana's Lolo National Forest, up a succession of dirt tracks that parallel glittering creeks and twist through stands of fir and spruce, and eventually you'll come to a clearing. At first glance it's unremarkable, a grassy, sunlit hillside scattered with bleached tree trunks, as though a windstorm had opened the canopy.

It would be a pleasant spot to sit with your back against a lodgepole pine and watch chickadees bounce from branch to branch. What makes this clearing extraordinary isn't what's there now, but what once was—a road.

I visited the clearing one summer afternoon with an ecologist named Adam Switalski. Years ago, Switalski explained, large tracts of this land belonged to a private timber company, which had etched the forest with dirt roads to haul out wood. Eventually the logging operations ceased, and the company transferred its holdings to the U.S. Forest Service, which did little to deal with the derelict roads it inherited. The neglected roads plagued the forest, bleeding silt into streams and funneling disruptive humans into critical habitat for grizzlies, lynx and other sensitive species. Switalski held up his phone to display a map of the forest, across which the black lines of obsolete roads squirmed like parasites in a gut. "This is the kind of thing we're dealing with," he said with dismay.



The ecologist Adam Switalski's research has shown how road removal benefits wildlife, from bears to river trout. "Even the naysayers are like, 'Well, maybe we have a chance to restore populations we might otherwise have written off.'" Tailyr Irvine

The map is hardly unique. Roads, with their deadly traffic, noise pollution, chronic erosion and attendant humans, are among the most ubiquitous and powerful forces threatening our public lands and the wildlife and fragile ecosystems they contain. They point like "dagger[s] at the heart of any wilderness," former Supreme Court Justice William O. Douglas wrote in his 1965 environmental treatise *A Wilderness Bill of Rights*. Today America's roadless areas sustain more than 200 threatened and endangered species; elsewhere, they furnish strongholds for creatures like Amur tigers and African elephants. Yet these refuges are tragically scarce. In the contiguous United States, it's impossible to get farther than 22 miles from the nearest road.

The Montana hillside on which Switalski and I now stood was a prime example of an unglamorous yet powerful tool for protecting our biodiversity—road

removal, commonly known as road decommissioning. In the early 2000s, the Forest Service brought heavy machinery to this old logging road, ripping it up to permit new grasses, shrubs and trees to sprout from the stirred earth. Waist-high thimbleberry bushes now covered the slope, and Douglas fir seedlings plunged roots deep into the loosened soil. It seemed improbable that 30-ton logging trucks had ever trundled through here along a ribbon of asphalt-hard dirt. “One time, I was skiing with a buddy of mine around here and we passed an old road,” Switalski said as we wandered through the clearing. “He didn’t believe there had ever been one there. That’s the ultimate sign of success.”



Old-growth Douglas firs. Removing old roads drives crucial regeneration of trees and plants. Steinberg / Science Source

Few people have seen more success than Switalski, who serves as project manager at a Montana-based nonprofit called the Clark Fork Coalition, named for the river whose watershed it serves. Over the last two decades, Switalski has guided road restoration’s best practices and demonstrated its value for species as diverse as black bears and cutthroat trout. For most of that period, however, his work, and the work of other would-be road removers, has been hampered by shoestring budgets and politicians ideologically opposed to road destruction. But a recent wave of federal legislation and programs has sparked a boom period for road decommissioning —one that could reshape America’s national forests.

“It is just the most exciting time in my career right now,” Switalski told me. “It’s a generational opportunity, if not the opportunity of a lifetime.” Road networks, like many cancers, tend toward exponential growth; today it finally seems

possible that ours is about to shrink.

Homo sapiens, the legal scholar Jedediah Britton-Purdy once observed, is an "infrastructure species"—a creature defined by what it builds. And what we build, most of all, are roads. Some 40 million miles of roadways girdle our planet, four million of which enfold the United States. America's interstate highways might be its grandest and most-trafficked routes, yet the country's largest road network, and likely the world's, is managed by the U.S. Forest Service, the federal agency that administers more than 190 million acres of public land. The Forest Service calls itself the Land of Many Uses—national forests are stomping grounds for timber companies, rangelands for ranchers, playgrounds for hunters and fishers—but it might be more apt to call it the Land of Many Roads. Around 370,000 road miles, the vast majority unpaved, lattice our national forests, enough to encircle Earth 15 times.

Governing this gargantuan network was never the Forest Service's mission. The agency, established in 1905 by President Theodore Roosevelt, constructed many early roads to funnel vacationers to campgrounds; still others helped its personnel fight wildfires and excise beetle-infested trees. "Improving access was prerequisite to managing the area's natural resources," observed Bud Moore, a Forest Service ranger in Idaho, in a 1996 memoir. "Everybody would be happier and better off."



A recontoured hillside near Lolo Pass. Reconstructing the landscape with fallen trees and other natural debris is far more beneficial than simply abandoning roads, Switalski found. Tailyr Irvine

Before long, however, road-mania overwhelmed American woodlands. Starting in the 1950s, the Forest Service built tens of thousands of road miles to facilitate logging, and in many cases it effectively paid private timber companies to install roads on its behalf. Roads trundled across meadows, befouled streams and strewed the forests with what Moore called “the junk of American industrialization.” “We soon learned that far greater threat to the land lay in road-building than in logging the timber,” Moore lamented.

Moore wasn’t the only one to recognize his agency’s folly. Beginning in the 1980s, a wealth of studies suggested that roads were imperiling wildlife in America’s ostensibly wildest spaces. In Oregon, for instance, forest roads, and the hunters and tourists who traveled them, chased elk from otherwise prime habitat. Worst off were grizzly bears, who overwhelmingly perished near roads

—not because they were struck by cars, though that happened, but because roads pumped the woods full of trigger-happy humans. In 1993, biologists declared roads “the most imminent threat to grizzly habitat today.” Although the Forest Service blocked some roads with gates and berms to protect wildlife, poachers and all-terrain vehicle enthusiasts broke locks or circumvented these cursory barriers. Many rangers and environmentalists feared that roads, once built, became permanent—“final and irretrievable facts,” as a ranger once put it.



A black bear in the foliage of a serviceberry tree. The bears are nine times likelier to forage along a decommissioned road than an active one. Andrew Kandel / Alamy

Even as the Forest Service was expanding its infrastructure, however, another government agency had begun shrinking its own road network. In 1978, Redwood National Park acquired 48,000 heavily logged acres, an industrial zone scarred with more than 300 miles of timber roads. In the early 1990s the National Park Service began to obliterate these derelict roads in earnest,

deploying excavators and bulldozers to restore “the original contours and slopes of the land,” as the geographer and author David Havlick put it in his 2002 book *No Place Distant*. Redwood National Park has since expunged around 250 miles of road, though 100 miles linger.

In 1995, the road decommissioning movement took another lurching step forward in Idaho’s Nez Perce-Clearwater National Forests, lands so tortured by logging that, on some hillsides, their road density exceeded New York City’s. That winter a succession of storms soaked the forest, triggering more than 900 landslides—most stemming from unused roads, some of which turned to slurry beneath the relentless rain. Trees, boulders and more than 50,000 dump trucks’ worth of sediment hurtled down the mountains and entombed streams. One hydrologist who’d moved to Idaho from Florida told me the wreckage reminded him of Hurricane Andrew. “The hillsides just went liquid on us,” Annie Connor, a now-retired Forest Service engineer, recalled to me.

It was a devastating lesson: Every road was a time bomb, waiting for a storm to detonate. In the aftermath, Connor, one of road decommissioning’s foremost pioneers, set to unmaking what her forebears had built. Roads had stair-stepped the forest like rice paddies, intercepting water and then melting catastrophically; now Connor sought to restore the mountains’ natural topography. She dispatched legions of bulldozers and excavators into the Clearwater to claw up compacted roadbeds, smooth out earthen fill and dump woody debris to furnish microhabitats. The Nez Perce Tribe, the land’s traditional stewards, joined the



Forest streams are especially damaged by road networks, which leach silt or bury waterways altogether. That’s one reason

Switalski relishes reconstructing them, for example by “using clump plants and native materials like wood and rock to rebuild stream channels.” Tailyr Irvine

effort as an equal partner, contributing money and personnel, and even managing the project in parts of the forest. By 2005, Connor’s crews had demolished 500 miles of logging roads. “That’s all we did in the late 1990s,” she said. “We decommissioned roads.”

In the years after Connor’s labors, intrigued scientists popped up in the Clearwater like wildflowers after a blaze. Among the curious was Rebecca Lloyd, a hydrologist who came to the Clearwater in 1997 to survey roads after the storms. It was grueling work: Many ancient logging roads had half-vanished into the brush, forcing Lloyd to bushwhack across dense mats of shrubs and conifers. Yet these abandoned roads weren’t benign: They bled sediment, disrupted water and spawned landslides. “Even an overgrown road is still a road,” Lloyd said.

But a road, Lloyd discovered, could be made less road-like. When she excavated soil samples from roads that Connor’s team had torn up and recontoured, she found they contained far more organic matter, carbon and nitrogen than the nutrient-starved dirt of existing roadbeds. The restoration, she wrote in one study, had “accelerate[d] the recovery of soil properties by hundreds to thousands of years.” Lloyd also found that even the soil microbes change, from a bacteria-dominated community to a rich fungal web more typical of an intact forest. Given enough machinery and labor, roads were not irretrievable after all.

Another scientist drawn to the Clearwater was Adam Switalski. In 2002, Switalski, an ecologist who’d cut his teeth studying Yellowstone’s reintroduced wolves, had taken a job as a staff scientist at Wildlands CPR, a conservation group devoted to studying the ecological impacts of roads and motorized vehicles. (The acronym CPR originally stood for “Center for Preventing Roads.”) At the time, high-quality road decommissioning projects were scarce, and studies of their efficacy for wildlife even scarcer. Switalski set out to change that, starting with trout, whose spawning gravels are often smothered by

sediment from erosive roads. Switalski and his colleagues took sediment cores from streams in Montana's Flathead National Forest and, sure enough, found that creeks along decommissioned roads were less silt-clogged than ones crossed by active roads—excellent news for the forest's cutthroat and bull trout.

As Switalski built the scientific case for road decommissioning, he naturally turned to the Nez Perce-Clearwater. Beginning in 2006, he set arrays of motion-activated cameras throughout the forest—some along the faint tracks of obliterated roads, others along surviving roads that remained open to traffic. When he checked the cameras, the difference was stark: Black bears were nine times more likely to traipse along the decommissioned roads, which had become de facto game trails in the absence of humans. Even better, new serviceberry and huckleberry bushes had sprouted in the stirred earth, providing bears cover and fruit.

"It was a cool story," Switalski said. "You basically turn a wildlife sink, where bears are getting shot, into high-quality fruiting shrub habitat."

Roads, once perilous, had become pantries.

Decommissioning roads is a logistically convoluted process, one that involves a litany of players. There are the environmental groups who push for it, the federal agencies who authorize it, the contractors who conduct it and, not least, the members of the public who fight for or against it. From a technical standpoint, though, it's reasonably straightforward: Make a hell of a mess.

One July morning, Switalski drove me deep into the Lolo to watch a road get destroyed. A Caterpillar 323F excavator, 27.5 tons of sunflower-colored steel, snarled in a clearing. Its huge arm swung back and forth, as stately as the neck of a sauropod. Beyond the Cat stretched a dirt road, or what had been a road—a runway of debris that resembled the path of a narrow tornado. Craters

pitted the earth; hummocks rose and fell; downed trees jutted from slash heaps like the spars of shipwrecks.

“It’s all sorts of chewed up,” Jeff Cahill, the excavator’s operator, said after he’d idled the Cat and hopped down to greet me. “The idea being that it looks like the Western Front when you’re done.”

The excavator’s claw, Switalski explained, loosened the soil and created “microtopography”—as far as I could tell, a highfalutin word for bumpiness. Rainfall, delayed and rerouted by craters and hillocks, percolated into the earth rather than flushing sediment into a nearby creek. The slash piles that covered the old roadbed—fir and spruce saplings that Cahill had plucked like daisies with the Cat’s claw—would provide shade and cover for future grasses, wildflowers and shrubs. A metal culvert, through which the stream had once flowed beneath the road, lay in a battered, rusty ruin. Liberated from its pipe, the creek gurgled clear through the rubble, and a cutthroat trout flickered over the gravel.

For all the pandemonium, the excavator was surprisingly gentle. Cahill climbed back into the cockpit, seized a joystick in each hand and manipulated the claw with precision, caressing and folding the earth as though mixing cake batter. He scooped up mats of alder and willow, dropped them along the streambank, and tamped them down with a few dainty pats. “There you go,” Switalski said. “Instant floodplain.”

Less than engineering a new ecosystem, Switalski said, the intention was to wipe the road clean, to forge a tabula rasa upon which nature could rewrite itself. “You can’t be a perfectionist,” he cautioned. Still, he fought the urge to meddle. Over the Cat’s growl, Switalski asked Cahill to stick a willow *here*, to loosen the soil *there*, to leave *this* sapling but uproot *that* one. “My anal tendencies are kicking in,” he apologized. Then he asked Cahill, who’d just dropped a boulder, to turn it around.

“You want me to … flip the rock?” Cahill asked.

“Yeah, just rotate it around so it’s facing the other direction,” Switalski said, laughing at his own nitpicking.

Cahill shrugged and repositioned the boulder with a percussive thunk. Switalski cocked his head.

“Nah,” he concluded. “I liked it how you had it before.”

Cahill plopped the rock down again, and the ground jiggled like Jell-O. “This is getting to the point where it’s *just about* perfect,” Switalski said.

“That’s about the first time I’ve heard that from you,” Cahill said with a grin.

He shut down the Cat for lunch. “A lot of guys have trouble with organized chaos,” he said as we unbagged sandwiches. He’d gotten into the road decommissioning game after training in the landscaping business; though he’d enjoyed landscaping, he couldn’t stomach the thought of sculpting summer properties for millionaires. Road restoration scratched his mechanical itch in service of a higher calling. “Some nights I’ll stay out here until 7 or 8 at night because I like the work so much,” he said.

He isn’t the only skilled laborer to have found a future in road decommissioning. Connor, the former Forest Service engineer from Idaho, once told me that road obliteration had connected her to half the people living around the Nez-Perce Clearwater National Forest: Her neighbors were excavator operators, mechanics and loggers who found seasonal work replanting old roadbeds. According to one 2016 study published by researchers at the University of North Carolina, the restoration economy creates more than 200,000 jobs and generates more than $24 billion annually. If you squinted, you could see the outlines of a cottage industry: an army of Cahills correcting humanity’s mistakes, deploying yellow mechanical dinosaurs



A sapling emerges from a decommissioned road. In addition to natural regeneration, Switalski is planting thousands of trees. The new trees, he says, trap sediment “coming off the landscape throughout decades of industrial logging.” Tailyr Irvine

on behalf of the land rather than against it.

For all its manifold benefits, however, road obliteration has proceeded only in fits and starts. Annora Nelson, a regional transportation engineer with the Forest Service, calculates that the agency has decommissioned close to 3,400 miles of road since 2016—a step in the right direction, albeit a small one. One reason for the sluggish progress is politics. Practically every proposal to shut down a road, even an obscure and little-used one, is met with outcry. Often that comes from hunters, ATVers and other motorized recreators who have grown accustomed to the access afforded by roads: After the Forest Service barricaded some roads in Idaho to protect elk and grizzlies in the late 1990s, an unlit gasoline bomb appeared on a ranger’s doorstep. Sometimes the objection comes from within the Forest Service, whose employees insist that they need roads for logging operations or fire suppression. (Although the latter concern seems reasonable enough, given that roads often function as firebreaks, it overlooks that roads can also be sources of wildfire; a 2018 California fire that torched more than a thousand homes, for instance, ignited when the wheel rim of a trailer’s flat tire scraped the asphalt and flung sparks into dry brush.)

“You have all of these competing interests within the agency,” Adam Rissien, rewilding manager at the conservation nonprofit WildEarth Guardians, told me. “And when it comes to ensuring ecological sustainability, well, you can guess who loses.”

And then there's money. According to Nelson, the price tag of decommissioning varies widely: Whereas a "little two track way out in the forest" may not require much work to repair, removing a major road that winds through a floodplain "is a really big deal."

In Nelson's region, which encompasses all of Montana and portions of adjacent states, decommissioning typically costs anywhere from $5,000 to $15,000 per mile, but managers of some forests, like Washington's Mount Baker-Snoqualmie, have said their costs are many times higher. That funding was once abundant. In 2008, Congress established the Legacy Roads and Trails Remediation Program, which spent nearly $500 million to retire 7,000 miles of road and replace more than a thousand fish-blocking culverts over the next decade. Beginning in 2017, however, the remediation program went unfunded and withered. "Funding, of course, is always a constraint on everything the Forest Service does," Nelson said. "The legislature holds the purse strings, and they hold them pretty tightly."

But recent years have brought significant change. The 2021 Infrastructure Investment and Jobs Act, which authorized more than a trillion dollars in spending on projects like road upgrades and public transit, also re-established the Legacy Roads and Trail program, allotting $250 million over five years to decommission roads and perform other forms of restoration. Although the revitalized program promptly destroyed roads in places like California's San Bernardino National Forest, Colorado's Pike and San Isabel National Forests, and Montana's Flathead National Forest, some environmentalists fret that the Forest Service isn't directing enough of this new funding toward road removal, instead focusing on culvert replacements and other repairs—actions that make roads less harmful, especially to aquatic ecosystems, but also ensure their continued use. The program "needs to be funded more and focused on better projects," said Ryan Talbott, Pacific Northwest conservation advocate at WildEarth Guardians.

Even if road removal isn't fully benefiting from new federal funding sources,

other causes are. The infrastructure act also included a billion dollars to upgrade America's culverts, money that's already being disbursed to eliminate fish barriers from Puget Sound to the Chesapeake Bay. Still another program earmarked $350 million to wildlife crossings—bridges, underpasses and roadside fences that permit animals to safely navigate highways. Granted, these initiatives can't fully heal the ecological wounds inflicted by our country's four-
million-mile road network, but they may stanch the bleeding. "From my perspective, this legislation is a game changer," Susan Holmes, former federal policy director of the Utah-based organization Wildlands Network, told me soon after the infrastructure act passed. "It creates a new priority for biodiversity."

For Switalski, too, the funding had proved transformative. "We're adding zeroes to a lot of budgets," he said. His group, the Clark Fork Coalition, had recently received a half-million dollars from yet another new initiative, a $161 million effort sponsored by the Bureau of Land Management, to restore degraded landscapes around the West. Among other restoration activities, the money would help the coalition decommission roads in the Blackfoot River watershed, made famous by *A River Runs Through It*. "You spend half your time searching for funding to address the road system, and we now have this incredible mechanism to get work on the ground," Switalski said.



Switalski spent years developing road removal's best practices on limited budgets, but new funding has changed the game. "Me and my colleagues, we're so excited to finally see our life's work taking off." Tailyr Irvine

The influx of cash wouldn't just produce more road restoration—it augured more *effective* restoration. One frequent objection to decommissioning, Switalski said, is that national forests are overrun with so many roads that it's hard to eliminate enough: A patch of forest laced with, say, ten miles of logging roads doesn't magically become good grizzly habitat if you reduce its mileage to eight. But now there is enough money to remove roads at an adequate scale, and to restore the creeks they'd damaged by digging new pools, installing logjams and planting streamside vegetation. "I now have the luxury of doing the highest-quality decommissioning possible," he said. "In a couple of decades or less, you won't even know that a road went through that landscape."

The road, however, does not easily surrender its grip. Not long after our visit to

the Lolo, I ventured with Switalski into the nearby Helena National Forest, up yet another treacherous dirt road. Downed trees blocked our progress, and Switalski stopped often to hack them away with a handsaw. Abandoning our car, we hiked on foot past ponderosa pine and Douglas fir stumps. After 20 minutes of walking, we crested a rise that overlooked a lush mountain meadow. Wind tousled the grass, and I half-expected a family of von Trapps to traipse across the hillside.



The new federal programs promise to vastly increase wilderness restoration. “It’s going to make a huge landscape-level difference, because we’re talking about billions of dollars going towards this work. So it’s an order of magnitude greater funding.” Tailyr Irvine

Yet the tableau was eerily wrong. A thick purple belt of vegetation, almost hallucinatory in its vividness and precision, girdled the hillside. As we drew closer, the belt resolved into thousands of spiny, head-high plants tipped with violet flowers the size of baseballs. The plants, Switalski explained glumly, were musk thistle, an exotic weed that crowds out native species, and their invasion

was an unfortunate side effect of road decommissioning. Years ago, logging trucks had transported thistle seeds in their treads and deposited them on the mountainside, where they lay dormant for years. When an excavator finally churned up the road, it surfaced the seedbank and loosened the soil—fomenting perfect conditions for the thistle to germinate.

This was not unexpected. Switalski has found that obliterated roads are initially cursed by up to six times more weeds than control sites. The problem is so common that he has come to recommend spraying herbicide before and after restoration at sites in the mountain West to prevent weed explosion. “It’s one of our primary issues,” he admitted. Even in their death throes, roads warped the land.



Spirea by a former roadside, a telltale sign of regeneration. Some 10,000 miles of roads have been removed since 2000, according to the Forest Service, including nearly 3,400 since 2016. Alamy

But roads that scar the landscape, like scars on the human body, can also be signs of healing. As we picked our way through the thistle, Switalski stooped to point out subtle signs of regeneration. “Here’s a raspberry under the shelter of this log, right where you’d expect it,” he said. “There’s a spirea. There’s some strawberry coming up.” Native grasses—timothy, brome, fescue—bowed to the wind, heads heavy with seeds. Come back in five years, Switalski added, and you might find dozens of larch seedlings straining skyward—the germs of a new forest. The road would be a distant memory.

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