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40 TREES: THE QUEST TO SAVE WHITEBARK PINE ON THE FLATHEAD
INDIAN RESERVATION

By

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B.A., College of Charleston, Charleston, SC, 2010

Professional Paper

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40 Trees: The quest to save whitebark pine on the Flathead Indian Reservation

Chairperson: Joseph Eaton

Abstract Content:

When it comes to managing natural resources in the face of global climate change, sometimes localized action is best. Rick Everett spent a lot of time in western forests - first as a ski patroller and logger and then as an ecologist - before landing as a professor at a tribal community college on the Flathead Indian Reservation. Now he faces a challenging new question: How do you save a tree species that is ecologically valuable to the forest and culturally valuable to Native American tribes, but is being pushed toward extinction by forces varied, deadly and driven by climate change? Everett has found himself in a race to save the Flathead's whitebark pine, an endangered species. Success depends on acting quickly, working with tribal governments and spending a lot more time in the woods. On the reservation, an increased flexibility for active forest management gives Everett a high chance of success with whitebark restoration, while also restoring traditional Native American forestry techniques. Everett needs to find 60 still-healthy trees in order to jump start the whitebark population, and over the last two years he's found 20. Because the tree grows high in the mountains, the time in which he can search is limited to after the winter snow melts but before squirrels and birds harvest the tree's precious pinecones and the seeds they hold. This story of science on the front lines brings you along with Everett as he probes roads in the reservation's mountainous borders at the start of spring. Along the way, it will examine forestry practices on a Native American reservation, outside the strictures of federal mandates.

40 Trees: The quest to save whitebark pine on the Flathead Indian Reservation
By Andrew Graham

On a warm September day in 2014, Rick Everett rode shotgun in an SUV bouncing up logging roads toward elevations of 6,000 feet. It was late in the Montana summer, and the grass had turned from green to brown and was approaching a burnt shade of red.

Everett, a professor at the Salish Kootenai community college, had enlisted Tony Harwood, a long-time wildland firefighter turned forester for the Confederated Salish and Kootenai Tribes (CSKT), to guide him through the sinuous web of old logging roads that crisscross the reservation's western border.

Below them stretched the Flathead Indian Reservation, a valley 10 miles across at its widest, bordered by the Mission Mountains to the east and the Bitterroot Range to the west. The forests of the reservation are owned and governed by a confederation of three Indian tribes - the Salish, Pend d'Oreille and Kootenai - recognized for a strong track record of environmental stewardship.

Passing elk, deer and a black bear, the two men drove the road to its end on the shoulder of a mountain called Three Lakes Peak.

The forest where they stopped had been heavily logged in the 1990s, and Everett expected to find mostly lodgepole trees, a fast growing tree species common to western Montana.

But not all the seedlings that rose waist high between the old stumps were lodgepoles. As Everett and Harwood checked the seedlings' species type by counting their needles, they realized some were whitebark pine, a tree facing extinction across the West.

Everett and Harwood weren't on one of the mountain ridges where the few remaining trees are most often found. Nevertheless, there they were, surviving and reproducing in a spot where most researchers wouldn't expect it to exist at all.

The discovery of healthy whitebark pines on the Flathead Reservation was a revelation to Everett. If specific trees are surviving, he thought, the survivors could, with a scientist's help, repopulate the valley. And Everett knew he was well positioned to make that happen.

Since then, Everett and Harwood have hatched a plan to use the surviving trees as a seed source to restore whitebark pine killed by blister rust, an invasive fungus. Working with tribal governments outside the strictures of federal forestry mandates, Everett and Harwood's quest relies on finding hardy survivors with strong genetics—trees that have fought off blister rust—and using their seeds to repopulate the forests.

For the plan to work, the two men estimate they'll need pinecones from 60 healthy trees to ensure biological diversity. So far, they've found 20. Everett says they must find 40 additional trees by May's end, before squirrels and other animals start eating the seeds.

A week after his first trip with Harwood, Everett drove back up the logging roads alone and hiked farther into the forest. There he found bigger, more mature whitebark trees. Though scarred by blister rust, these trees were still producing pinecones.

Unlike other trees, whitebark seeds do not spread on their own, carried by the wind. Instead, the tree relies on a small grey and black bird called the Clark's nutcracker. The Clark stores seeds in a specially evolved pouch in its throat, before flying off to bury them as far as 20 miles away from the tree.

To save the whitebark on the reservation, Everett and Harwood hope to circumvent the limitations of the Clark's nutcracker. They'll ship seeds from trees that show resistance to blister rust to a U.S. Forest Service nursery in Coeur D'Alene, Idaho. There they'll be grown under controlled conditions and come back as seedlings ready to be planted back in the forests.

Blister rust, a fungal disease accidentally imported from Europe, has been killing off whitebark pine for the last century. The disease first appears as a red or yellow spot on a single pine needle, then moves into the trunk and slowly circles the tree, appearing on the outside of the trunk as thimble-sized orange sacks. The rust kills the tree by cutting it off from its roots and choking it. Once infected, it's estimated that 90 percent of whitebark pine will eventually succumb to the rust.

A whitebark's first defense is to shed the infected needle. Once the disease has moved into the bark, resistant trees can wall off the canker with bark, like a toughened callous growing around a blister. Trees that have genetic resistance to the blister rust either avoid infection or live through it with scarred branches and trunks.

To truly know if a tree has genetic resistance requires a three-year test that takes place in Coeur D'Alene. Not wanting to wait, Everett will use what he can see—if all the trees in a stand are dead except one or two, he figures they probably have some resistance.

It's rough science. But sometimes even trees that pass the test in Coeur D'Alene become infected years later, after they have been replanted in the woods.

“Nature is a wonderful humbler of what you think you know,” said Aram Erariam, who runs the Idaho nursery.

Rick Everett first became curious about whitebark pine in the 1970s, long before he became a scientist. Everett was ski patrol at Snowbowl, the local ski hill outside

Missoula, a university town an hour south of the community college where he now teaches. Ostensibly a student at the University of Montana, Everett squeezed in his seven-year undergraduate degree between winters skiing and summers fighting wildfires and sawing lumber with the U.S. Forest Service.

Pine trees lined the ridge at Snowbowl, and Everett argued with fellow patrollers about whether they were whitebark or limber pine, a deceptively similar tree. They were whitebark, and they were already well in decline. By 2015, Snowbowl had lost 80 percent of its population.

After spending the 1980s between the Forest Service and the ski slopes, Everett decided to reevaluate.

“I can keep up skiing, and watch my body decline, watch everything break,” he said, “or I can start using my head.” A master’s degree in botany from California State San Bernardino, and then a PhD from the University of California Riverside trained him into an ecologist. He then spent ten years working as a postdoctoral researcher, studying forests and the fires that shape them at UC Berkeley.

A staff photo from his ski patrol days shows Everett as a bearish young man with long black hair. Today it’s white and wavy but still reaches his shoulders. He roams the woods in faded flannel shirts and a puffy vest, torn jeans and running sneakers.

Everett’s strength as a researcher, and the questions he chooses to focus on, come from long hours in the forests, said Emily Heyerdahl, a researcher at the fire lab who trained Everett in fire ecology and still collaborates with him today. Google Earth and remote sensing data from satellites has made it possible to answer ecology questions from the computer, she said, but there’s still a lot to learn by poking around outside.

“I think the tack Rick has taken is to be in the woods a lot,” she said.

When a teaching job at the Salish Kootenai College came up four years ago, Everett jumped at the chance to move back to northwestern Montana and play a role in tribal forestry.

When Everett first started his search for whitebark survivors, he had good reason to fear the worst. Besides blister rust, big areas of forest had been hit by mountain pine beetle in the 1970s and 90s. The beetle kills trees by burrowing into its trunk, and when infestations reach whitebark forests they focus on the same big mature trees as Everett.

Harwood brought Everett old maps from the 1960s and ‘70s, back when the tribe’s primary concern with its forests was their commercial value as timber. Before it was recognized as a threatened species, whitebark was a valuable lumber known for its hard grain. Foresters in the ‘60s used airplanes and cameras to scout whitebark pines to cut.

Studying the photographs, Everett began to see the mistake he remembered from his ski patrol days. Many of the pine forests had been marked as limber pine, but Everett thought they could be whitebark.

Harwood became Everett's guide for getting in on the ground. "Any forester worth their salt wants to get out of the office," Everett said.

On the western side of the reservation, the two men found more whitebark close to where they had found their first seedlings. Harwood also took Everett to areas on the eastern side, in the Mission mountain range, where tribal members had told him they'd seen big whitebark trees in the past.

Everett and Harwood found more, confirming Everett's suspicions about the old logging maps.

"Little areas of buried treasure, or above ground treasure," Harwood called them.

Once Everett marks his 60 survivor trees, climbers on loan from the U.S. Forest Service will cover them in small metal cages until they can be harvested in the fall. The cages protect the cones from squirrels and other harvesters. While most tree climbers use metal spikes to dig into trunks and propel themselves up, whitebark is too precious to risk damaging with spikes, and so climbers must ascend branch to branch, roped into the treetops like rock climbers on a cliff face.

The collected cones will most likely be sent to the nursery in Coeur D'Alene. They'll come back three years later as baby trees, to be planted when CSKT Forestry is ready. The source trees will then be monitored, and as long as they stay healthy, cones can be harvested from them year after year.

Everett is convinced whitebark pine on the reservation is far better off than most people believe. With satellite imagery and aerial photography, it's easy to look at the dead trunks lining the ridge tops and see destruction, he says, without noticing the new trees coming up below them.

"You get down in there, and probably half of that population has really taken it in the shorts," Everett says. "We need to realize that this tree is a vibrant, non-static entity of this forest and it's doing everything it can to claw its way back up."

While whitebark is dependent on the Clark's nutcracker, a lot else may depend on the tree. Grizzly bears eat the seeds from the trees, and along with them, Everett estimates that somewhere between 120 and 130 other different species use whitebark for food or habitat.

Were it to go extinct, the mountaintop forests themselves could begin to decline, because whitebark roots stabilize the thin soil up high, allowing other plants and trees to take root around them.

The U.S. Fish & Wildlife Service has declined to add the tree to the endangered species list, citing a need to focus on species of higher priority. Still, the agency says ecologically functioning whitebark forests could disappear within two to three generations.

If the Fish & Wildlife Service's dire predictions hold true, the effects of the tree's disappearance would quite literally cascade downhill.

In the Flathead Valley, the water supply comes from snow that melts in the mountains. Alpine forests act as natural insulation by shading the snow and prolonging its melt. Melting snow drains into streams, which become rivers, and if the spring runoff comes and goes too quickly, everything from fish to farms to kayakers suffer when river levels run low come mid-summer.

Whitebark pine, with its jutting branches and widespread tree canopy, is particularly good at shielding the snow. But with whitebark declining and global temperatures rising, the Flathead Valley's snowpack would melt earlier each year.

Restoring whitebark is not a new idea; efforts to save the tree have been pursued across the West for more than a decade. By harvesting pinecones and growing them to the seedling stage in a nursery, researchers can increase the 15 percent wild seedling survival rate to 90 percent. But when the seedlings go back in the forest, the randomness of nature kicks back in.

Everett thinks he can be more successful in the Flathead because of his unique partnership with the CSKT, who are committed to doing more than just planting the seeds. Although the tribes are slow to begin restoration, the motivation is high.

Bob Keane, a U.S. Forest Service researcher who has worked on whitebark pine restoration since its inception, says that everyone living today has been robbed of a chance to see the productive whitebark forests that declined before their lifetimes.

In a healthy forest, the whitebark cones ripen throughout the summer, drawing in a growing stream of life that feeds on them. The Clark's nutcracker is followed by woodpeckers and other birds. Come August, chipmunks and squirrels begin to move through the branches breaking off the now dried cones.

Grizzly bears aren't much for climbing. They wait for the squirrels to stash piles of cones, then rob them. Meanwhile Everett hopes to jump the whole train.

"Man alive," Keane said of whitebark pine forests before the rust, "they were just alive with birds and mammals and everything else."

For tribes like the CSKT, that memory has special significance. “We’re doing it to restore an ecosystem. They’re doing it to save a cultural resource,” Keane said.

Working with tribal forestry has one big difference from doing so with state and federal forestry departments - their land is theirs, and for the most part they can manage it as they please. It’s a significant advantage over the bureaucracy of working in federal forests.

“I have a hell of a lot more flexibility here,” Everett says, “it’s a sovereign nation.”

The CSKT forestry department is still bound by laws like the National Environmental Policy Act (NEPA), which mandates a series of evaluations for any decision with implications for the natural world. But all day-to-day forestry planning decisions are made by the tribes themselves, with federal agencies providing funding and approval on certain projects.

At the state and federal level, projects get clogged up during the NEPA process by lawsuits from private citizens and advocacy groups with environmental concerns. That can happen with any project, from logging to replanting trees to the use of controlled burns for ecological benefit. But foresters and researchers alike say such lawsuits aren’t as likely in tribal forestry; few groups want to tell a tribe they know what’s best for its forests.

Tony Incashola runs the Salish and Pend D’Oreille cultural committee from the Salish Longhouse in St. Ignatius, a reservation town named after an old Jesuit Mission. Since 1975, the committee has sought to maintain tribal traditions and indigenous knowledge about local ecology. To that end, it has logged more than 12,000 hours of recording with tribal elders, much of which deals with how people once interacted with the land around them.

The cultural knowledge Incashola gathers makes it into tribal forestry plans, creating a blend of Western forestry and indigenous traditions.

Whitebark seeds were once a food equally attractive to indigenous people and grizzly bears. And for the tribe, that’s reason enough to ensure the tree’s survival. Without cultural resources like whitebark, said Incashola, “in time we’ll be non-existent, according to our elders, because we’ll be no different from anybody else.”

Everett and Harwood brought their restoration project before the tribal council for permission. “A decade ago they would’ve said no,” Incashola, the cultural committee chairman said. “Traditionally, I think the elders wanted everything to happen naturally, even lose things naturally.”

But with climate change looming, whitebark restoration received the council’s full support. Still, researchers are realizing that in the face of that same climate change just planting new whitebark pine seedlings won’t be enough.

“We can grab all the seed we want,” Everett says, “but unless we’re stabilizing the ecosystem that they grow in and shooting for long term maintenance of that ecosystem, then we’re doomed to failure.”

One reason Everett thinks he and the CSKT will succeed is fire.

On an April morning, a group of tribal elders led a bitterroot harvest on the valley floor, a spring tradition where the edible tuber is dug up to be cooked in honor of past ways of life. But up in the hills, a different tradition was playing out. The CSKT Division of Fire was preparing to torch a forest.

The group staged at a grassy outcrop northwest of the small town of Hot Springs on the valley’s western side, 40 miles north of where Everett and Harwood found their first survivor whitebark. Their target was a 500-acre steeply sloping hill forested by big ponderosa pine trees and undergrowth.

On the hillside, a crew did maintenance checks on a helicopter while the fire captains talked about the weather, soil moisture and their burn plan.

When the time came, two groups of four piled into trucks and filed out at the top of the ridge, one group at each side of the burn area. Timing their movements, the groups marched downhill, following 10-foot-wide lines of dirt cut through the forest with a bulldozer and chainsaw. In each hand, they carried metal canisters that dripped kerosene through burning wicks. As they walked, lines of flames flickered to life across the forest floor behind them—their smoke designating the edges of the controlled burn. Overhead, a helicopter dropped chemical-filled “ping-pong balls” between the lines. They burst into flames a few moments after reaching the forest floor.

By mid-afternoon, the hillside was a column of smoke. The fire burned the undergrowth in the designated area and would burn itself out over night. The men and women stood around the pick-up trucks, faces covered with soot but glowing from a dangerous job well done.

“Do you think those elders down there picking bitterroot saw that?” one of the captains asked laughing, as he reached the group and pulled off his helmet.

Every time the CSKT Fire Division deliberately puts the torch to a forest, it reverses a century of Western forestry.

The destabilizing of whitebark’s ecosystem can best be traced back to the early 1900s, and two well-meaning but ultimately misguided decisions. The first was the importation of pine seeds from Europe. The seeds brought blister rust along for the ride. In 1906, it was observed on plants in New York, and by 1921 it had been found on both coasts. It was first observed on a whitebark pine at high elevations in 1926.

Around the same time, the U.S. Forest Service made a decision that would have far reaching ramifications on Western forests. In 1910, after devastating wildfires swept the West, the Forest Service issued a call for every forest fire to be put out by 10 a.m. the day after its start.

Foresters didn't think about how the imported seeds could carry an infection, just as they didn't think about how forests had evolved with the flames foresters banished.

Whitebark grows slowly but steadily. If left alone, it can reach ages of 1,000 years in sparse environments. But the species struggles to compete for space and nutrients with faster growing pine tree species like Douglas fir and Engelmann spruce. Fire is whitebark's natural defense system. The tree has thicker bark than other pine species. Before fire suppression policies, the West's frequent summer wildfires smoldered and burned across the ridges, killing the less hardened competition and leaving whitebark alone in their wake.

High elevation is another defense, since most tree species aren't hardy enough to grow in whitebark's alpine environment. But as temperatures increase due to climate change, those species are marching upward and, without fire, could crowd out whitebark.

After decades of studying whitebark's decline, Bob Keane believes that with a healthy environment it can still survive the threats against it. "As long as there's fire on the landscape it will get that," he said.

Keane works at the Fire Sciences Laboratory in Missoula, and is known for his work on the tree and his driving of restoration efforts. "He is the whitebark god. He's Mr. Whitebark," Everett said.

But Keane has had trouble gaining permission to burn whitebark sites on state and federal land. He's been trying to burn around the patch of whitebark at Snowbowl for years, and is ready to give up because concerns from nearby residents about smoke have kept his project from getting off the ground.

Keane thinks Everett will have better luck on the reservation. "The tribe says burn the damn thing, we don't care," Keane said.

Though researchers know the role wildfire played, there's little information about how often it burned through whitebark pine forests in the past. Over the next year, Everett plans to map the fire history of the Flathead. By dating the burn scars left on the trees that survived and examining the clues in old dead wood from the forest floor, he can piece together when different areas burned, and where.

The CSKT uses more deliberate fire, called prescribed burns, than their neighbors. Darrell Clairmont, a prescribed burn specialist, says the tribes want to develop the program even further. Sales from timber production is a part of the tribes' annual

revenue, and they'd rather burn off excess forest fuel on their own than see wildfires rip through valuable tree stands.

But there's another reason the tribes are known to burn more frequently too. While federal foresters have a history of suppressing fires, American Indian tribes have a much longer history of lighting them. Before manifest destiny sent settlers West, Native Americans routinely set the forest and grasslands aflame. While it's impossible to quantify exactly which past fires were human-ignited, accounts from missionaries and explorers and interviews with tribal elders lead to estimates that human-ignited fires doubled the number of natural fire starts from lightning.

The Salish and Kootenai tribes set fires to drive deer and other game before the flames, trapping them in canyons or driving them into lakes where they were easily hunted. But they also set fires for more direct ecological reasons—to clear out the underbrush, refresh the soil and stimulate the growth of edible plants like bitterroot and huckleberry.

Off the reservation, it's harder to justify prescribed fire, with the hazards of smoke or the dread of a prescribed burn turning into a wildfire. That makes burning for forest health, as opposed to just for reducing the risk of catastrophic wildfires, a less likely possibility.

"They're very very conducive to fire here," Everett said.

Driving back down to the valley after the prescribed burn, Ron Swaney, one of the fire management officers, pointed at bare spots in the mountains and talked in a slow drawl about fires he's fought over the years. They're getting bigger, and there's more of them as the climate changes, he says.

Lately Swaney has travelled with Everett to the Mission Mountains to look at whitebark. Everett told Swaney he wants to develop an identification manual and have firefighters mark whitebark trees, since the workers move through the forests all summer long. He also wants the firefighters to protect source trees from big fires that burn too hot for even whitebark pine to survive.

Everett's scientific jargon sometimes loses him, Swaney said, but he's on board for whatever it takes to preserve whitebark. "Tell me what to do man, you want me to collect that cone or not?"

Outside the Flathead Valley, some question whether the cones should be collected, saying foresters should roll the dice on whitebark pine and let them fend for themselves.

Elsewhere, replanting has run into a legal impediment - the 1964 Wilderness Act, which excludes areas designated as wilderness from human intervention. In areas designed to let nature run its course, planting a tree species, even to save it, qualifies as meddling.

Ideologically speaking, the question of whitebark restoration is a thorny one. Are manmade threats like climate change and a fungus Europeans introduced sufficient reason to intervene in the slow extinction of a tree species, fundamentally altering the course of nature?

The impediment is made more potent because an estimated 50 percent of whitebark is found in designated wilderness areas.

Gary Macfarlane, the vice president of a Missoula based advocacy group called Wilderness Watch, says selecting for blister rust resistant whitebark may be unfruitful meddling. Like antibiotics and bacteria, meddling with the trees may cause more powerful strains of the disease.

“Natural selection’s been around for eons, and it seems to be working better than choosing specific trees,” he said. And because of the slow timeframe on which whitebark grows, there’s no way to measure success.

Outside wilderness areas there’s been no real opposition to replanting, and an estimated 14,000 acres of rust-resistant whitebark trees have been planted over the last decade. “It is sort of this experiment,” said Beth Hahn, a researcher at the Forest Service’s Aldo Leopold Wilderness Research Institute in Missoula.

Hahn believes the effort to save a single species can reflect a choice of values as well as an ecologically based decision. Mountain ridge-lines can be as sacrosanct for conservationists as they are for the tribes. And just sitting on their hands goes against the grain for researchers and foresters who see their job as stewardship.

“Managers manage,” she said simply.

One area which will be integral to the CSKT’s whitebark restoration effort is the Mission Mountain Tribal Wilderness, a 34 mile long and five mile wide stretch along the southeastern side of the Reservation. The key word there is ‘tribal,’ not federal, wilderness. Although the tribes largely manage the area to wilderness standards, there are two big differences. One is a broader leeway for active forest management, and the other is an imperative for protecting the tribes’ cultural values.

Everett and Harwood are aware of the debate, but they have the permission they need to proceed, and they intend to do it.

“If we’re too cautious, if we don’t try to restore areas where we can do restoration,” Everett said, “we’re not going to have the tools to do it if we start really needing to. It’s gonna be too late.”

In April, Everett headed back towards Three Lakes in his rusty steel gray Toyota Tacoma. It was his second whitebark scouting attempt since winter had released its hold

on the valley. Two weeks earlier, he'd tried the road and been turned back by the snowpack.

Hands on the wheel, he peered around each corner to make sure the road stayed clear while he talked about the whitebark he hoped was now accessible. "People who say things are going to wind up extinct are really sticking their necks out, because they're not taking into account the sheer orneriness of a biological entity," he said as the truck rattled upwards.

Even as he prepares for restoration, Everett is more and more impressed by the resilience of the reservation's forests.

Above the tree line, whitebark branches are twisted into arcs and bows by centuries of wind and ice. The strange shapes are easily recognizable. But that shape is a result of environment, not DNA, and in the gentler forests below tree line it becomes nearly indistinguishable from lodgepole. Dead whitebark on ridges are obvious, but living whitebark in the forest are not.

The road stretched out behind Everett's truck as he switchbacked up through logging cuts and old burns. When he hit the first patch of snow, he got out to manually switch his wheels into four-wheel drive. When he hit a downed log, he got out to roll it off the road.

Then a pile of stones and a large tree trunk deposited by a rock slide blocked the road. Everett got out and walked. Soon each patch of snow was bigger than the last, and his steps sunk in past his ankles.

"It's not worth it," he said after a few turns on the road.

Forests have been managed for as long as humans have inhabited them, but for the most part the mountain tops have been left alone. By preserving whitebark the tribes seek to preserve a healthy and productive chain that starts from the ridges and trickles down to their valley. For Everett it means more time trying to understand the forest.

Despite Everett's confidence, whether they will succeed remains to be seen.

"We're farmers, but we aren't going to see our crop grow for another two to three hundred years," Everett said as he trudged back towards the truck, his sneakers disappearing into snow patches and mud. He'll try the road again in a week or two.