

Notes from the Field



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Searching Siskiyou

Collecting Sadler's oak and Brewer's spruce in the Pacific Northwest, a team of plant investigators develops a fresh appreciation for the fertile ferocity of fire.

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We made our way along a winding path that followed the contours of the land toward Babyfoot Lake, often clambering over or under massive trunks of conifers strewn about like enormous toothpicks. Countless trunks were still standing, their bases fire-scarred below the barkless, weatherbeaten, ashen-gray pillars supporting an overcast sky of nearly the same hue. They made for a ghostly reminder of the ravages visited upon this landscape in the recent past—even as a new forest in every shade of green was emerging in stark contrast among the standing dead. It was in this

landscape that, with great support from the American Public Gardens Association and United States Forest Service (USFS), we were headed out to find *Quercus sadleriana*, Sadler's oak. The Global Conservation Consortium for Oak has identified many species of North American oaks requiring more research and collection work, and Hoyt Arboretum has chosen to be the species champion for *Q. sadleriana*. As we set forth, the signs and impacts of fire on the landscape soon became as familiar as the individual voices and laughter of each of us in our small company.

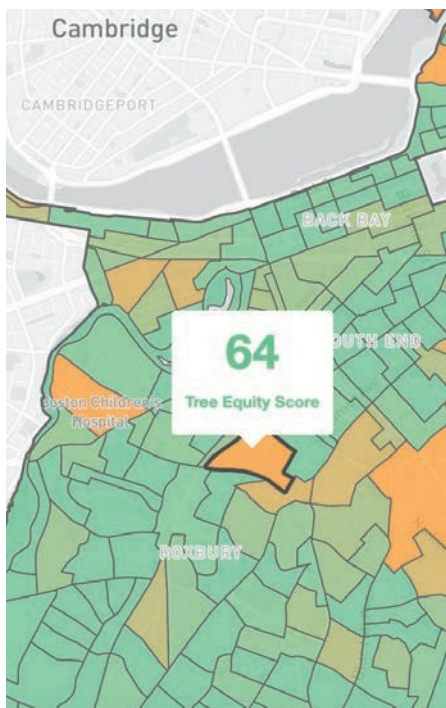
We were walking in the Kalmiopsis Wilderness in Rogue River-Siskiyou National Forest, home to landscapes marked by numerous fires over the last two decades. Fire, of course, is a natural part of the ecology in northern California and extreme southwestern Oregon where we spent the better part of two weeks in September 2022. The physical and ecological impacts of fire are many and complex—but overall, it is regenerative. For centuries, indigenous peoples understood this and used fire to their advantage. Together, human-ignited fires and natural ignitions led to the regular occurrence of low- to moderate-intensity fires that helped maintain an ecological balance. Fire-suppression policies implemented in the twentieth century, however, along with a changing perspective on the human relationship with forests, began to upset that balance. Forests grew denser, fuel loads increased, and forests became less fire-resilient, all conspiring to heighten the likelihood of massive, difficult-to-control fires that would have deeper, more detrimental ecological impacts.

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Climate change is exacerbating this situation on both the landscape scale and at the level of the individual taxon.

This sobering fact underscored the importance of what we were doing (and the work of botanic gardens and arboreta the world over) and lent a sense of urgency to our daily activities. Drive, hike, see, observe, record, collect, learn, enjoy the company of like-minded friends, and ask questions. Repeat. Although uncertainty surrounds the fate of many species that we saw, *ex-situ* conservation has a distinct role to play in long-term stewardship. With dedicated and careful attention in the months and years ahead, the seed we collected will grow into plants that will find their way into our arboreta and gardens, as well as many others throughout North America.

Previous attempts at collecting *Quercus sadleriana* in California had found plants with few acorns; however, this year would be different. Headed into the field, we were supplied with a good account, furnished by a USFS botanist, of a large population with maturing acorns. We proceeded up



GREEN CITIES Tree Equity Score Analyzer

In urban areas across the U.S., a pattern has become all too familiar: socioeconomically disadvantaged districts and neighborhoods of color have fewer trees than their whiter, wealthier counterparts, meaning these areas do not receive the myriad benefits trees provide. To promote awareness of environmental justice, American Forests created the Tree Equity Score Analyzer—a tool allowing users to understand cities through exploring maps, evaluating data, and creating optimal scenarios for tree planting and carbon sequestration. Each neighborhood is assigned a Tree Equity Score based on “tree canopy, surface temperature, income, employment, race, age and health factors.” Recently this tool added data expanding its reach to more than 200,000 neighborhoods—including those in the Boston Metro area. Unsurprisingly, the Arboretum has a perfect score of 100, though the same can’t be said for other areas.

—Jamila dePeiza-Kern

ever-narrowing forest service roads climbing into a previously burnt-over forest. *Q. sadleriana* has a distinctive leaf, oval and serrate like chestnut, which stands out from the other shrubby material. Reaching our target GPS points, we found a large population of Sadler's oak covering the hillside, with a robust and plentiful mast. Given the research and conservation priority assigned to *Q. sadleriana*, and the Hoyt Arboretum's mission to champion the species, we were thrilled to find this species doing very well in the post-fire landscape, with acorn maturity that was perfect for collection. We filled seed bags and made collection notes, a satisfying pattern to repeat with this target species over the next three days.

Another target tree, the chosen illustration on the cover of our field notebooks, was the magnificent Brewer's spruce, *Picea breweriana*. With its shallow root system and aversion to sun contributing to poor regeneration after fire, this vulnerable endemic conifer is under threat. It has found its niche, however, in disjunct populations on often steep and north-facing slopes in montane chaparral and climax communities.

Our search for the drooping green-blue branches of Brewer's spruce began as we made our way through southwest Oregon, Douglas fir (*Pseudotsuga menziesii*) foiling our eager eyes on numerous occasions. Occurrence records from herbarium specimens from a 2017 trip by the Royal Botanic Garden of Edinburgh guided our route. We arrived at one site crestfallen, finding a desolate landscape recently burned to a crisp where there should have been a stand of Brewer's spruce. The Slater Fire raged through this area in 2020, and probably took this particular occurrence with it.

This disappointment made our discovery of Brewer's spruce in the Klamath National Forest that much sweeter, however. Beholding its unforgettable, pendulous form, we were very unlikely to mistake it for Douglas fir ever again. A worn path showed that others had visited this tree, and we took the utmost care to collect only what was needed. In our excitement, we forgot to

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send up a collecting bag with our climber, and for a good fifteen minutes, we on the ground caught the sticky cones that rained down from the heavens as he swayed in the breeze at the top of the world.

This was not the last time we saw Brewer's spruce. We witnessed its beauty in the Miracle Mile of Conifers in the Russian Wilderness, a one-mile stretch that boasts some of the greatest conifer diversity in the world. And our hike to Babyfoot Lake, a region regenerating after the 2002 Biscuit Fire, led us to trees that survived on rocky, protected slopes. In a moment of melancholy, we found that an ignorant lakeside camper had chopped down a Brewer's spruce sapling for firewood, highlighting the importance of respect for nature and the importance of both in-situ and ex-situ conservation of this species.

While on the hunt for *Picea breweriana*, we followed Forest Service roads that snaked through the undulating landscape, and at a fork in one such road we took a moment to break for lunch. All around, the largest trees showed bold fire scars 10 feet up their trunks, yet retained lofty canopies high above a vigorous understory of shrub thickets and young trees. A prominent component in the regenerating mid-story forest were stands of *Pinus attenuata*, the knob-cone pine.



The young knobcone pines stood between 8 and 15 feet, the larger specimens adorned with tapering downturned cones pressed tightly against the upper trunk. Mature cones remain closed until the next fire sweeps through, so we could count down the trunk that these trees had been reproductive for half a dozen years, the oldest cones still tightly closed. We collected cones of various ages, along with acorns of *Quercus vaccinifolia*, a prominent scrub oak at the site.

The cones collected along the two-week journey were stored in cloth bags, and by the end of the trip most had dried to the point where they were easily shattered or opened on their own. Those from the knobcone pines, however, remained firmly closed. Fire is the force needed to unlock them. On our final day, safely back at the Hoyt Arbo- return in Portland and with new tools at our disposal, we ignited a blowtorch and passed it over the *Pinus attenuata* cones. We were mesmerized as the dry, hard resin covering the cones melted before quickly boiling then vaporizing under the heat of the flame. Within minutes, a soft cracking could be heard as the cone scales separated, and we watched wide-eyed as the seeds within were finally revealed. After seeing entire landscapes ravaged by fire throughout the trip, this final act of seed collecting using fire as a necessary tool was a reminder that there exists a delicate balance in nature, and that even something as destructive as fire can be required for new life. 🌿