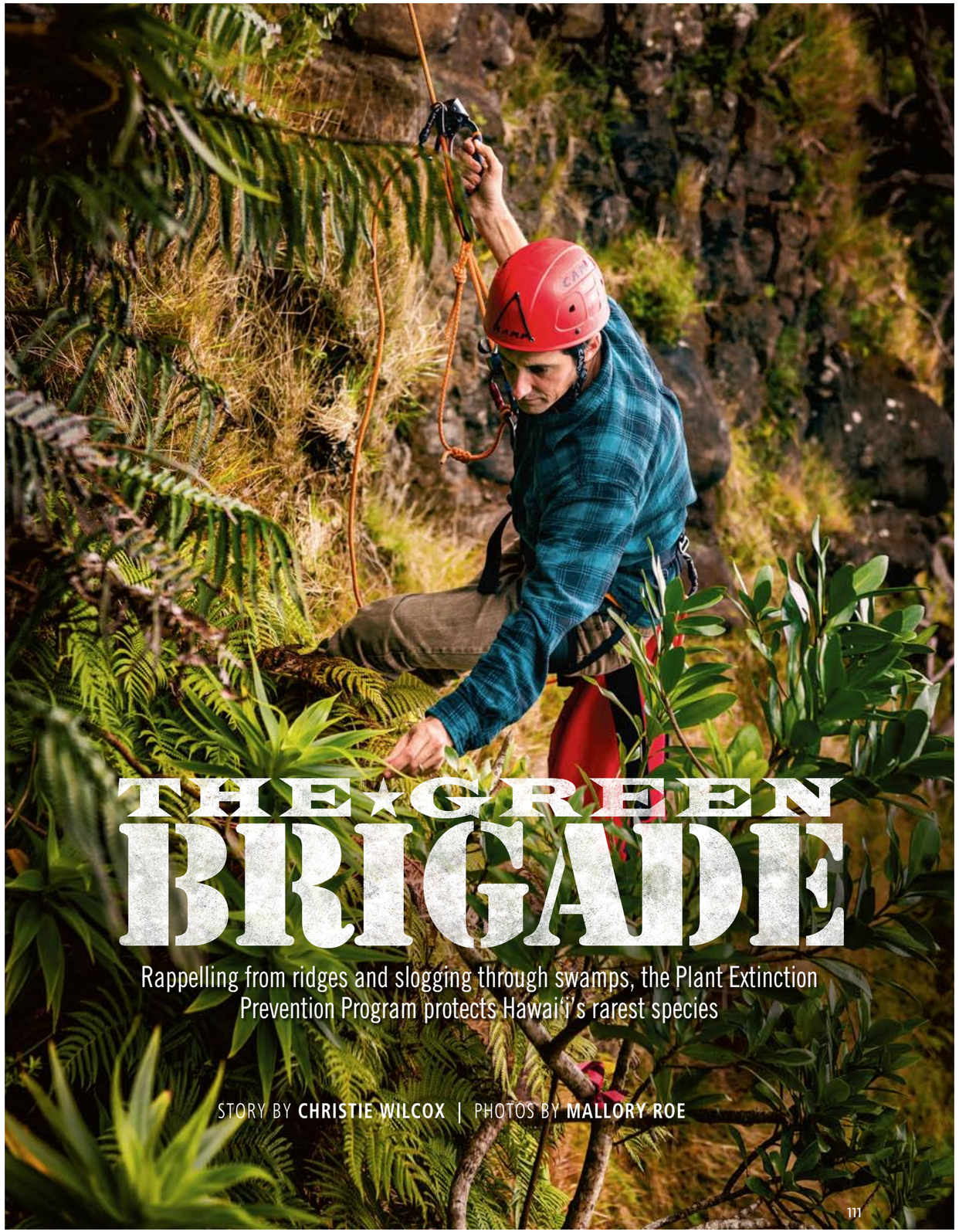

THE GREEN BRIGADE

Rappelling from ridges and slogging through swamps, the Plant Extinction Prevention Program protects Hawai'i's rarest species

STORY BY **CHRISTIE WILCOX** | PHOTOS BY **MALLORY ROE**

The wind whips around our faces as Josh VanDeMark loops his orange rappelling rope around a large ʻōhiʻa tree several times. We are standing on the rim of Kalalau valley on Kauaʻi. The lush, green cliffs plunge into a fertile gorge. In the distance I can see the shore and the sparkling ocean. As VanDeMark ties a secure knot, a rainbow appears. It would be bliss if it weren't for the biting wind.

"One of the perks of the job," says Wendy Kishida, gesturing toward the view. Kishida, Kauaʻi coordinator for Hawaiʻi's Plant Extinction Prevention Program, is leading our excursion. As she checks VanDeMark's rope, she reviews the day's plan one last time. There are eight *Plantago princeps*, an endemic Hawaiian relative of the plantain, growing on the cliff about a dozen feet below us. VanDeMark will rappel to them to check their condition and replace the temporary aluminum tags that PEPP personnel affix to rare Hawaiian plants whenever they find one. VanDeMark's task is to swap the tags for more durable steel ones.

Kishida is originally from Indiana; she came to Hawaiʻi for a master's in botany, studying ʻōhiʻa root systems in lava tubes. After finishing her degree, her caving experience landed her a job developing a management plan to protect cave-dwelling wolf spiders and amphipods on Kauaʻi; she's lived on the island ever since. When she was offered a job at PEPP, she was happy to go back to working with Hawaiʻi's rare flora rather than fauna. "I'm a botanist more than a zoologist," she smiles.

Everyone involved with PEPP is passionate about plants. Steve Perlman, a statewide PEPP specialist who often works with Kishida on Kauaʻi, has been a leader in plant conservation for more than forty years. Before joining PEPP he worked as a field botanist for the National Tropical Botanical Garden on Kauaʻi, pioneering methods for collecting and surveying Hawaiʻi's rarest plants, methods PEPP still uses. VanDeMark, the Hawaiʻi Island PEPP coordinator, is a Michigan native who came for an internship at Hawaiʻi Volcanoes National Park. "These plants mean everything to us," he tells me. Susan Ching Harbin, the Oʻahu PEPP coordinator, was one of the program's first hires. "We're so plant-centric," she tells me. "We're constantly thinking about the plants."

On the long, winding drive to get to today's work site in Kōkeʻe State Park, Kishida explained PEPP's mission. The plants for which PEPP cares are on the brink of extinction. There are fewer than fifty of each left in the wild, and in many cases far fewer still. Of the 239 plants on PEPP's list, 35 species were once found on multiple islands but now survive on only one. Fourteen species are extinct in the wild, meaning that the last wild plants have perished but the species still exists in greenhouses and outplantings. Twenty-two species are listed as possibly extinct, meaning either genetic material wasn't collected or attempts to grow the plants failed. Those could be hanging on, though, in areas PEPP hasn't been able to survey.

But when it comes to Hawaiʻi's rarest plants, there is always hope. Take the case of *Hibiscadelphus woodii*: back when the program started in 2003, four specimens were known to exist, all living on the same

Josh VanDeMark (above top, also on the opening page), the Hawaiʻi Island coordinator for the Plant Extinction Prevention Program (PEPP), rappels in Kōkeʻe State Park on Kauaʻi toward eight of the last known wild *Plantago princeps* var. *anomala* plants in the world. Decimated by introduced herbivores, the endemic Hawaiian species survives on slopes too steep even for goats to climb, and PEPP personnel risk their lives to protect and propagate the plants. Above bottom: Kauaʻi PEPP coordinator Wendy Kishida checks on a *P. princeps*.




Clockwise from top left: a *P. princeps* growing in Kōkeʻe; a young *Delissea kauaiensis* that PEPP personnel propagated and outplanted in Kōkeʻe; the fruit of a wild *D. kauaiensis*; VanDeMark and Kishida collecting *D. kauaiensis* fruit. The fruit will be taken to a nursery, the seeds propagated and the young plants returned to the forest. Without such interventions, the 239 endangered species PEPP protects would be at a much higher risk of extinction. "It's rare that a wild population recovers on its own," says VanDeMark. "There are so many things up against them."

cliff. PEPP employees were heartbroken when a landslide took out three of them, and the sole survivor died in 2011. For five years it appeared the species was gone.

But then in early 2016, while exploring a remote ridge on Kauaʻi close to the home of the original four, Kishida and Perlman spotted a plant they thought might be *H. woodii*. It was far away—they could see it only with binoculars—and it wasn't flowering, so they couldn't be sure. They intend to get a closer look as soon as they can, but the plant hasn't made it easy: It will take a dangerous and demanding five-hundred-foot rappel to get close enough to examine the leaves. But if their instincts are right, PEPP just might still have a chance to save the species.

Before PEPP started, scientists estimated that a native Hawaiian plant went extinct every year. But in the thirteen years the program has been working to save them, only two species have dropped off the radar; the team was unable to propagate them from collected material. And for both of those—*H. woodii* and *Adenophorus periens*—there is still hope. "No species should go extinct," Kishida says. "We have the technology to save them. We just don't always have the manpower or the funding." PEPP has relied on soft-money funds for the entirety of its existence, applying each year to government programs and private funders for continued support. In the current funding climate, PEPP and other conservation programs face severe budget cuts. PEPP is pursuing private grants and public support (through donations made to the University of Hawaiʻi Foundation), but the program's future remains uncertain.

With the help of interns and volunteers, PEPP undertakes the challenge of outplanting in some of Hawai'i's most remote and inaccessible places. Here, interns haul young plants and supplies up the Palikea Trail in O'ahu's Honouliuli Forest Reserve. Grueling though it can be, outplanting is "one of my favorite parts of the job," says Kishida. "The plants always look so happy when we put them back in the forest. It's where they belong."

The eight plants VanDeMark is heading down to inspect are among the last *P. princeps* left on Kaua'i. When Kishida started working for PEPP, there were more than fifty. But in the past ten years, the species has declined. The spot we are visiting used to have fifteen; then that dropped to five. Now it's rebounded slightly to eight, but there are still so few left — fewer than twenty-five in the wild on the entire island, Kishida estimates.

VanDeMark secures his helmet, checks his harness and backs up to the edge of the precipice. "The tags should be near the flagging tape," Kishida calls after him as he rappels down the cliff. These plants were once much easier to get to. Their current inaccessibility is because of their main threat: goats. The invasive mammals find the rosette of leaves at the top of each *P. princeps* irresistible, and they'll consume any plant they find. That means the plants can survive only in places where even goats can't tread.

As if on cue, a small herd of goats appears on the slope about fifty feet below VanDeMark. They glance at the strange creature dangling above them, then continue on, nibbling their way deeper into the valley. While the plants might be safe from goats, living on a steep cliff has drawbacks, like landslides and competition from invasive weeds.

"I found a spike!" VanDeMark calls up, excitedly. The fruits of *P. princeps* are grouped in rows along a long, spike-like stalk, Kishida explains. Fruits mean seeds and seeds mean hope. The sad truth is that even with help, most of the plants PEPP monitors can't rebound in the wild. There are simply too few facing too many threats. But they stand a better chance if their seeds can be harvested. Every time they check on plants, PEPP employees collect what seeds they can and give them to partners like Lyon Arboretum, which grow the seeds into mature plants to be put back into the wild.

After climbing back up, VanDeMark shows me his find. These plants, he says, "are part of Hawai'i's heritage, its story and identity. They inhabited the landscape that Polynesians encountered when they first arrived and were elements of the natural realm where Hawaiian culture originated. Only a handful of generations ago, they were among the native plants and animals that would have been familiar and comforting to people of these islands. Sadly, today they are unfamiliar to most and at risk of disappearing altogether."

Back on O'ahu, I tag along on a planting mission with Susan Ching Harbin and a small army of interns from Lyon Arboretum and the state Division of Forestry and Wildlife to see what becomes of seeds like the ones VanDeMark collected. On the drive through Kunia toward the trailhead, Ching Harbin tunes the radio to a Hawaiian music station. "I always play Hawaiian music when I have the plants in the car," she says. "I feel like it's their native tongue and I owe it to them."

With sixty-two PEPP-protected species, O'ahu is home to the second-highest num-

ber of rare Hawaiian plants of the main islands (Kaua‘i is first with about eighty). Because there are only two PEPP employees on each island, the program relies on partnerships for labor-intensive activities like today’s planting. “There’s no way we could accomplish everything we do without help,” Ching Harbin says.

Today’s plants are headed for Palikea in the Honouliuli Forest Reserve, close to where the parent plants were once found. Both species are extinct in the wild and survive only because PEPP collected their seeds. Packed into the two trucks are fifty little *Phyllostegia kaalaensis*, a mint last seen in the wild around 2000, and twenty-eight *Silene perlmanii*, a carnation relative named after Steve Perlman, who discovered the only known wild plants in the 1990s, just before they died.

At the trailhead, enthusiastic interns carefully load the plants into large tubs, then place them in special backpacks originally designed for carrying kayaks. “Outplanting is my favorite part,” grins intern Kyle Clarkin as he gently swings a tubful of plants onto his back. It’s a rigorous, hour-long ridge hike to the valley the plants will call home. We descend through a dense, piney, fern-filled forest toward the site. Along the way, Ching Harbin points out native plants. “Look at these manono,” she says, gesturing to the endemic shrubs with their bright, blueberry-like fruits. “And look at the size of these pōpolo! I planted these two years ago. They’ve grown like weeds!”

PEPP employees spend three to four days a week hiking to some of the most remote and difficult places in the Islands. Though the fieldwork is grueling, returning these species back to where they belong makes it all worthwhile for Ching Harbin. “Planting really connects you to that plant and to the area you plant it in,” she says. “None of us would show up if we weren’t making a difference.”

We finally reach the wet slope for which Ching Harbin was headed, and she splits the interns into teams. “You want to plant them under filtered light, about half a meter to a meter apart,” she instructs. “Then place the tags to the right and uphill.” Each tag carries information about the plant, including when it was planted, its genus and species, and its genetic makeup. “Like those who breed cheetahs or pandas, we know who each plant’s parents are, and we try to improve the species’ genetic diversity,” Ching Harbin explains. For the mint, these fifty plants are the first to go back into the wild since the species went extinct, while the twenty-eight *S. perlmanii* will bring the number of outplanted individuals to around two hundred.

Even with today’s plantings, these species need all the help they can get. They still face the threats that brought them to the brink of extinction: habitat loss, climate change, introduced species that compete for space and nutrients and introduced herbivores that graze on them. Their survival depends upon PEPP’s dedication. “Many of these plants are found nowhere else in the world and have a role in what makes this a unique and special place,” VanDeMark says. “In a way it’s not Hawai‘i without them.” HH