The Miami blue was fluttering toward extinction. Then the scientists showed up

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One crisp, sunny afternoon this month, grad student Sarah Steele Cabrera headed down a sandy path at Long Key State Park carrying two nylon bug containers.

Cabrera had scouted out the park, a former fishing camp fashioned into an early version of glamping by railroad tycoon Henry Flagler and now a tangle of gumbo limbo, poisonwood and prickly nickerbean, and found a perfect spot to release the contents of the boxes: 60 newly hatched Miami blue butterflies, among the rarest insects in North America, and maybe the world.

Cabrera's butterflies, bred at a University of Florida lab in Gainesville and shipped overnight by FedEx two days earlier, are part of the latest effort in a yearslong rescue mission that have made the butterfly one of the more high-profile endangered bugs. It even has its own limited-edition beer.

Only decades ago, collectors considered the butterflies a trash specimen because they were so plentiful. Peterson's 1951 Field Guide described them as common. But today just two wild colonies can be found on remote islands west of Key West, surrounded by busy shipping lanes potentially carrying exotic enemies and in the middle of hurricane alley. So Cabrera's mission is not without urgency.

"Unfortunately by the time we're doing this, they're in critical care," said attorney Dennis Olle, a director of the North American Butterfly

Association and former president of the Miami Blue chapter. "We're dealing with stuff that could wink out very quickly."

The rescue would amount to a major breakthrough for a state besieged by invasive species, battered by climate change and in a seemingly losing race to save its natural beauty. So far, years of trying have failed to reproduce a stable population, but researchers are hoping to repeat the success they've had with another nearly extinct butterfly, the Schaus' swallowtail.

A rescue would also be welcome news on a planet undergoing an alarming decline in insects in recent years, from the rainforests of Puerto Rico to Germany's prehistoric forests.

"It's not nuclear war. It's not global warming. The apocalypse of all things is going to be the collapse of the insect population," Olle said. "It will fundamentally change the way we live on earth and we've all taken it for granted.

In the United States, Florida ranks high for its bounty of butterflies. But increasingly, the state has also climbed the list for the number of imperiled butterflies. In the last three years, two were added to the endangered species list while a third, the frosted elfin, is now being considered.

The Miami blue began disappearing during the 1980s and '90s, as coastal construction in South Florida boomed and condos began replacing the dunes and coastal berms they inhabited. By the early '90s, they could only be found on Key Biscayne, although still in good numbers.

"They would be flying all over the place," said botanist Roger Hammer who helped revive the Atala butterfly after taking several from its last known colony and breeding them on coontie he planted in his yard.

When he ran out of space, he smuggled some into Fairchild Tropical Botanical Garden, where they quickly began eating the collection, evidence that rare butterfly populations can be saved.

When Hurricane Andrew hit in 1992, the Miami blues vanished entirely. They were thought to be extinct for seven years until a butterfly enthusiast from Pennsylvania discovered about 50 at Bahia Honda State Park and emailed pictures to NABA's president, who flew down the next day and confirmed the colony.

For the next three years, NABA fought to get the butterfly protected. Olle lobbied the U.S. Fish and Wildlife Service, which ultimately refused. So NABA drafted its own rescue plan, raised money and took its case to Florida wildlife managers, who listed them in 2002. It would take the feds another 10 years to recognize their perilous state.

To ensure against extinction, a breeding effort was started at UF's McGuire Center for Lepidoptera, which had already begun breeding the Schaus' swallowtail. UF researcher Jaret Daniels, Cabrera's boss and mentor who now runs the breeding lab, helped collect 100 eggs from Bahia Honda to create the "assurance population." But in 2010, the lab population crashed at the same time the Bahia Honda colony vanished. Luckily, researchers had by then found one of the populations off Key West that provided eggs for a new lab nursery.

Since 2016, when the latest effort started, Daniels has bred 17 generations, amounting to thousands of offspring that need to be fed and tended to in the cooler Gainesville climate. A crew of staff and grad students keeps a nursery stocked with nickerbean and fragrant blackbead, the butterflies' two host plants, and tends to the pupa and caterpillars in individual cups that line the lab.

"These guys are horribly cannibalistic," Daniels said. "Keeping them

away from their brethren is a good thing. Once they've had flesh, they never go back."

In addition to the busy nursery, the research team is also trying to figure out exactly what's keeping the Miami blue from bouncing back. Like other butterflies, scientists generally know what's harming them—pesticides, loss of habitat, invasive species like green iguanas and changing climate—but don't know specifics about their decline.

Insects tend to be heavily reliant on their surroundings, which is why they also tend to be such a good measure of a habitat health. Butterflies can be a particularly good yardstick because they have such small ranges and many depend on specific plants to survive. The Miami blue inhabits a tiny range of just 45 to 55 yards and needs just two plants.

They also play a critical role in keeping certain habitats in balance, especially the disappearing ones unique to South Florida, by pollinating native plants and serving as the first course in the food chain.

"Everything loves to eat them," Cabrera said, including song birds, wasps and lizards. "Wasps will find caterpillars to take back to nests and feed their babies."

That makes pinning down what's harming them like finding a needle in a haystack. The UF team, however, thinks they may be closing in. Like other butterflies, Miami blues have a "mutualistic" relationship with ants. As caterpillars and pupa, the blues produce a sticky sugar that ants, particularly Florida carpenter ants, like to eat. So much so, that the brawny ants will defend the vulnerable caterpillars from other insects.

"If they have a caterpillar they're tending, they will not leave that caterpillar," Cabrera said. "If they find another insect, they'll pick it up and throw it off the plant."

Preliminary research in Daniels' lab has found that with no ants around, the caterpillars were gobbled up in significant numbers. But with ants on patrol, there were no attacks. That may mean researchers will need to look into what's going on with ants and whether there's a problem with invasive ants.

"I think one of the side stories is ants," Olle said. "We got ants. The problem is we got ants from everywhere."

As part of the research, Daniels is also trying to figure out how many butterflies to release and when. Beginning in July, Cabrera began putting out pupa. In each case, butterflies emerged, mated and laid eggs. Female butterflies lay up to 100 eggs, one at a time, so tracking them can be challenging. But the eggs hatched, caterpillars rolled into their cocoons and a second generation of butterflies appeared. Yet they never managed to reproduce a third generation. Researchers aren't sure if they didn't release enough or something else interfered.

By releasing adults, Cabrera hopes the butterflies have a better chance of survival and bring the ephemeral blue, whose entire life lasts only a month, back from the brink.

At the end of the trail, just inside a stand of mangroves overlooking the Atlantic, Cabrera, biologist Taylor Hunt and a trio of volunteers find a scrubby stand of nickerbean and blackbead covered with pink pompom flowers. Kim Gabel, a UF horticulturist who retired last year after helping defeat a gory outbreak of invasive New World screwworm killing endangered Key deer, got to open the first box.

"There you go," she said after the last butterfly departed.

The release takes just a few minutes, and given the massive effort to produce them, seems slightly anticlimactic.

"What's the man hours for this butterfly?" muses biologist Hunt, who will take over releasing butterflies and monitoring the two colonies about 73 miles away. "What's the man hours."