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Plants Hang On in Concrete Jungle

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Despite miles of skyscrapers and pavement in New York City, nature has not lost its foothold, at least not yet.

A majority of native plant species found here since botanists began combing the city in the late 1800's survive somewhere in the five boroughs, a new study has found. Among them are elegant wildflowers like the slender blue flag iris, handsome trees like the wonderfully aromatic sweetbay magnolia and the fantastical thread-leaved sundew, a carnivorous plant.

While a majority of native plant species persist, they do so by the slimmest of margins, scientists say. The study, soon to be published in *The Proceedings of the Linnaean Society of New York*, found that 43 percent have disappeared, including such treasures as the yellow lady's slipper orchid and the showy aster.

"It's pretty impressive what's still here, but it's declining," said Dr. Robert DeCandido, lead author of the paper and a former urban park ranger. "And every day the world becomes more and more like New York City, not the reverse."

As demographers predict that most people will live in cities soon, ecologists have begun taking a look at urban environments they had long ignored, cataloging which species remain and which may be most usefully and successfully restored.

"The benefits of biodiversity are just as important in urban settings as in wild preserves," said Dr. Steven N. Handel, plant ecologist at the Center for Urban Restoration Ecology at Rutgers University in New Brunswick, N.J. He was not involved in the new study, but he said, "These species lists are the foundation for all our restoration efforts."

And while the new study examines what remains of the native flora, borough by borough, an even more elaborate listing is yet to come. Dr. Steven Clemants, a botanist at the Brooklyn Botanic Garden, initiated a survey 12 years ago that is continuing. In it, researchers and volunteers are mapping historical and current distributions of plant species onto a grid covering New York City and adjacent areas.

In the new study, Dr. DeCandido and a co-author, Adrianna Muir, an intern at the City Parks Department, were able to draw on the rich records of botanical exploration of the city. They sought reports in the scientific literature of plants collected over more than 100 years, studied museum specimens, made field observations and studied the observations of the many amateur naturalists who have haunted the city's green spaces. In doing so, they were able to document 1,357 native plant species. Of those, 778 have survived.

Among the best at surviving are woody plants, like hardy trees and shrubs. Wildflowers were hit harder, as were species that lived in wet or moist areas and meadows. Some plant groups, orchids, for example, are almost extinct in the area.

And in a pattern typical of fragmented natural areas, the parks that are the remaining strongholds of the native species are being invaded by foreign plants, already at 411 species, which can be formidable competitors. Foreign species already outnumber surviving native species in Brooklyn and Manhattan.

It can be hard to determine when something is really gone.

"Things move around," Dr. DeCandido said. "For example, if there's a fire or if a tree falls down, a species might not be in the place you looked before but somewhere else nearby. It takes a good three to four years to do a 3,000-acre park, walking it all seasons. I walked Pelham Bay Park for five years, three or four days a week."

Dr. DeCandido said that beyond the obvious removal of green space through building and development, native species were being destroyed as natural areas were converted to parking lots, roads and ball fields. The collecting of orchids has also had an effect, as have off-road vehicles.

While deep, intact forests can remain wet, forests that persist in small isolated patches tend to dry out, making survival harder for moisture-loving species. In some areas where parks are left unmanaged and more natural, forests are slowly reclaiming meadows, leading to declines in meadow species.

While managing areas with native species may seem unnecessary, Dr. Handel said, those areas need regular management just as the city's pipes, roads and park benches do.

The most pristine of the boroughs is Staten Island, where many native species have kept the city's totals looking as hopeful as they do.

"It's the last borough to be developed," Dr. DeCandido said.

He says he views native plants as part of the city's heritage, like the holdings of its museums and galleries. But, he warns, "if the other boroughs are any indication, those native species are going to be lost."

Still, he and other researchers urge people to remember that some places in New York City remain quite wild in the naturalist's sense of the word.

"Most people think if they want to see nature they have to go to Yellowstone," Dr. Handel said, "and that's crazy. There are important biodiversity preserves right here in the metropolitan area, places linked to the great migrations, whether it's birds or butterflies."

Even as invasive species increase and native species decrease, there are glimmers of hope.

"Sometimes things can reappear," Dr. DeCandido said. "Once in an area where the Parks Department had made a clearing, we found a Carolina cranesbill, something we hadn't ever seen there. Another time we found a sedge, a species that only appears every few years and needs the right conditions, including a wet spring."

And some lost species, like wild lupine, are coming back through the hard work of restoration.

So scientists continue their often grim tallies, but as Dr. Handel put it, "This is not the end of the story."