Hole-in-the-Donut Restoration

National Park Service
U.S. Department of the Interior

South Florida Natural Resources Center
Everglades National Park

The Hole-in-the-Donut (HID) is a 6,600-acre wetland in the Everglades so named for the patch of farmland surrounded by native landscape that once characterized the region. When farming ceased in 1975, the patch was quickly invaded by Brazilian pepper (Schinus terebinthifolius), a non-native shrub from South America. Now, under management of Everglades National Park (ENP), the "donut hole" is being restored. The project was initiated twelve years ago and the efforts to restore and maintain the landscape are still underway.

Farmed for over 50 years before it was acquired by ENP, the HID, with its aerated and fertilized soil, was far more suitable for the growth of non-native Brazilian pepper than the waterlogged, nutrient-poor environment of the untouched Everglades. The plant was first introduced to Florida in 1926 and before long, fruit-eating animals had spread the weedy tree throughout south Florida. Typical of invasive plants, Brazilian pepper thrived in disturbed areas. It was this trait that allowed the plant to invade the HID. Once a few of the shrubs became established, the aggressive weed rapidly dominated the abandoned farmland. The dense thicket that eventually formed monopolized the nutrients, water, and sunlight, thereby inhibiting the growth of native plants.

Restoration

In 1997, ENP initiated a large-scale effort to restore the infested former farmland to its natural state. But getting rid of 6,600 acres of Brazilian pepper is no easy task. Using bulldozers and backhoes, the park set out to conquer the exotic invader. They leveled nearly half of the vast pepper forest and removed the debris. Yet, the battle was far from won. The persistent plant recovered as new shoots cropped up from underground root systems and from viable seeds remaining in the soil. In a final, ambitious effort, the soil was scraped away down to the bedrock.

A drastic measure, scraping the soil down to bedrock turned out to be the key to restoring the HID. With the aerated and nutrient-rich agricultural soils removed, the treated areas were successfully restored to wetland. Many native plants have reestablished in these areas on their own and wading birds and other animals have become regular visitors. But while basic ecosystem function has been largely restored, the full suite of native organisms has not yet returned. With time, a more representative community of native plants is expected to develop.

By 2009, 4,100 acres will have been restored in the HID. Efforts to monitor native communities and introduce missing native plant species are ongoing in the restoration area. In addition, the question of what to do with the seven million tons of removed soil remains. Currently stored on-site in large mounds, carrying the soil out of the park would be very disruptive to park visitors and damaging to park roads since such a project would require transporting 250,000 dump truck loads of soil out of the park. Therefore, park managers are looking for alternative uses for the soil, including its potential as fill for several borrow pits located throughout ENP.

Brazilian pepper (*Schinus terebinthifolius)* prior to restoration on the left and restored marl prairie on the right. Photo by Joy Brunk, ENP

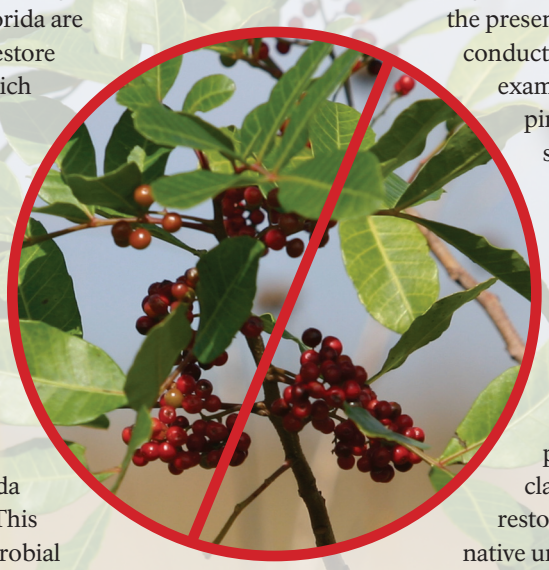
Restoring a Wetland

Photos by Lauren Serra, ENP, and Rodney Cammauf, ENP Volunteer

Restoring thousands of acres of Brazilian pepper to native marshland is an challenging task. First, the towering weeds are cut down and mulched. Next, the debris is bulldozed into long windrows, scooped up with front end loaders, and then hauled to soil disposal mounds via trucks. Finally, a grader is used to scrape the remaining soil from the bedrock. Scientists actively monitor the progress of the restoration. Wading birds and other wildlife have been quick to return.

Applied Science and Monitoring

Scientists from universities and research groups outside of ENP have taken advantage of the HID project as an opportunity to study aspects of ecological restoration. Researchers from the University of Florida are examining the ability to restore pine rockland habitat, which is known to have once occurred naturally in portions of the HID. Another University of Florida project is tracking soil nutrient dynamics in restored sites to determine what conditions favor the growth of different plants. A third project is being conducted by Florida International University. This group is developing a microbial biocontrol agent that targets Brazilian pepper.



The park has contracted the consulting firm, Everglades Research Group (ERG), to monitor the return of native vegetation and wildlife in the HID. In addition to documenting the presence of all native species in restored sites, ERG has conducted several smaller scale studies. In one study, they examined the growth and survival of south Florida slash pine seedlings (*Pinus elliottii* var. *densa*) on a 31-acre section of the HID after Brazilian pepper had been removed. Published in the journal *Ecological Restoration* (O'Hare and Dalrymple 2006), the project revealed that, through natural recruitment, 3,013 pine seedlings taller than 4 inches had become established in the area after four years. Most of these seedlings were found within 82 feet of pine rockland habitat and at elevations of at least 3.5 feet. The ERG authors concluded by emphasizing the importance of expanding the pine rockland habitat, now classified as globally imperiled. They suggest that such restoration projects could benefit from planting or seeding native understory species and implementing a prescribed burning program.

Photo by Joy Brunk, ENP

Wetland Mitigation Program

Restoration of the HID is an expensive undertaking with a current price tag of approximately $90-120 million — far in excess of what the park's operating budget can support. Outside funding for HID restoration comes from selling wetland mitigation credits to developers who build on wetlands within Miami-Dade County. As part of former President George H. W. Bush's "no net loss" of wetlands initiative, mitigation banking allows developers to fill in small, isolated wetlands if they pay for restoration of equivalent acres of wetlands in areas that are protected, like Everglades National Park. The HID wetland restoration project is a partnership project involving Miami-Dade County, the National Park Foundation, the National Park Service, and the private sector. A trust fund established with mitigation funds will allow for long-term management of the HID area by the National Park Service, preserving and protecting the area unimpaired for the enjoyment of future generations.