Florida Statewide Endangered and Threatened Plant Conservation Program helps conserve a rare, endemic shrub

Submitted by: Mike Jenkins, Plant Conservation Biologist, Florida Forest Service

The Florida Forest Service houses and administers the Florida Statewide Endangered and Threatened Plant Conservation Program (PCP) that provides funding for rare plant conservation projects in Florida. The goal of the Florida Plant Conservation Program is to restore and maintain existing populations of listed plants on public land and on private lands managed for conservation purposes. Under this Program, the United States Fish and Wildlife Service under Section 6 of the Endangered Species Act provides 75% of the funds needed to conduct these projects, while the projects provide match for the remaining 25%. Currently, the PCP is funding 12 projects benefitting twenty-six species of federal-listed plants, from the Florida Keys to the Panhandle.

Archbold Biological Station (ABS) and Bok Tower Gardens (BTG) work together to conduct one of the more technically challenging, yet successful, PCP projects. The project helps conserve the extremely rare Florida Ziziphus (Ziziphus celata). This plant, thought to be extinct until rediscovered in 1987, is endemic to the Lake Wales Ridge and is both state and federal-listed as Endangered.

Though an ex situ population of Florida Ziziphus was created in 1988, the PCP project to conserve Florida Ziziphus started in the early 1990’s with the initiation of the PCP. Demographic and genetic research has helped determine that many Florida Ziziphus populations were uniclonal and most of the 40 mapped genotypes were cross-incompatible with each other. After successful mapping of these genotypes, ABS and BTG could now identify which genetic individuals were cross-compatible, leading to the production of viable fruits, which are used to augment existing wild populations and introduce populations into suitable habitat. Translocations from 2002-2011 had a mean seed germination rate of 4.3% and a mean seedling survival rate of 30%. Transplant survival has been 64.3% at eight sites, four of which were augmentations of known populations.

Original population surveys documented 121 stems of Florida Ziziphus. The 2011 annual survey documented 1,886 plants, including five previously unknown populations discovered in 2007. This major increase is the result of a multi-faceted conservation strategy that entailed demographic and genetic research, the creation of ex situ Florida Ziziphus populations, successful propagation of cross-compatible genotypes, field surveys, intensive monitoring and plant introductions and augmentations.

This world-class plant conservation project is just one of the many projects PCP has helped to fund since its inception in 1991. Since then, it has helped to fund 4 to 13 projects per year, totaling 82 plant conservation projects, benefitting 91 species of rare plants. These projects were conducted by 99 different individual researchers and land managers from 27 different institutions. These projects have produced over 170 reports, whose titles and list of species are available on the PCP website http://www.floridaforestservice.com/forest_management/plant_conservation_index.html and will soon be in a searchable database online.

Florida Ziziphus fruit at Bok Tower Garden’s ex situ population. Photo by Cindy Campbell.
Linking complex forest fuel structure and fire behavior at fine scales

Improved fire management of savannas and open woodlands requires better understanding of the fundamental connection between fuel heterogeneity, variation in fire behaviour and the influence of fire variation on vegetation feedbacks. In this study, we introduce a novel approach to predicting fire behaviour at the submetre scale, including measurements of forest understorey fuels using ground-based LiDAR (light detection and ranging) coupled with infrared thermography for recording precise fire temperatures. We used ensemble classification and regression trees to examine the relationships between fuel characteristics and fire temperature dynamics. Fire behaviour was best predicted by characterising fuelbed heterogeneity and continuity across multiple plots of similar fire intensity, where impacts from plot-to-plot variation in fuel, fire and weather did not overwhelm the effects of fuels. The individual plot-level results revealed the significance of specific fuel types (e.g. bare soil, pine leaf litter) as well as the spatial configuration of fire. This was the first known study to link the importance of fuelbed continuity and the heterogeneity associated with fuel types to fire behaviour at metre to submetre scales and provides the next step in understanding the complex responses of vegetation to fire behaviour.

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