Little Colorado River Restoration Project
Genetics-based Riparian Habitat Restoration and Climate Adaptation

Project Update December 1, 2019 – May 31, 2020

Summary

Project staff are delighted to report that as of May 27, the ~3,500 trees that survived from 2019 or were planted in February/March 2020 have added 2"to 6" of growth this spring. Additionally, despite some scouring, the ~100 remaining native recruits along the river that project staff fenced to protect from ungulates are thriving. The trees treated with mycorrhizal fungi appear to be preforming better than their counterparts. Project staff are increasingly optimistic that all the hard work of many volunteers and the generosity of the Wildlife Conservation Society will result in a native cottonwood forest where a thicket of tamarisk once reigned.

Progress:

- Planted the remaining ~3,500 cottonwood trees between February 18-21, 2020, in partnership with the Arizona Department of Forestry and Fire Management, which is a work program for low risk inmates. In total, the project planted ~7,500 cottonwoods.
- ACE cleared 6.14 acres of camelthorn for cottonwood planting access in fall 2019, a detail missed in the December report. Because this area had not been previously planted, reducing the risk of confounding the results, a 500-tree experiment was planted in newly cleared area in February 2020 to test the effects of mycorrhizal fungi on productivity and drought tolerance. Half the cottonwood trees were treated with mycorrhizal fungi and half were not. Despite having clayey soil, this group of trees is from visual observations preforming better than other zones.

- Student volunteers from Flagstaff and Coconino High Schools collected and planted ~500 willow wands on March 6, 2020. The students also planted native grass seeds to reduce invasive weeds. Additional volunteer trips were suspended thereafter owing to COVID-19 concerns. Depending on virus threat, the project team hopes to work with the high schools to plant additional willows and grasses in fall of 2020.
- The students of High-Tech High created a video, 840 Arizona - A Climate Change Documentary – 2019, about their experience planting cottonwood trees as part of the WCS project. The High-Tech High students joined the project for a multi-day service event and planted 840 trees:

- Partners hosted the second "Using Mycorrhizal Fungi in Restoration" workshop and demonstration to a "sold out" group of land managers and restoration practioneers (20 participants) on February 6, 2020, during Rivers Edge West's 2020 Riparian Restoration Conference, Grand Junction Colorado.
- In addition to the workshop, three talks were given at the Rivers Edge West's 2020 Riparian Restoration Conference
    - Tracy, J. and L. Markovchick. Using mycorrhizal fungi in restoration to improve habitat suitability for an endangered bird.
    - Cadmus, A. Localized Performance of Fremont Cottonwood (*Populus fremontii*) Collected Across a Water Regime Gradient.
    - Parker, J. The Root Race: Does Stream Type Affect Belowground Architecture of a Riparian Tree Species?
- The ''Riparian Habitat Science and Economic Stability Act" is currently under review by House Natural Resource Committee. If passed, the Act will create up to **$150 million** of new Federal funding for grantees to work with Federal agencies to develop and update practical science-based riparian restoration methods, emphasizing genetic solutions that will "improve the health of riparian areas in the West."
- Provided featured talk at the Land and Water Summit, which took place in Albuquerque, NM, February 27 & 28, 2020. The talk, "Genetic Solutions to Global Change in Wildlands and Urban Environments," emphasized restoration of riparian habitats. Reviews of the conference listed this presentation as one of the most important presentations of the 2-day conference.
- As the result of the Albuquerque talk, the project PI was invited to give a Zoom presentation to the staff of the Open Space Superintendent for the City of Albuquerque. This meeting focused on developing plans for three experimental forests (one along the Rio Grande) using scientific approaches that have emerged, in part, from our WCS project along the Little Colorado River. This group is interested in becoming part of the Southwest Experimental Garden Array (SEGA) network of which our Little Colorado River project is also a network member.

- New irrigation well was completed March 31, 2020, after a yearlong delay, and began pumping water on April 2 to irrigate the cottonwoods and willows.
- Drip irrigation was installed to each cottonwood and willow tree by April 29, 2020, which has increased survival rates from ~20% (2019 planting) to ~ 60% (2020 planting). Survival is poor in some areas and impressive in others. The area with the mycorrhizal treatments is surprisingly successful compared to other zones. GPS mapping is being updated to confirm these numbers.
- Proposal submitted to the Arizona Community Foundation of Flagstaff ($3,700) to continue STEM-based volunteer activities (planting more willows, student-designed experiments, measurements) with Flagstaff and Coconino High Schools at the restoration site.

Additional Matched Resources:

The Landsward Foundation provided matching funding in the amount of $67,250 to ACE for tamarisk removal and treatment with herbicides, construction 1,800 feet of new Arizona Game and Fish Department-specific wildlife friendly fencing, removal of 410 feet of non-wildlife friendly fencing, and clearing land at the restoration site for planting. (This should have been report in December 2019.)

ACE built 0.4 mile of road to access site and breached dam of one wetland pond to allow better water flow at no cost to the project ($2,433.75 value)

Challenges

COVID 19 Challenges

In early February, The Arboretum at Flagstaff hired the project's part-time outreach coordinator, Trenton Anderson, to assist with planning and organizing upcoming school and volunteer service days. Things were off to a strong start until early March, when COVID emerged as a serious health crisis. Initially, it was hoped that the crisis would be temporary, and volunteer and in-person outreach would continue in early summer through the fall. As we waited for the situation to become clearer, Trenton's time was shifted to helping to weed and water the trees. This has greatly increased our ability to care for the trees. We did not feel it was fair to terminate Trenton. In addition, The Arboretum at Flagstaff applied for and received funding through the CARES Act, which requires that all employees remain on the payroll through July, so the recipient organization does not have to repay the monies.

To reduce the risk of spreading the virus, the number of project staff per vehicle were reduced to one (occasionally two), and extra sanitation precautions were taken (masks, disinfectant, gloves, etc.). Additionally, student undergraduate labor was reduced to just a few students who agreed to strictly follow CDC and Arizona shelter-in-place guidance. COVID required restrictions have meant that PIs have been unable to visit the site since February, which hampers communication.

Face-to-face outreach activities with volunteers, land managers, and donors were indefinitely postponed beginning in early March 2020 as the result of the threat posed by COVID-19. Additionally, COVID is

dominating all media attention, so planned stories and site visits by reporters are also on hold. We have shifted our outreach efforts to making progress on the ‘‘Riparian Habitat Science and Economic Stability Act.” Dr. Whitham has been spending a great deal of time working with Representative Tom O'Halleran’s (AZ-01) staff and partners at other organizations to advance the legislation. This legislation is currently going through committee review and regardless of how it might fare in the Senate and with President Trump, we have our foot in the door with subsequent legislation involving climate change mitigation. In short, our progress with this effort is very good news.

Drought Conditions

Although three winter storms brought rains to most of Arizona in March, which improved drought conditions in SW Coconino County, the precipitation was not enough for significant drought improvements at the restoration site. Drought conditions resulted in high rates of mortality for the trees planted in 2019, very few (~20%) of which survived until spring 2020. The irrigation system has been a game changer and mortality for trees planted in early 2020 has dropped dramatically (survival rate ~60%). The irrigation system ensures the trees each get 2 gallons of water per week consistently, freeing staff time for weeding, monitoring, mapping, and care of the trees.

Grazing

Native ungulates, likely pronghorn, crawled under the fence surrounding the restoration site in late May to eat the leaves of some of the larger cottonwoods. The hope is that the trees were large enough to regrow; project staff will treat the trees with a non-toxic deer/rabbit repellent.

New Invasive Weeds

A new invasive weed has emerged at the site, Russian knapweed (*Rhaponticum repens*). Project staff are taking steps to eradicate the weed before it gets a foothold by digging up the plants and bagging them for disposal.