USA: Arizona: Gus Pearson Natural Area Restoration (https://app.ser-rrc.org/api/v1/project/8969)

Country: United States of America

Activities:

Biomes:

Abstract: Initiated in 1992 with National Science Foundation funding, the Gus Pearson Natural Area Restoration was an experimental project of Nothern Arizona University's Ecological Restoration Institute and is located approximately 7 miles (20 km) northwest of Flagstaff, AZ. The original experiment's aim was to compare three treatments: 1) tree thinning to emulate predisruption forest structure, followed by fuel reduction and prescribed burning (composite); 2) tree thinning only, without fire (thinning); and 3) control. The study also attempted to examine the response of the treatments to different "patch types" at the site, including presettlement stands, postsettlement stands, and remnant grassy patches. GPNA is the site of the Ecological Restoration Institute's oldest ecological restoration treatments utilizing thinning of small trees to emulate presettlement forest structure prior to reintroducing low-intensity fire (though the study site itself had to be decommissioned as a part of the GPNA to allow for cutting trees).

Learn More (https://app.ser-rrc.org/api/v1/project/8969)

USA: Arizona: North Simpson Habitat Restoration Project

Overview

The North Simpson Habitat Restoration Project is a project of Tucson Audubon Society on lands owned by the City of Tucson, Arizona. The project involves the planting of numerous native tree, shrub, grass, and forb species on the floodplains of a near-perennial riparian area that came into existence since the 1970s as a consequence of municipal effluent discharge. The project's design is to use the newly available water resources to improve riparian habitat to offset riparian habitat elsewhere in the Tucson basin that was lost due to groundwater pumping , mis-management of the Santa Cruz River, and destroyed by urban development. The site itself did not historically have perennial water, but had been a very wide xero-riparian forest before the river was channelized and bermed to support extensive agriculture at the project site. The intention of project managers is to create ecosystem functions that mesh with the now-available water resources, as well as structural diversity of the habitat to benefit wildlife in the area. Tucson Audubon has conducted classes in restoration at the site, offered birding tours, does ongoing monitoring of completed projects within the site to provide a clear picture of the results of their work and is continuing to work on new areas within the larger project site.

Project Details

Lead Entity:

Tucson Audubon Society

Lead entity types:

- Regional NGO

Adaptive management

Describe adaptive management processes and mid-course corrections taken to address unforeseen challenges and improve outcomes in each of the following categories:

Other:

The primary lesson learned through the many years of this project has been that the success of seeding is directly dependent on annual rainfall...and that, while much cheaper than planting stock or seed with irrigation, it has been in most years a waste of time, effort, and money. When it works, it is amazing, and doesn't need the intensive effort inputs of imprinting or creating clay seedballs to succeed. Another critical element of the Simpson site has been its grant-funding mandated monitoring of birds. The objective of the bird monitoring was to document changes in bird numbers and diversity. Seasonal surveys along the 1.4-mile survey are an effective monitoring approach allowing analysis of differential site use and importance to differing suites of birds by season, as well as allowing documentation of changes in site use through time as the habitat has developed. We have been able to show statistically significant responses, through time, in terms of increases to both diversity and density of birds using various portions of the property, and that the multiple habitat types within the large project area are valuable at different times of year to differing species. The edges of the project, most disconnected from any flood flows, are supporting more grasses and desert upland plants and play a much more important role during the winter to wintering sparrow species while the riparian gallery is significantly more important during the summer breeding season. To assess the impact of our work on the broader floodplain, we utilized two survey transects that were set up when the project was first initiated – one north of and one south of the Santa Cruz River. Both surveys went through retired agricultural fields which had been fallow for the same duration (since the late 1970s) and neither survey included the gallery forest along the river which has been outside the restoration area. While the north and south sides of the river were not completely identical in original conditions, they're about as similar as can be found. South of the river served as the control, no restoration work had been done there at the time of the surveys. To the north of the river, we had been working constantly; planting trees, shrubs, grasses and annuals to improve habitat value. Both transects were surveyed synchronously numerous times though the winter (October 03,2012—April 05, 2013)– one pair of surveyors on the north, one pair on the south. Our methodology minimized differences between the two areas making the results of the surveys more clearly contrast the habitat value for birds. Over the course of the surveys we recorded an average of 14.6 species at each survey point south of the river while in the restored area to the north we recorded an average of 24.9; a whopping 70.6% increase. We also looked at the density of native birds utilizing the habitat. More than 2.2x as many native individuals utilized the restored area than were recorded to the south. A decade of hard work is paying off for the birds in a big way.

State of Progress:

- Implementation activities ongoing, including aftercare, maintenance, and adaptive management

Project Start:

2000-01-01

Project End:

2030-01-01

Global Regions:

- Northern America
- Americas

- World

Countries:

- United States of America

Ecosystem Functional Groups / Biomes:

- Deserts and semi-deserts biome
- Rivers and streams biome

Ecosystems:

- Succulent or Thorny deserts and semi-deserts

Extent of project:

- 500-1000 ha

Extent of restoration:

- 200-500 ha

Degradations:

- Other
- Other forms of unsustainable agricultural practices

Description:

By the mid-twentieth century, the Simpson Farm site had little or no native vegetation remaining on it, the Santa Cruz River that bisected the property was channelized to control the intermittent flows in response to stormwater, and the surrounding floodplain was functionally disconnected from the river for all but the largest storm events. After the site was retired from agricultural use in the 1970s, it sat fallow until the project began. During this time, due to soil sterilization, compaction, and floodplain disconnection, the site failed to regenerate substantial native vegetation that had been on site before the industrial agriculture phase.

Planning and Review

Goals and Objectives

Was a baseline assessment conducted:

UNSURE

Was a reference model used:

YES

How was the reference model constructed?:

- The reference model is based on other diverse sources of information (e.g. other local or regional historical information, ecosystem classification systems, species range maps, successional models, Indigenous and Local Knowledge).

were_goals_identified:

YES

Goals and objectives:

- Other

Goals Description::

The Simpson Habitat Restoration Project aims to improve ecological connectivity to other ecologically rich ecological corridors such as the Brawley/Los Robles Wash, which passes through the Buenos Aires Wildlife Refuge in the Altar Valley and within a mile of the Simpson Site, and to extend the wildlife corridor connecting corrridors between the Waterman Mountains of the Ironwood Forest National Monument, and the other surrounding mountain ranges including the Tucson Mountains, the Santa Catalinas, the Tortolitas, and the numerous ranges further afield that are connected by the main stem of the Santa Cruz River and its numerous tributaries. Central to the mission of the Tucson Audubon Society was the goal to restore vital bird habitat to the Santa Cruz River valley. The habitat enhancement strategy for the river stretch focuses on

widening and diversifying the vegetation growing along the channel and increasing floodplain connectivity where possible, to make more and richer wildlife habitat.

Stakeholder Engagement

Were Stakeholders engaged?:

unsure

Description of Stakeholder Involvement:

Beginning in the 1970s, the City of Tucson began discharging treated effluent into the Santa Cruz River channel. In the 1970s and 1980s the City of Tucson purchased 23,000 acres of adjacent farmland for groundwater rights and subsequently retired the farmland. Tucson Audubon Society became involved in the project in 2000, signing a 99-year right-of-entry lease with the city, with the agreement to restore habitat and monitor wildlife on the initial 1,700 acres.

Ecosystem Activities and Approaches

General Activities: Tucson Audubon Society developed a site assessment and work plan, before they began spreading seed and planting trees and shrubs. Once the initial work plan was established, Tucson Audubon utilized a large pool of volunteers though restoration work days at the site to build irrigation systems, water harvesting swales, and to plant trees, shrubs, and grasses. Employing a wide pallet of species, work at the Simpson site has planted a wide variety of trees including: mesquite, palo verde, elderberries, desert willow, walnut, cottonwood, and willow. Habitat restoration at the Santa Cruz River Habitat Project also involved a complete plant pallet (shrubs, grasses, cacti, annuals, etc., in addition to trees) to fully restore the known historical diversity among the riparian and floodplain communities. In addition, students from Sunnyside, Tucson and Desert View High Schools and from other schools throughout Pima County were involved. Seed is pelletized by mixing it with native clay and water, and then rolling it into balls or pushing it through a mesh that breaks it up into small pieces. In this innovative technique, the clay dries around the seed and provides a protective coat that reduces predation by birds, insects, and rodents. In the next heavy rainfall the clay dissolves and exposes the seed precisely when germination conditions are most favorable. Plant species were chosen for the site based on their historical presence in the area, successful use in other restoration efforts, recommendations from experts, suitability to site soil, their benefit to wildlife, and other criteria. The mix of plant species was also important and all new plants were arranged in groups and tucked in around existing plants to create "guilds" (an association of plants that benefit each other and enrich the entire habitat). Through the use of 'restoration workshops', the staff of Tucson Audubon was able to gain hundreds of hours of volunteer labor for the project while also providing an educational outreach component to their work. Plants were irrigated so that they can be watered for several years until they can survive on their own. Since making the system self-sustaining was another important goal, plants were placed in deep earthen basins with stout downhill berms so that rainwater will be concentrated around them. The use of deep organic mulch reduces evaporation from the soil, and gradually breaks down to add nutrients. The main strategy has been to use trees and shrubs that will do well on the river berms away from direct influence of the stream. These species will broaden the swath of vegetation along the river corridor but will be able to survive on rainwater alone. These include mesquite (Prosopis velutina), blue palo verde (Parkinsonia florida), desert willow (Chilopsis linearis), graythorn (Ziziphus obtusifolia), alkali sacaton (Sporobolus airoides), and many others. The abandoned farm fields surrounding the river have very low vegetation diversity and density. Here we plant and sow seeds of a similar array of native, drylands species. The basin holding the plants also fills with water during heavy rains, focusing runoff from surrounding areas around the roots of the plant. The project also does large-scale imprinting on old farm fields. This involves pulling a cylinder implement with protrusions over the fields with a tractor, leaving a pattern of shallow indentations in the ground. Then another tractor spreads seed on the imprinted land, which tends to settle into the indentations along with finer sediments and blown organic materials. The indentations also help focus rainwater on the seeds which then have a greater chance of surviving and growing. 1) eliminate existing threats to the ecosystem: Tucson Audubon Society developed a site assessment and work plan before they began spreading seed and planting trees and shrubs. Once the initial work plan was established, Tucson Audubon utilized a large pool of volunteers through restoration work days at the site to build irrigation systems, water harvesting swales, and to plant trees, shrubs, and grasses. Work at the Simpson site has planted a wide variety of trees including: mesquite, palo verde, elderberries, and desert willow, and, immediately adjacent to the effluent flow, cottonwood, and willow. Habitat restoration at the Santa Cruz River Habitat Project also involved a wide functionally diverse pallet (shrubs, grasses, cacti, annuals, etc., in addition to trees) to restore both the known historical diversity of the floodplain communitie, as well as to create the riparian gallery forest newly allowed by the increased water resources of municipal effluent. Through the use of 'restoration workshops', the staff of Tucson Audubon was able to gain hundreds of hours of volunteer labor for the project while also providing an educational outreach component to their work. Plants were irrigated so that they can be watered for several years until they can survive on their own. Since making the system self-sustaining was another important goal, plants were planted in shallow water-harvesting basins with stout downhill berms to concentrate available rainwater to their roots. The abandoned farm fields surrounding the river had very low vegetation diversity and density. The main strategy has been to focus on the habitat of the broadly disconnected floodplain by using trees and shrubs that will do well on the river berms away from direct influence of the stream, but that can survive intermittent flooding. These species broaden the swath of vegetation along the river corridor but will be able to survive on rainwater alone. These include mesquite (Prosopis velutina), blue palo verde (Parkinsonia florida), desert willow (Chilopsis linearis), graythorn (Ziziphus obtusifolia), alkali sacaton (Sporobolus airoides), and many others. In the early stages of the project the managers tried a range of arid-land techniques touted for their successes in other areas including pelletizing seed and imprinting the soil. Though both techniques came highly recommended, they were not shown to be successful at this project

site. The likely cause is the very infrequent periodicity with which sufficient rainfall occurs to establish perennial plants from seed - roughly a decadal event. Direct irrigation of both seeded and container stock was the only establishment technique shown to have a high likelihood of success.

Categories of ecosystem restoration activities and approaches utilized:

- Ecological restoration

Specific type of rehabilitation and/or restoration approach implemented:

- Assisted natural recovery with planting, seeding, or faunal introductions (e.g. enrichment planting or seeding; farmer assisted natural regeneration; rewilding)

Restoration activities implemented:

- Soil and water management
- Restoration of vegetation cover and ecosystem structure

Restoration activities implemented - cover and structure:

- Weeding or pruning
- Tree planting
- Shrub planting
- Herbaceous species and subshrub planting (e.g. grasses, forbs, ferns, terrestrial mosses and lichens)
- Other vegetation introduction (e.g. epiphytes, hemiepiphytes, vines, parasites, hemiparasites)

Restoration activities implemented - soil and water:

- Improved irrigation and water use efficiency at site

Project Outcomes

Eliminate existing threats to the ecosystem: To date, the work at the Simpson site has seen thousands of plants established via miles of irrigation line installed while hundreds of acres were seeded--with little result. Habitat has improved at North Simpson with increased plant diversity, density, and structural diversity--all made possible only by direct restoration efforts; the previous 30 years of being fallow had seen none of these improvements. Improvement has also resulted from the absence of cattle, which were fenced out in 2001. Factors limiting recovery of the ecosystem: Because the Santa Cruz River at the Simpson site was not an historically perennial stream, recovery is a tricky term in its usage here. With the growth of urban Tucson and a tightly developed floodplain, the Santa Cruz River through the city has little chance of being broadly restored. The habitat enhancement efforts downstream, with the newly available effluent water resources represent a physical translocation of what has been largely lost within the city. However, huge berms, both legal and illegally created, hem the river in at the project site and have thus far only been breached in a few target areas to re-establish some minor levels of floodplain connectivity. Further breaching of these berms to re-establish broad connectivity is the primary limiting factor hampering the re-establishment of a broad floodplain vegetation community at the site. Economic vitality and local livelihoods: The decline of the riparian vegetation along the Santa Cruz river was a phenomenon not limited to Tucson alone. Along long distances of its reach, the Santa Cruz has undergone drastic vegetative change, with significant sections being completely developed in the latter half of the twentieth century. The reestablishment of large sections of riparian forest is extremely valuable for bird populations in an important region for bird migration and nesting. The loss of bird diversity has coincided with 80-90 percent riparian habitat across the state of Arizona. The restoration of riparian habitat is critical for bird species throughout the arid southwest. Tucson Audubon's efforts to involve the public in restoration efforts has broadened the understanding and appeal of restoration throughout Tucson. The effort to involve a large slice of the community has increased the visibility of the project, making it valuable for educating the public about the need for further restoration in the Santa Cruz watershed.

Monitoring and Data Sharing

Does the project have a defined monitoring plan?:

YES

Monitoring Details:

Avian monitoring is done quarterly following the Arizona Important Bird Areas protocol and has allowed us to track species diversity and population size response within the project area. Specific new project components are monitored for establishment rates as well as diversity, density, and stand structure.

Open Access URL:

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Long Term Management ×

STAPER ×

USA: Arizona: Patagonia/Sonoita Creek Preserve Sacaton Restoration (https://app.ser-rrc.org/api/v1/project/9009)

Country: United States of America

Activities:

Biomes:

Abstract: Big sacaton (Sporobolus wrightii) once covered riparian floodplains throughout the southwestern United States and northern Sonora, Mexico. Today, these grasslands occupy less than 5% of their previous range. This restoration project evaluated the role of arbuscular mycorrhizae in the establishment and survival of sacaton at the Nature Conservancy's Patagonia/Sonoita Creek preserve near Patagonia, Arizona. The project evaluated the efficacy of using different sized transplants grown under greenhouse conditions and how mycorrhizae affected their subsequent survival in abandoned agricultural fields.

Learn More (https://app.ser-rrc.org/api/v1/project/9009)

USA: Arizona: Restoration of Ecosystem Health in Southwest Forests Project (https://app.ser-rrc.org/api/v1/project/8975)

Country: United States of America

Activities:

Biomes:

Abstract: The Restoration of Ecosystem Health in Southwest Forests project was initiated in 1995 to develop the scientific basis for ecological restoration of southwestern forests and woodlands at both operational and landscape scales. The majority of the work has been focused in the Greater Mount Trumbull Ecosystem within the Grand Canyon/Parashant National Monument. This innovative collaboration between Department of Interior (BLM, NPS, BIA), state (Northern Arizona University, Game and Fish, State Forestry) has resulted in one of the foremost development and application sites for designing, implementing, monitoring, and evaluating restoration-based hazardous fuel reduction and ecological restoration projects. The work at Mount Trumbull represents an expansion and enhancement of collaborative partnerships and worked specifically in four project