



TAMARISK MANAGEMENT IN GRAND CANYON: PAST CHALLENGES, CURRENT EFFORTS, AND FUTURE DIRECTION

OVERVIEW OF FLORAL DIVERSITY

Grand Canyon National Park (GRCA) contains over 1750 plant species, exceeding the diversity of other national park units. The park provides refuge for 9 endemic species, which are found nowhere else in the world, and an additional 23 endemic species that extend just outside of park boundaries. Three of the four major North American deserts intersect here, providing a dynamic, diverse and expansive landscape for evolution and speciation to occur.

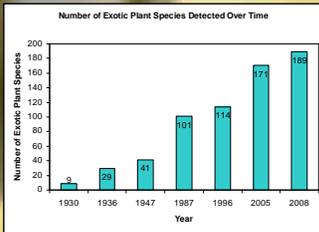
Grand Canyon contains some of the nation's best remaining examples of desert riparian habitats. These areas harbor diverse and productive ecosystems, which typically account for less than 2% of the land, but they provide critical shade, water, and food in desert landscapes, with up to 90% of all bird species and 80% of all mammal species routinely using these areas. The park also contains old growth forest and woodland ecosystems, pristine mountain meadows, and some plant communities found nowhere else in the world.



Desert Riparian Area

EXOTIC PLANT HISTORY

Vegetation program staff reviewed floral inventories dating back to 1930 to determine the history of exotic plants in the park. While some of the increases in exotic plant species are due to the limited extent of early inventories, recent increases reflect the encroachment and invasion of new plant species into the park.



As part of regular vegetation and research program activities, staff document new species in the park through specimen collection and program managers update the park's exotic plant species list several times each year.

HOW DO WE PRIORITIZE ACTIONS?

NPS Management Policies (2006) direct park managers to give high priority to control and management of exotic species that can be **easily managed** and have **substantial impacts** on park resources. In 1999, GRCA biologists used the Alien Plant Ranking System (APRS) to rank 132 of the 145 species based on:

- Level of impact
- Feasibility of control
- Innate ability of species to become a pest

In 2005, GRCA biologists re-ranked species to incorporate new species (current total is 189), change in distribution, and data from recent Arizona state planning efforts. The park's program focuses management efforts on the species that aggressively invade natural areas, negatively altering native wildlife habitat and ecosystem structure and function. Efforts currently focus on the 80 exotic plant species that are considered **invasive**, and on high priority ecosystems and corridors.



Barrel Cactus



Spruce Fir Forest



Grand Canyon Agave



Clipping and Bagging Ravenna Grass Seeds



Digging Ravenna Grass



Russian Olive Along Colorado River



Digging Date Palm



Removing Camelthorn

COMPLIANCE AND WORK PLANS

Park staff recently prepared a programmatic Environmental Assessment to cover all exotic plant management activities. The document will be available for public review in a few weeks. Previously, compliance was completed for individual species (e.g. tamarisk), small project areas, or programmatically but with less opportunity for the public input.

In addition to the compliance document, program staff prepare an annual work plan. The plan includes a description of proposed activities in the park's developed and natural zones, goals and objectives for the year, a summary of the prioritization process, specific actions planned, and a detailed schedule. The annual work plan is provided to the park's Cultural Resource staff to ensure protection of the park's historic and archeological resources.

PROGRAM COMPONENTS

The park's program was modeled after the NPS Strategic Plan for Managing Non-Native Plants on NPS Lands and includes:

- Educating the public about prevention and increasing overall awareness of the issue.
- Using hand tools and a lot of volunteers (manual methods).
- Spreading mulch and native plant seed (cultural methods).
- Applying herbicide to those plants which do not respond well to manual removal (chemical methods).
- Developing partnerships and coordinating with surrounding land managers.
- Completing invasive plant surveys as part of all park projects.
- Implementing monitoring methodology to evaluate trends.



Crew Leader Giving Project Orientation



Monitoring Vegetation



Using GIS Layers to Create Field Maps

TAMARISK MANAGEMENT PROGRAM

The removal of tamarisk (*Tamarix ramosissima*) from tributaries of the Colorado River in GRCA began in 2000. Tamarisk control methods include pulling, cutting and applying herbicide, or girdling and leaving the dead trees for wildlife habitat. Crews use only hand tools and non-mechanized equipment, often carried in heavy packs on the backs of hearty volunteers, in an effort to preserve wilderness qualities of the park's remote backcountry.

The park will continue to focus on the tributaries, seeps and springs, those areas with natural flow regimes and the best opportunity for passive restoration. Park staff are also committed to long-term monitoring. There are no plans to expand this work into the Colorado River corridor in the near future.



Lightweight Pressurized Sprayer Used in Backcountry for Herbicide Application



Tamarisk Near Falls



Desert Refuge



Manual Seedling Removal



Challenging Site Access



Volunteers Mounting Plant Specimens in GRCA Herbarium



Desert Botanical Garden Partner Collecting Plants



Accessing Work Site



Checking-in on Satellite Phone

TAMARISK PROGRAM ACCOMPLISHMENTS

Crews have completed work in over 130 project areas, removing 260,000 individual trees from 6,000 acres. In 2005, the program expanded to include a partnership with the Hualapai Tribe in an effort to work at the watershed level. Project managers provide public access to all project results on the park's website.

This large-scale project has been supported by \$659,000 from the Arizona Water Protection Fund, in addition to other funds secured by project partners. Beginning in 2009, NPS funds will provide essential support for the cyclic maintenance of project areas and the continuation and expansion of this successful project.

PROJECT AREA MONITORING

The primary monitoring objective was to determine the change in vegetation and level of project success. Project managers expected to see an increase in native plant species' composition and cover in project areas, and also positive changes in soil chemistry and overall water quality. The monitoring components include:

- Paired 50m transects are installed in 25% of the project areas; pairs include tamarisk areas and nearby tamarisk-free reference areas.
- Permanent photopoints are installed in every project area, and also at the beginning and end of each transect.
- Transects include vegetation and soil measurements.
- Hydrology sampling is conducted in areas near transects.
- Southwestern willow flycatcher habitat assessments are completed prior to any actions.



Hydrology Monitoring Point



Reference Site Transect



Long-Term Photopoint Monitoring

One of the monitoring objectives for the treated areas, to decrease tamarisk cover to 5% or less, was exceeded in all project phases. Project managers and partners are currently preparing a full data analysis, which will be presented at the Ecological Society of America meeting in August and submitted to the Restoration Ecology for publication.

VOLUNTEER CONTRIBUTIONS

Tamarisk management is extremely labor intensive and time consuming. The enormous progress made since 2000 is largely due to the hard work of volunteers, who have donated 136,522 hours of their time to the park's vegetation program, for a total matching contribution of \$2,562,518. Park managers hope to expand volunteer opportunities in 2009, with a goal of doubling the number of volunteer hours.



Volunteers Cutting Tamarisk

Know someone that might want to lend a hand?

Opportunities are listed at: www.gcvolunteers.org