Grand Canyon Wildlands Council &
Glen Canyon National Recreation Area

Lees Ferry 10 Acre Riparian Revegetation Project
Project Team

- Grand Canyon Wildlands Council
- Glen Canyon National Recreation Area
- Phillips Consulting
- Stevens Ecological Consulting
- Flagstaff Native Plant and Seed

Project Funded By

Arizona Water Protection Fund
Central Utah Project Completion Act Fund
Lees Ferry Revegetation Overview

- Site Analysis
- Planting Design
- Propagules
- Site Clearing
- Tillage
- Irrigation and Maintenance
- Monitoring
Revegetation History on the Colorado River

Over 2000 acres of riparian Revegetation Projects completed on the Lower Colorado River

Successful completion of 300 acres of riparian revegetation on the Colorado River Indian Reservation

Current Large Scale Revegetation Projects on the Gila River and Yuma East Wetlands
Comparison of Avian Density

Density from surveys

Selected species

- Saltcedar III Density n/100 acres
- Saltcedar IV Density n/100 acres
- Revegetated Area Density n/100 acres
Establish a 10 acre stand of native vegetation, including Freemont cottonwood, Gooddings willow and Fourwing saltbush at Lees Ferry.

Maximize successful establishment of native species and minimize amount of future maintenance required.

Monitor the environmental health of the ten-acre revegetation project through avian censusing and revegetation monitoring.

Maintain stands for the benefit of both wildlife and humans.
Site Analysis

• Preliminary soil analysis of 14 evenly spaced points throughout the site
  - Soil samples at 6”, 3’, 6’, 9’
  - Salinity, soil type, vegetation and depth to water table
• Intensive analysis using EM 38 electro conductivity meter and Trimble XTS Pro
  - 100’x25’ grid across entire site
  - 235 sampling points with salinity measurements at 2’ and 5’
  - Elevation and location with survey unit
  - Mapping of data
Lee's Ferry Riparian Restoration Project

Depth To Water Table (13,000 CFS)

Red Line- 0-6'
Yellow Line - 0-10'
Above Yellow Line - 10'+

Colorado River
Planting Design

• Determined from synthesis of intensive site analysis data and thresholds established from nine step method (Bertin W. Anderson)

  270 Freemont cottonwood
  105 Gooddings willow
  115 Sandbar willow
  140 Inkweed
  140 Fourwing saltbush
  95 Seepwillow
  Experimentals
  11 Netleaf hackberry, Desert olive, Greasewood, Apache Plume, Shrub live oak, Squawbush, Single leaf ash, Box elder
Site Clearing and Irrigation Construction

- D-7 bulldozer, chainsaws and tractor
- All exotic material cleared and piled in windrows
- Boater camp saved
- Tamarisk stand at boat launch saved
- Driftwood piles saved
- Valuable habitat along riverbank preserved
- Hand broadcast of Fourwing saltbush seed
- Berms graded along road to protect site
Propagules, Planting and Irrigation

- Propagules prepared from cuttings and seed from local genetic stock (1 gallon pots)
- Planting holes augered 18” diameter and 8’ deep or to water table
- Drip irrigation system construction
- Beaver Fencing around each individual tree
- Planting (volunteers?)
- Irrigated with 8 gallons a day for entire first growing season
- Periodic weeding and replanting of dead trees
Monitoring and Maintenance

• Site Monitoring
  - Pre and post restoration avifauna censusing
  - Vegetation monitoring for first two growing seasons
    - Observation of plant species-specific percent survival and growth rates
    - Determination of species survivability based on variations in depth to the water table and salinity levels
    - Calculation of foliage volume and density
    - Determine the viability of this revegetation method for establishing long-term self-sustainable riparian habitat
    - Biweekly monitoring of 15 transects
Four-wing saltbush Growth July 5, 2001-November 8, 2001

Sampling date vs. Height (in) chart showing the growth pattern from July 5, 2001 to November 8, 2001.
Goodings Willow Growth July 5, 2001-November 8, 2001

Sampling date

Height (in)
## Percent Increase in Foliage Density and Volume

(July 5, 2001 - November 8, 2001)

<table>
<thead>
<tr>
<th>Species</th>
<th>Density (%)</th>
<th>Volume (%)</th>
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<tbody>
<tr>
<td>Fremont cottonwood</td>
<td>86</td>
<td>94</td>
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<tr>
<td>Four-wing saltbush</td>
<td>80</td>
<td>87</td>
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<tr>
<td>Goodings willow</td>
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<td>87</td>
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<td>Sandbar willow</td>
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<td>83</td>
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<tr>
<td>Seep willow</td>
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<td>April-May, 2001</td>
<td>Irrigation Construction, Planting and Site Monitoring Begins</td>
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<tr>
<td>May-September, 2001</td>
<td>Irrigation and Site Monitoring</td>
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<td>March, 2002</td>
<td>Rehab Irrigation System</td>
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<td>May 2002</td>
<td>Follow Up Planting, Weeding and Second Season of Irrigation</td>
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<td>May-June 2002</td>
<td>Monitoring and Project Completion, O&amp;M Turned Over to GCNRA</td>
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Proposal For the Future

• Implement Additional 3-5 Acre Project Upstream in Glen Canyon (2002-2003)

• Maintain 10 Acre Revegetation at Lees Ferry

• Seek Funding and Continue to Build Project Partnerships and Public Outreach

• Implementation of Side Canyon Tamarisk Removal

• Continue to Implement Main stem Revegetation Projects and Exotic Plant Control Measures