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

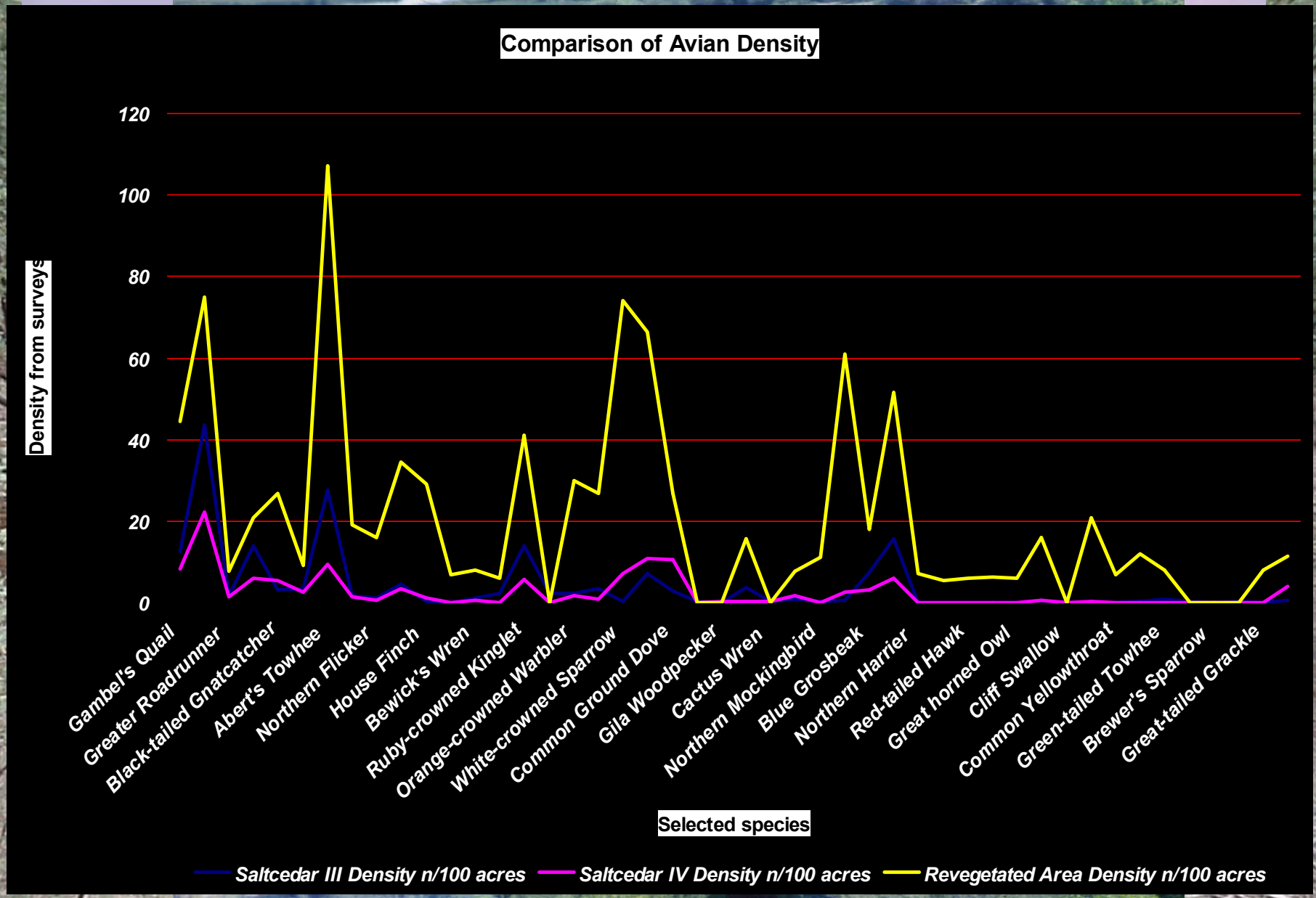
- **Site Analysis**
- **Planting Design**
- **Propagules**
- **Site Clearing**
- **Tillage**
- **Irrigation and Maintanance**
- **Monitoring**

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
120
100
80
60
40
20
0
Gambel's Quail
Greater Roadrunner
Black-tailed Gnatcatcher
Abert's Towhee
Northern Flicker
House Finch
Bewick's Wren
Ruby-crowned Kinglet
Orange-crowned Warbler
White-crowned Sparrow
Common Ground Dove
Gila Woodpecker
Cactus Wren
Northern Mockingbird
Blue Grosbeak
Northern Harrier
Red-tailed Hawk
Great horned Owl
Cliff Swallow
Common Yellowthroat
Green-tailed Towhee
Brewer's Sparrow
Great-tailed Grackle
Selected species
Saltcedar III Density n/100 acres
Saltcedar IV Density n/100 acres
Revegetated Area Density n/100 acres

Project Objectives

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.

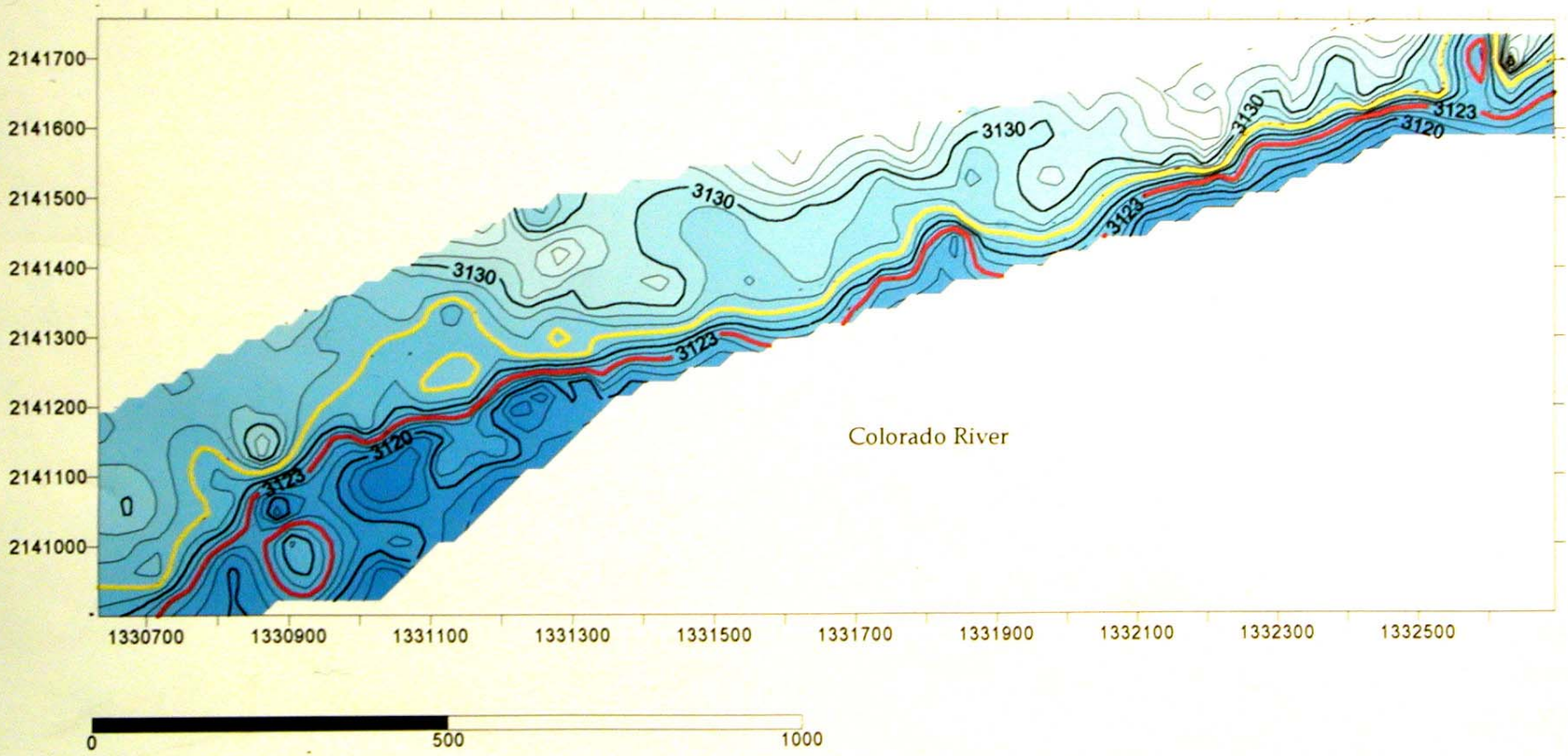
Maintain stands for the benefit of both wildlife and humans.

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'+

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

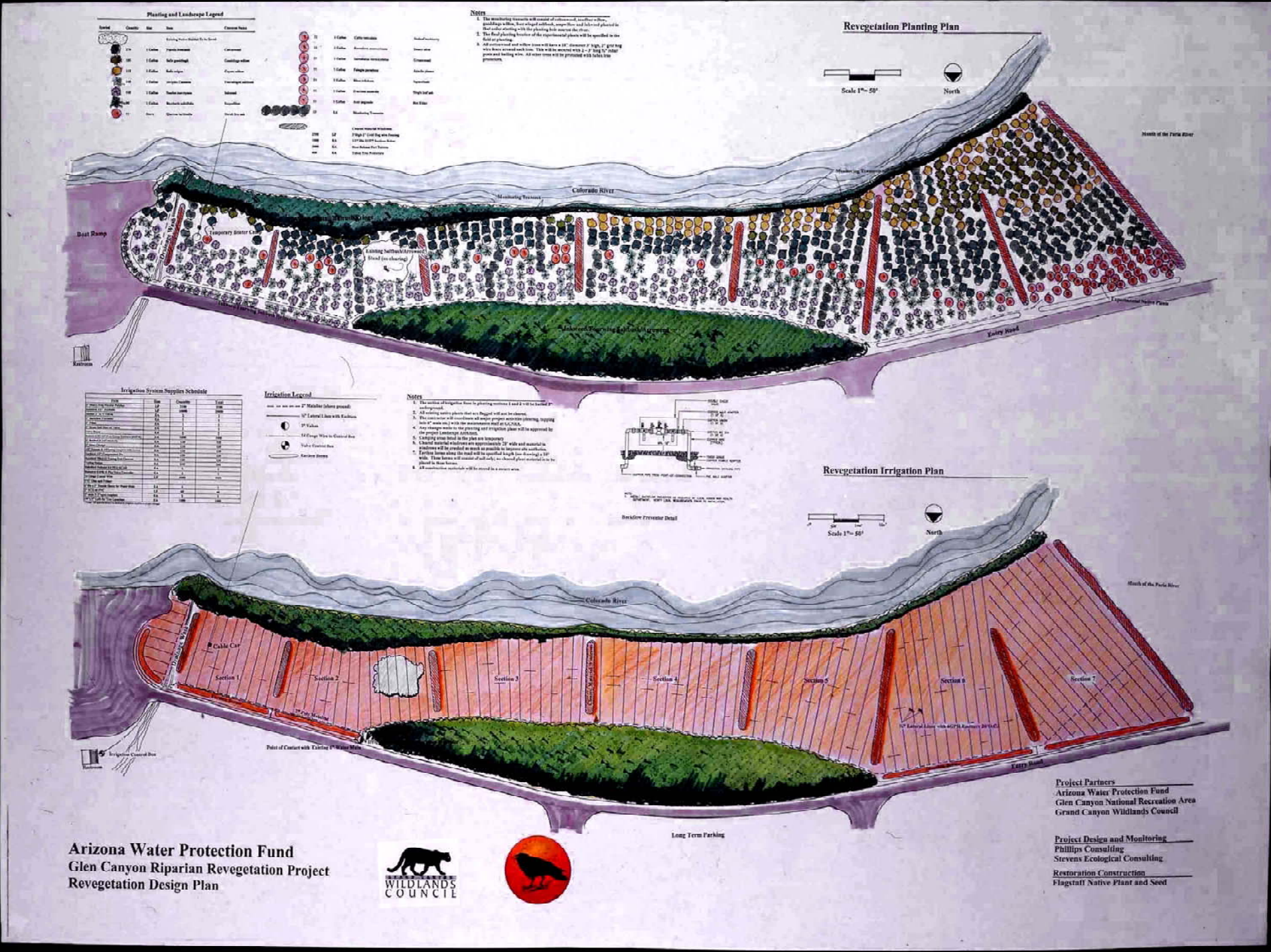
140 Inkweed

140 Fourwing saltbush

95 Seepwillow

Experimentals

11 Netleaf hackberry, Desert olive, Greasewood, Apache Plume, Shrub live oak, Squawbush, Single leaf ash, Box elder



Arizona Water Protection Fund

Glen Canyon Riparian Revegetation Project

Revegetation Design Plan

WILDLANDS COUNCIL

Project Partners

Arizona Water Protection Fund
Glen Canyon National Recreation Area
Grand Canyon Wildlands Council

Project Design and Monitoring

Phillips Consulting
Stevens Ecological Consulting

Restoration Construction

Flagstaff Native Plant and Seed

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

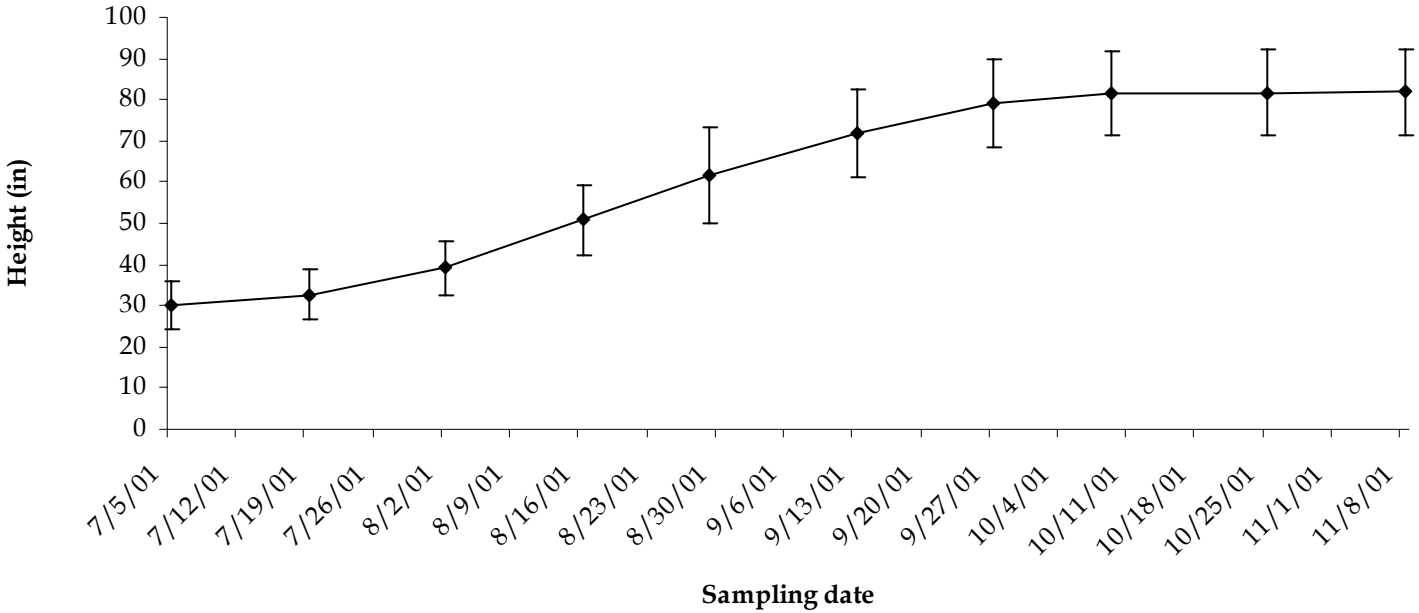
    - Calculation of foliage volume and density

    - Determine the viability of this revegetation method for establishing long-term self-sustainable riparian habitat

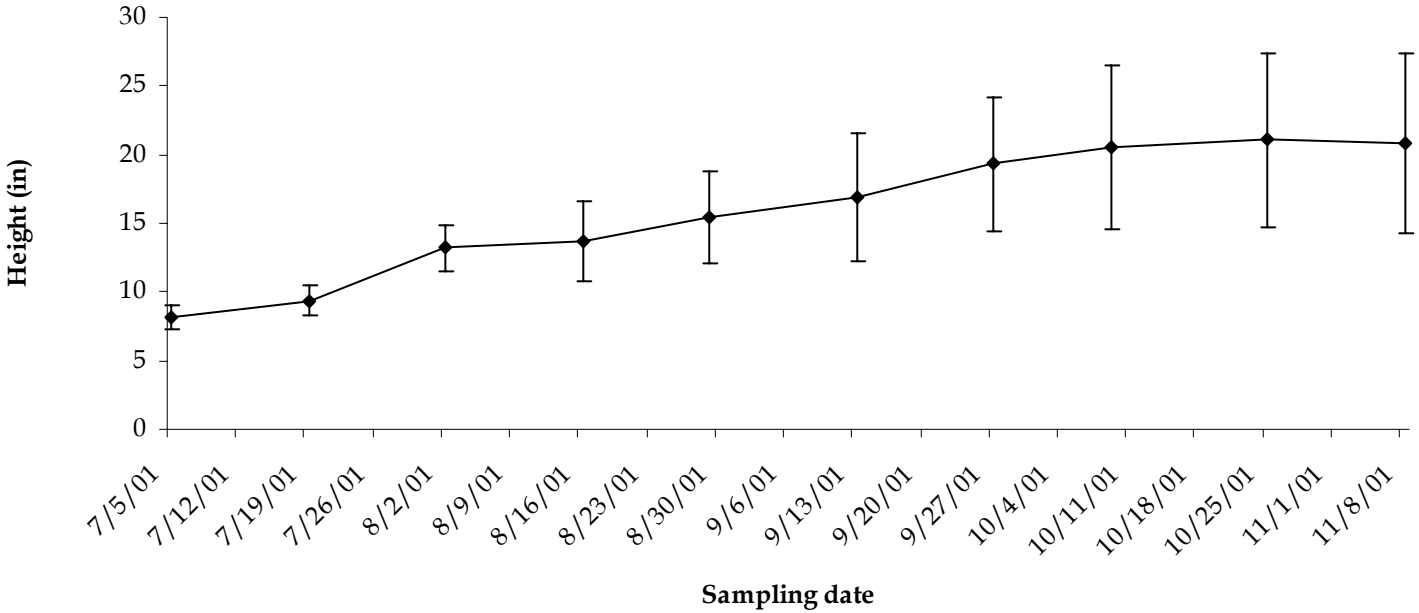
    - Biweekly monitoring of 15 transects


NTD
VOUNTEER

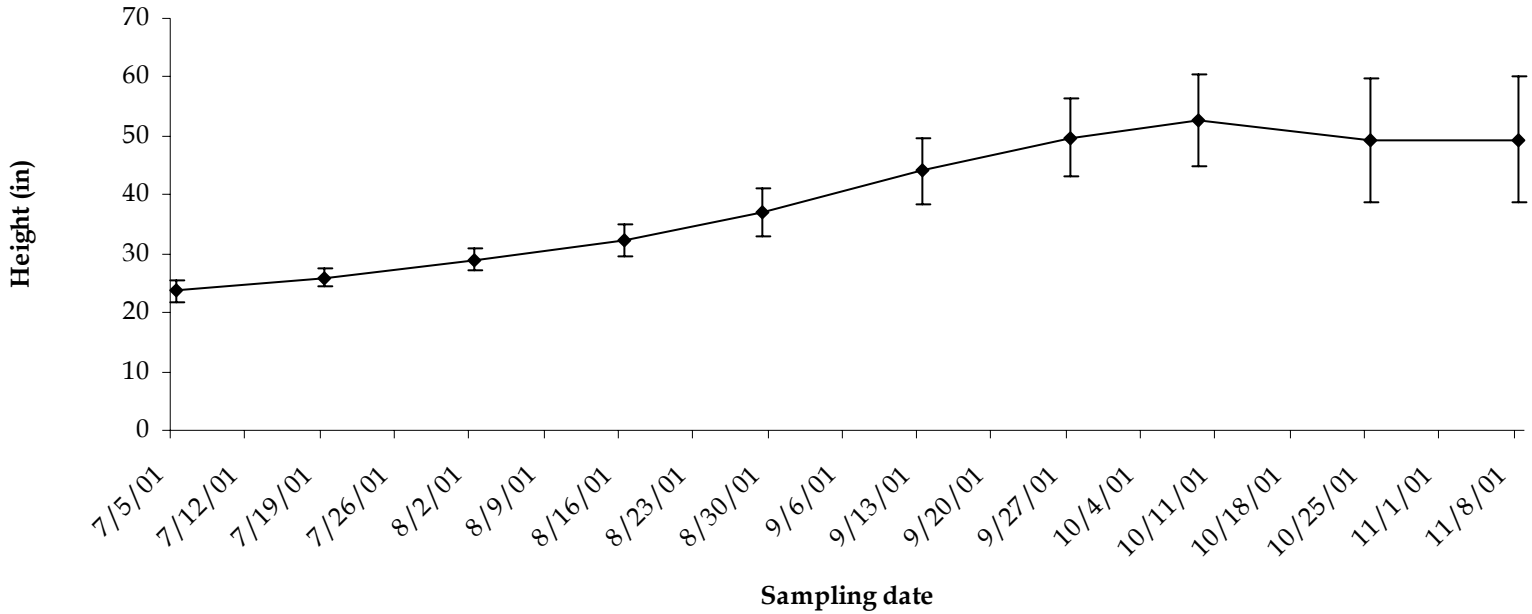
Cottonwood Growth July 5, 2001-November 8, 2001

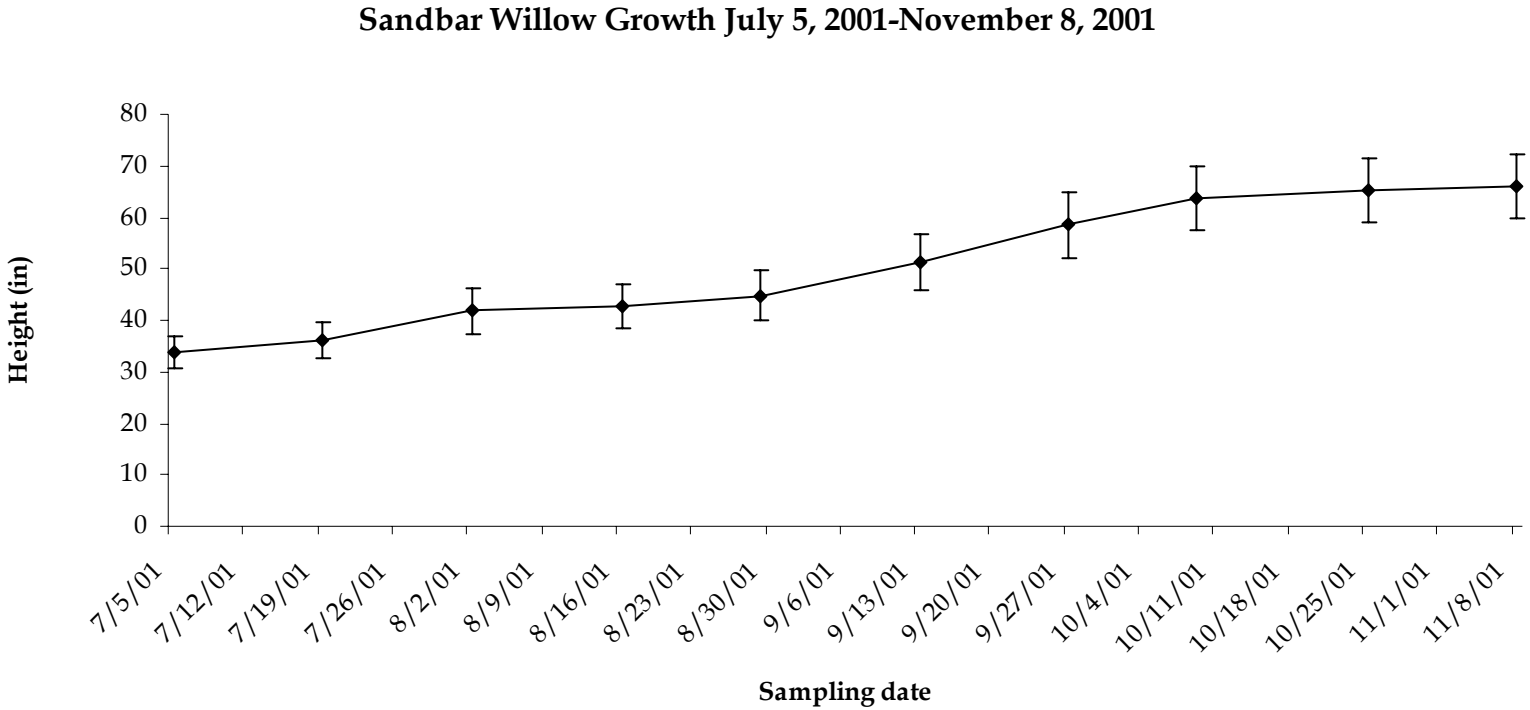


Four-wing saltbush Growth July 5, 2001-November 8, 2001



Goodings Willow Growth July 5, 2001-November 8, 2001




Sandbar Willow Growth July 5, 2001-November 8, 2001
Height (in)
80
70
60
50
40
30
20
10
0
7/5/01
7/12/01
7/19/01
7/26/01
8/2/01
8/9/01
8/16/01
8/23/01
8/30/01
9/6/01
9/13/01
9/20/01
9/27/01
10/4/01
10/11/01
10/18/01
10/25/01
11/1/01
11/8/01
Sampling date

Percent Increase in Foliage Density and Volume

(July 5, 2001 - November 8, 2001)

Species	Density (%)	Volume (%)
Fremont cottonwood	86	94
Four-wing saltbush	80	87
Goodings willow	77	87
Sandbar willow	71	83
Seep willow	80	90

Timeline

Date	Item
April-May, 2001	Irrigation Construction, Planting and Site Monitoring Begins
May-September, 2001	Irrigation and Site Monitoring
March, 2002	Rehab Irrigation System
May 2002	Follow Up Planting, Weeding and Second Season of Irrigation
May-June 2002	Monitoring and Project Completion, O&M Turned Over to GCNRA

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**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