Native Riparian Species
Seeding Demonstration Project
In the Colorado River Delta

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Project Objectives:

- Research the seeding methodology developed by the US Bureau of Reclamation for native riparian species by implementing a demonstration project in a 5-acre revegetation site.
- Enhance restoration of cottonwood-willow and other habitat types while potentially reducing the costs of planting.
- Increase genetic diversity of riparian tree species in restoration sites.
San Luis
Rio Colorado
San Luis
Upper Gulf of California
Ciénega de Santa Clara
Mexicali
U.S.
MEXICO
Seeding Demonstration Site
Mexicali
San Luis
Rio Colorado
Ciénega de Santa Clara
Upper Gulf of California
Project Implementation

A. Site Identification
   - Topography
   - Depth to groundwater
   - Soil texture and chemistry

B. Hydraulic analysis and Irrigation Design
   - Infiltration testing
   - Irrigation design

C. Site Preparation
   - Clear nonnative species
   - Laser level
   - Creation of furrows
CURVAS PARA LA MENOR PROF. AL NIVEL ESTATICO EN EL SITIO CILA
CURVAS PARA LA MAYOR PROF. AL NIVEL ESTATICO EN EL SITIO CILA
Project Implementation

D. Fremont Cottonwood and Gooding’s Willow seed collection and preparation

- Identification of source trees in the area
- Seed collection
- Seed treatment and storage
- Seed viability determination analysis
Project Implementation

E. Seed design and application

- Desired tree density: 5 trees per square meter or ~20,000 trees per acre
- Species layout: Gooding’s willow nearest to irrigation canal; Fremont cottonwood furthest from canal; mixed cottonwood and willow in area between
- Used tree establishment rate of 1% and 10% respectively for Gooding’s willow and Fremont cottonwood (GSA 2008, 2009) to determine seeding rate
PROPOSED SEEDING LAYOUT FOR LAGUNA ROJA
SEEDING DEMONSTRATION
PLAN VIEW

FREMONT COTTONWOOD
GOODDING'S WILLOW
MIX
FREMONT COTTONWOOD

0 50 METERS
SCALE

FREMONT COTTONWOOD AND GOODDING'S WILLOW
HYDROSEEDING DEMONSTRATION
PROPOSED SEEDING LAYOUT FOR LAGUNA ROJA
SEEDING DEMONSTRATION
SECTION VIEW

FREMONT COTTONWOOD  MIX  GOODDING’S WILLOW  IRRIGATION CANAL  GOODDING’S WILLOW  MIX  COTTONWOOD

NOT TO SCALE

FREMONT COTTONWOOD AND GOODDING’S WILLOW HYDROSEEDING DEMONSTRATION
Monitoring and Results

Vegetation monitoring:
- Vegetation quadrat surveys (1x per month)
- Photo monitoring (1x per month)
- DBH, height and condition, herbaceous, shrub, and ground cover (2x per year)
- Cover point transects (1x per year)
- Aerial photo monitoring (2-3 times per year)

Depth to groundwater monitoring (1x per week)
Water quality of irrigation source (2x per year)
Starting to monitor groundwater quality
Monitoring and Results

- Total of 1.3 acres seeded
- Establishment rates:
  - 2,500 trees per acre (total of ~3,240 trees in 1.3 acres)
  - Fremont cottonwood establishment rate of 0.81 trees/m² and made up 85% of total trees
  - Gooding’s willow establishment rate of 0.26 trees/m² and made up 15% of total trees
- Salt cedar and arrowweed had aggressive establishment – site was weeded twice during the growing season
- Average height of trees was 1.74 meters after one growing season
Monitoring and Results

- Lower establishment than predicted could be result of high salinity of irrigation water source
## Monitoring and Results

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<thead>
<tr>
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<th>Hydroseeding</th>
<th>Cuttings</th>
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<tbody>
<tr>
<td><strong>Average height (m)</strong></td>
<td>1.74</td>
<td>1.54</td>
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<tr>
<td><strong>Survival rate (of monitored trees)</strong></td>
<td>100%</td>
<td>92%</td>
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Seedling Propagation Results

- Refining seedling propagation protocol with GSA
  - No water baths
  - Use of cleaned seed gives best results and makes it easier to sow
  - Sandy soil
  - Time-consuming – still honing methods
  - Will continue on small-scale in 2012
Next Steps

- Plant remaining 3.7 acres – note how difference in salinity of irrigation water affects establishment rate
- Fill in any gaps of the 1.3-acre seeded area with other native species such as salt heliotrope and saltbush
- Scale up the demonstration plot to look at feasibility of hydroseeding for large restoration projects
- Wildlife monitoring to determine if/how species are using habitat – if they prefer less densely planted areas, etc.
Questions?