

Native Riparian Species Seeding Demonstration Project In the Colorado River Delta



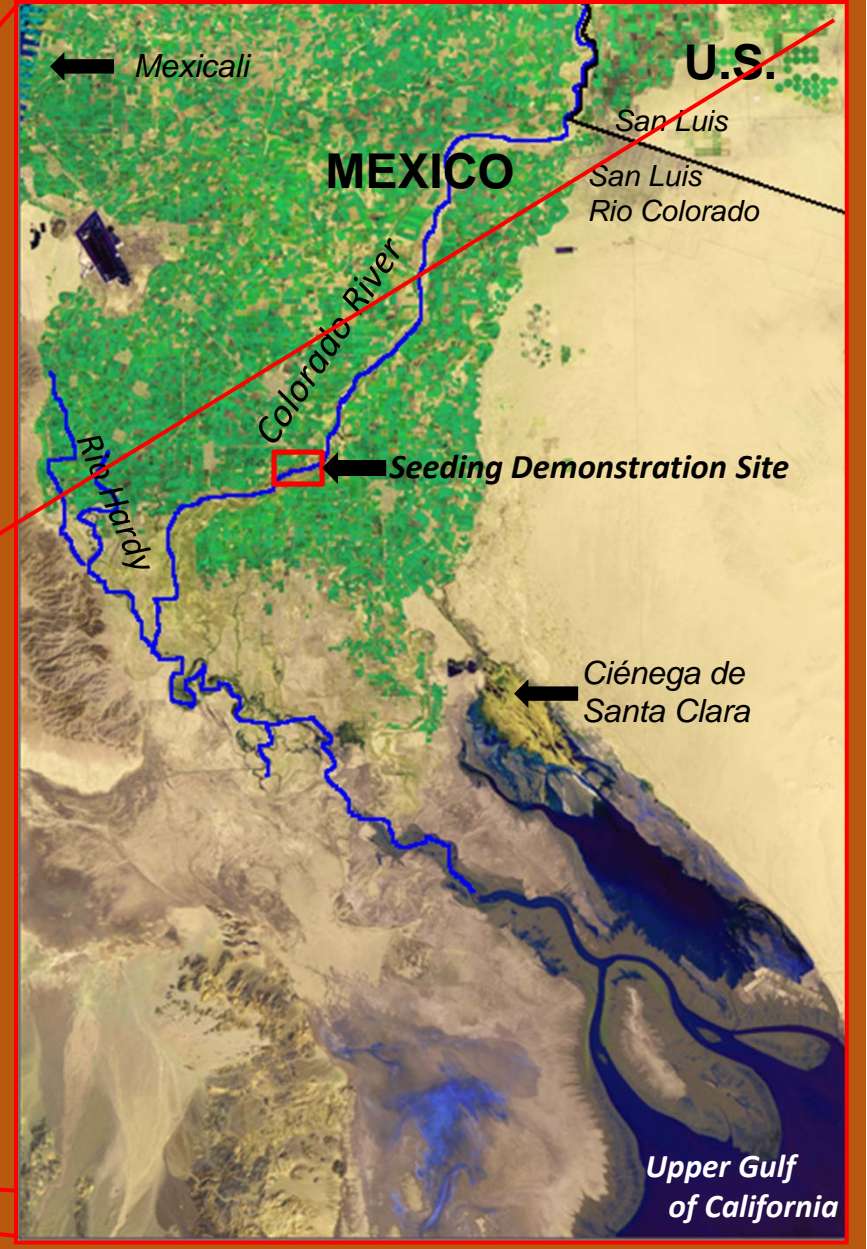
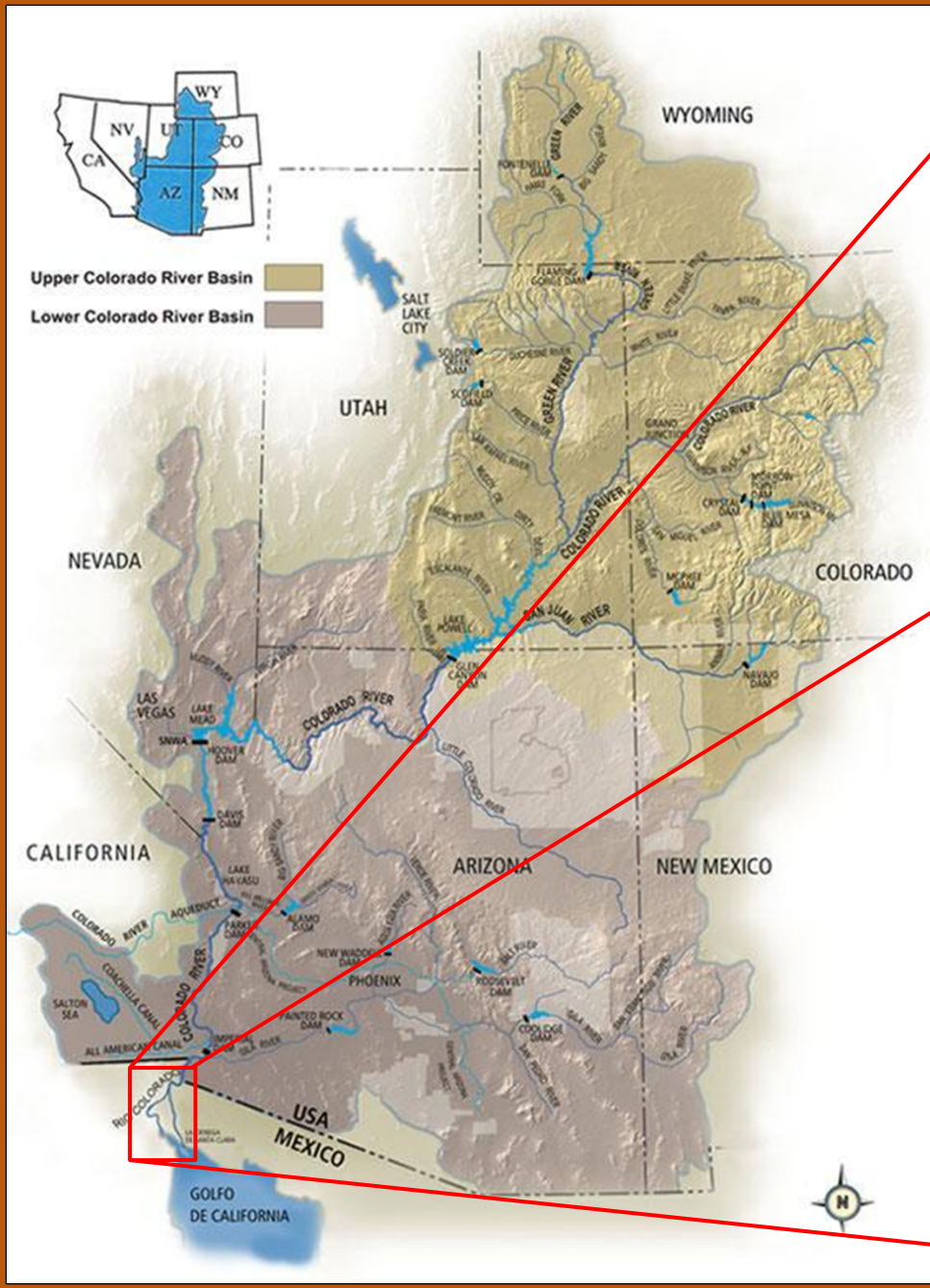
Karen Schlatter
Sonoran Institute
January 26, 2012



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



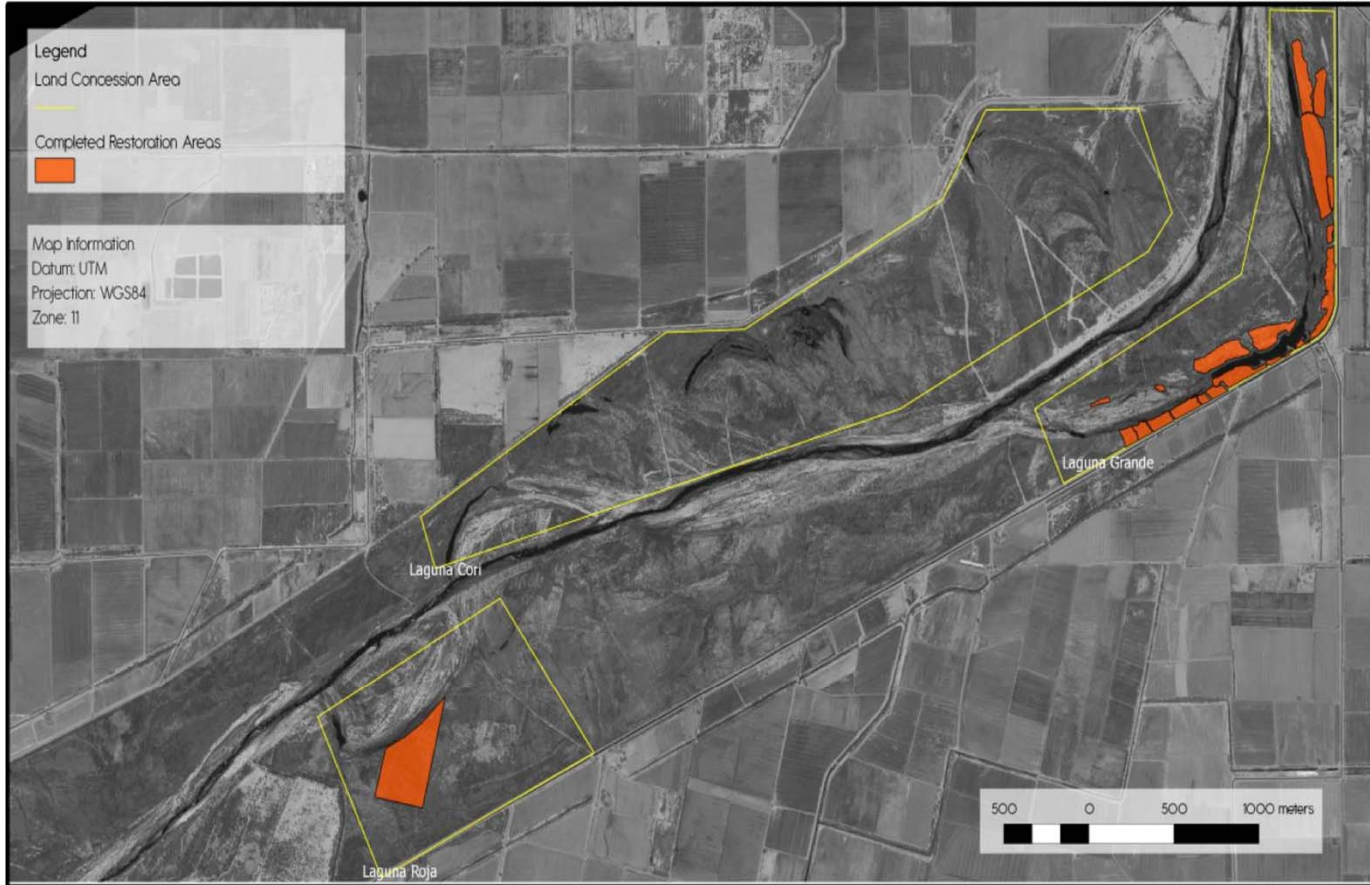












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COLORADO RIVER RIPARIAN RESTORATION SITE NETWORK

MAP 1
DEMONSTRATIVE SITE
RESTORED AREAS
October 2010



Project Implementation

A. Site Identification

- Topography
- Depth to groundwater
- Soil texture and chemistry

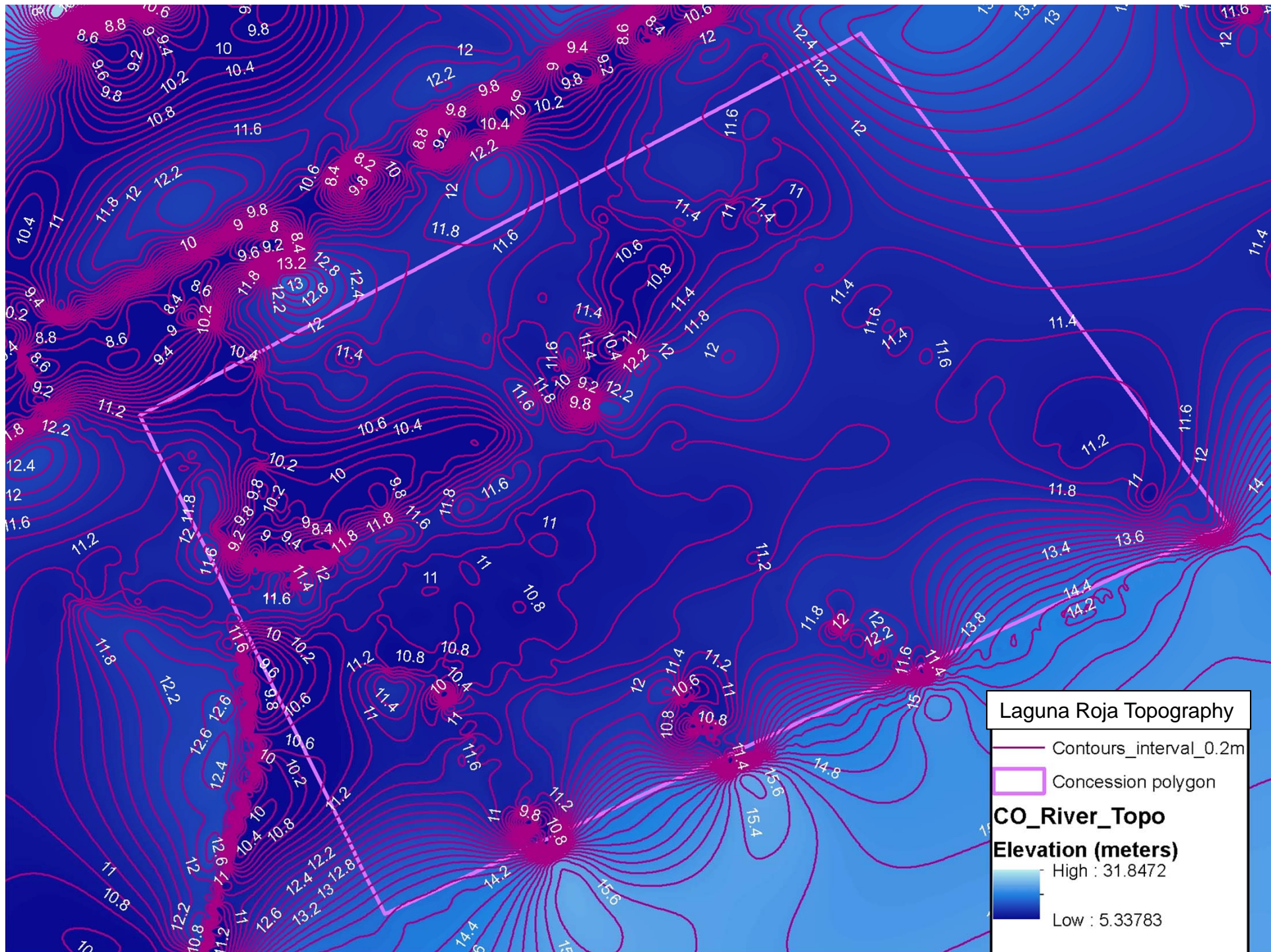
B. Hydraulic analysis and Irrigation Design

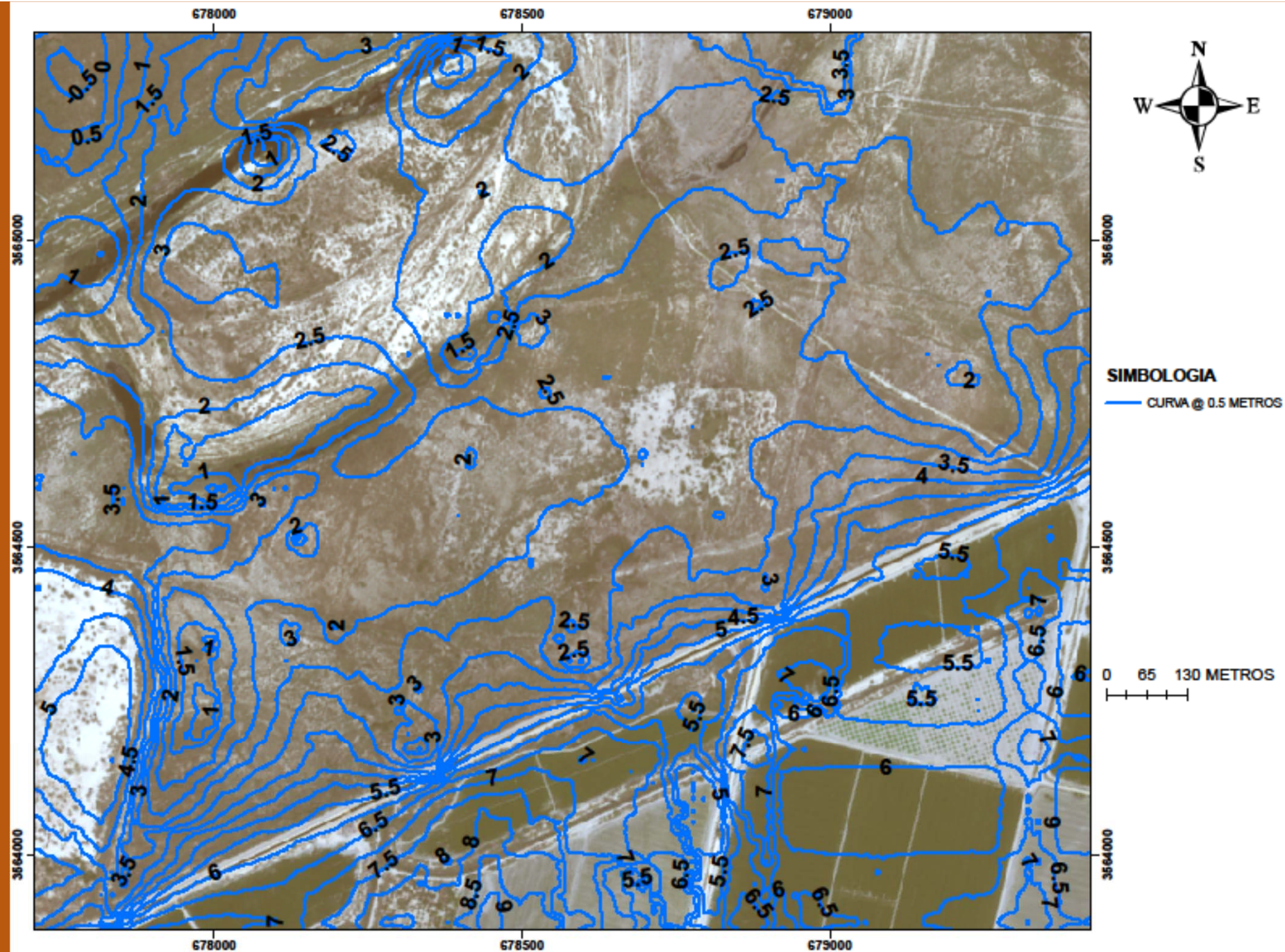
- Infiltration testing
- Irrigation design

C. Site Preparation

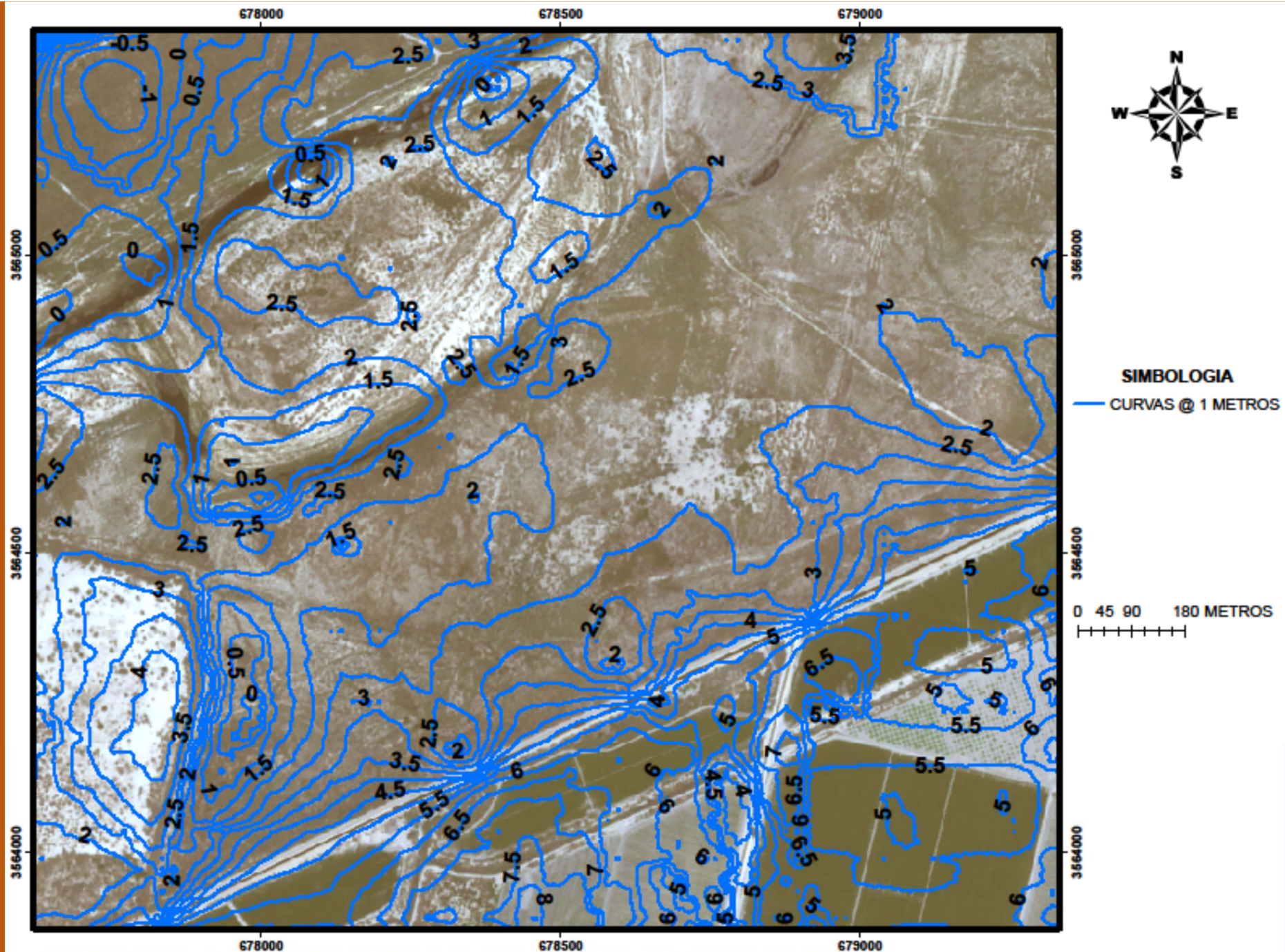
- Clear nonnative species
- Laser level
- Creation of furrows



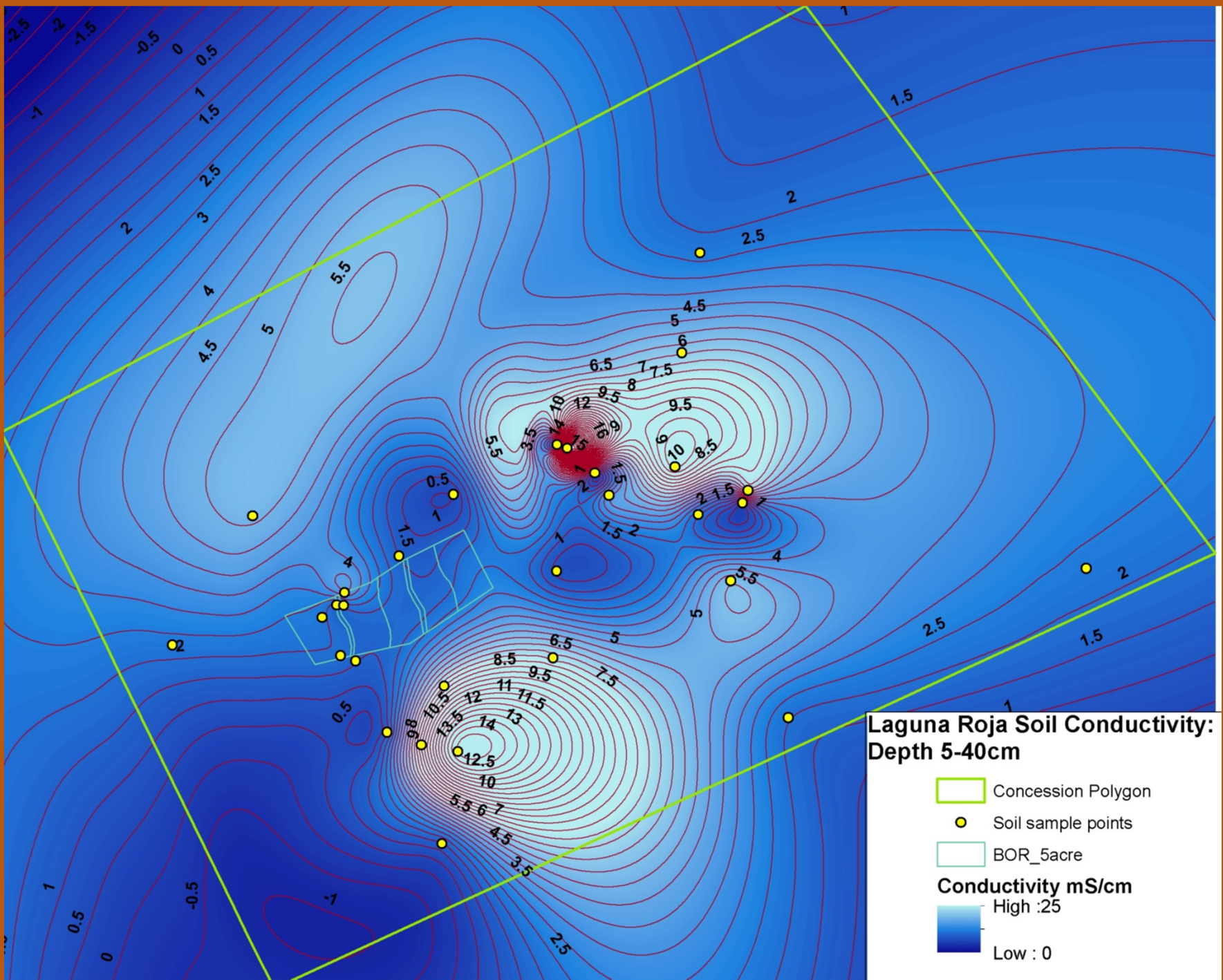


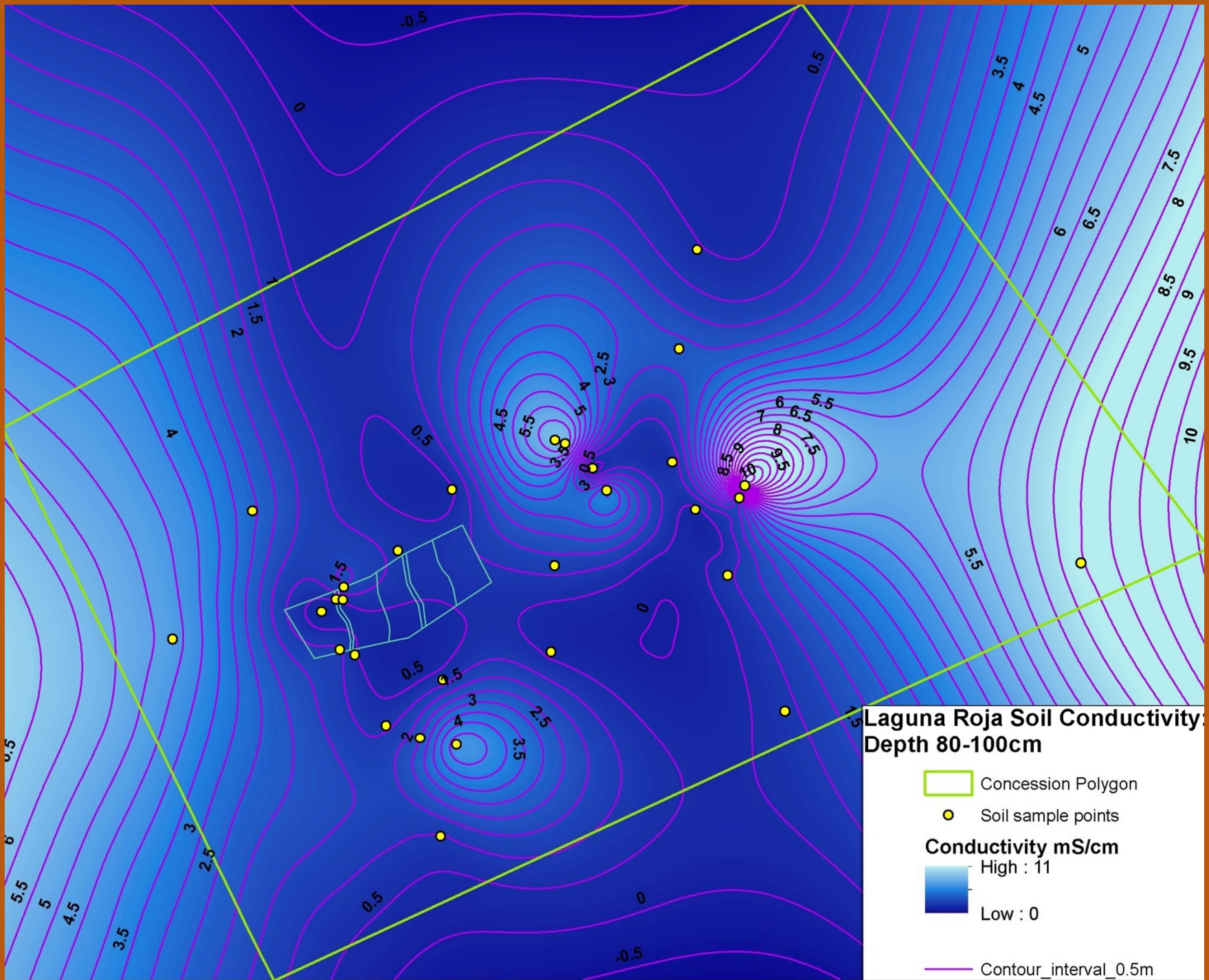


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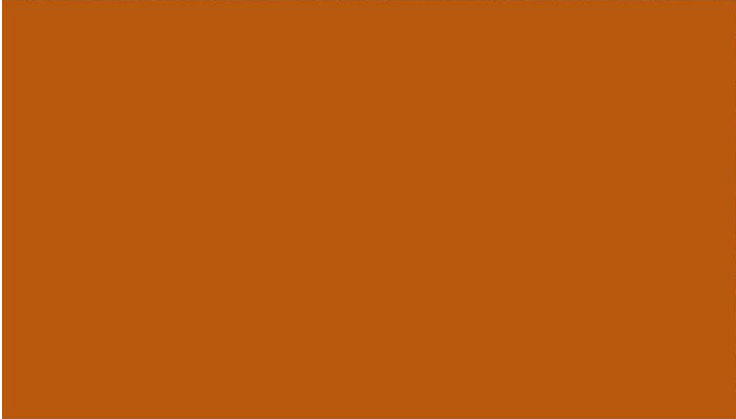
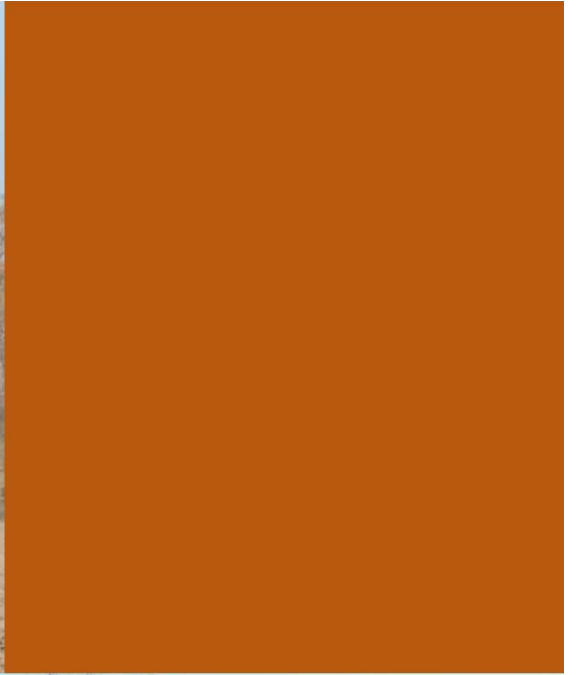














Project Implementation

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



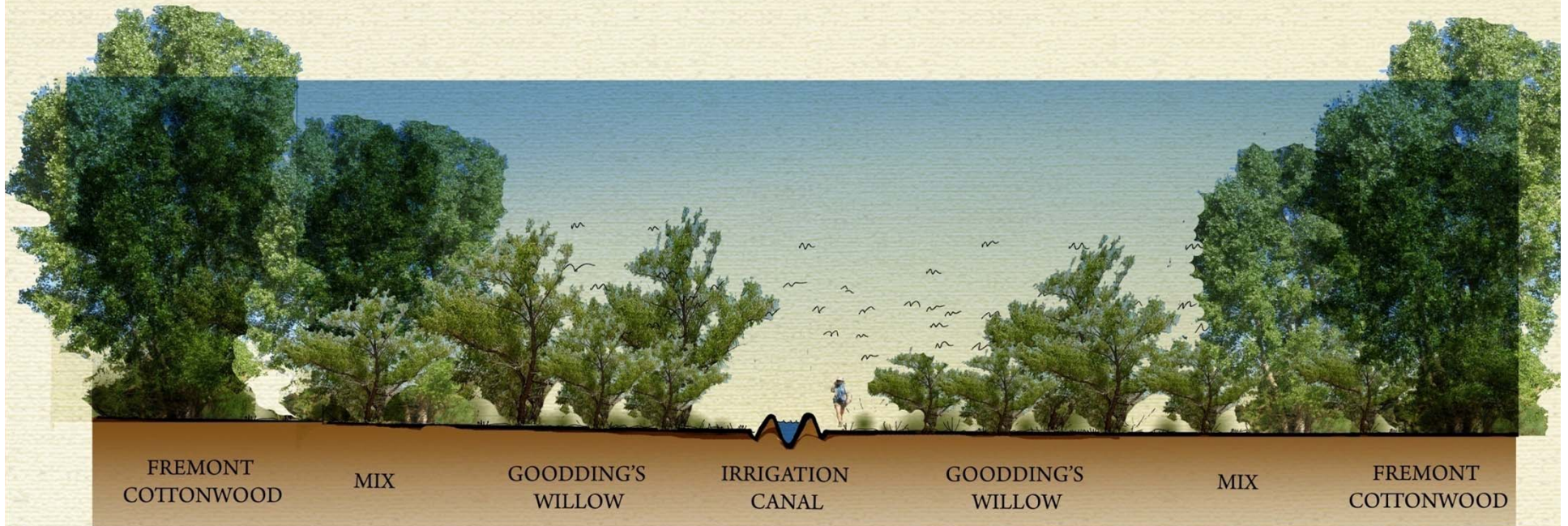
PROPOSED SEEDING LAYOUT FOR LAGUNA ROJA
SEEDING DEMONSTRATION
PLAN VIEW



FREMONT COTTONWOOD AND GOODDING'S WILLOW
HYDROSEEDING DEMONSTRATION



PROPOSED SEEDING LAYOUT FOR LAGUNA ROJA
SEEDING DEMONSTRATION
SECTION VIEW



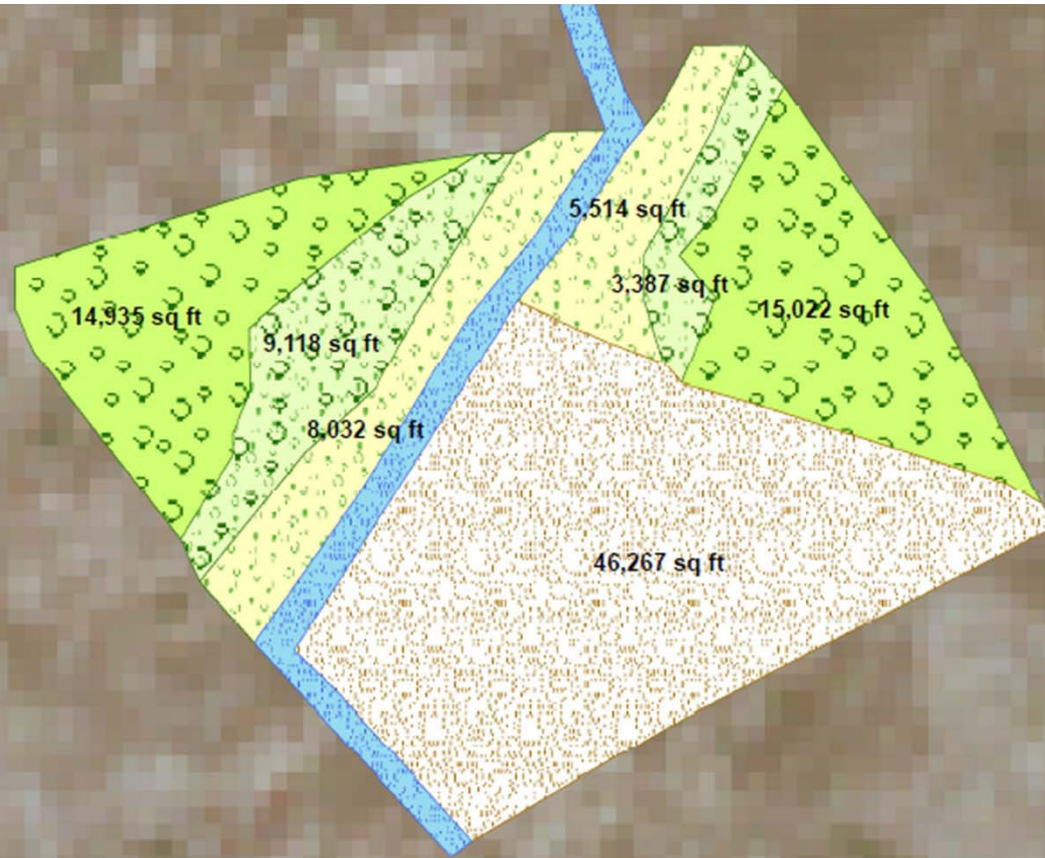
NOT TO SCALE

FREMONT COTTONWOOD AND GOODDING'S WILLOW
HYDROSEEDING DEMONSTRATION









Legend

- | | | | |
|---|--------------------|---|----------|
|  | Fremont Cottonwood |  | Unseeded |
|  | Goodding's Willow |  | Canal |
|  | Combination | | |



0 50 100 150 200 250 Feet

Demonstration project seeding layout - 2011

Drawn	RK	Date	06/17/11
Checked	MG	Job Number	1032
Approved	MM	File	E:\Jobs\1032...1032 - Sonoran Institute\SeedTypeFigure.mxd



Monitoring and Results

Vegetation monitoring:

- Vegetation quadrat surveys (1x per month)
- Photo monitoring (1 x 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





Pt. 1-14 4/21/2011



Pt. 1-14 7/11/2011



Pt. 1-14 8/16/2011



Pt. 1-14 9/20/2011



Photo point 1-14; 10/25/11



Pt. 1-6 4/21/2011



Pt. 1-6 7/11/2011



Pt. 1-6 8/16/2011



Pt. 1-6 9/20/2011

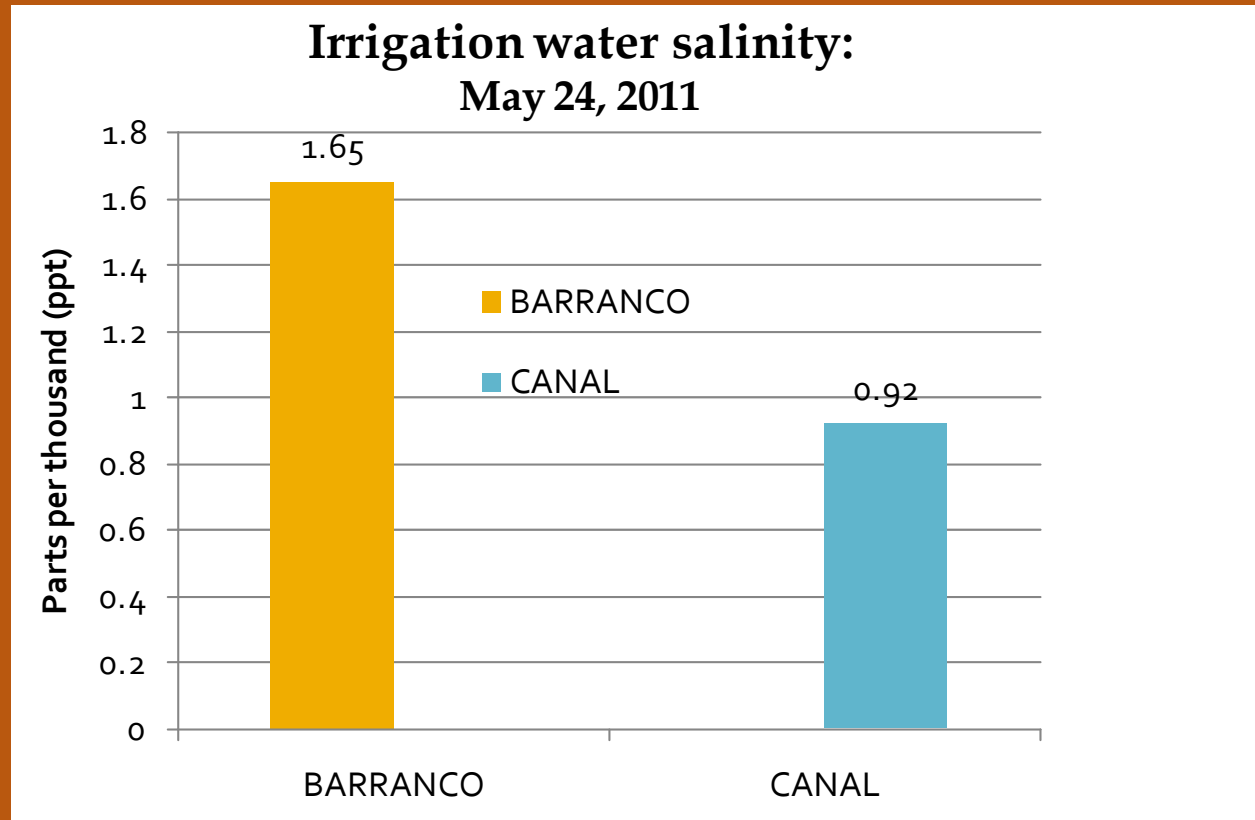


Photo point 1-6; 10/25/11



Monitoring and Results

- Lower establishment than predicted could be result of high salinity of irrigation water source



Monitoring and Results

Hydroseeding
vs.
Cuttings

	Hydroseeding	Cuttings
Average height (m)	1.74	1.54
Survival rate (of monitored trees)	100%	92%

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?

