A New Design Mimicking Nature's Old Techniques

By

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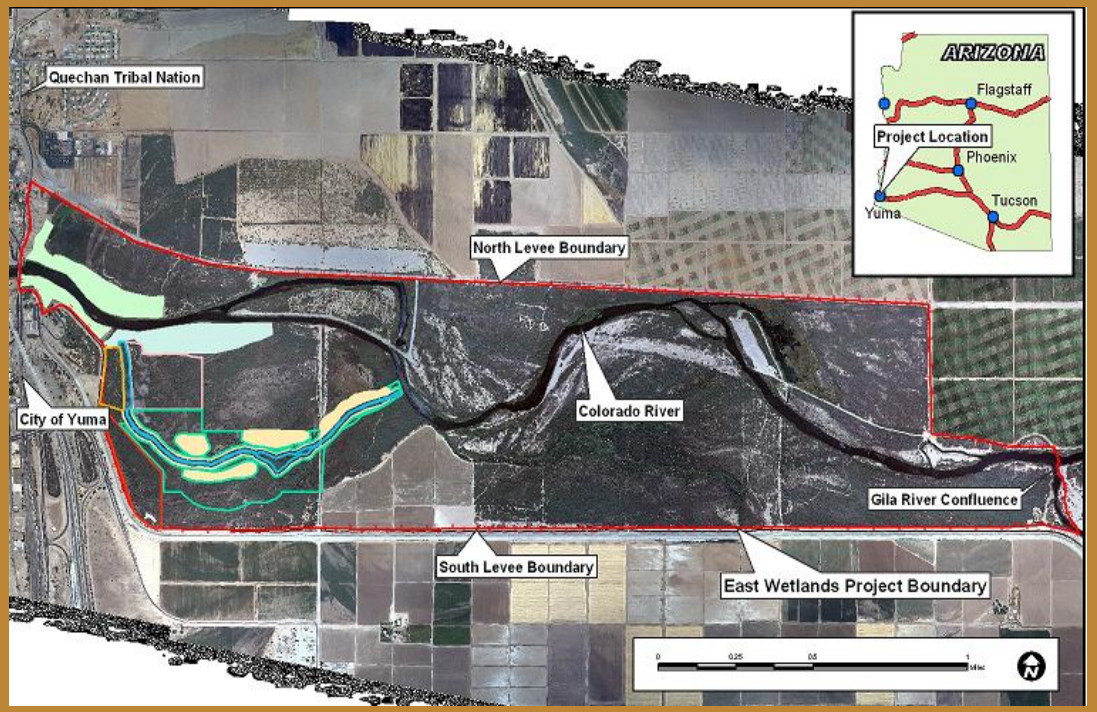
Altered Ecosystem

Yuma East Wetlands (YEW) Restoration

- Proposed 1,400 acres restoration
- 180 acres at different phases of restoration
- 30 acres proposed



Success! But more to Learn

- Restoration relatively new for the LCR
- Non-native plant re-colonization
- Little information on density and structure for best growth and hindrance of non-native weeds
- Limit irrigation needs

Questions

1. What planting density and bioengineering technique is most beneficial for bulrush and willow short- and long-term growth?
2. Does having a structurally diverse planting regime deter non-native re-colonization?
3. Can we grow native trees with out using irrigation infrastructure?
4. What native seeds grow in the YEW?
5. Do harvested seeds establish the same as purchased seeds?

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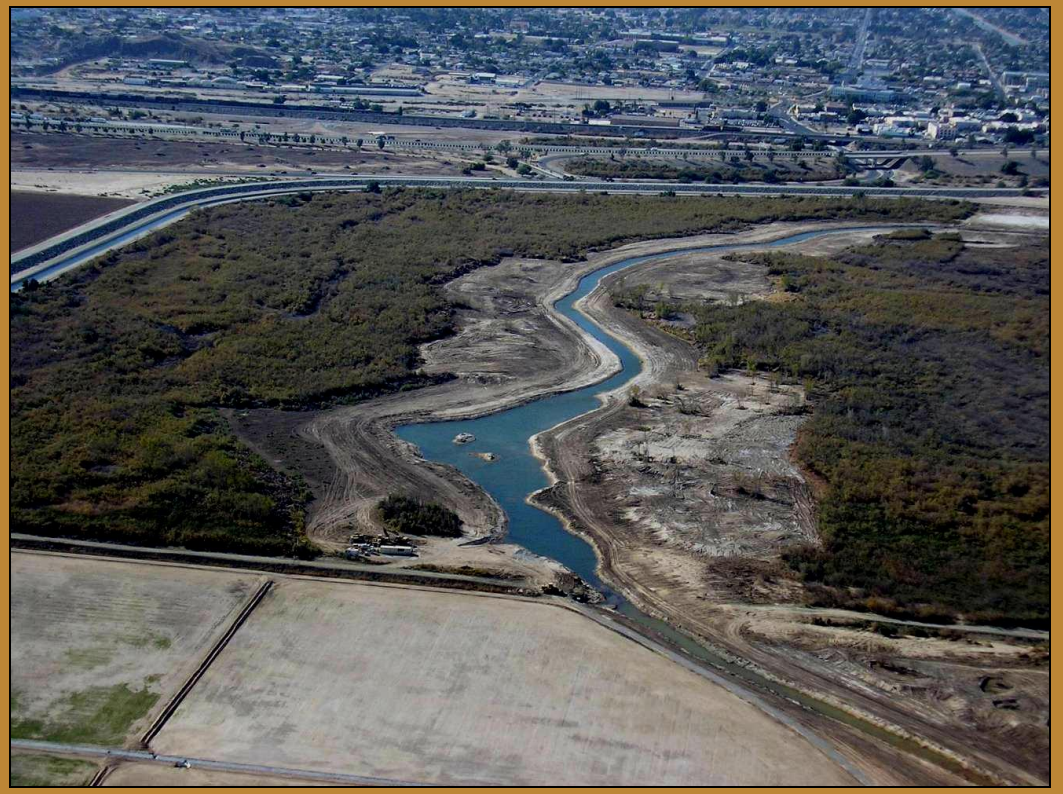
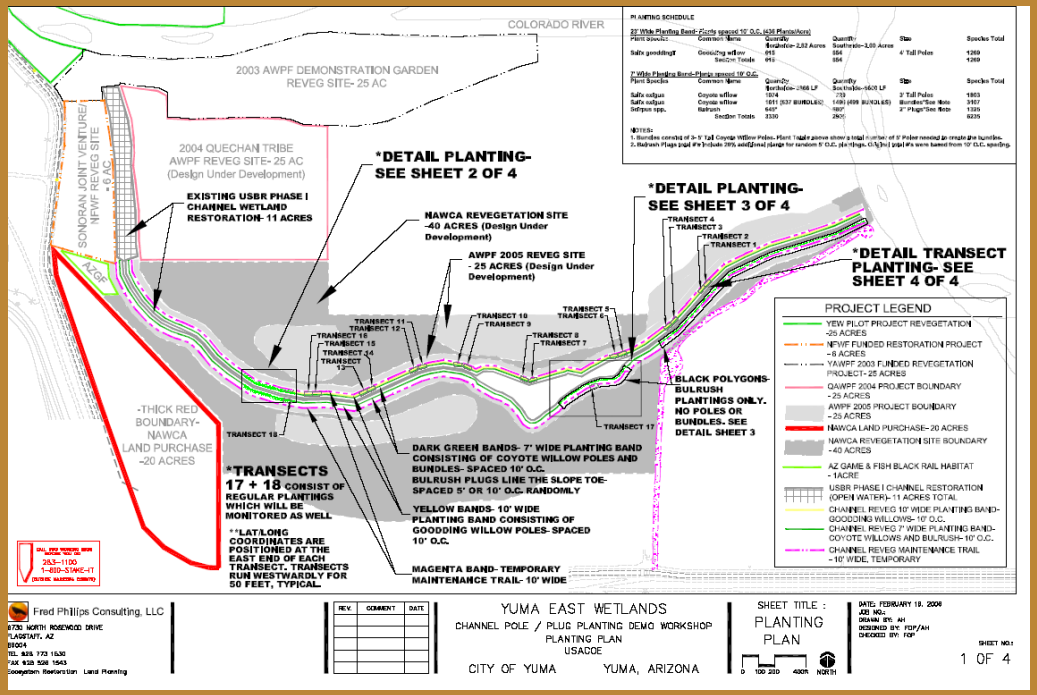
South Channel



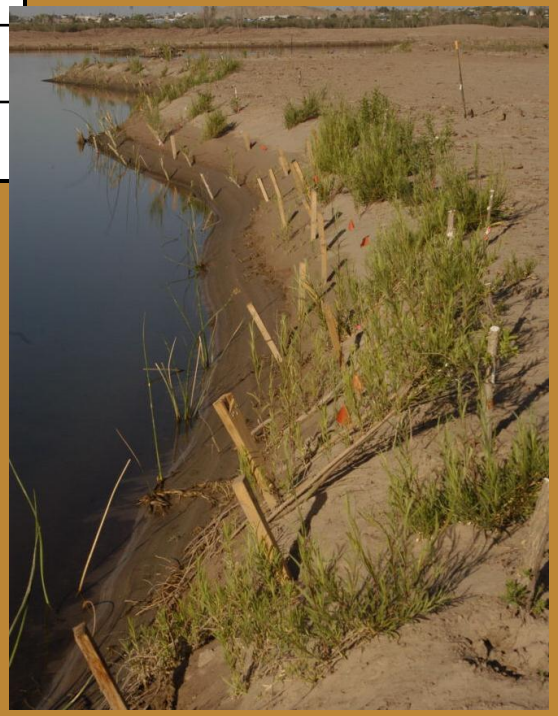
Sample Design

- 6 Treatments x 2= 12 transects
- 15 m transects
- Randomly paired
- Located on north side of channel



South Channel Treatments

Along Water's Edge		Slope				Top of Slope	
S. californicus	*S. americanus*	*S. exigua* Pole	*S. exigua* Bundle	*S. exigua* Pole + Bundle Alternating	Seed Dispersed among *S. exigua*	*S. goodingii*	Seeding under *S. gooddingii*
25 ft of 5' O.C.	25 ft of 5' O.C.			2.5' O.C.		10' O.C.	*Anemopsis californica*
10' O.C.			5' O.C.		*Heliotropium curassavicum*	10' O.C.	*Distichilis spicata*
5' O.C.			2.5' O.C.		*Sesuvium verrucosum*	5' O.C.	*Sporobolus airoides*
25 ft of 5' O.C.	25 ft of 5' O.C.			5' O.C.		10' O.C	
5' O.C.		2.5' O.C.			*Sesuvium verrucosum*	5' O.C.	
10' O.C		5' O.C.			*Heliotropium curassavicum*	5' O.C.	*Distichilis spicata*



Planting

Bulrush Plugs

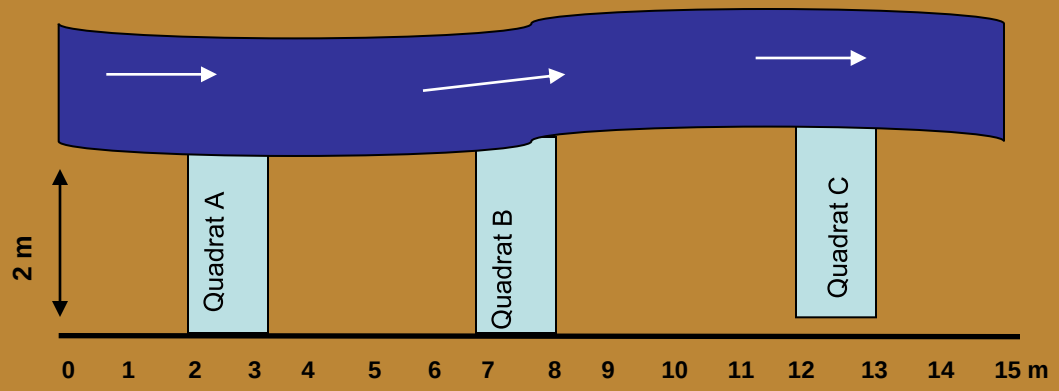
Willow Bundles

Willow Cuttings

Willow Poles

Monitoring

- Every month from April-October
- Tree height, cover, condition, factors affecting growth
- Estimate cover using Daubenmire scale
- Photo monitoring



Preliminary Results

- Growth occuring and shorebirds have returned
- Growth over time between treatments
- Percent composition of native verses non-native vegetation between treatments

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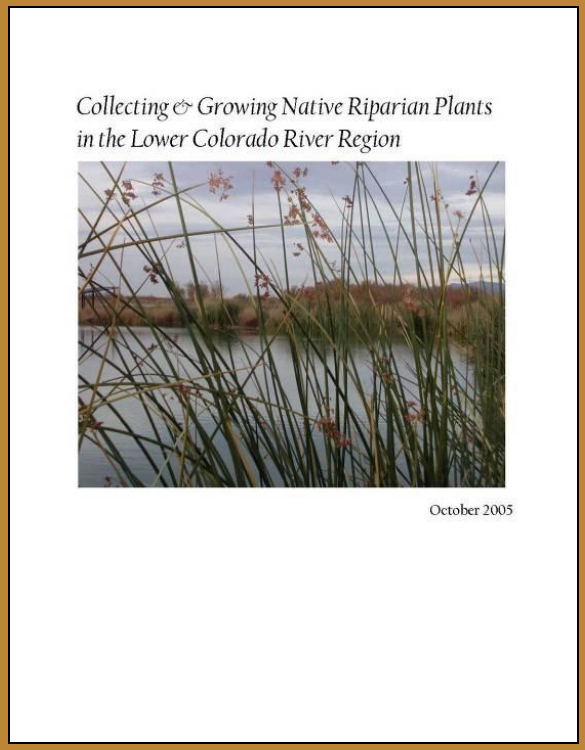
Seed Plots

- 8 randomly selected plots
- 6-20 subplots with different species
- Estimate cover in each subplot
- Photo monitoring

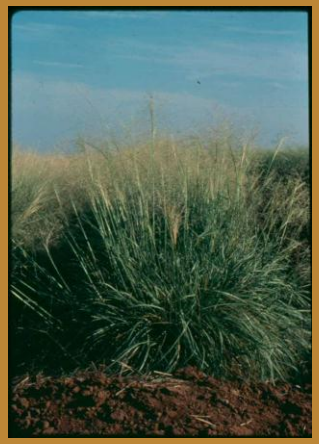


Inland Saltgrass*
(Distichlis spicata)

Wolfberry (*Lycium andersonii)*

Olney Threesquare
(*Schoenoplectus americanus)*

Seep willow *
(*Baccharis salicifolia)*



Alkali Sacaton*
(*Sporabolus airoides*)

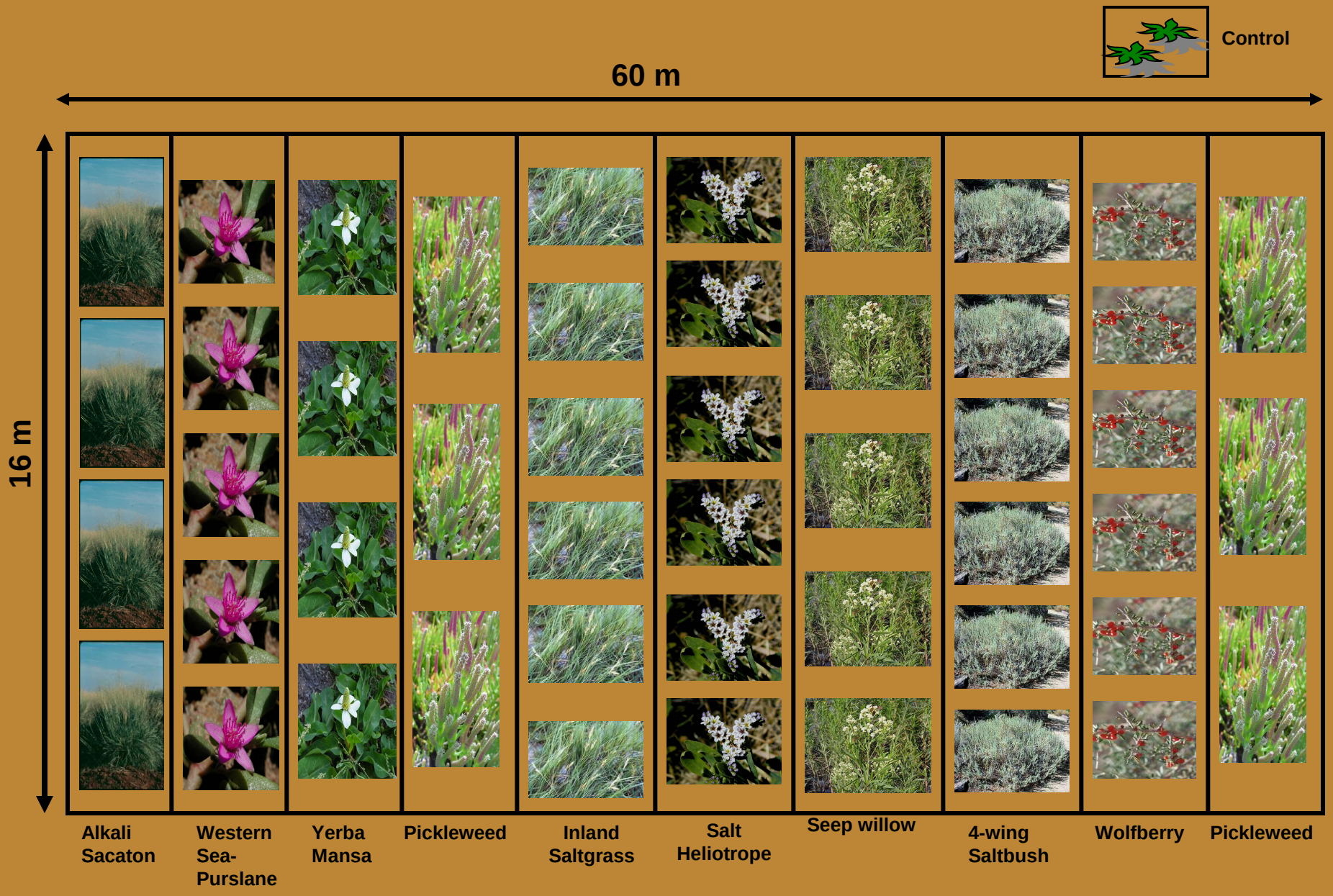
Pickleweed
(*Salicornia virginica*)

Yerba Mansa
(*Anemopsis californica*)

Salt Heliotrope*
(*Heliotropium curassavicum)*

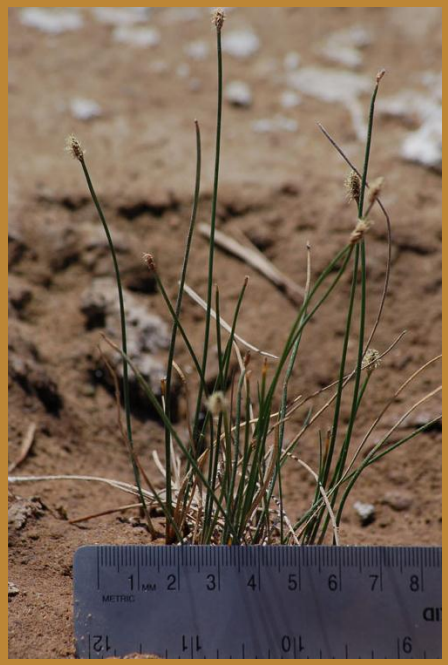
Western Sea-Purslane*
(*Sesuvium verrucosum)*

4-wing Saltbush
(*Atriplex canescens*)


Control
60 m
16 m
Alkali Sacaton
Western Sea-Purslane
Yerba Mansa
Pickleweed
Inland Saltgrass
Salt Heliotrope
Seep willow
4-wing Saltbush
Wolfberry
Pickleweed

Preliminary Results

- Seeds have sprouted
- Growth success over time
- Native verses non-native plant establishment



Applications and Future Endeavors

- Replicate on North Channel and other areas
- Use data for future restoration efforts on LCR
- Correlate with wildlife recovery
- Continue with native seed plan and collection program

Contributors:

City of Yuma
Yuma Crossing National Heritage Area
Quechan Indian Tribe
Yuma County
Bureau of Reclamation
Army Corps of Engineers
Arizona State Land Department
Bureau of Indian Affairs
Audubon Society
Arizona Water Protection Fund
National Fish and Wildlife Foundation
North American Wetland Conservation Association
Arizona Game and Fish

During Excavation

After Excavation