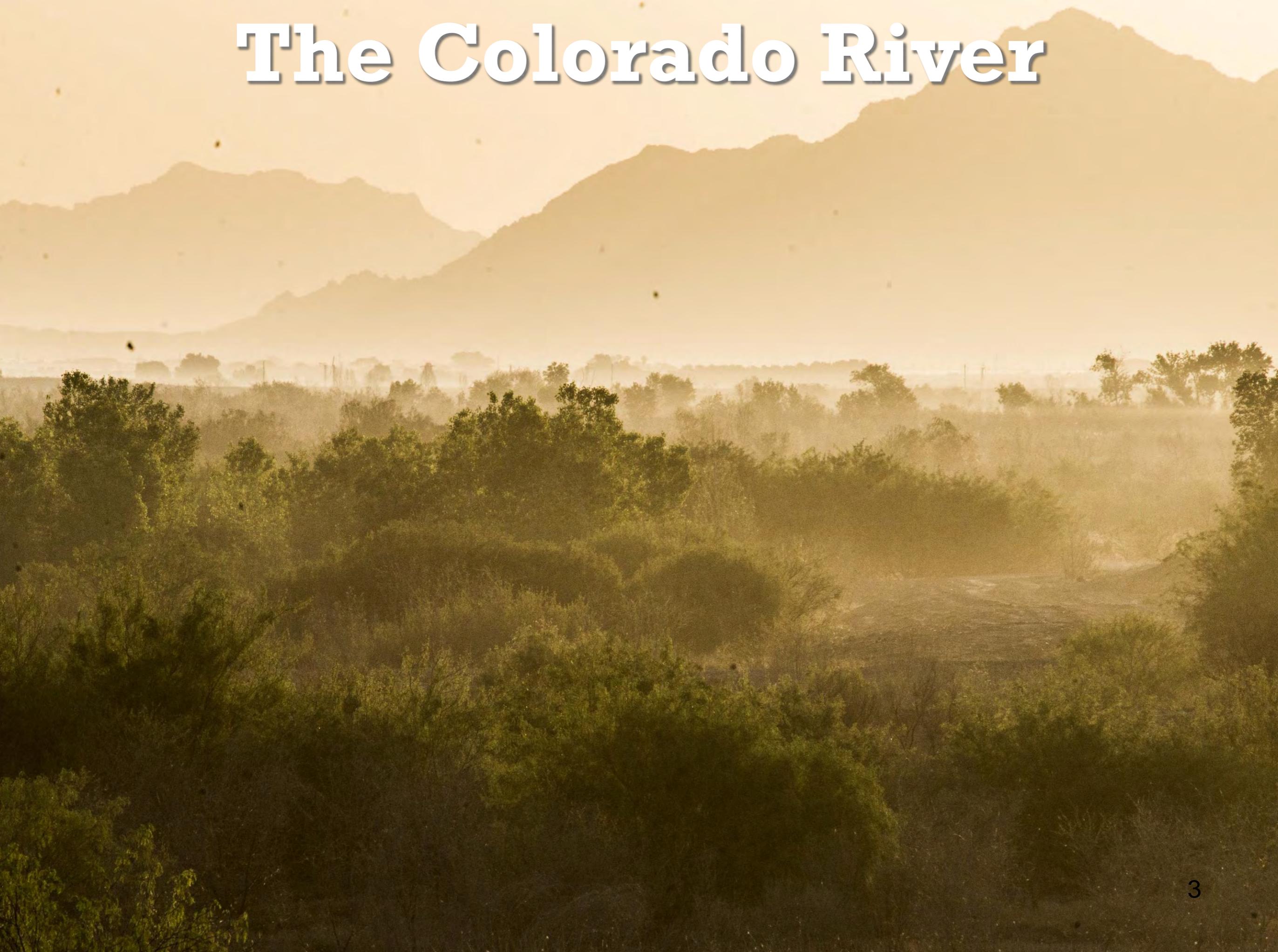






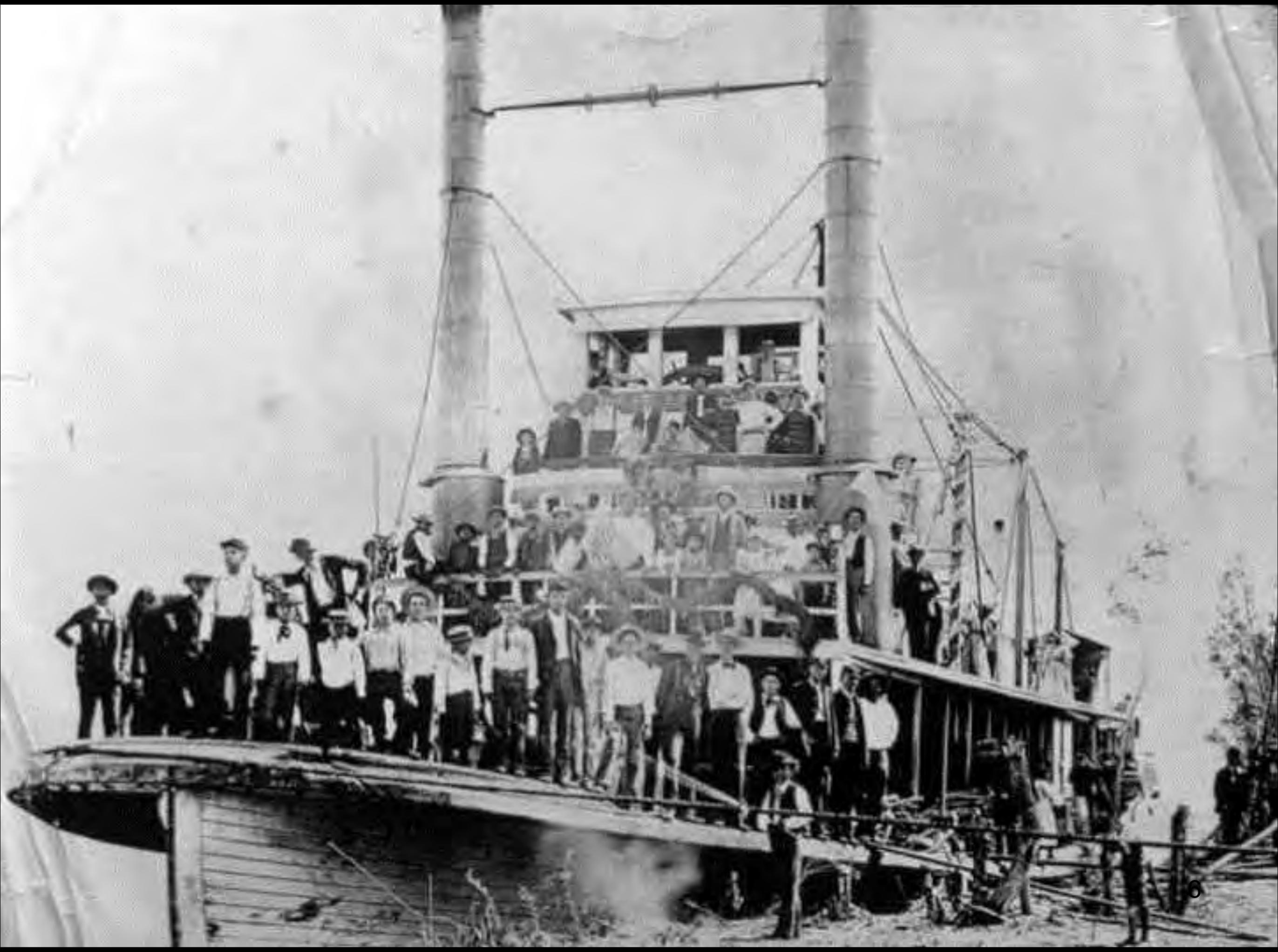
The Colorado River

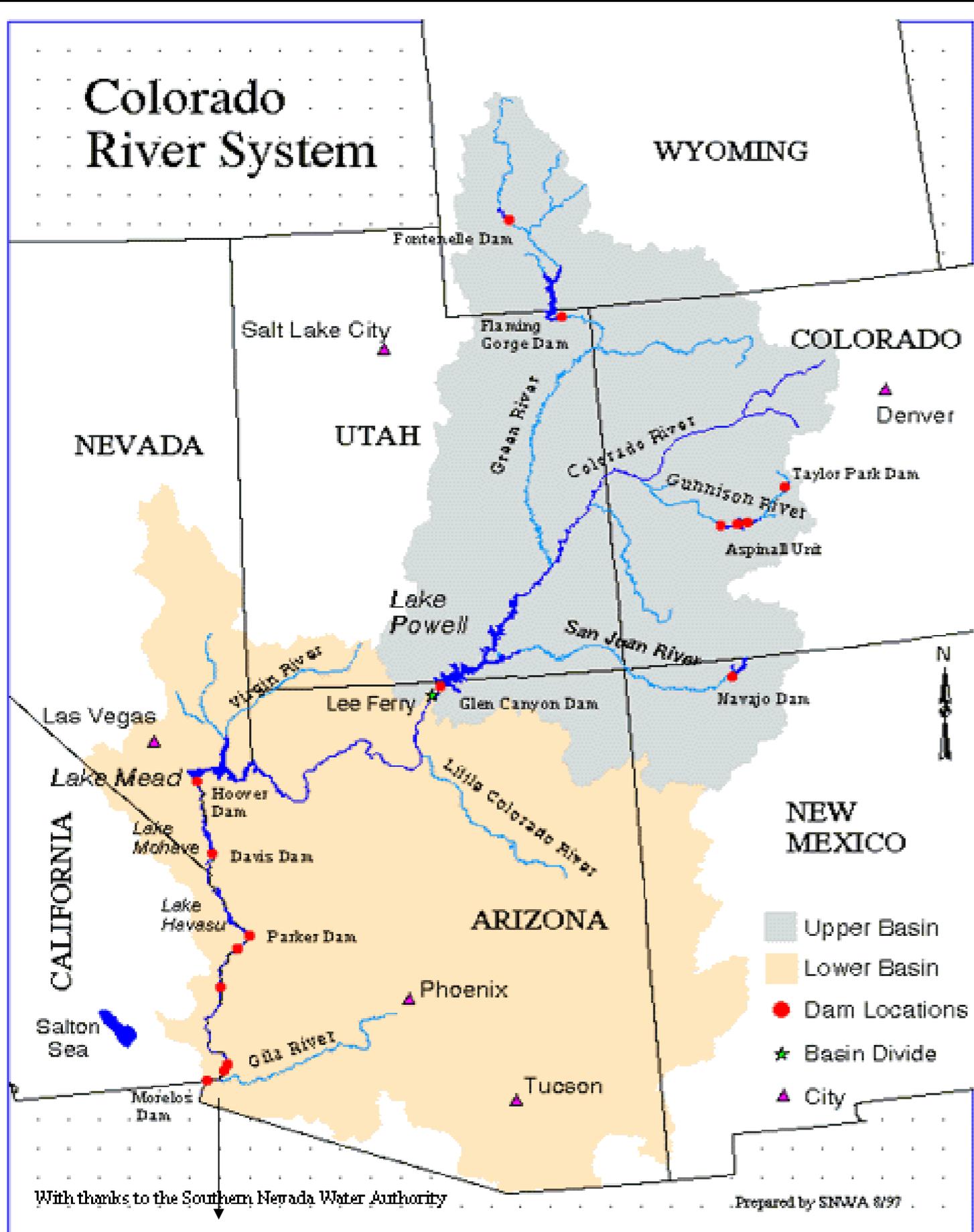


- **Riparian Areas in the Desert Southwest Make up approximately 3% of the Land Mass**
- **Riparian Areas in the Desert Southwest Support 35% of the Avifauna Species and 33% of the Plant Species**
- **90% + of the Riparian Areas have Been Destroyed in the south west**



*a sample of the Geese that winter on the -
Colorado River Delta Project*





Habitat Fragmentation

4 Large Dams

Glen Canyon

Hoover

Davis

Parker

5 Smaller Weirs

Headgate Rock

Palo Verde Weir

Imperial Dam

Laguna Dam

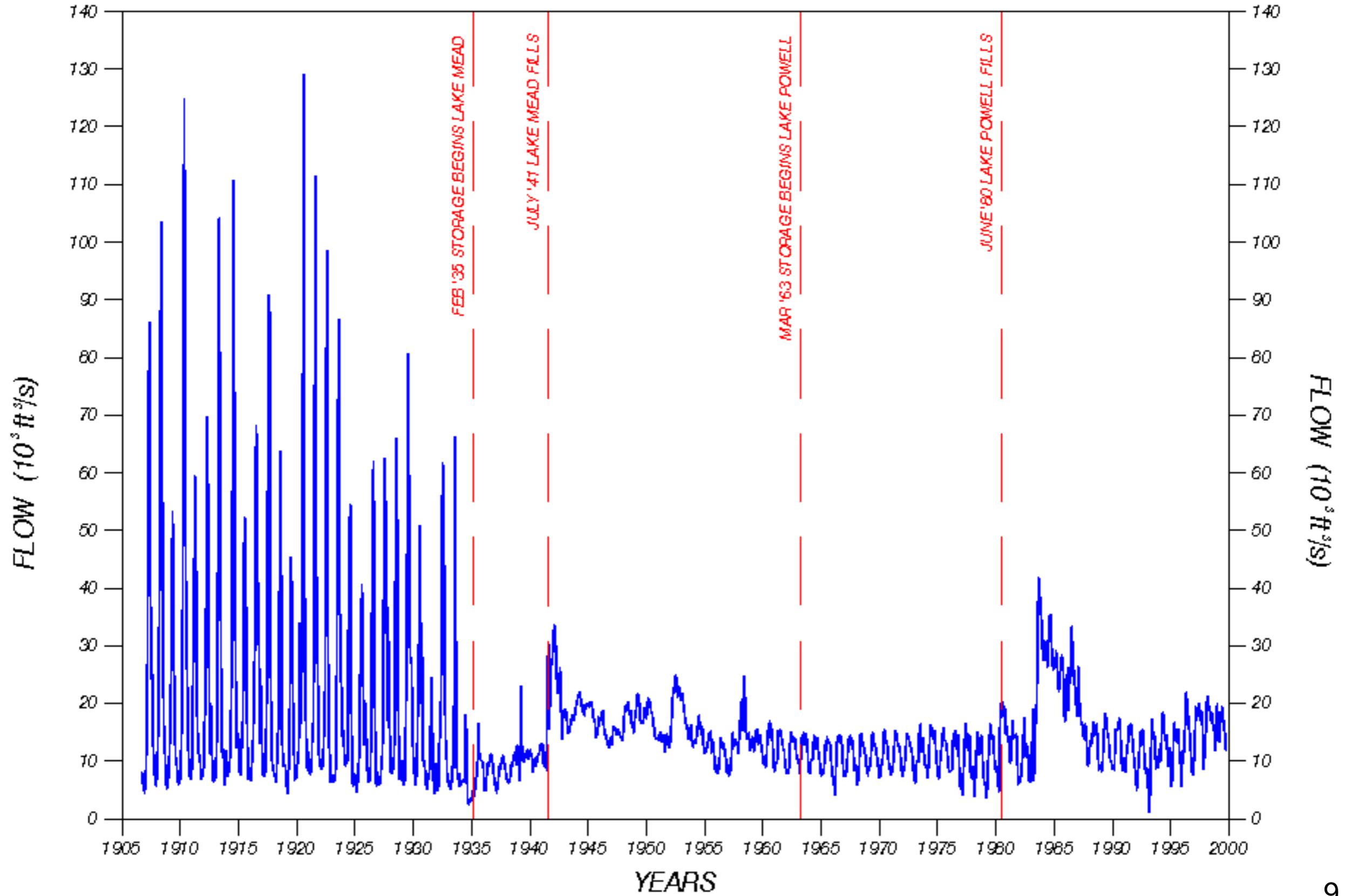
Morelos Dam

Imperial Dam & Desilting Works
C423-300-020000



FLOW BELOW HOOVER DAM 1906 THROUGH SEPTEMBER 1999

(UNITS: ENGLISH)



Reduction in river flows and flooding



THE COLORADO RIVER AT YUMA























































































AERIAL PHOTO POINT 1



AERIAL PHOTO POINT 2

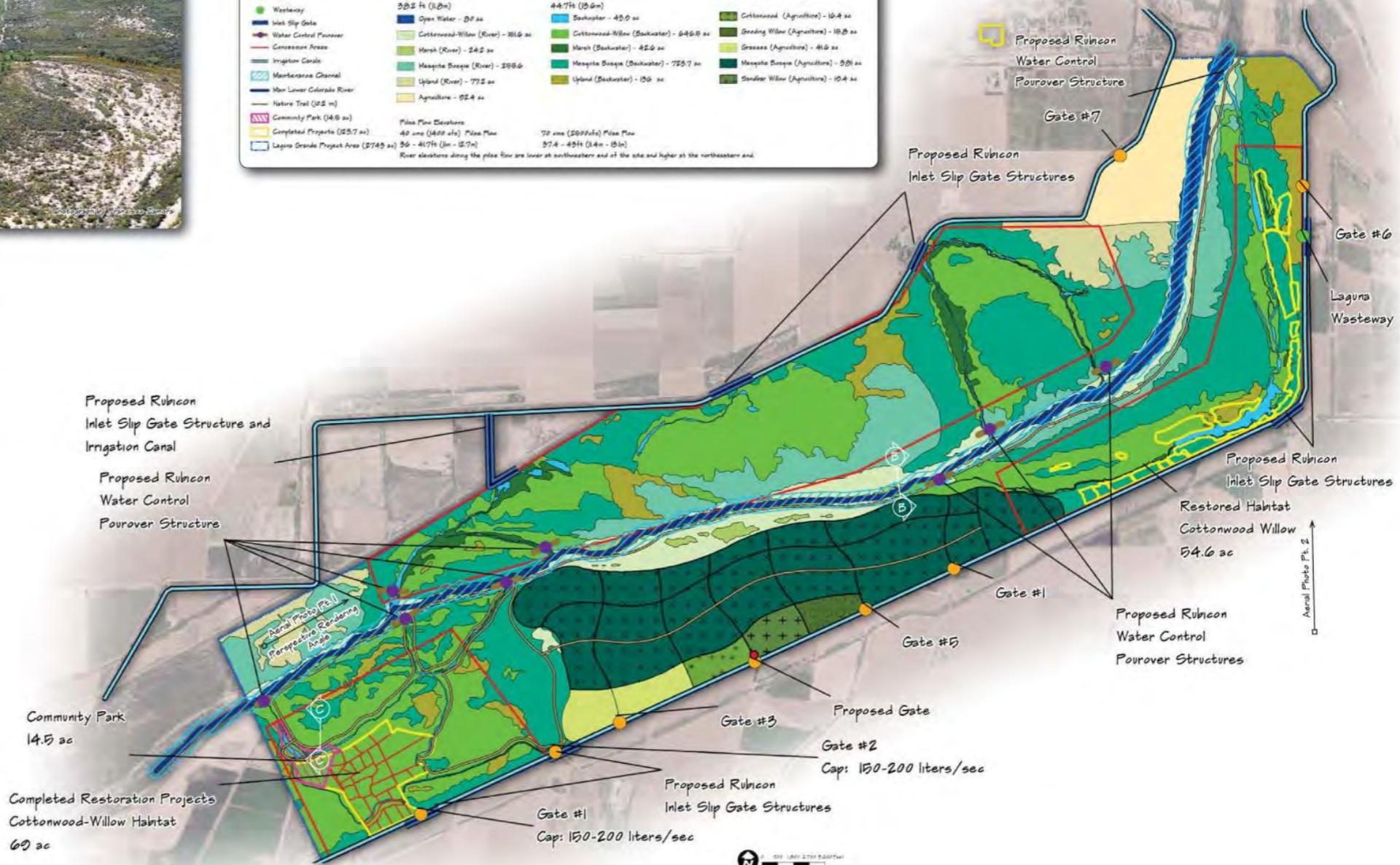
* Main River Restoration design is dependent on existing groundwater conditions and conditions enhanced by the proposed pulse flow

** Backwater Restoration design utilized historic channels, oxbows, and existing infrastructure to capture and hold water from pulse and base flow waters (delivered via the main river channel and adjacent irrigation canals) to improve groundwater conditions and allow for restoration of native riparian habitat.

*** Agricultural Conversion design creates a series of flood irrigated cells, using water from existing irrigation infrastructure. Irrigation cells immediately adjacent to irrigation canals will be used to cultivate nursery stock for native riparian, wetland, and upland species.

LEGEND	MAIN RIVER RESTORATION*	BACKWATER RESTORATION**	AGRICULTURAL CONVERSION
Gate	Mean River Elevation 382.2 ft (116m)	Mean River Elevation 44.7ft (13.6m)	Flood irrigated from adjacent canals
Wasteway	Open Water - 87 ac	Saukwater - 42.0 ac	Cottonwood (Agriculture) - 10.4 ac
Inlet Slip Gate	Cottonwood-Willow (River) - 161.6 ac	Cottonwood-Willow (Backwater) - 646.9 ac	Grassland Willow (Agriculture) - 18.8 ac
Water Control Paveover	Marsh (River) - 24.2 ac	Marsh (Backwater) - 42.6 ac	Grasses (Agriculture) - 41.6 ac
Concession Areas	Mequite Bosque (River) - 298.6 ac	Mequite Bosque (Backwater) - 723.7 ac	Mequite Bosque (Agriculture) - 39.8 ac
Irrigation Canals	Upland (River) - 77.2 ac	Upland (Backwater) - 136 ac	Sandbar Willow (Agriculture) - 10.4 ac
Maintenance Channel	Agriwells - 82.4 ac		
Main Lower Colorado River			
Nature Trail (1.2 mi)			
Community Park (4.6 ac)			
Completed Projects (25.7 ac)			
LAGUNA GRANDE PROJECT AREA (2745 ac)			

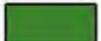
Pulse Flow Elevations
 40' - 400' (12m - 127m) Pulse Flow
 70' - 45ft (21m - 13.6m) Pulse Flow
 River elevations along the pulse flow are lower at southeastern end of the site and higher at the northeastern end.



LAGUNA GRANDE RESTORATION CONCEPT



Legend

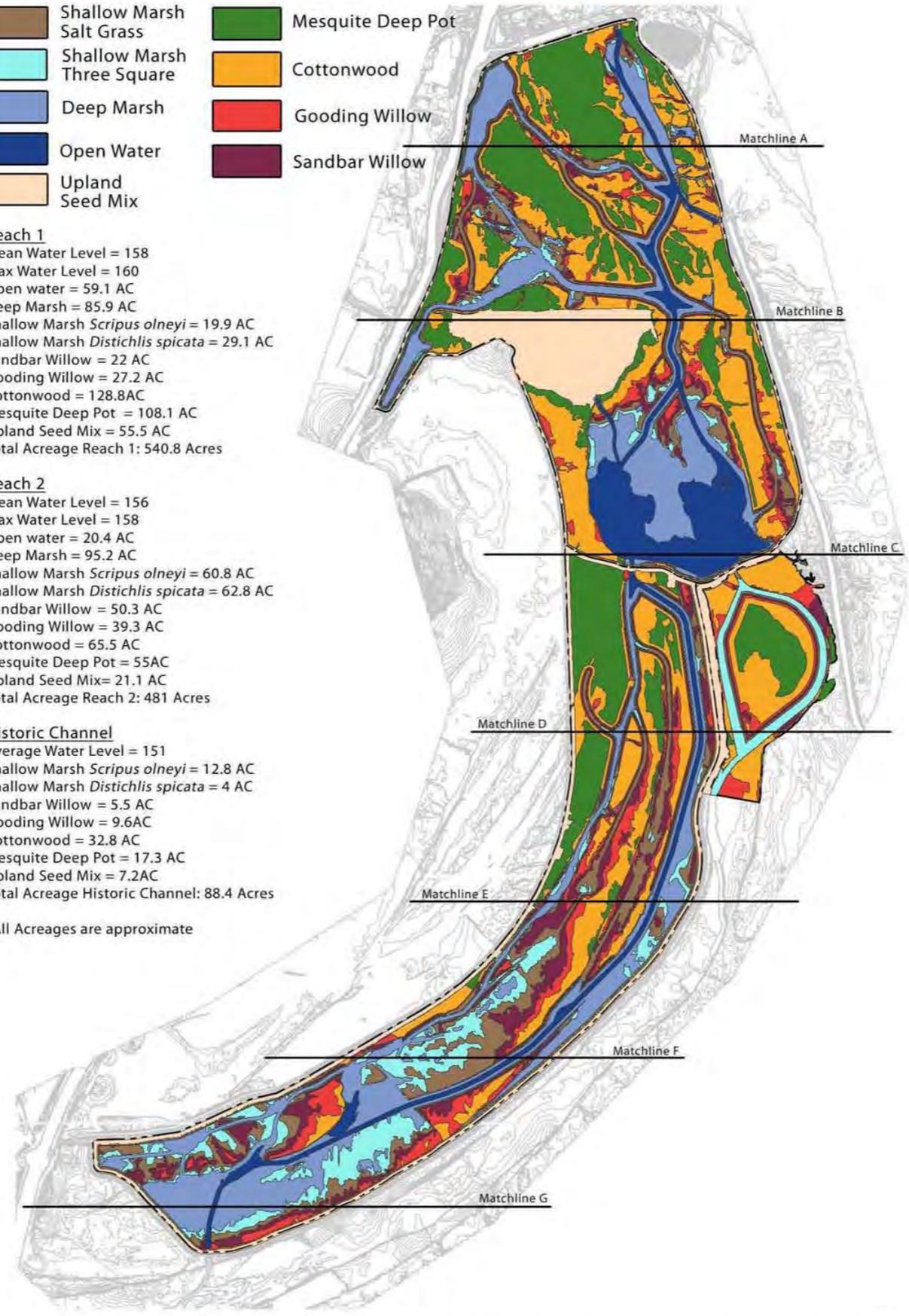
- | | |
|--|---|
|  Shallow Marsh Salt Grass |  Mesquite Deep Pot |
|  Shallow Marsh Three Square |  Cottonwood |
|  Deep Marsh |  Gooding Willow |
|  Open Water |  Sandbar Willow |
|  Upland Seed Mix | |

Reach 1
 Mean Water Level = 158
 Max Water Level = 160
 Open water = 59.1 AC
 Deep Marsh = 85.9 AC
 Shallow Marsh *Scripus olneyi* = 19.9 AC
 Shallow Marsh *Distichlis spicata* = 29.1 AC
 Sandbar Willow = 22 AC
 Gooding Willow = 27.2 AC
 Cottonwood = 128.8AC
 Mesquite Deep Pot = 108.1 AC
 Upland Seed Mix = 55.5 AC
 Total Acreage Reach 1: 540.8 Acres

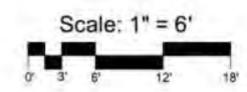
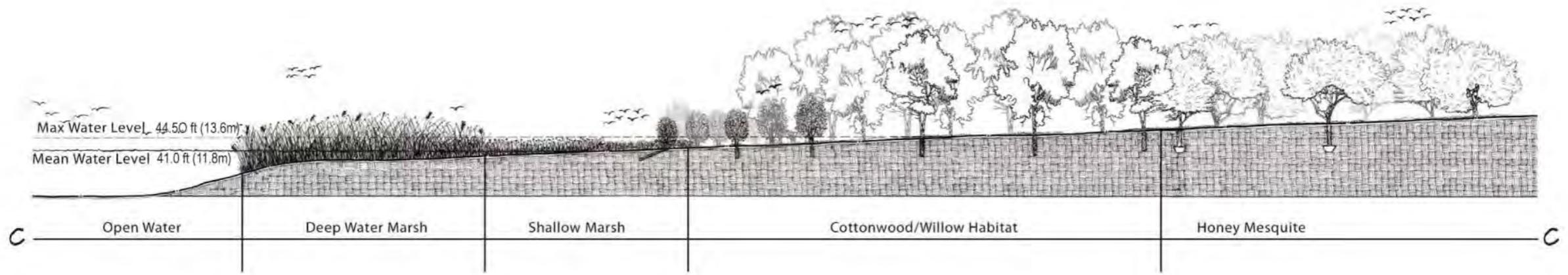
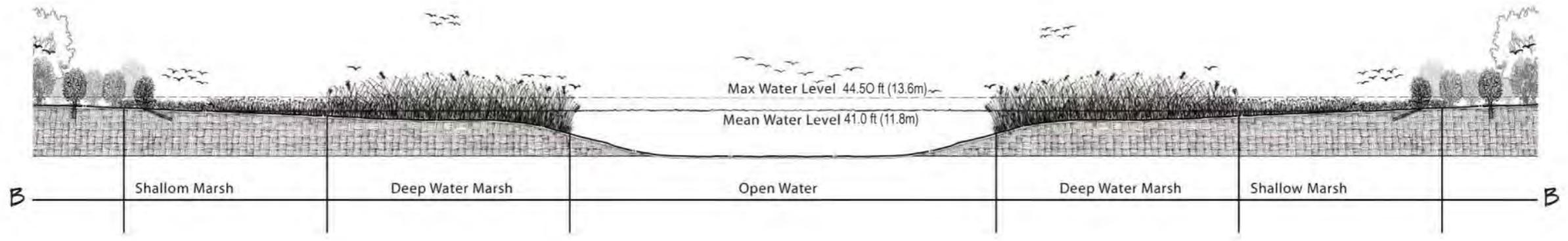
Reach 2
 Mean Water Level = 156
 Max Water Level = 158
 Open water = 20.4 AC
 Deep Marsh = 95.2 AC
 Shallow Marsh *Scripus olneyi* = 60.8 AC
 Shallow Marsh *Distichlis spicata* = 62.8 AC
 Sandbar Willow = 50.3 AC
 Gooding Willow = 39.3 AC
 Cottonwood = 65.5 AC
 Mesquite Deep Pot = 55AC
 Upland Seed Mix= 21.1 AC
 Total Acreage Reach 2: 481 Acres

Historic Channel
 Average Water Level = 151
 Shallow Marsh *Scripus olneyi* = 12.8 AC
 Shallow Marsh *Distichlis spicata* = 4 AC
 Sandbar Willow = 5.5 AC
 Gooding Willow = 9.6AC
 Cottonwood = 32.8 AC
 Mesquite Deep Pot = 17.3 AC
 Upland Seed Mix = 7.2AC
 Total Acreage Historic Channel: 88.4 Acres

*All Acreages are approximate



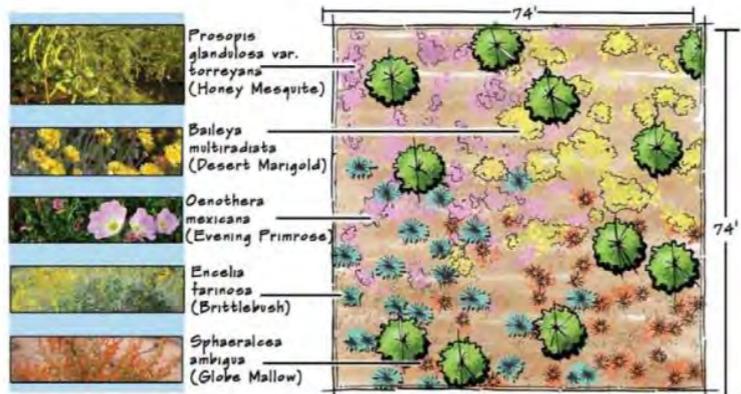




LAGUNA GRANDE CONCEPT DESIGN SECTIONS

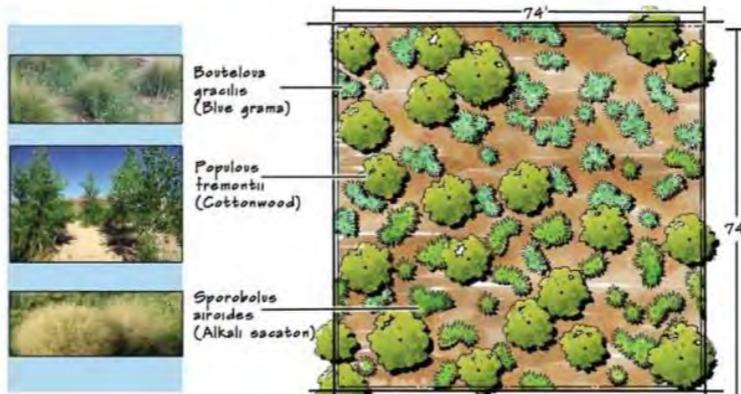
Sheet # 4





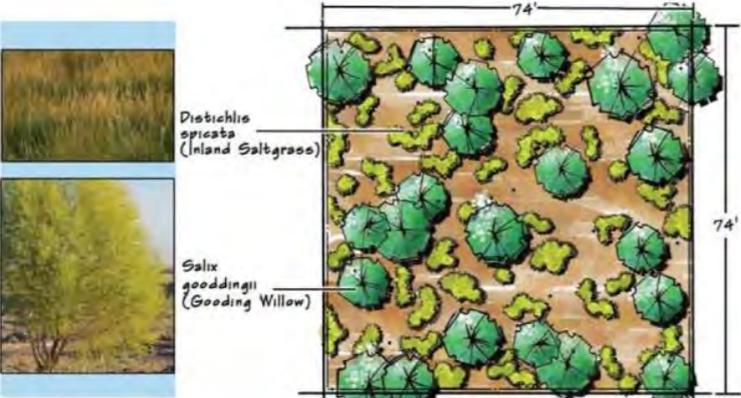
PLANTING ZONE PROPERTIES
 Plant Specs:
 * *Prosopis glandulosa* var. *torreyana*, 1 gallon, hand planted randomly 20' O.C.
 Seed entire area 5 lbs per acre with Seed Mix 1:
 * *Oenothera mexicana*
 * *Baileya multiradiata*
 * *Encelia farinosa*
 * *Sphaeralcea ambigua*

PLANTING DETAIL MESQUITE HABITAT



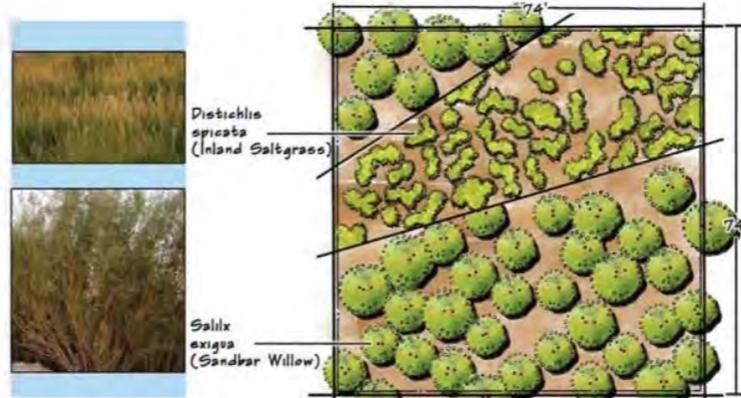
PLANTING ZONE PROPERTIES:
 * *Populus fremontii* 1 gallon, hand planted randomly 15' O.C.
 * Seed entire area 5 lbs per acre with Seed Mix 2:
 * *Sporobolus airoides*
 * *Bouteloua gracilis*

PLANT DETAIL COTTONWOOD HABITAT



PLANTING ZONE PROPERTIES:
 * *Salix gooddingii* 1 gallon, hand planted randomly 15' O.C.
 * *Distichlis spicata* 4" plugs, hand planted randomly 5' O.C.

PLANT DETAIL GOODING WILLOW HABITAT



CLUSTER PLANTING DETAIL

 Each cluster will have 3 poles at least 7' in length with a minimum diameter of 1/2". Holes will be augered at a 6" diameter to the lower water table of the year. All poles will be planted at the bottom of the lowest water table of the year. The above ground portion of the pole will be cut at a maximum height of 2' high and a minimum height of 10". When planted all poles will be slotted in with a water sealer leaving no air gaps between pole and soil. To maintain maximum soil to stem contact.
 All willow pole plantings will be soaked for a minimum of 7 days prior to planting. The entire pole will be under water while being soaked. Once poles are removed from water they will not spend more than 6 hours out of water before planting. All poles will be cut locally during plant dormancy. The tops of all poles will be sealed with latex paint to seal in moisture.
PLANTING ZONE PROPERTIES:
 Plant Specs:
 * *Salix exigua* 1 gallon, hand planted randomly 7' O.C.
 * *Distichlis spicata* 4" plugs hand planted randomly 5' O.C.

PLANT DETAIL SANDBAR WILLOW HABITAT





RUBICON SLIP METER, CANAL INLET



EXAMPLE OF EARTHEN LEVEE TO CONTAIN WATER IN BACKWATER AREAS



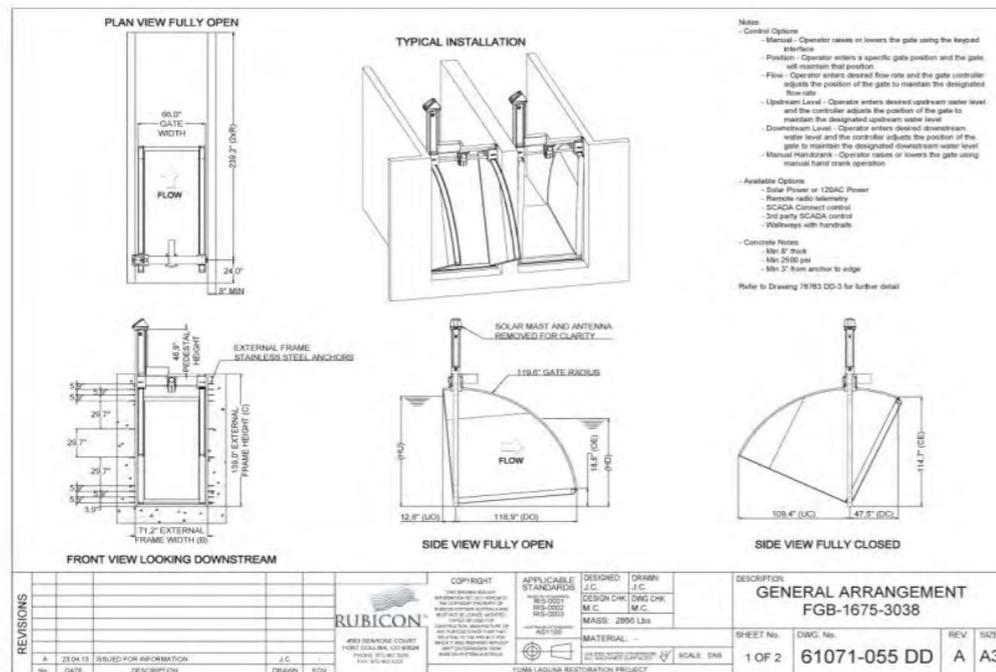
PROPOSED RUBICON POUR-OVER STRUCTURE



PROPOSED RUBICON POUR-OVER STRUCTURE WITH STOPLOG SLOTS



PROPOSED RUBICON POUR-OVER STRUCTURE



DETAIL OF PROPOSED RUBICON POUR-OVER STRUCTURE

WATER CONTROL STRUCTURE DETAILS





Yuma East Wetlands (YEW) prior to restoration, note invasive salt cedar and phragmites



Same site after clearing, grading, and installation of water control structures



Site after capturing river "pulse flows" and water input from adjacent agricultural ditches



5 years post restoration (using same methods specified in this plan)























































Poquito Creek Restoration

Creek People

Austin Parks Foundation

Austin Parks and Recreation

COA Watershed Protection Department

Ladybird Wildflower Center

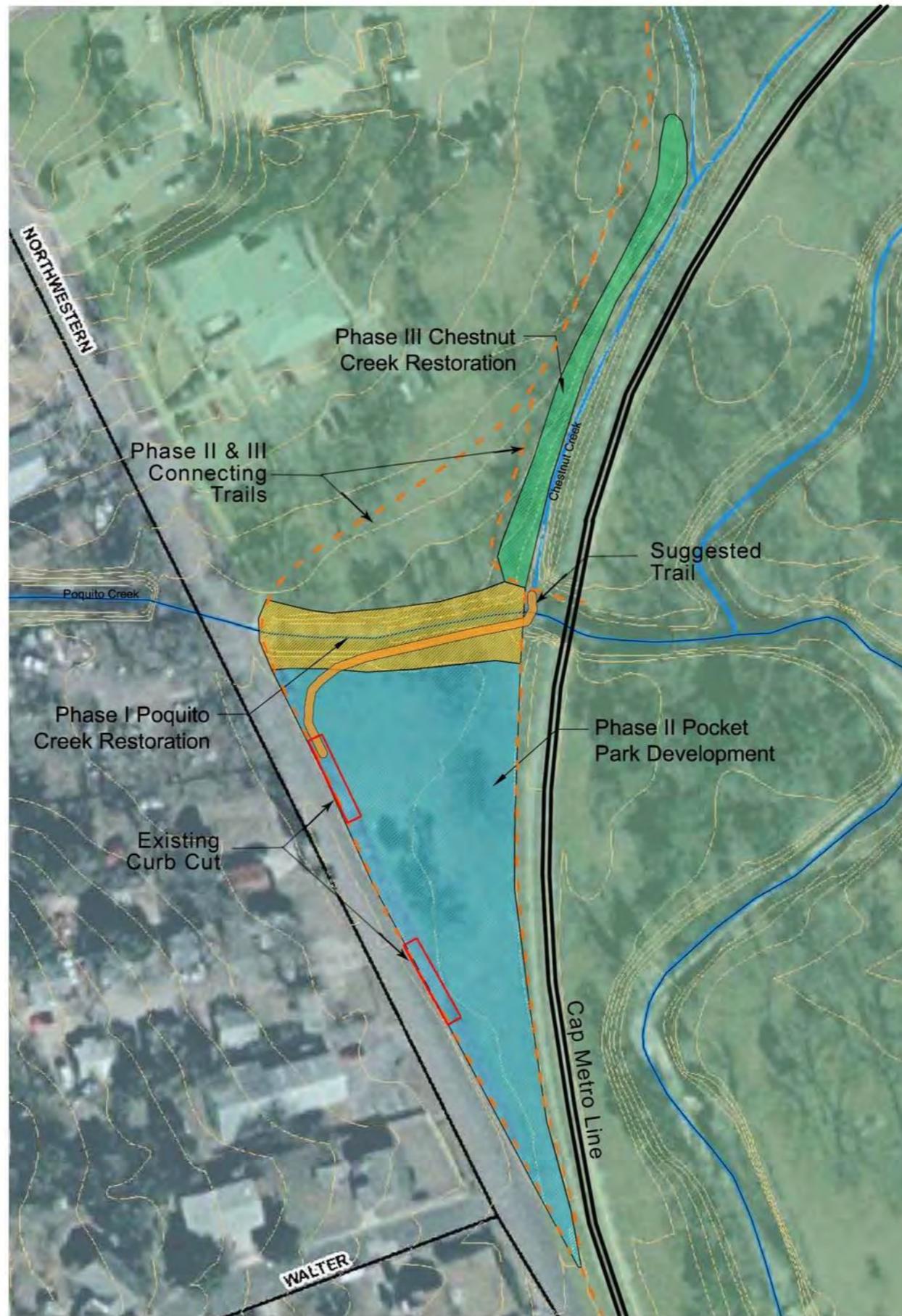
Fred Phillips Consulting

Taurus Irrigation

Rain Lily DesignL

Austin, Texas





Poquito Creek Restoration Design

Poquito Creek Restoration Phase Map

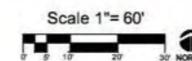


Figure 1

5/30/2012

DESIGN LEGEND

Large Trees (15 gallon)

- Mix of:
 - Chinkapin Oak (2)
 - Bur Oak (1)
 - Anaqua (1)
- Mixture of:
 - Cottonwood (4)
 - Sycamore (3)
- ⬠ Mixture of:
 - Bald Cypress (4)
 - Cedar Elm (3)

Medium Trees (5 gallon)

- Mixture of:
 - Possumhaw (5)
 - Button Bush (4)

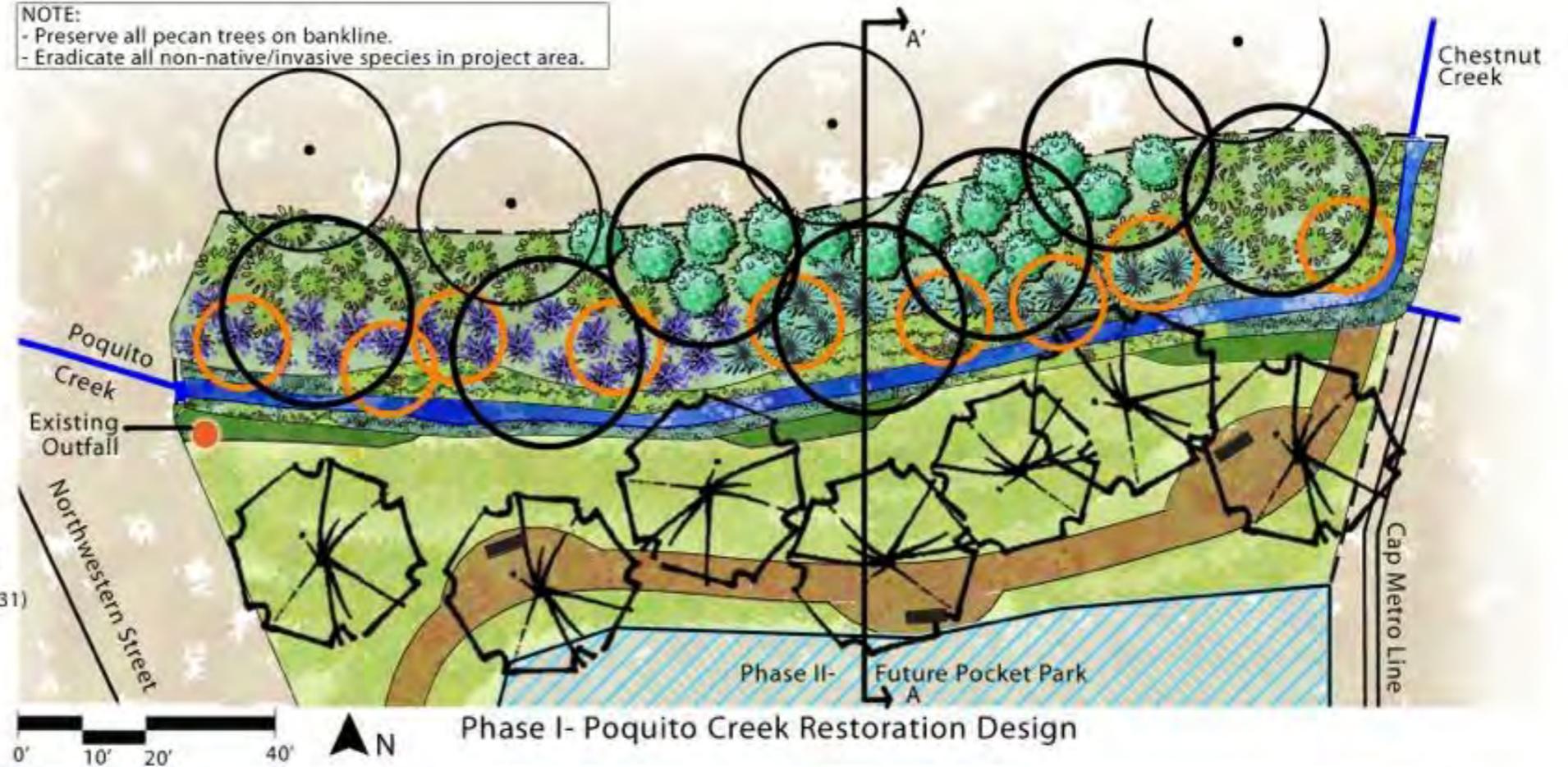
Wetland Plants

- Sandbar Willow Vertical Bundles 7' O.C. (13)
- Meadow Sedge/ Creek Sedge Plugs 5' O.C. (31)
- Spikerush Plugs 5' O.C. (21)
- Seed Mix (Purpletop, Inland Seoats, Prairie Wildrye, Sideoats Grama, Virginia Wildrye, Plains Bristlegrass)- .12 Acres, 15 lbs per Acre

Grasses (1gallon)

- Mistflower (17)
- Purpletop (23)
- Inland Seoats (38)
- Bushy Bluestem (17)

NOTE:
 - Preserve all pecan trees on bankline.
 - Eradicate all non-native/invasive species in project area.



Phase I- Poquito Creek Restoration Design



Existing Conditions of Poquito Creek



Restored Cross-section of Poquito Creek

Poquito Creek Restoration Design

Phase I Restoration Design

Figure 2

5/30/2012







































Landscape Architecture

Ecological Restoration

Wildlife Biology

Land Management



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