

Planting, Water Management, and Maintenance of the 365-acre Phase 1 Managed Marsh at the Imperial Irrigation District

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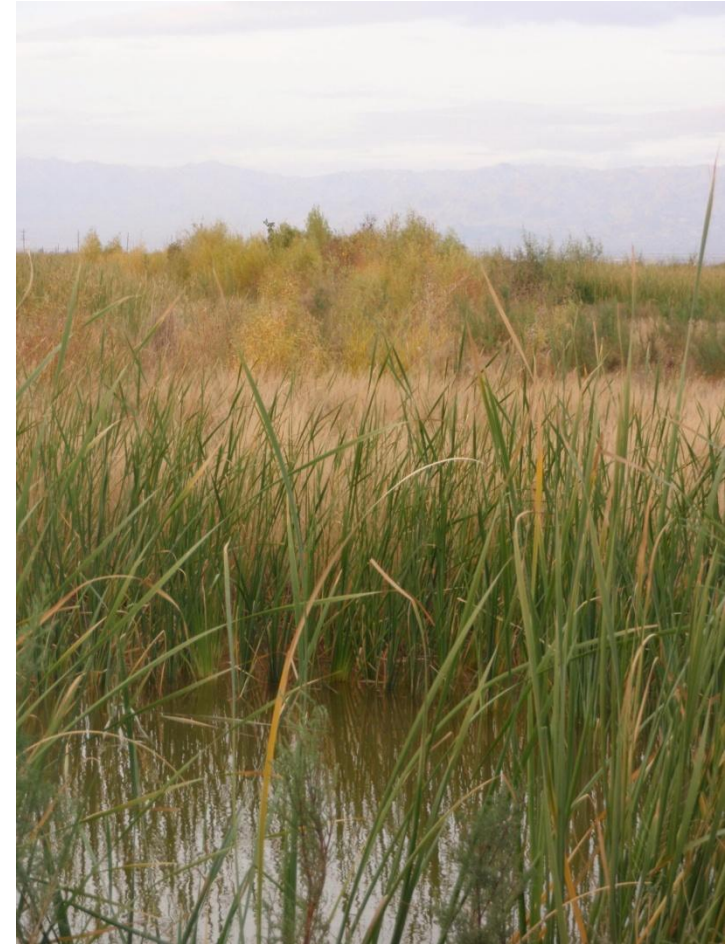
Bureau of Reclamation
CRTR Meeting
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Requirement for Managed Marsh

The Water Transfer Project involves water conservation and transfer transactions between the IID and the San Diego County Water Authority (SDCWA), a 1998 agreement amended and supplemented by the Quantification Settlement Agreement executed in October 2003.

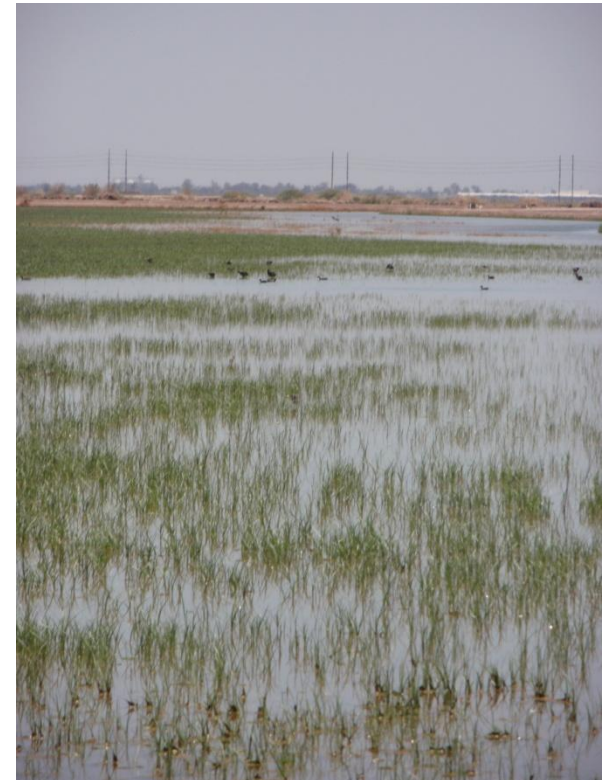
As part of the mitigation requirements for that project, IID is required to create a Managed Marsh complex to mitigate for impacts to drain vegetation from operation and maintenance activities. The Managed Marsh is developed in compliance with a Draft HCP/NCCP.



Relationship of Imperial Irrigation District (IID) and Lower Colorado (LC) HCP Habitat Requirements



- LC habitat needs are for at least 8,132 acres of new habitat (5,940 acres of cottonwood-willow, 1,320 acres of honey mesquite, 512 acres of marsh, and 360 acres of backwater).
- IID habitat needs are for a Managed Marsh complex of approximately 959 acres, including 341 acres of non-emergent vegetation and 618 acres of open water/emergent vegetation



IID and LC MCP Covered Species

- **Yuma Clapper Rail**
- **California Black Rail**
- Vermilian flycatcher
- Summer tanager
- Gila woodpecker
- Gilded flicker
- Least bittern
- Elf owl
- Arizona Bell's vireo

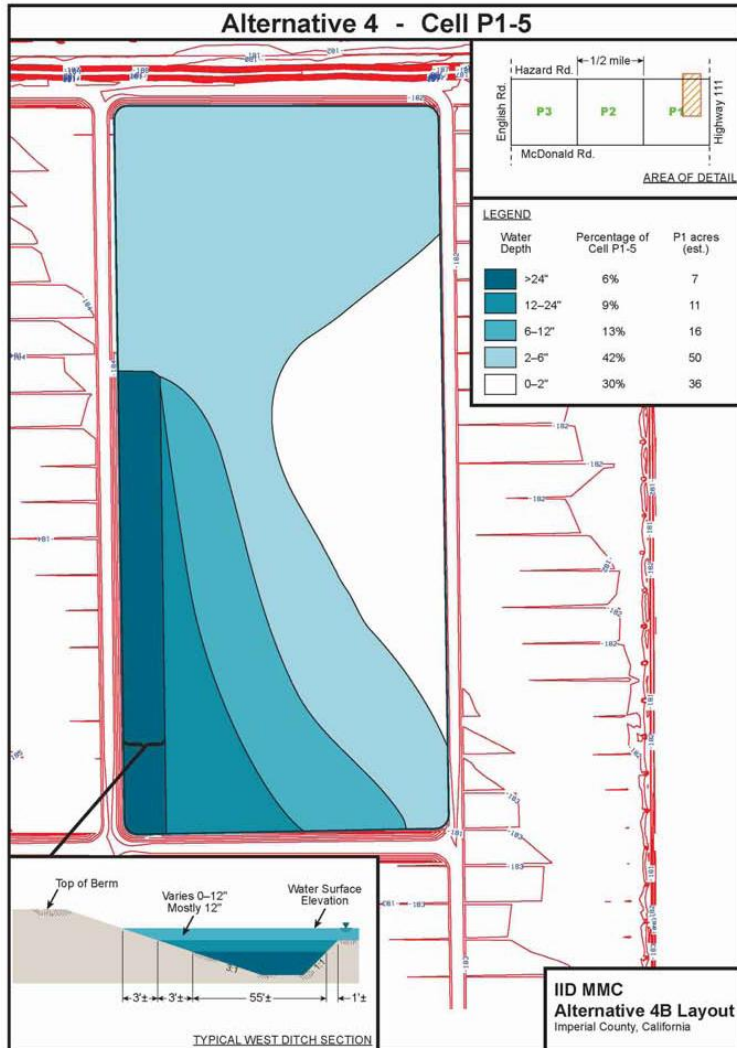


Location of Imperial Irrigation District and Lower Colorado River Marsh Projects



- Marsh and Riparian Avian Species
 - Water depth ranges and different plant species for the 2 rail species
 - Conflicting habitat descriptions for many species; consensus difficult
- Minimize Earthwork
 - Use base grade (no islands or other features)
 - Use local borrow for berms and leave borrow areas intact
 - Engineering design and Farm Bureau design
- Design for Adaptive Management
 - Allow for both parallel and series flow
 - Optimize and simplify operational flexibility
 - Allow potential for water mixing if cells meet water quality standards

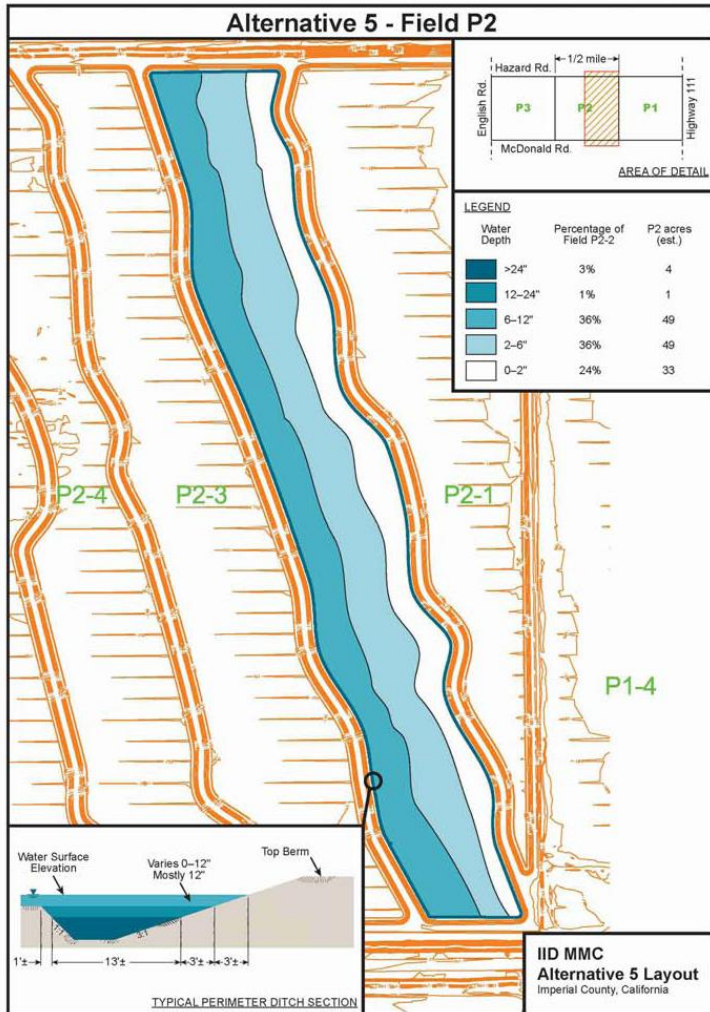
Engineer's Design: P1 Cells 8 cells in all



- Approximately 15 acres each
- Includes an L-shaped water dispersion channel in SW corner (borrow area)
- Water depths vary across cell with deepest in SW corner



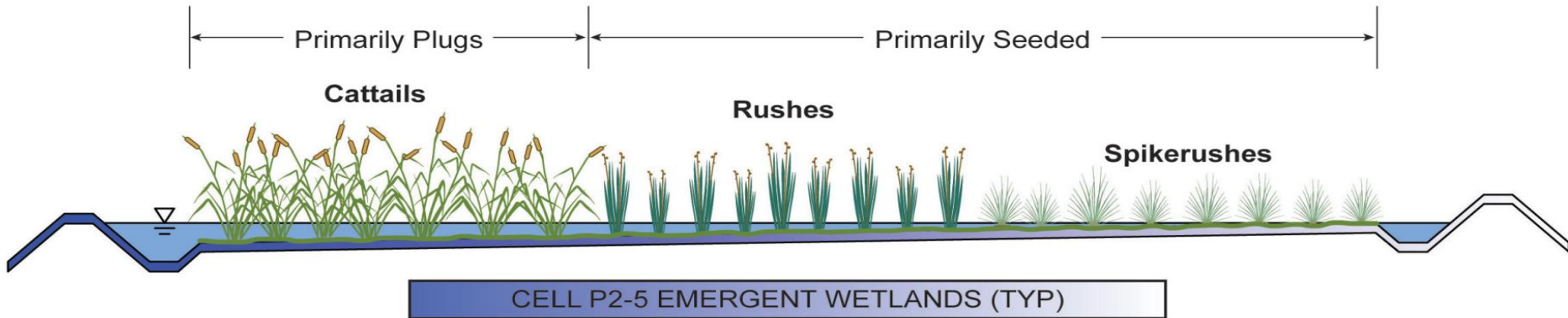
Farm Bureau Design: P2-3 cells 12 cells in all



- Cells vary in size with berms located on topographic contour.
- 2-3-foot-deep moat around perimeter (borrow)
- Permanently flooded cells (exception of P3 cells 3 to 5)



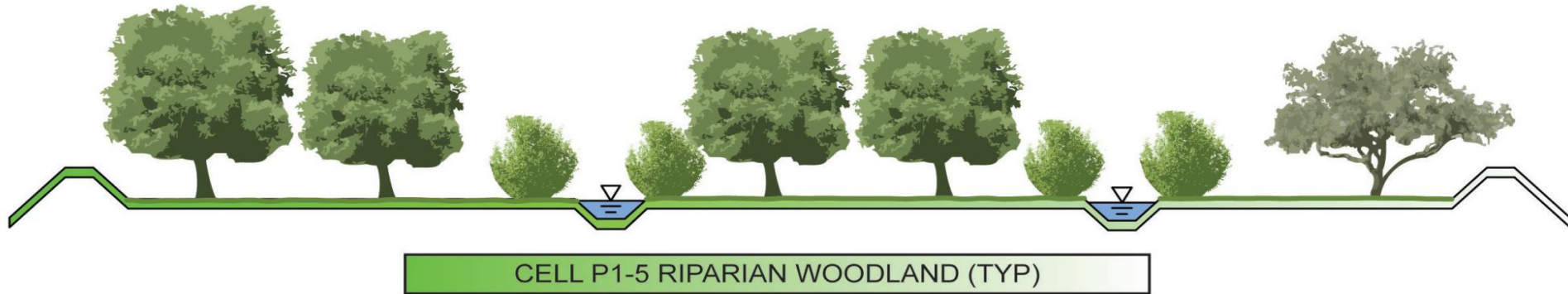
Emergent Wetlands



- Designed as emergent habitat
- Cells are normally flooded
 - Varied water depth from saturated soils to 2 to 4 ft
- Plants include cattails, bulrush, rush, scattered woody vegetation and saltgrass in dryer areas



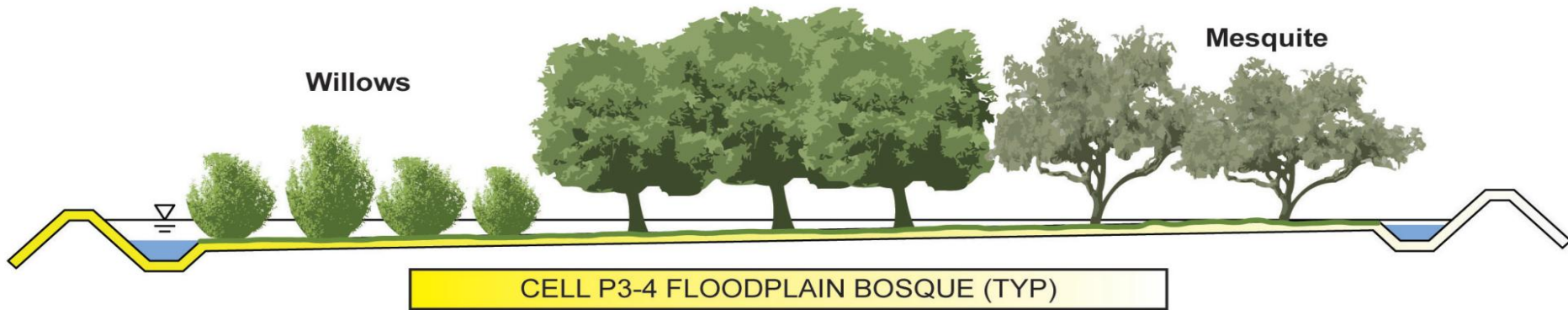
Riparian Woodland Habitat



- Designed to mimic desert riparian corridor habitat with meandering channels (post-construction modification)
- Areas adjacent to channels are lined with willows and cottonwoods
- Channels will be normally wet with low-velocity flows
- Adjacent areas are normally dry



Floodplain/Bosque



- Designed to mimic mesic bosque and willow/cottonwood flood plain
- Periodically flooded to mimic the floodplain area of a river
- Contains various shrub/tree species: willows, cottonwoods and mesquites
- Proved hard to implement with short planting window



Buffer areas (post-construction design)

- Approximately 20 acres to east and west
- Buffer between agricultural operations and habitat
- Dust control
- Furrow irrigated
- Bermuda grass and mesquite

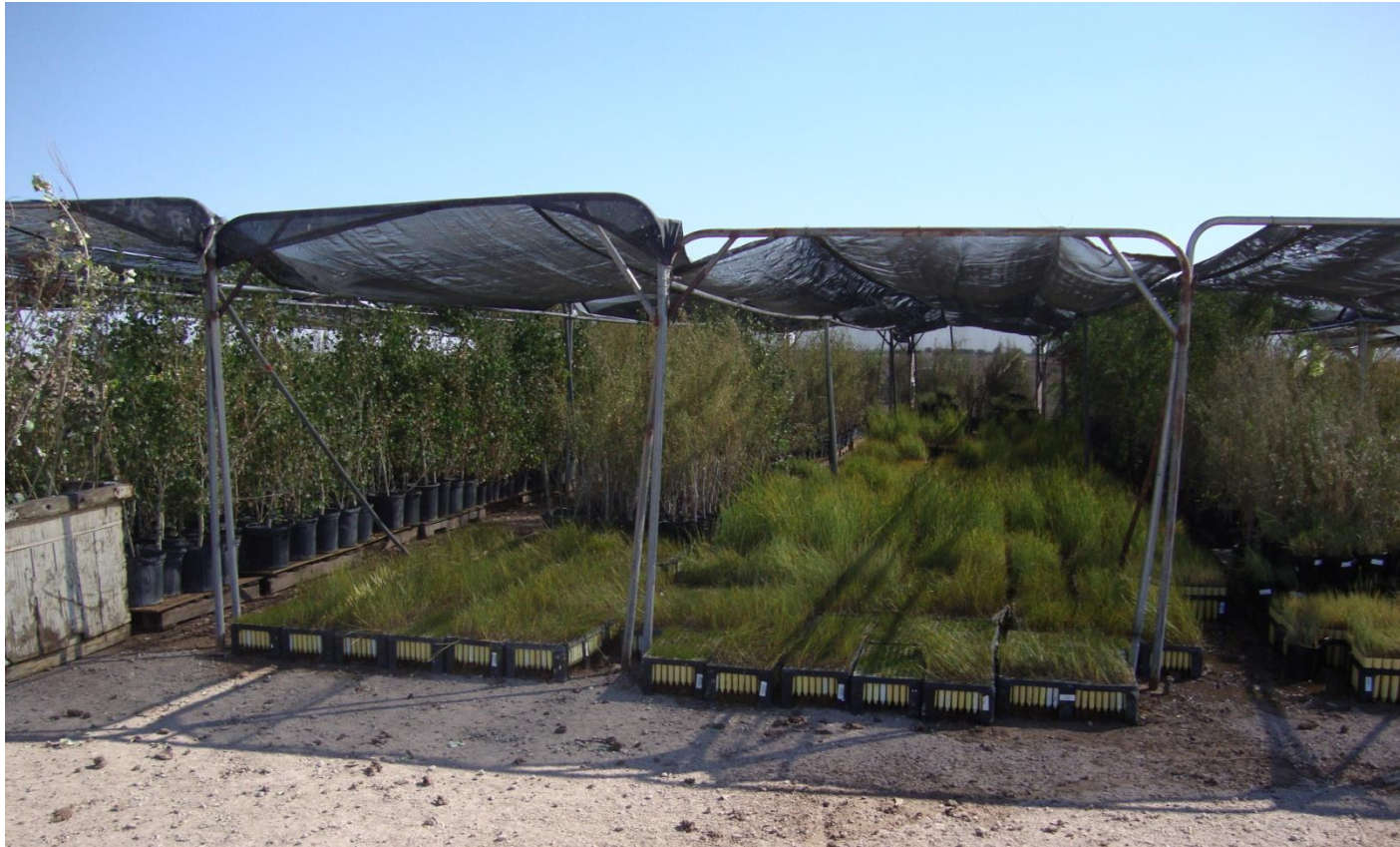


- Challenges:
 - Tree planting into cells that have highly variable depth (0-4 feet)
 - Emergent Wetland in highly variable depths
 - Extremely dry soil
 - Small emergent wetland plugs that would dry out quickly

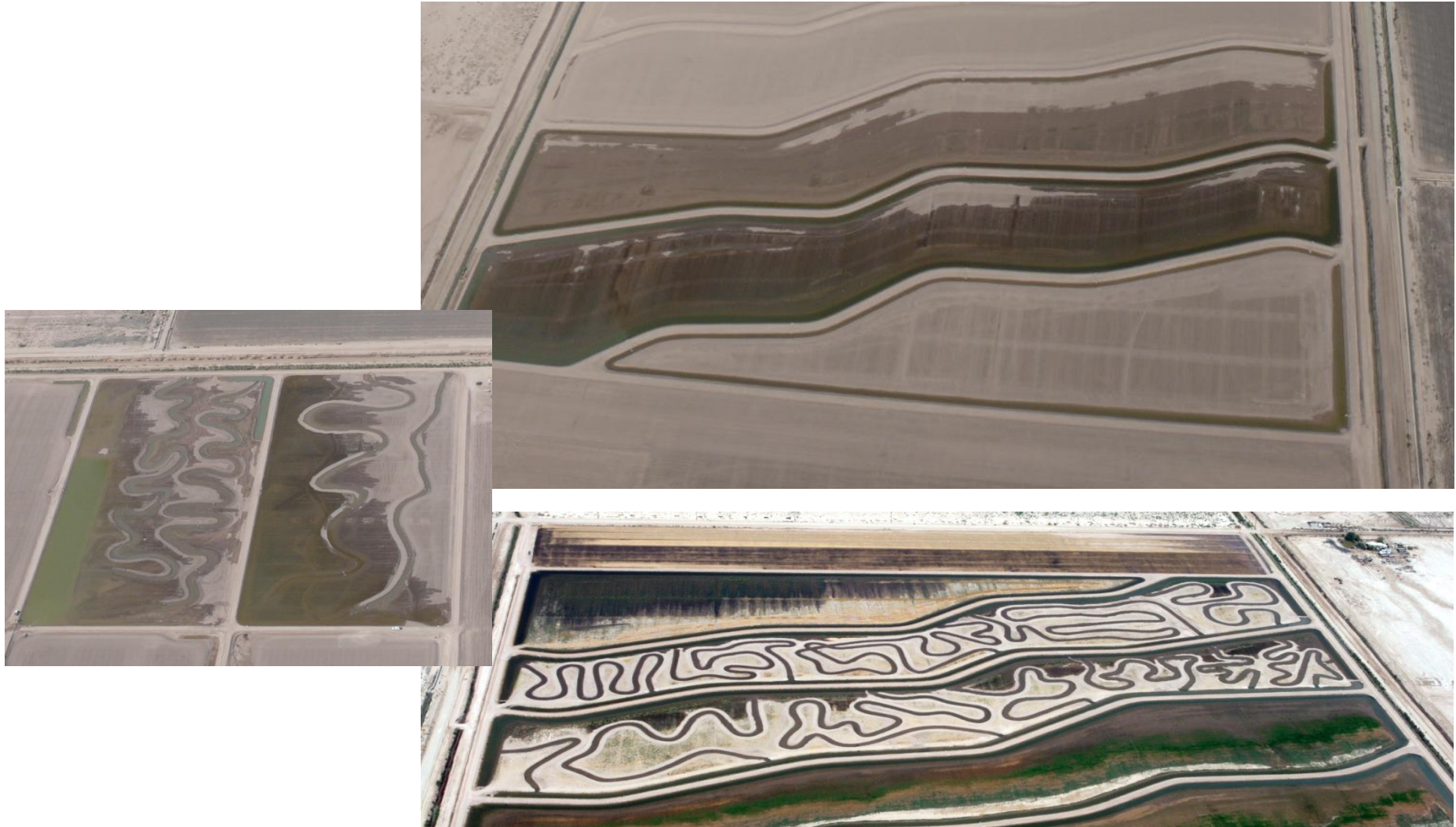
- Solutions:
 - Development of channels and corridors
 - Sprinkle irrigation for transplant zones
 - Prilling of seeds



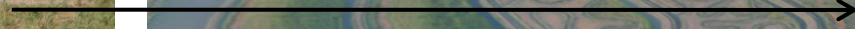
On-site shade-house to protect from heat



Corridors and Channels: Trees



Channels and Corridors: Trees



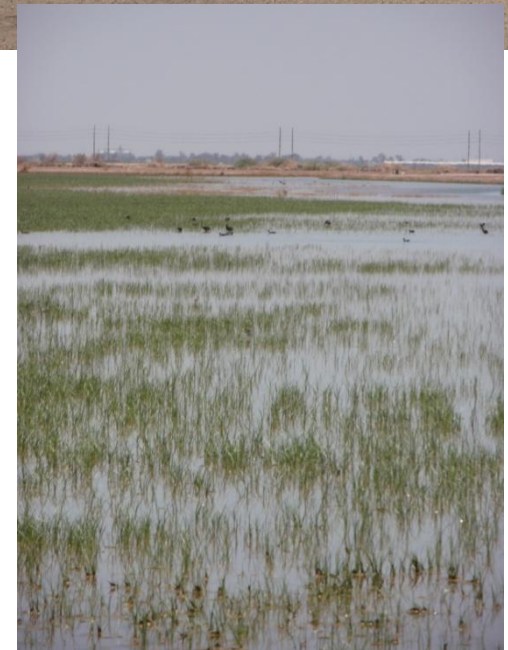
Planting Trees



Small transplants (BOR type) worked just as well at a fraction the cost



Emergent Aquatics: Seeding and Transplanting



Planting Buffer Areas: Furrow Irrigation



Progress: November 2009 – November 2010



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Some Numbers: Seeds at 15 lbs. per acre

Name and origin	pounds
<i>Juncus acutus</i> – San Diego County	400
<i>Scirpus acutus</i> – Lake Elsinore	560
<i>Scirpus californicus</i> – San Diego/Riverside	100
<i>Scirpus maritimus</i> – San Diego/Ventura	130
<i>Scirpus robustus</i> - Hemet	580
<i>Typha domingensis</i> - Temecula	10
<i>Typha latifolia</i> – Temecula/Carlsbad	10
<i>Distichlis spicata</i> var. <i>stricta</i> - commercially grown	350
<i>Scirpus americanus</i> - Central UT	<u>150</u>
TOTAL	2290



RIPARIAN TREES

Species	Number	Size
Fremont cottonwood (<i>Populus fremontii</i>)	336	TP (1.5)
	1,828	1-gallon
	1,124	5 gallon
	73	15 gallon
Black Willow (<i>Salix gooddingii</i>)	3,419	TP (1.5)
	3,271	1-gallon
	234	5-gallon
	92	15 gallon
Sandbar willow (<i>Salix exigua</i>)	3,389	1-gallon
Arroyo willow (<i>S. lasiolepis</i>)	2,240	1-gallon
TOTAL	16,006	



MESQUITE

Screwbean mesquite (<i>Prosopis pubescens</i>)	1,170	10T
Screwbean mesquite (<i>Prosopis pubescens</i>)	12,000	6-12 inches tall container
Total	13,170	



Emergent Aquatics

Species	Number	Size
Cattail (<i>Typha latifolia</i>)	19,200	3T
Cattail (<i>Typha latifolia</i>)	2,363	10T
California bulrush (<i>Scirpus californicus</i>)	3,150	3T
Alkali bulrush (<i>S. maritimus</i>)	10,800	3T
Spiny rush (<i>Juncus acutus</i>)	3,150	3T
Saltgrass (<i>Distichlis spicata</i>)	1,565	10T
Saltgrass (<i>Distichlis spicata</i>)	1,000	1 gal
TOTAL	41,228	



Management & Monitoring efforts include Wildlife, Vegetation, Water Quality, Vector Control, Infrastructure



Utilization of the Managed Marsh

Insects

Coleoptera		
	Carabidae	ground beetle
	Hydrophilidae	water scavenger
	Chrysomelidae	leaf beetle
	Coccinellidae	ladybug
Diptera		
	Chironomidae	midge
	Culicidae	mosquito
	Muscidae	fly
	Tabanidae	horsefly
Hemiptera		
	Corixidae	water boatmen
	Miridae	leaf bug
	Nabidae	damsel bug
	Notonectidae	back swimmer
	Reduviidae	assassin bug
Homoptera		
	Aphididae	aphid
Hymenoptera		
	Apidae	bee (honey)
	Pompilidae	spider wasp
	Sphecidae	mud-dauber
	Vespidae	wasp
Lepidoptera		
	Pieridae	whites/oranges
Orthoptera		
	Acrididae	grasshopper
	Gryllidae	cricket
Odonata		
	Coenagrionidae	damselfly
	Libellulidae	skimmers

Others

Ghost Shrimp
Snails
Dragonfly nymphs
Spiders (orb weavers and small jumping spiders)
Fish (mosquitofish, red shiners, sailfin mollies)



Birds (partial list)

Avocet	Killdeer	Northern shoveler
Black-necked stilt	Long-billed curlew	Lesser nighthawk
Long-billed dowitcher	Wilson's phalarope	Northern harrier
Sandpipers (least and western)	Willet	Prairie falcon
Swallows (cliff, barn, and rough-winged)	American coot	Red-tailed hawk
Snowy plover	Yellow-rumped warbler	Ferruginous hawk
Whimbrel	Trumpeter swan	Harris's hawk
Black skimmer	Snow goose	Turkey vulture
Long-billed curlew	Ring-billed gull	Burrowing owl
Greater yellowlegs	Common moorhen	Western kingbird
Hérons (great blue, green, and black-crowned night)	Mallard	Phobes (Say's and black)
American bittern	Double-crested cormorant	Ospreys
Egrets (Great, cattle, snowy)	Albert's towhee	American pipit
Marsh wren	Canada goose	Western meadowlark
White faced ibis	Northern pintail	Blackbirds (red-winged and yellow headed)
White-tailed kite	Ruddy duck	Grebe (pied-bill, eared, Western)
Teals (cinnamon and green-wing)	Sparrows (white-crowned and savannah)	Sora rail

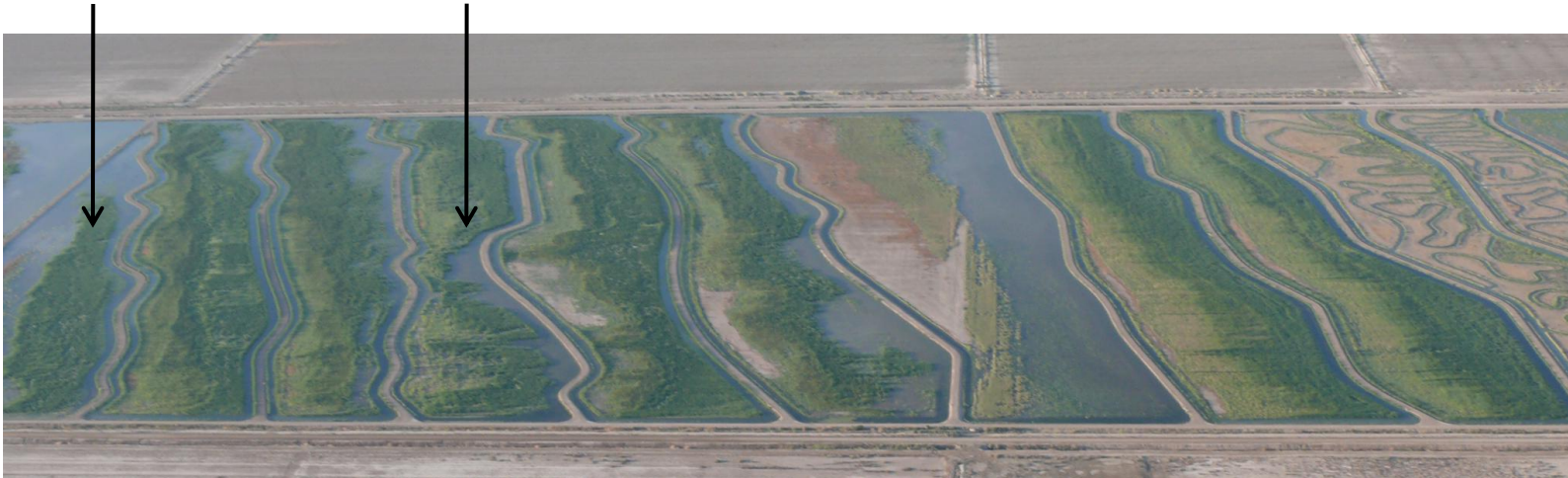


Costs for Planting



Item	acres	cells	cost/ac post-constr.	Total Cost	Notes
Seeded	150	13	\$ 1,058	\$ 158,700	includes seed, seeding, land prep
Riparian/Bosque	89	5	\$ 1,431	\$ 127,359	includes soil prep, plants, planting, recontouring
Buffer	50	2	\$ 2,630	\$ 131,500	includes soil prep, irrigation, planting and plants
Emergent	77	13	\$ 2,836	\$ 218,372	includes soil prep, sprinkler, planting and plants
Unplanted	48	2	\$ 200	\$ 9,600	soil prep only
TOTAL	414	22		\$ 645,531	including buffer
Ave cost per acre				\$ 1,559.25	post-construction

- Design criteria should take into account planting needs (timing, season, and strategies)
- Plant material development is very important
- Costs for seeding merit this as a strategy: order seeds in advance
- Not planting is also an option if there are seeds in water source and/or if species diversity is not an issue



- Imperial Irrigation District: Bruce Wilcox, Tommy Mills
- AECOM and CH2MHill
- Imperial County Farm Bureau
- Custom Harvest: Ed Hale
- Wildlife Research Institute
- Southwest Conservation Corps
- California Conservation Corps
- United States Fish and Wildlife Service
- California Department of Fish and Game