



Lower Colorado River Multi-Species Conservation Program

Balancing Resource Use and Conservation

Hart Mine Marsh Restoration



Gregg Garnett, Bureau of Reclamation, Boulder City, NV
Mike Oldham, USFWS, Cibola NWR
Andrew Hautzinger, USFWS, Albuquerque, NM





Acknowledgements

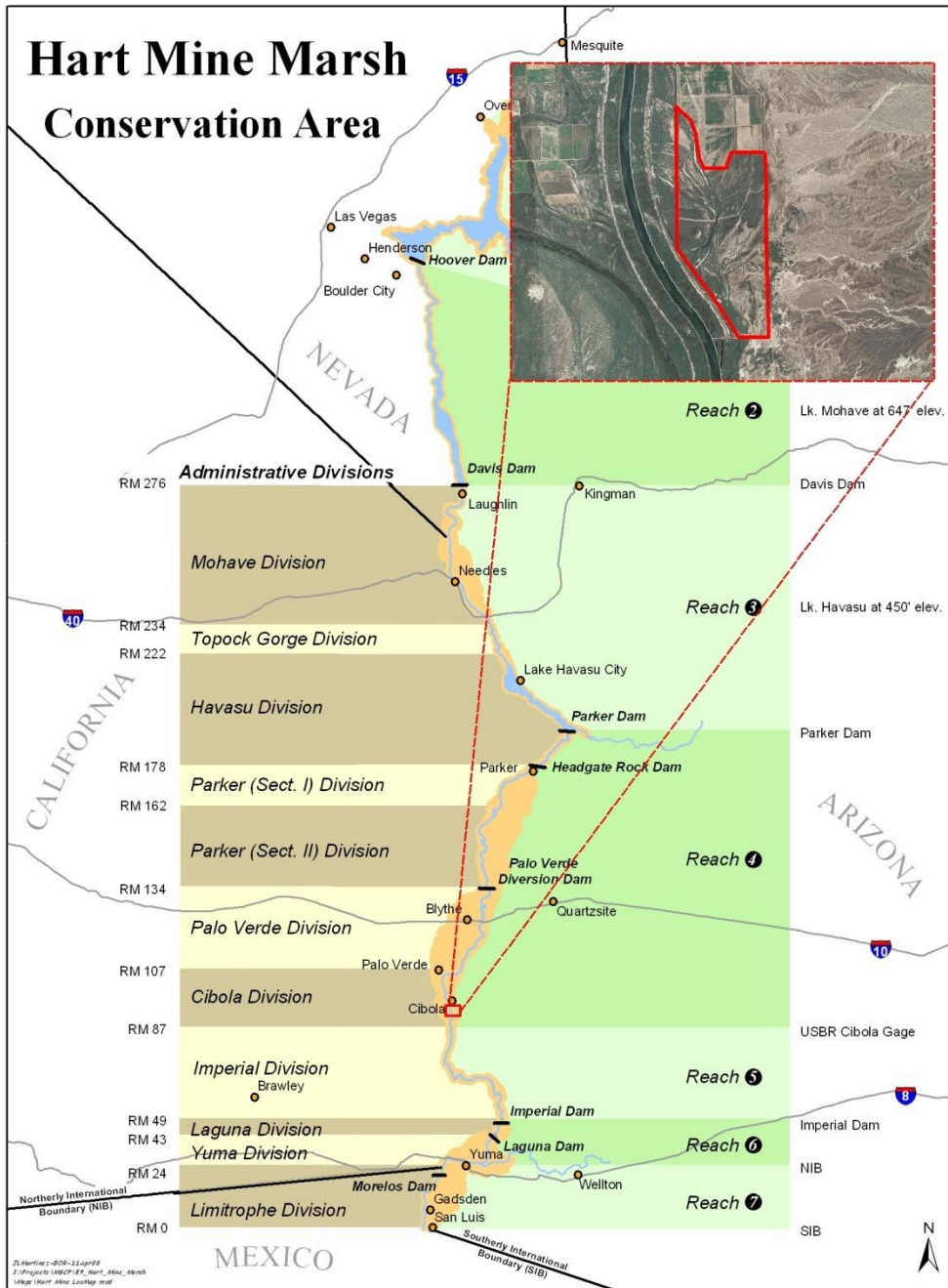
- USFWS – Cibola National Wildlife Refuge
- Reclamation's Provo Area Office
- USFWS – Southwest Region
- Reclamation's Yuma Area Office
- LCR MSCP and LC region staff



Outline

- Orientation/Location
- Background/Existing Conditions
- MSCP Goals/USFWS Goals
- Partnership/Planning
- Design/Construction
- Habitat Development/Management

Hart Mine Marsh Conservation Area



Hart Mine Marsh

Located on Cibola National Wildlife Refuge

The management unit is approximately 646 acres of which, 523 may have comprised the historic marsh footprint.

Partnership with the USFWS Cibola NWR and Reclamation's LCR MSCP office to restore a portion of this area.

Restoration will fulfill a portion of the LCR MSCP's habitat creation requirements while meeting goals identified in the USFWS's management plan for the lower Colorado River refuges

Hart Mine Marsh

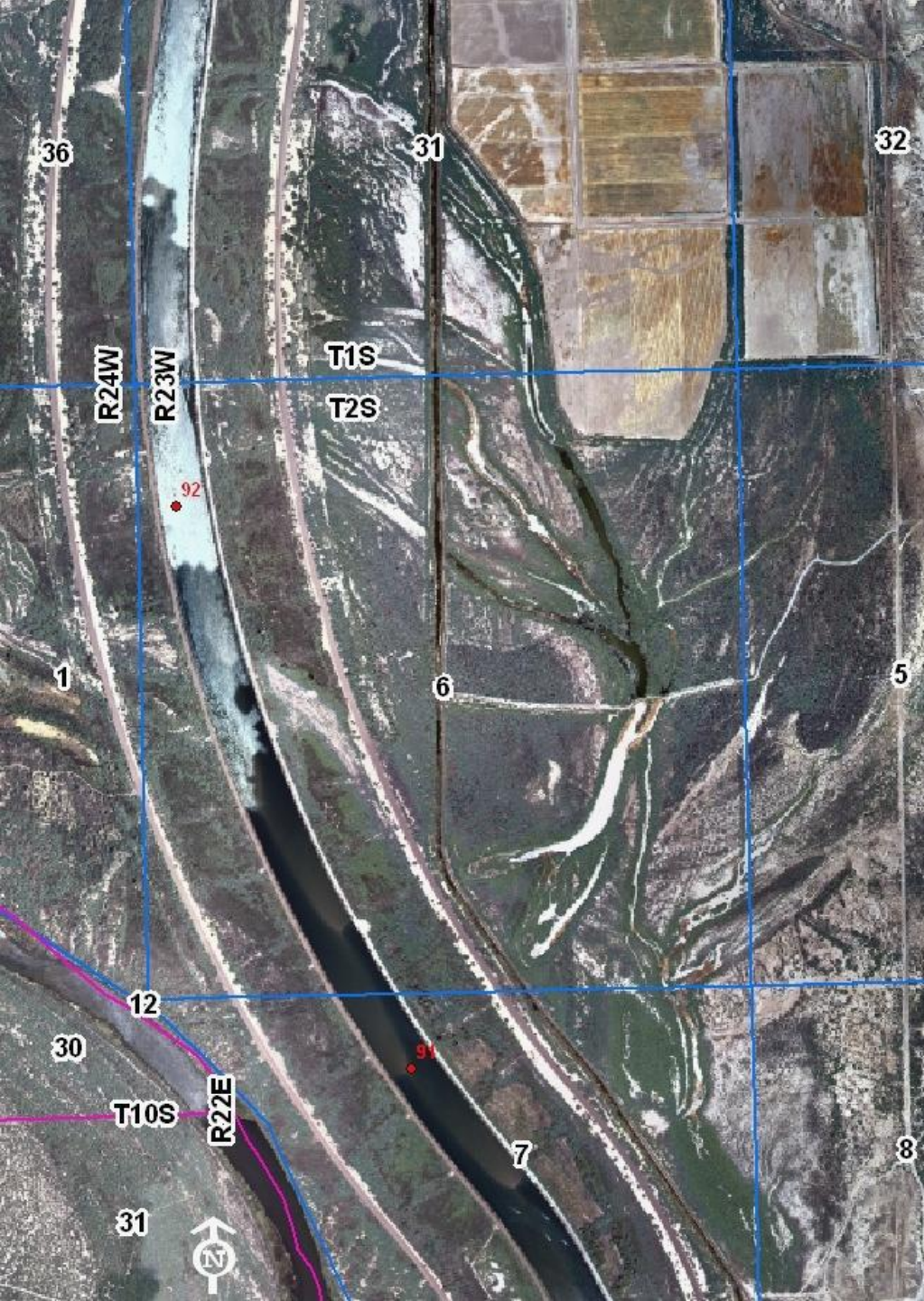
Historic Marsh on the LCR created and maintained by episodic flooding.

Disconnected from the LCR flood plain because of river alterations and management.

Further reduction in subsurface hydraulic connection to the river with the drop in water table due to river channelization.

Management practices used Arnett ditch drain water to maintain the marsh.

Resulting in loss of much of the marsh vegetation and function. Increased salinity and invasion of saltcedar.





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HMM prior to construction; sparse salt cedar, many areas with surface salt patches present, devoid of vegetation.



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HMM had limited areas of open water and emergent vegetation prior to restoration





Existing Conditions Report (ECR)

Components:

- Water Quality
- Soils
- Hydrology
- Geomorphic features
- Vegetation



Existing Conditions Report (ECR) Results:

Water Quality:	High nutrient loading, high to very high salinity
Soils:	Silt-loam to Clay-loam, highly saline soils
Hydrology :	Some subsurface connection to the LCR
Geomorphic features:	Alluvial fans, historic river meander scrolls
Vegetation:	80% Salt Cedar



Planning

Goals of the LCR MSCP

Goals of the USFWS

Limitations of the site:

- Water
- Logistic concerns
- Available funds

Regulatory permitting

Timeline





LCR MSCP Marsh Goals

- 512 acres of marsh total
- Creation of habitat for LCR MSCP covered species
- Reach 4
 - Yuma clapper rail
 - Western least bittern
 - Colorado River cotton rat



Yuma Clapper Rail

- Patches of bulrush and cattails with water depths of no greater than 12 inches
- Integrated mosaic of wetland vegetation types, water depths, and open water
- Creation of these habitats will also benefit Western least bittern and Colorado River cotton rat, as well as, California black rail



USFWS Wetland Review Process

- Multidisciplinary Team of Wetland Scientists, Geologists, Ecologists, Hydrologists, Regulators, and Managers
 - Historical processes
 - Existing physical and biological features
 - Current management



Wetland Review

Wetland Review Recommendations –

Alternate discharge for HMM

Utilize existing geomorphology

Cells that could be managed as separate units

Flexibility in water management (levels and type)

Integrated mosaic of wetland habitats

Ability to restore/mimic natural processes

Actions would not inhibit future development of HMM



Wetland Review

Wetland Review Recommendations –

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Comprehensive Conceptual Restoration Plan

<http://www.lcrmscp.gov/worktasks/conservationareas/E9/USFWSRestorationPlan.pdf>



Permitting/Design

Design was based on culmination of information and suggestions from the wetland review, CCRP, site constraints, and needs of the LCR MSCP

Preliminary engineering design was used for wetland permitting: Sections 401 and 404 of the Clean Water Act.

Site specific NEPA

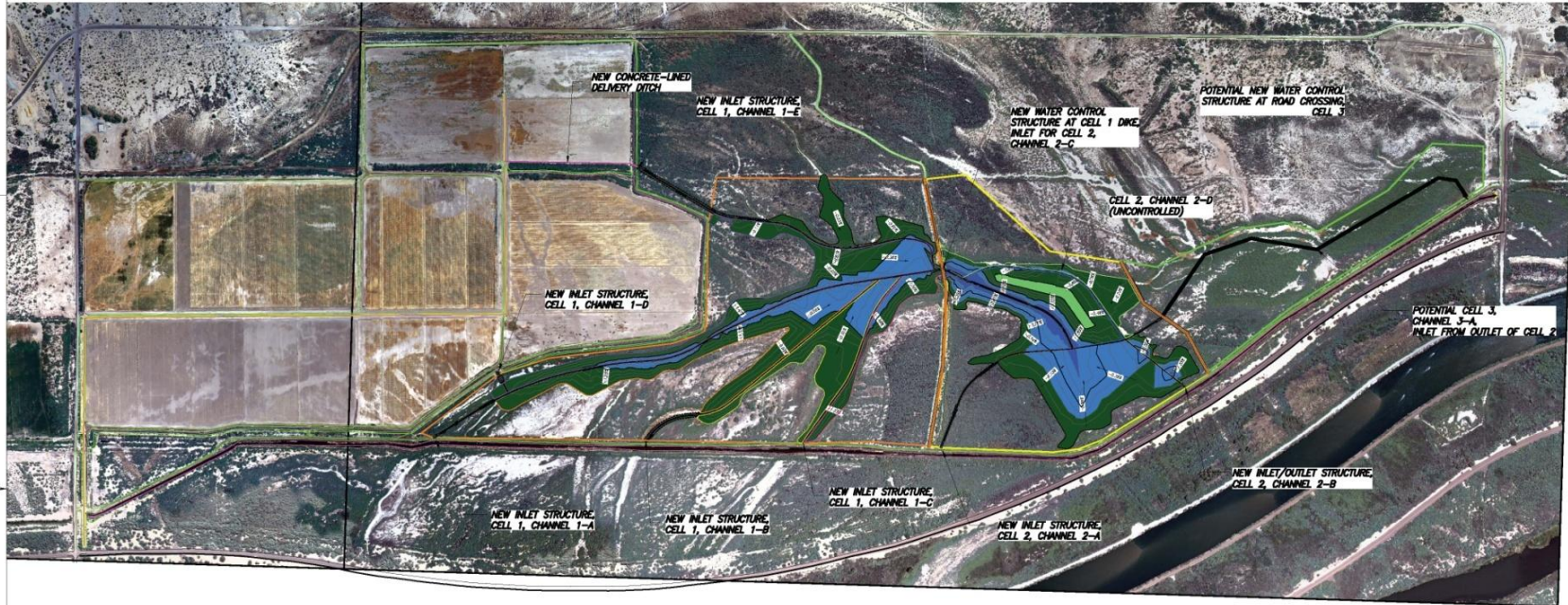
Class III pedestrian survey for Section 108 of the NHPA



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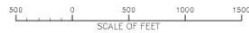


OAXX-418-XX



LEGEND

- CELL 1, ~61 ACRES IMPROVED HABITAT
- CELL 2, ~45 ACRES IMPROVED HABITAT
- OPEN WATER CHANNEL, 2.5:1 SIDE SLOPES, 6-FEET DEEP, 10-FEET BOTTOM WIDTH
- ROADS
- EXISTING DITCHES



Elevations Table			
Number	Minimum Elevation	Maximum Elevation	Color
1	210.00	213.00	Blue
2	213.00	214.00	Blue
3	214.00	216.00	Blue
4	216.00	218.00	Green
5	218.00	222.00	Green
6	222.00	260.00	Red

NOTES

1. Contour interval is 0.5 foot.
2. Plans are preliminary, not for construction.
3. Proposed high water elevation = 216.0'
4. Approximate total cut volume = ~75,000 cu yd.
5. Approximate total fill volume = ~46,000 cu yd.
6. Net cut volume to place on surrounding areas: ~29,000 cu yd.
7. Cells may change size dependent on final elevations from survey data and the need to balance cuts/fills.

DATE AND TIME PLOTTED: 11/15/2007 10:57 AM
DRAWN BY: J. HARRIS
CHECKED BY: J. HARRIS
SCALE: AS SHOWN
CADD SYSTEM: CIVIL 3D
C:\Users\jsharris\Documents\418\418.dwg

ALWAYS THINK SAFETY

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
PROVO AREA OFFICE
PROVO, UTAH

**CIBOLA NATIONAL WILDLIFE REFUGE
HART MINE MARSH**

HABITAT RESTORATION
SITE PLAN

DESIGNED	CHECKED
DRAWN	TECH. APPROV.
APPROVED	DATE

PROVO, UTAH 2007-05-17 OAXX-418-XX SHEET NUMBER

Engineering design for Hart Mine Marsh

Construction

Design-build scenario, Bottom-Up, Phased approach

Phase I, 2008-2009:

- Control water – outlet structure
- Clear and construct Cell 2

Phase II, 2009-2010:

- Additional control structures
- Clear and construct Cell 1

Phase III, 2010-2011:

- Additional inlet structure
- Site clean-up (road grading and graveling, etc.)





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Construction of HMM
outlet works



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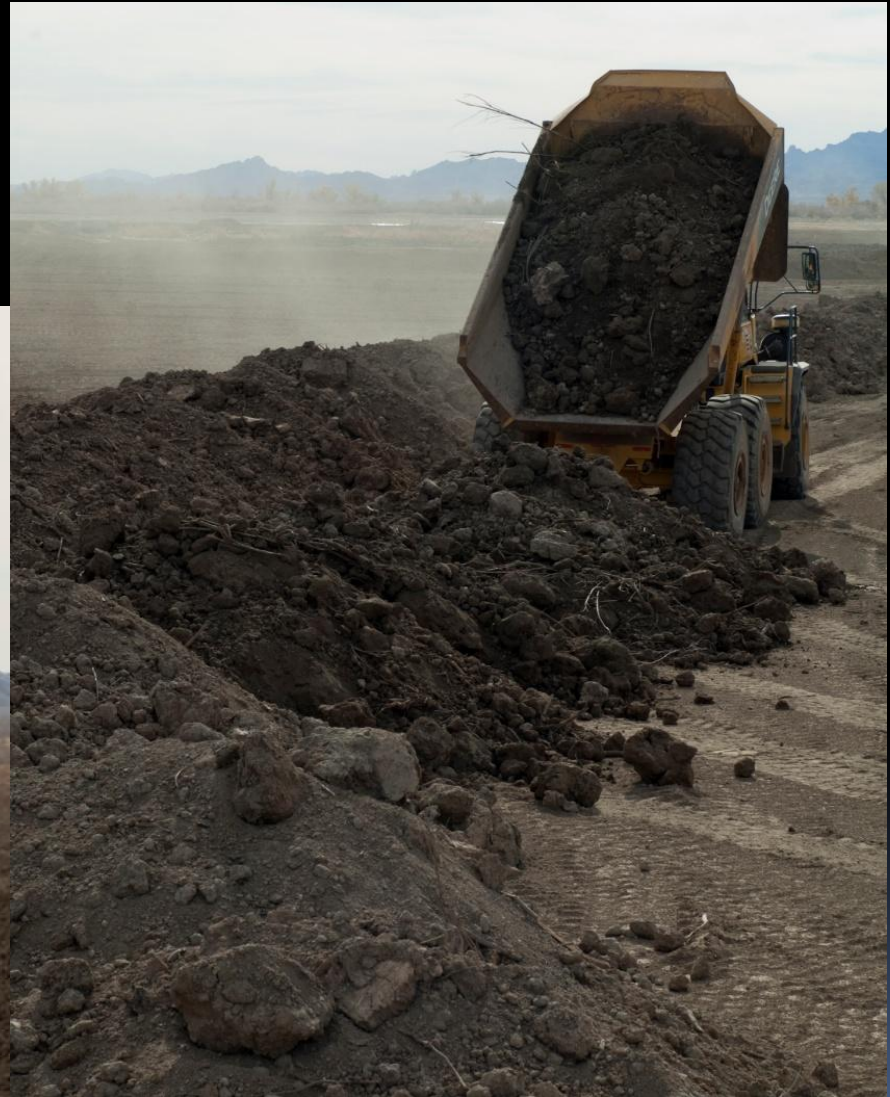


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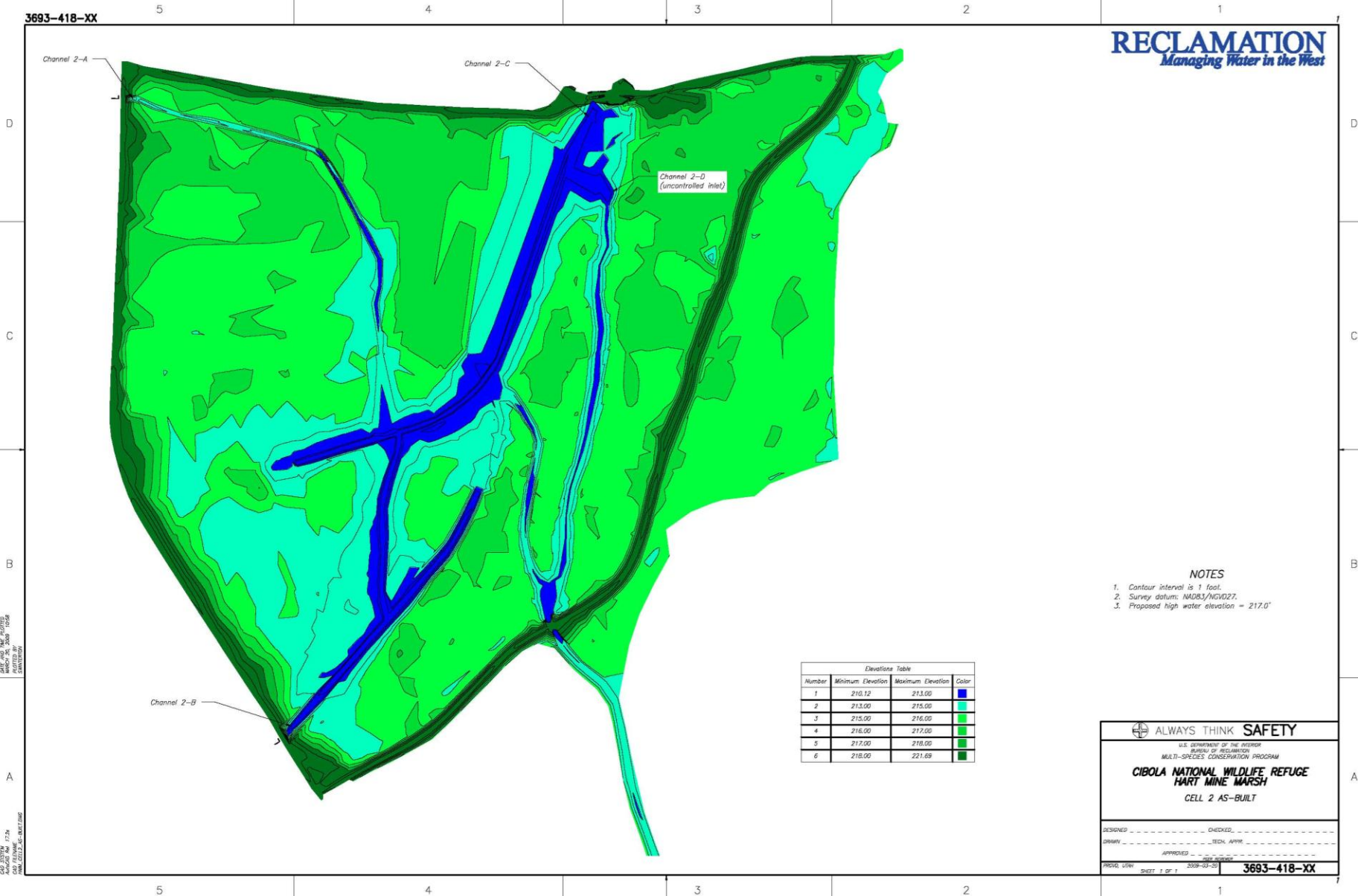




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3693-418-XX



RECLAMATION
Managing Water in the West

- NOTES**
1. Contour interval is 1 foot.
 2. Survey datum: NAD83/NGVD27.
 3. Proposed high water elevation = 217.0'

Elevations Table			
Number	Minimum Elevation	Maximum Elevation	Color
1	210.12	213.00	Blue
2	213.00	215.00	Cyan
3	215.00	216.00	Light Green
4	216.00	217.00	Green
5	217.00	218.00	Dark Green
6	218.00	221.69	Very Dark Green

DATE: 08/15/08
 DRAWN BY: J. W. BROWN
 CHECKED BY: J. W. BROWN
 PROJECT: 3693-418-XX

ALWAYS THINK SAFETY	
<small>U.S. DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION MULTI-SPECIES CONSERVATION PROGRAM</small> CIBOLA NATIONAL WILDLIFE REFUGE HART MINE MARSH CELL 2 AS-BUILT	
DESIGNED _____	CHECKED _____
DRAWN _____	TECH. APPR. _____
APPROVED _____	DATE _____
PROJ. CMT: _____	SHEET 1 OF 1 2008-02-20 3693-418-XX



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3693-418-XX

RECLAMATION
Managing Water in the West

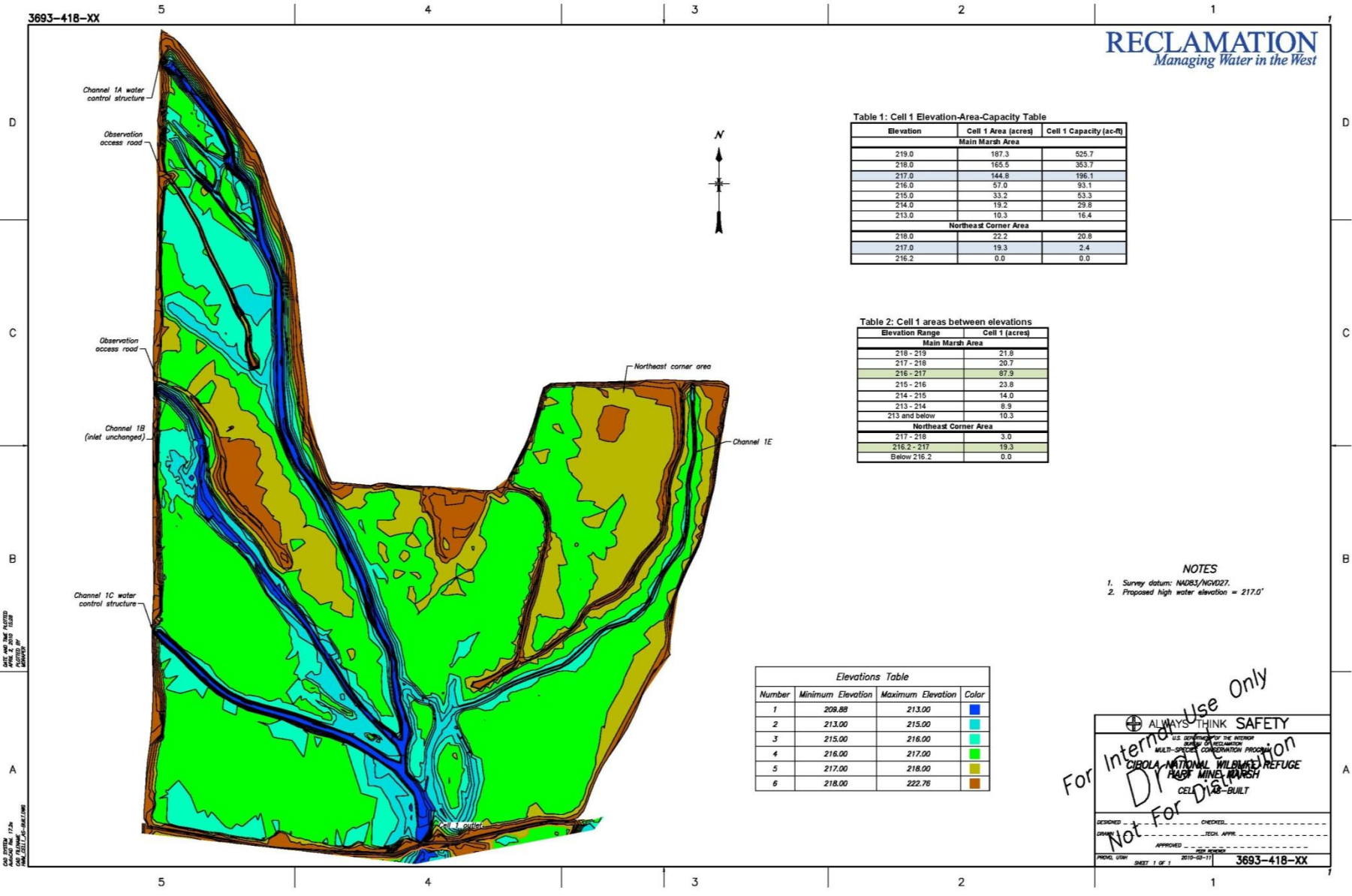


Table 1: Cell 1 Elevation-Area-Capacity Table

Elevation	Cell 1 Area (acres)	Cell 1 Capacity (ac-ft)
Main Marsh Area		
219.0	187.3	525.7
218.0	165.5	353.7
217.0	144.9	196.1
216.0	57.0	53.1
215.0	33.2	53.3
214.0	19.2	29.8
213.0	10.3	16.4
Northeast Corner Area		
218.0	22.2	20.8
217.0	19.3	2.4
216.2	0.0	0.0

Table 2: Cell 1 areas between elevations

Elevation Range	Cell 1 (acres)
Main Marsh Area	
218 - 219	21.8
217 - 218	20.7
216 - 217	87.9
215 - 216	23.8
214 - 215	14.0
213 - 214	8.9
213 and below	10.3
Northeast Corner Area	
217 - 218	3.0
216.2 - 217	19.3
Below 216.2	0.0



Elevations Table			
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1	209.88	213.00	Blue
2	213.00	215.00	Cyan
3	215.00	216.00	Light Green
4	216.00	217.00	Green
5	217.00	218.00	Yellow-Green
6	218.00	222.76	Brown

- NOTES
1. Survey datum: NAD83/NGVD27.
 2. Proposed high water elevation = 217.0'

Use Only

⊕ ALWAYS THINK SAFETY

For Internal Use Only

DRAFT

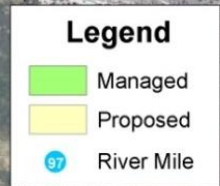
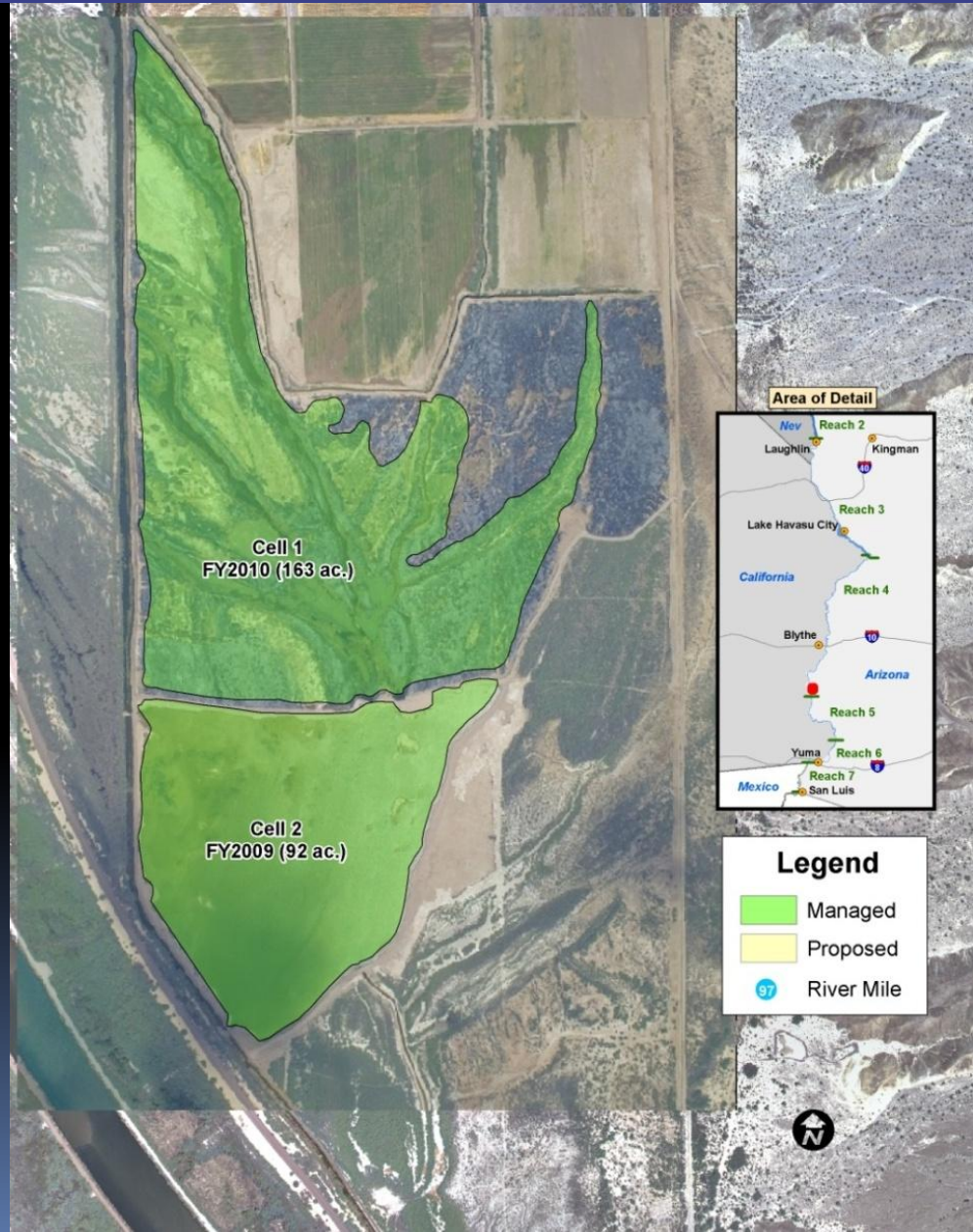
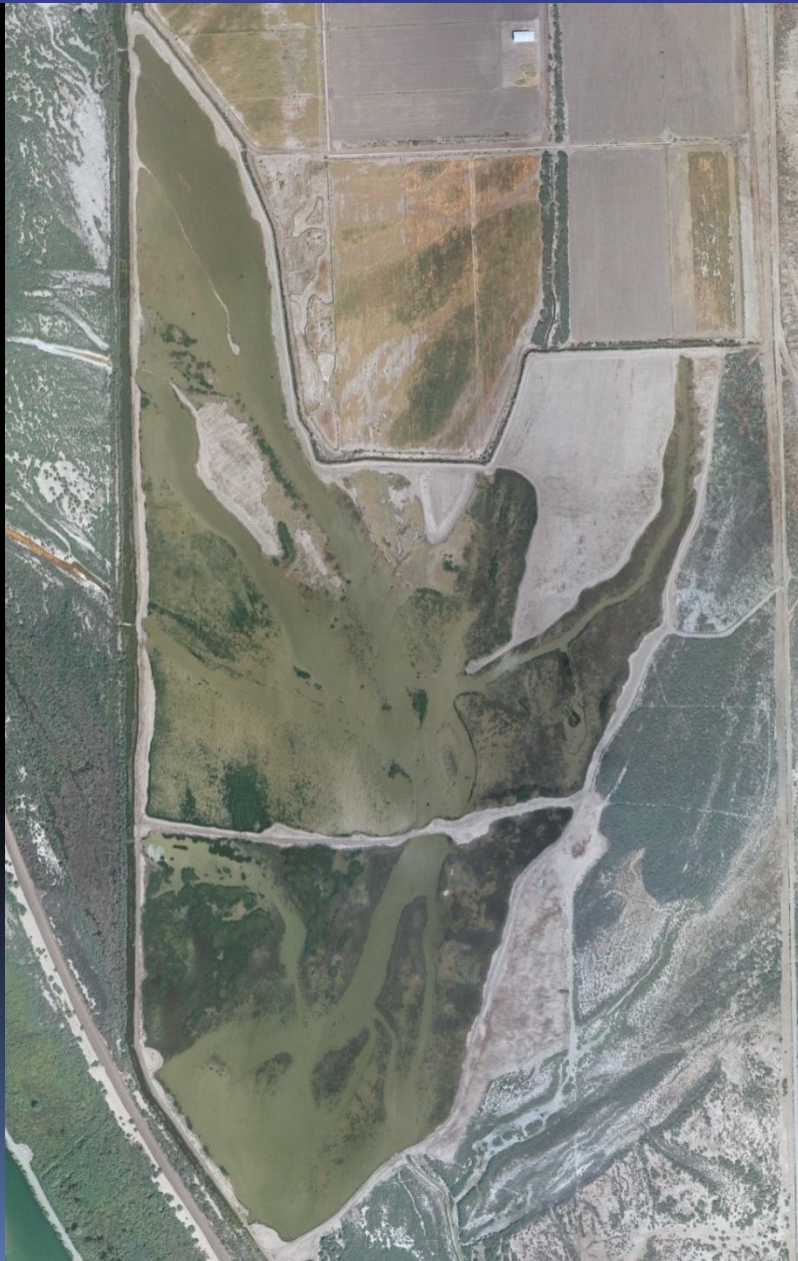
CIRCULAR NATIONAL WILDLIFE REFUGE
ALSO MINNESOTA
CELL 1-BUILT

DESIGNED: _____ CHECKED: _____
DRAWN: _____ INK: AFTER _____
APPROVED: _____ DATE: _____
PROJECT: 3693-418-XX
SHEET: 1 OF 1 (8/19-02-11)

DATE PLOTTED: 12/28/09
 PLOTTED BY: JEFFREY
 CHECKED BY: JEFFREY
 SCALE: AS SHOWN
 SHEET: 1 OF 1



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<i>Species</i>	<i>Common Name</i>	<i>Number of Plants</i>
<i>Schoenoplectus californicus</i>	California bulrush	35,200
<i>Scirpus tabernaemontani</i>	Great bulrush	4,800
<i>Scirpus olneyi</i>	Three-square bulrush	65,000
<i>Eleocharis palustris</i>	Common spikerush	20,000
<i>Distichlis spicata</i>	Inland saltgrass	575,000
<i>Atriplex lentiformis</i>	Quail bush	1,500
<i>Prosopis glandulosa</i>	Honey mesquite	200
Total		701,700



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June 2010 - Photo Point 9, HMM



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September 2010 - Photo Point 9, HMM



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June 2010 - Photo Point 7, HMM



Lower Colorado River Multi-Species Conservation Program



September 2010 - Photo Point 7, HMM



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<i>Species</i>	<i>Common Name</i>	<i>Number of Plants</i>
<i>Schoenoplectus californicus</i>	California bulrush	10,000
<i>Scirpus tabernaemontani</i>	Great bulrush	10,000
<i>Scirpus olneyi</i>	Three-square bulrush	30,000
<i>Distichlis spicata</i>	Inland saltgrass	70,000
Total		120,000



Habitat Development and Maintenance

Maintaining water levels during Clapper Rail breeding season

Invasive and non-native vegetation management

Abiotic monitoring: water quality and hydrology

Biotic monitoring: Habitat monitoring, marsh birds surveys (bats and rats, too?)

Periodic flushing of cells independently outside the Clapper Rail breeding season

Supplemental planting for marsh habitat diversity, ground stabilization, and to improve the overall habitat mosaic

Long-term management will include managing over-mature marsh vegetation



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Questions?



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Managing Water in the West

