Site assessments to inform restoration design and planning –
A case study at Arlington Wildlife Area in Arizona

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Why Conduct a Site Assessment?

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What to assess?

- Existing vegetation
- Accessibility
- Site topography
- Land-use history: fire, flood
- Hydrology
- Geomorphology
- Water availability
- Potential for herbivory, vandalism
- **Soil and groundwater conditions**

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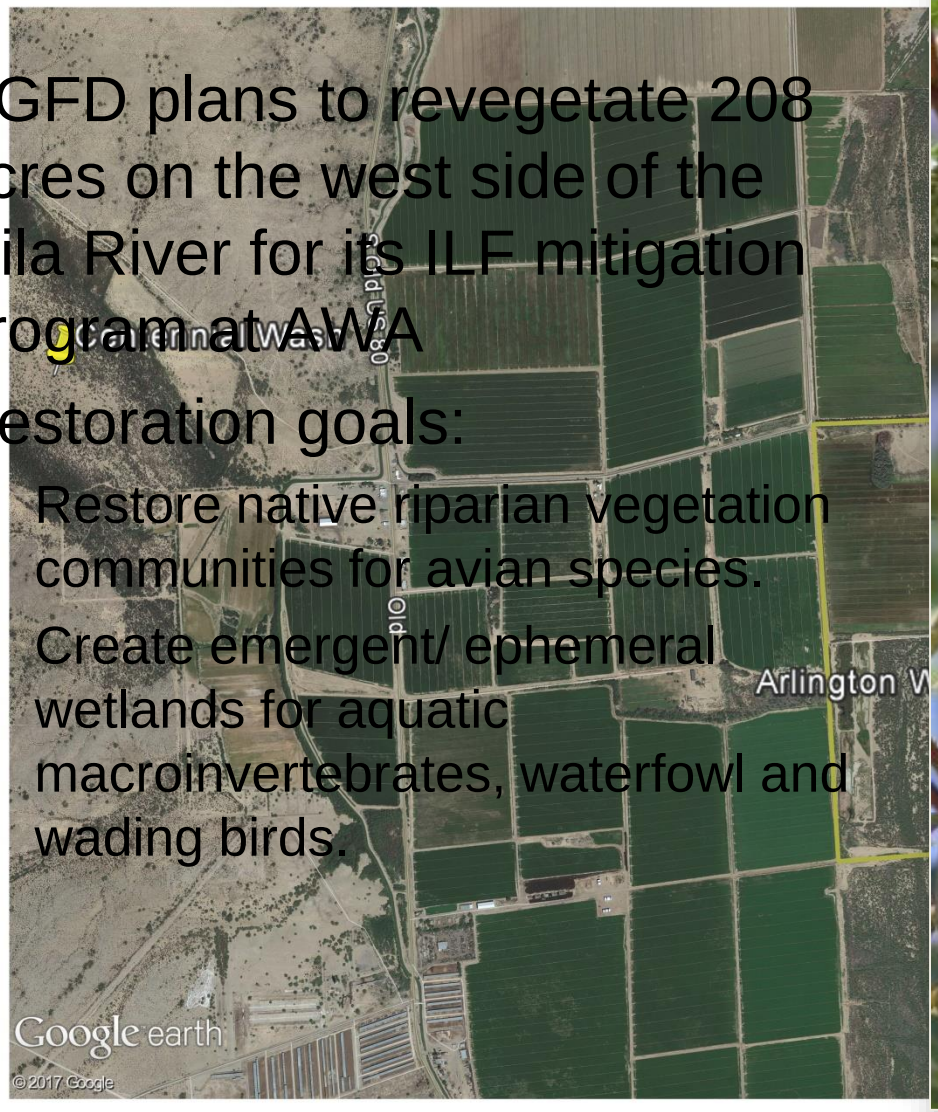
Background

- AGFD plans to revegetate 208 acres on the west side of the Gila River for its ILF mitigation program at AWA
- Restoration goals:
  - Restore native riparian vegetation communities for avian species.
  - Create emergent/ ephemeral wetlands for aquatic macroinvertebrates, waterfowl and wading birds.



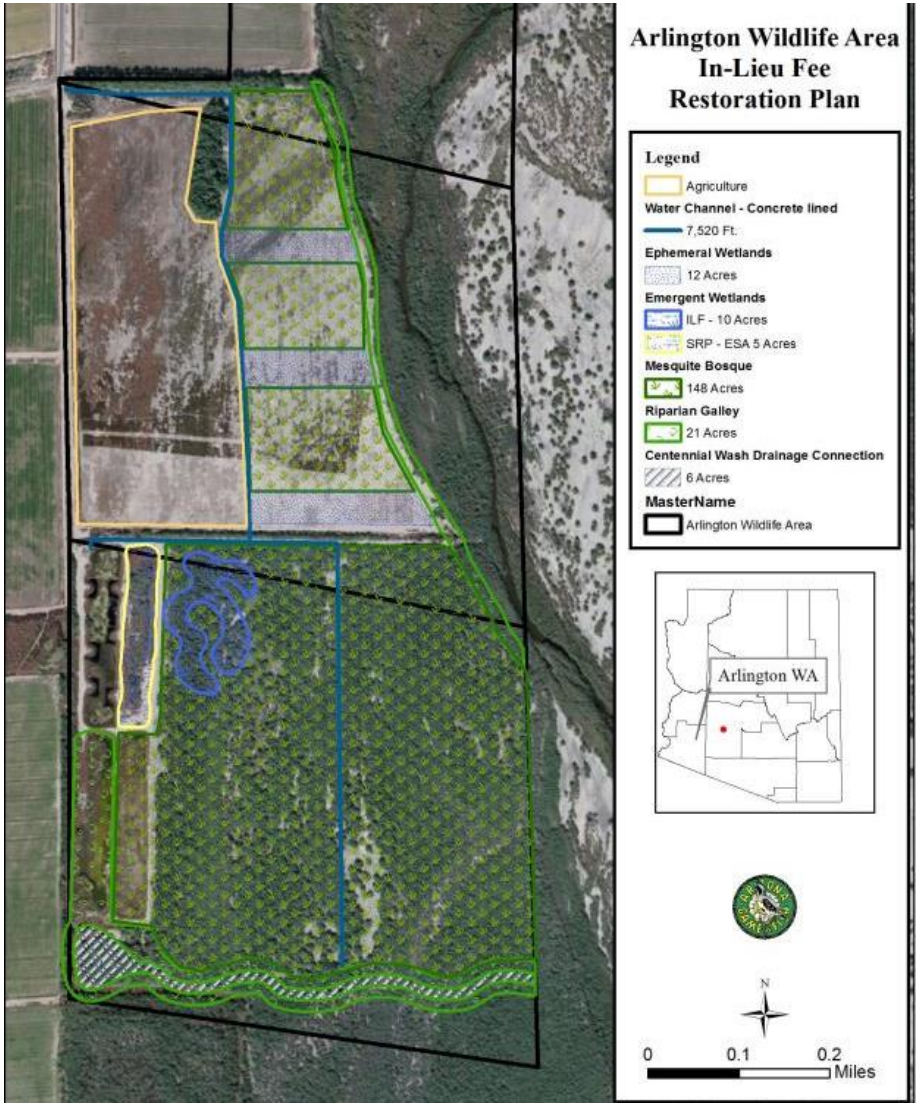
AWA Restoration Design (Revision 2)

Emergent wetlands:
10 acres

Ephemeral wetlands:
Increased from 0 to
12 acres

Cottonwood/ willow:
Reduced from 69 to
21 acres

Mesquite bosque:
Increased from 98 to
148 acres



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Site Assessment – Purpose

- Objectives:
  - Assess groundwater and soil conditions
  - Recommend plant materials suitable for the site conditions
  - Irrigation requirements
  - Leaching requirements

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Key Assessment Components

- Limitations to plant growth:
  - Salinity
  - Depth to and quality of groundwater
- Plant-specific effects
  - Soil texture
  - Soil stratigraphy

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Site Assessment

Existing Data Review

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Tools

- Google Earth: Historical land use
- https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx
  - NRCS Ecological Site Descriptions
  - NRCS Soils Maps
- USGS National Water Information System
- ADWR Groundwater Site Inventory (GWSI)
- Literature review: Buckeye Waterlogged Area

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Potential Issues Identified

- Saline soils
- Depth to water: 25-80 feet bgs
- Water quality
- Potentially saline perched aquifer
- Weed management

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Site assessment

- Geologic Logging,
- *In Situ* Hydraulic Conductivity Testing,
- Laboratory Testing

Site Assessment - Soil

- Soil physical and chemical properties to a depth of up to 8 feet
- Soil infiltration rates
- Laboratory testing on selected samples:
  - Soil salinity
  - Sodicity
  - Nutrient content
  - Texture

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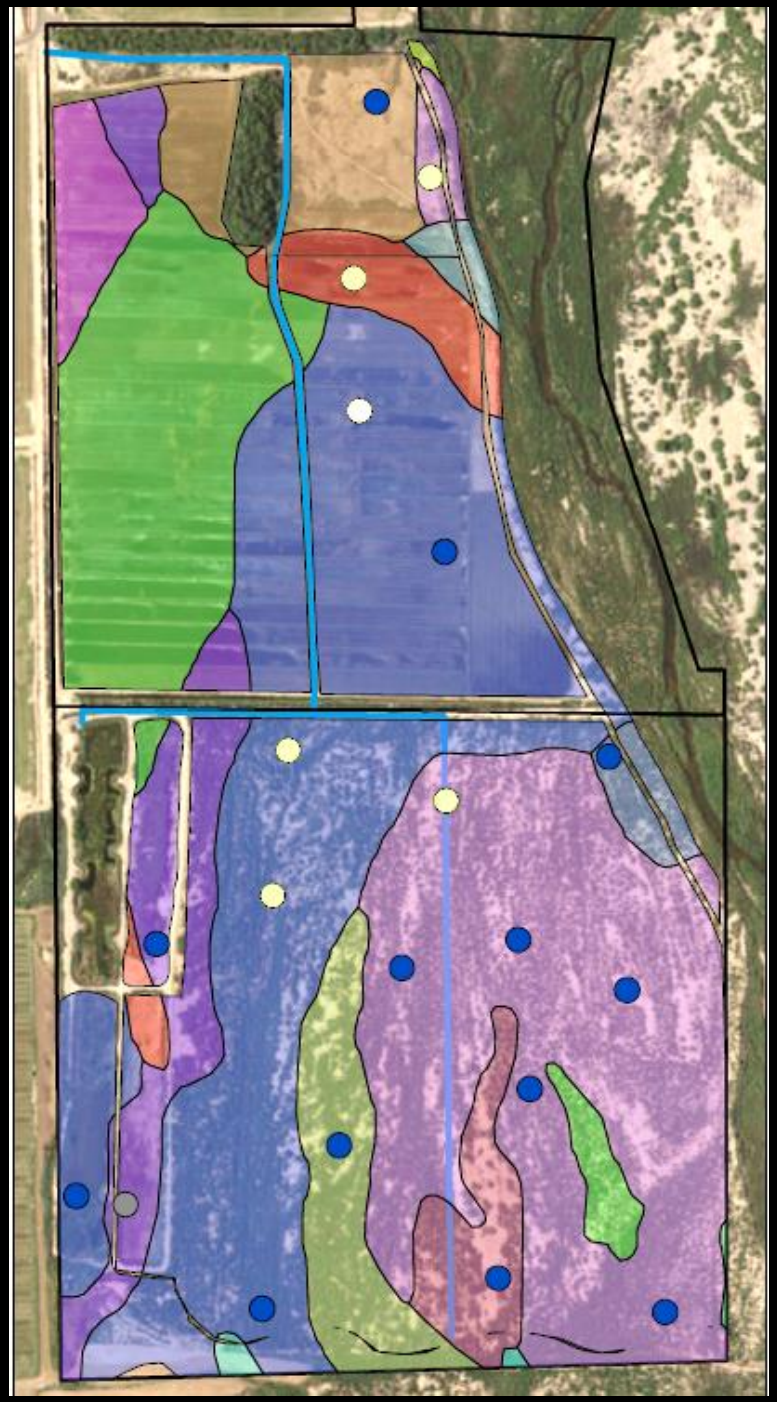

Legend

Soil Sample Locations - Labeled as Percent Sand, Silt, and Clay at Surface

Average Soil Texture through Profile

- loam
- sand
- sandy loam
- silt loam

NRCS Soil Type

Unit Symbol; Soil Type

- Aa;Agualt loam
- AbA;Antho sandy loam
- An;Avonda clay loam
- Ao;Avondale clay loam
- Ap;Avondale clay loam, saline alkali
- Cn;Cashion clay, saline-alkali
- Gb;Gadsden clay loam
- Ge;Gilman fine sandy loam
- GgA;Glenelg loam
- Gh;Gilman loam, saline-alkali
- Gp;Gliman loam, moderately saline
- Gs;Glenbar loam, saline-alkali
- Gt;Glenbar clay loam
- Ma;Maripo sandy loam

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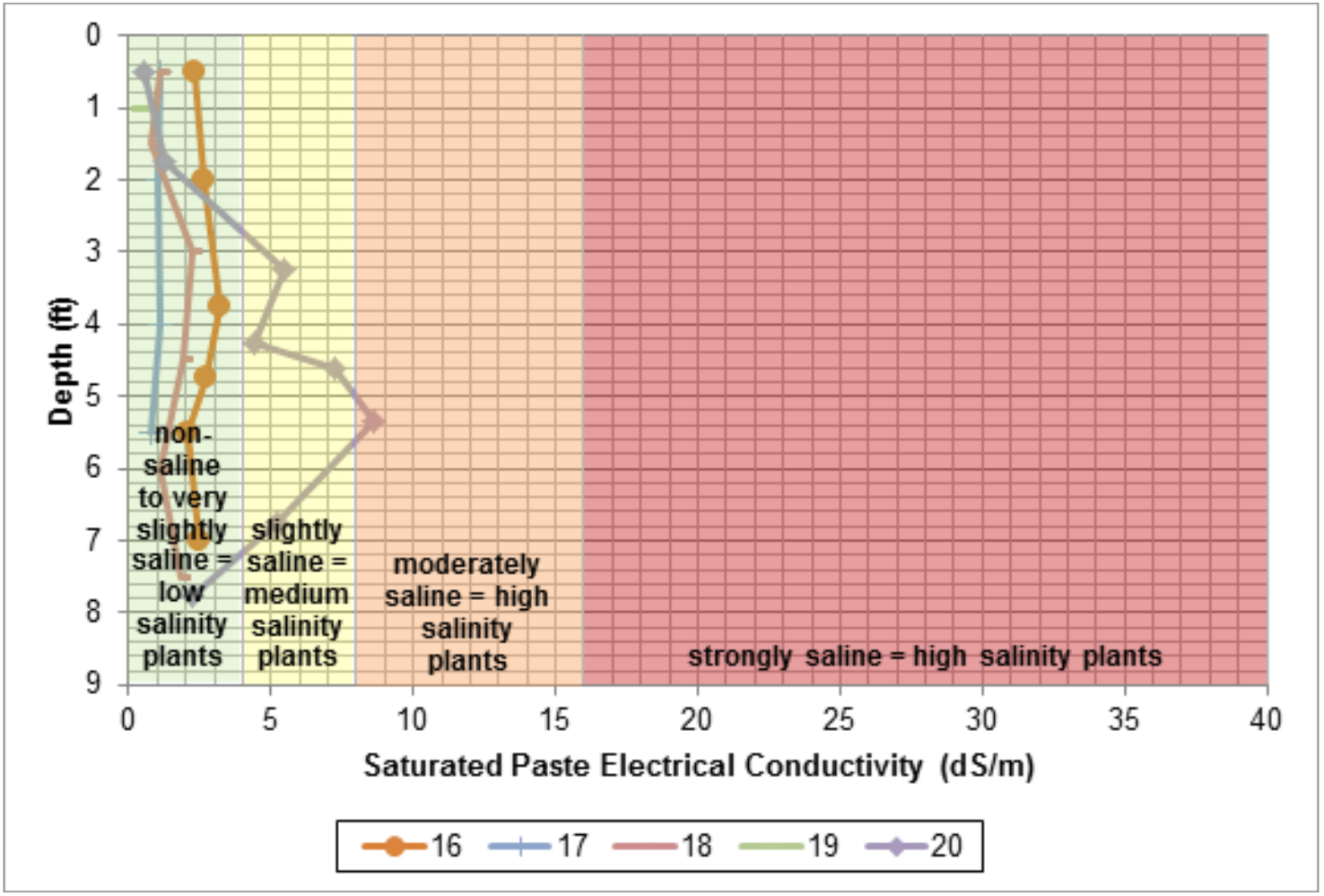
0 125 250 500 Feet

Grid Projection = UTM, NAD 1983, Zone 12N, meters

Soil salinity – northern parcel



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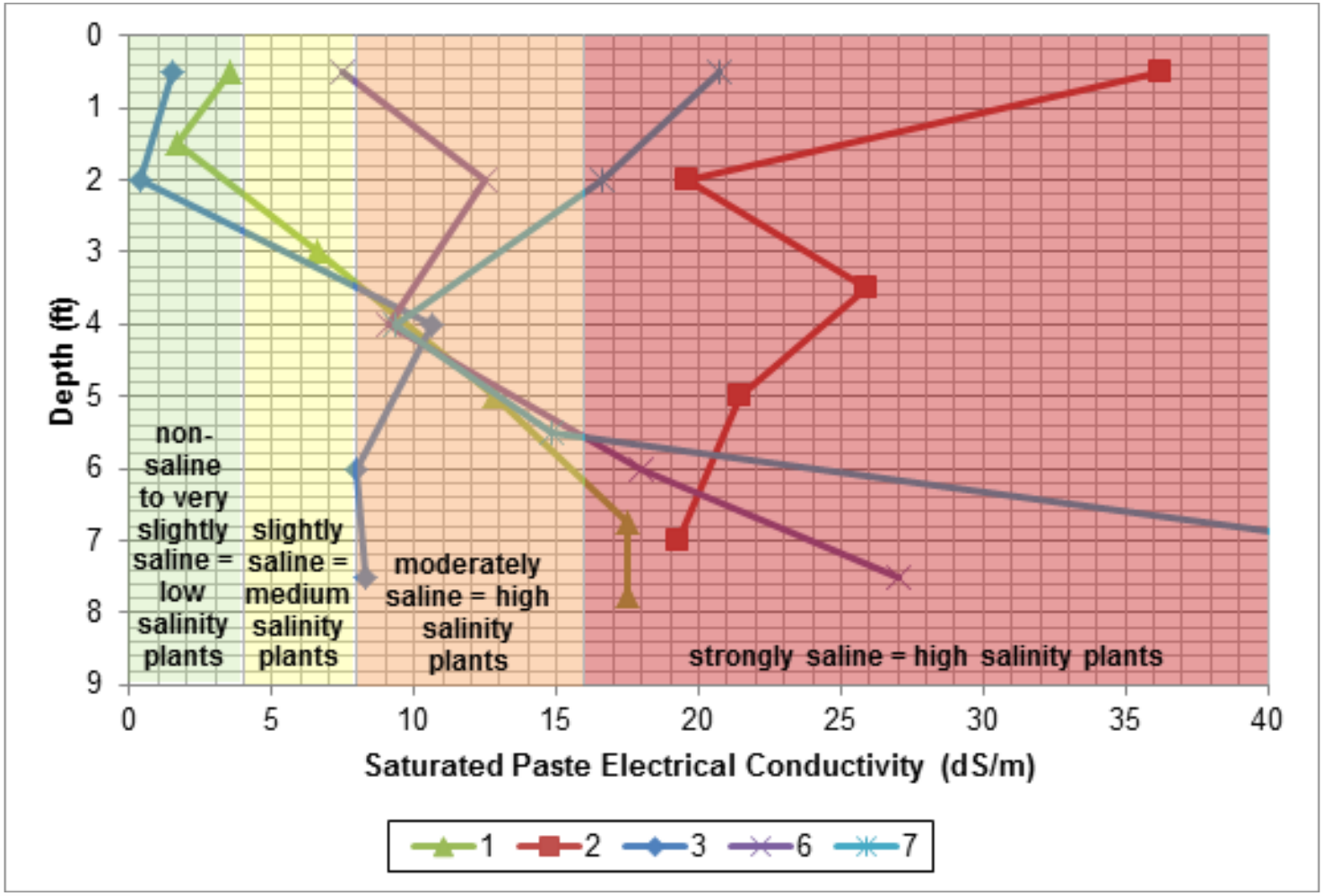
Soil salinity – southern parcel



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Soil infiltration rates

- Lower in northern parcel, even though soils are coarser – compaction from agriculture
- Higher in southern parcel

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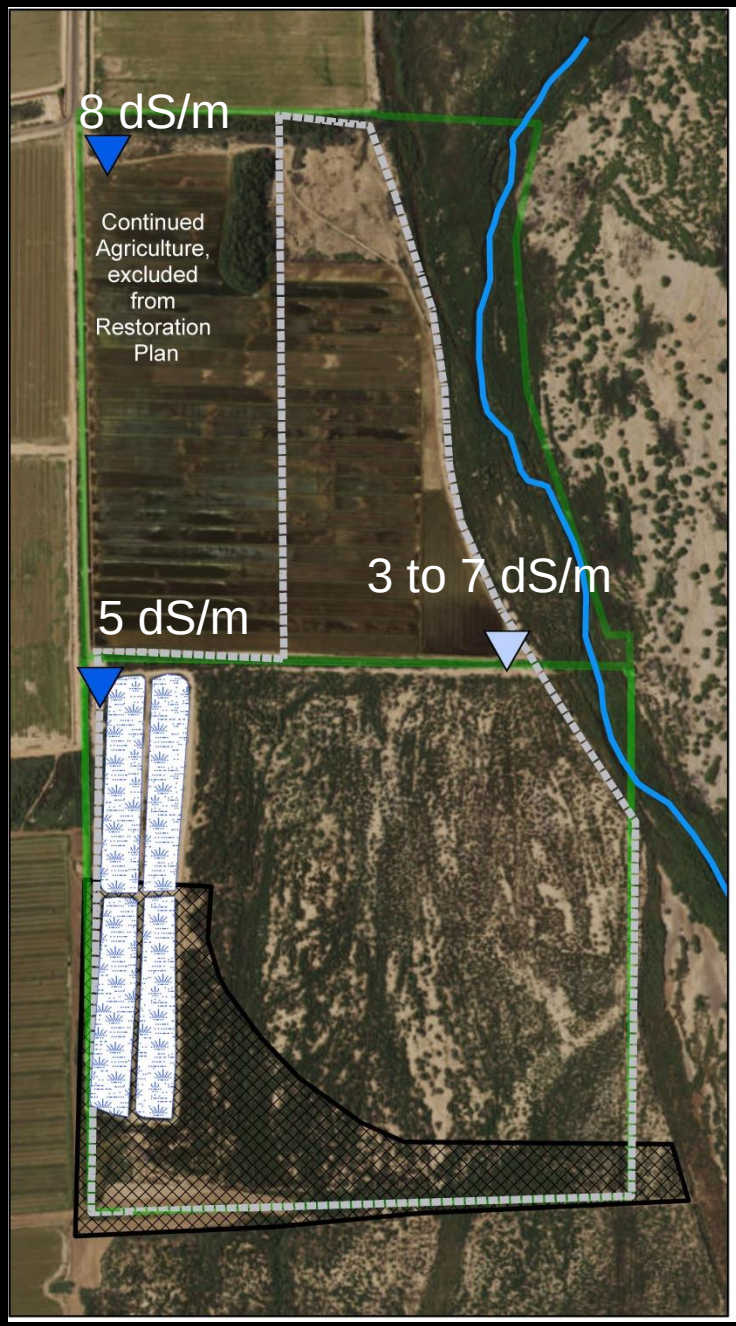
Site assessment

Groundwater depth and salinity



Arlington Wildlife Area Well Map

Legend

- New Well
- Existing wells
- Gila River
- Arlington Ponds
- GSA site characterization area
- Richardson parcel
- Jagow parcel
- Grading Area (proposed)

Grid Projection = UTM, NAD 1983, Zone 12N, meters

0 125250 500 Feet

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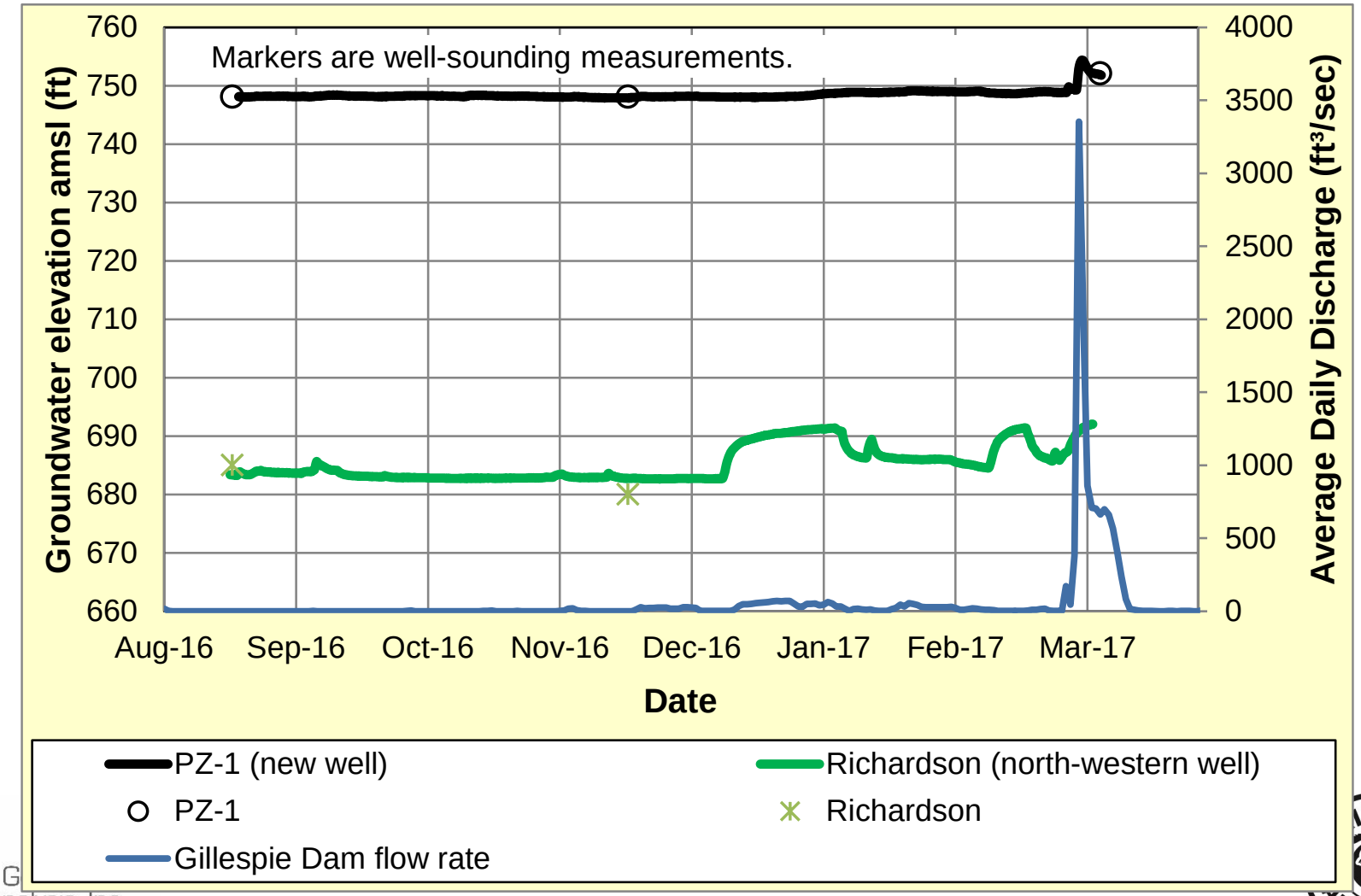
Depth to Groundwater



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Recommendations based on Assessment Results

Revegetation species

- Native wetland and riparian species with irrigation
- Mesquite bosque with irrigation management
- Xeric-riparian: salinity tolerant

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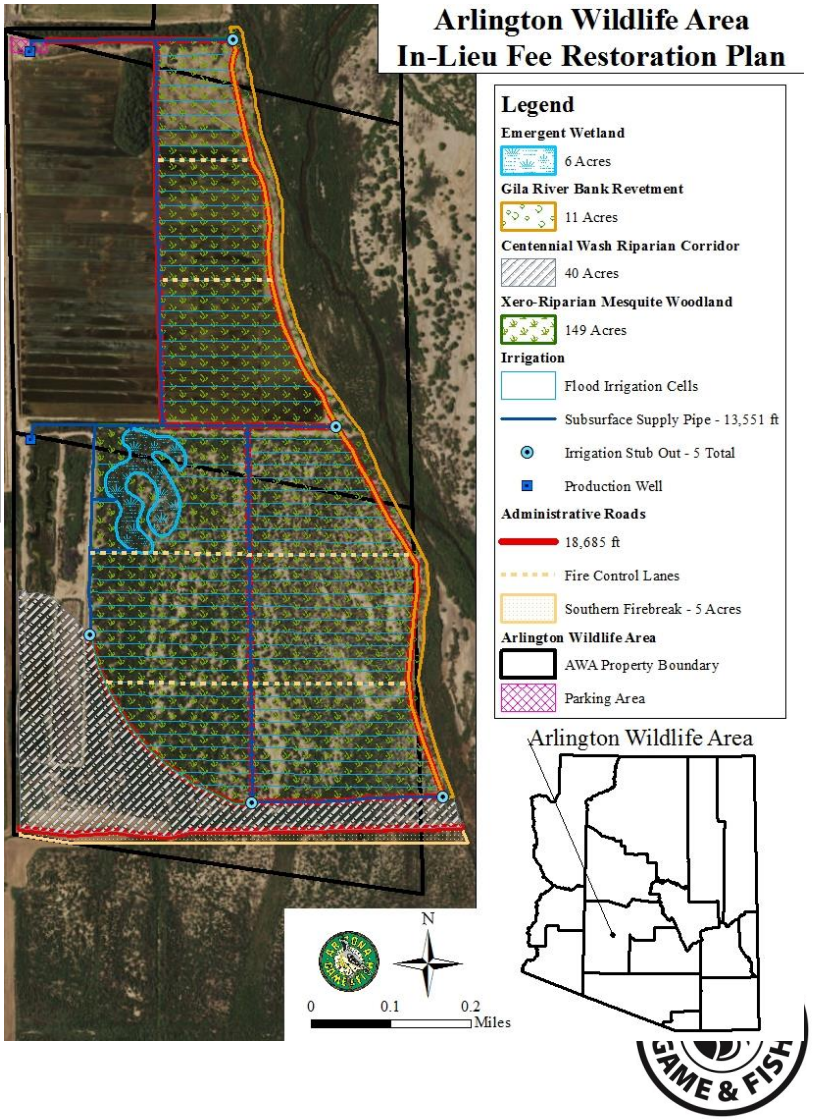
Post-Assessment Design

Vegetation Type	Original Design	Revision 1	Revision 2	Post-Assessment
Emergent wetland	30	11.8	10	6
Ephemeral wetland	40	0	12	0
Cottonwood/ willow	46	69	21	11
Cottonwood/ mesquite	0	0	0	40
Mesquite bosque	54	98.5	148	149



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Estimated Irrigation Requirements

Approximate average soil EC_e 0 to 4 feet bgs (dS/m)	Feet of Leaching Water Required for Reduction to:		
	EC_e of 2 dS/m	EC_e of 4 dS/m	EC_e of 8 dS/m
10	4	2	1
15	6	3	1.5
20	8	4	2
25	10	5	2.5

- Establishment: 3 feet
- Year 2: 3.5 feet
- Year 3: 4 feet

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Next steps

- Plan to do an EM-38 survey
- Leaching tests
- More iterations to come? Stay tuned!

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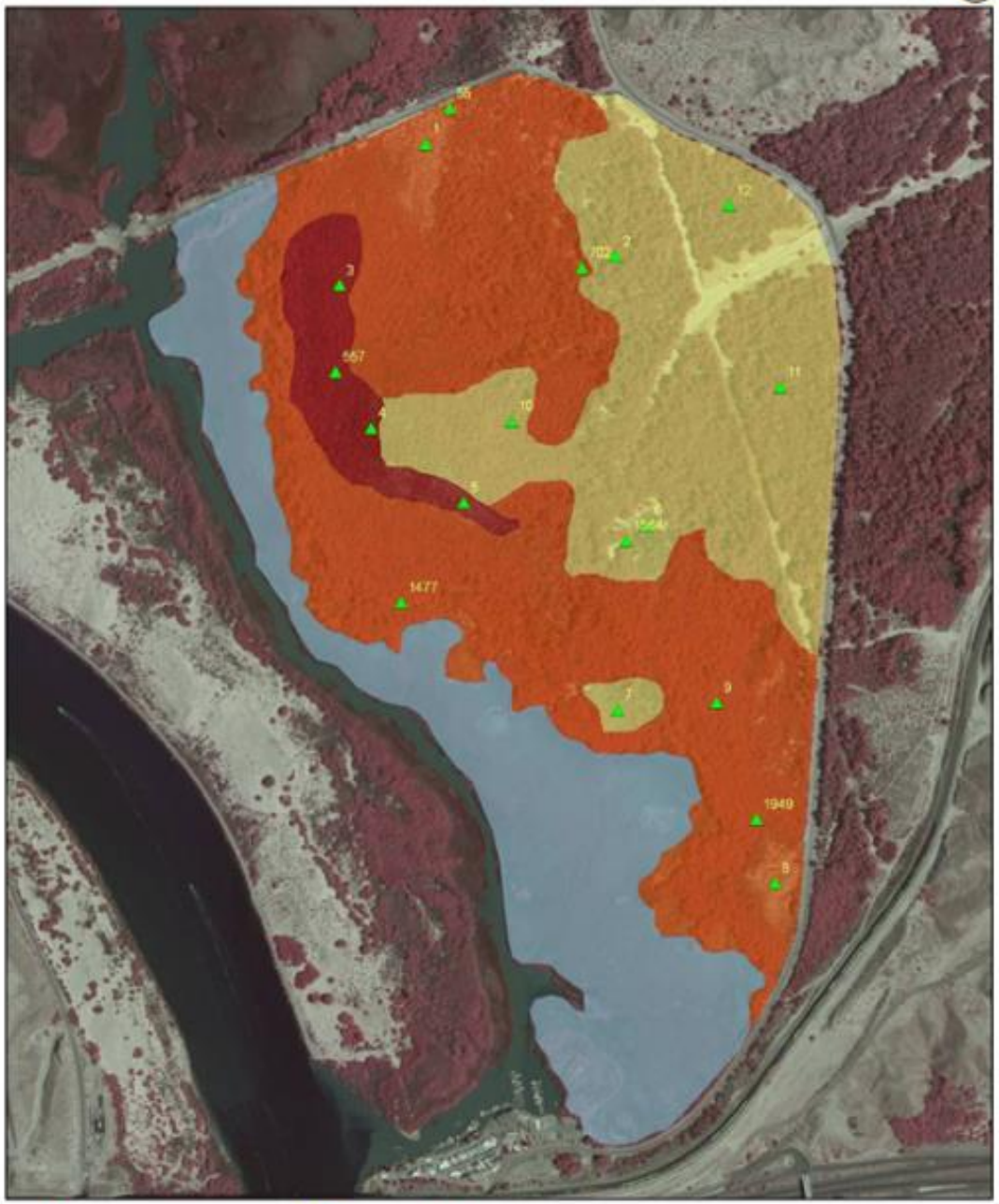
Soil Salinity (dS/m) 0-12" Depth



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Thank You!!
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