Soil Moisture Monitoring at PVER2

CRTR

January 29, 2013

Matt Grabau

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Lower Colorado River Multi-Species Conservation Program

Project Background/Need

- MSCP Habitat Conservation Plan:
  - Habitat creation goals → soil moisture required to support vegetation.
  - Species conservation measures → surface water or moist soils.
- Water Needs
  - Irrigation efficiency → amount of irrigation required.
- Pilot Project for 2012-2013

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Project Objectives

1. Determine soils variability.
2. Soil moisture monitoring and analysis.
3. Irrigation monitoring and analysis.
4. Evaluate sensor applications and data collection methods.
5. Develop long-term program recommendations.

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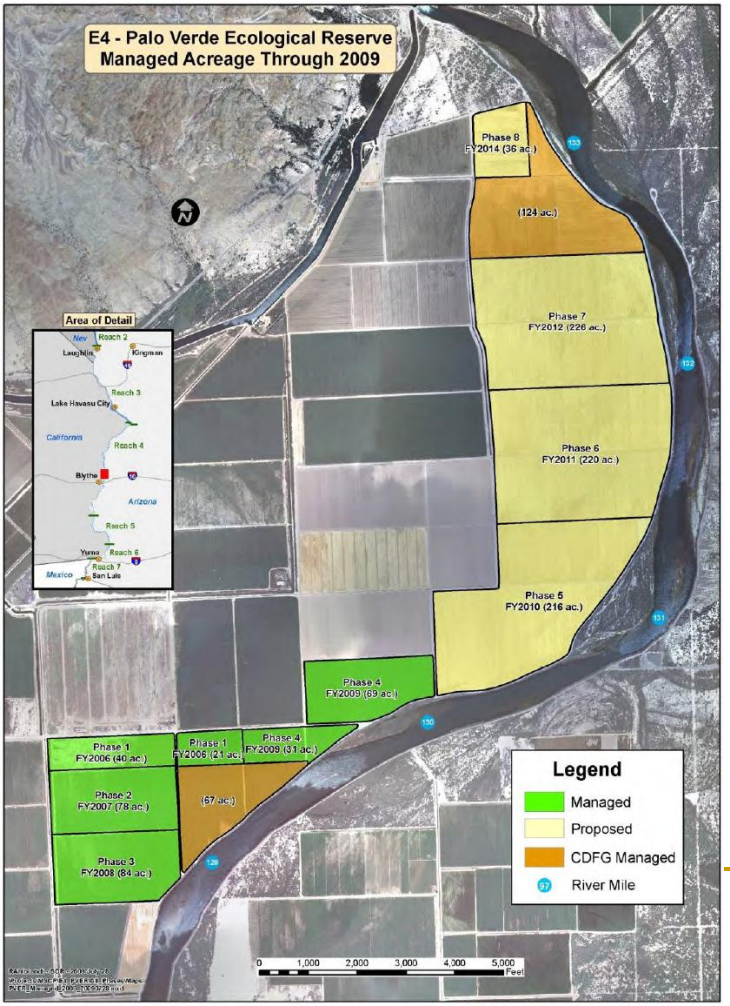
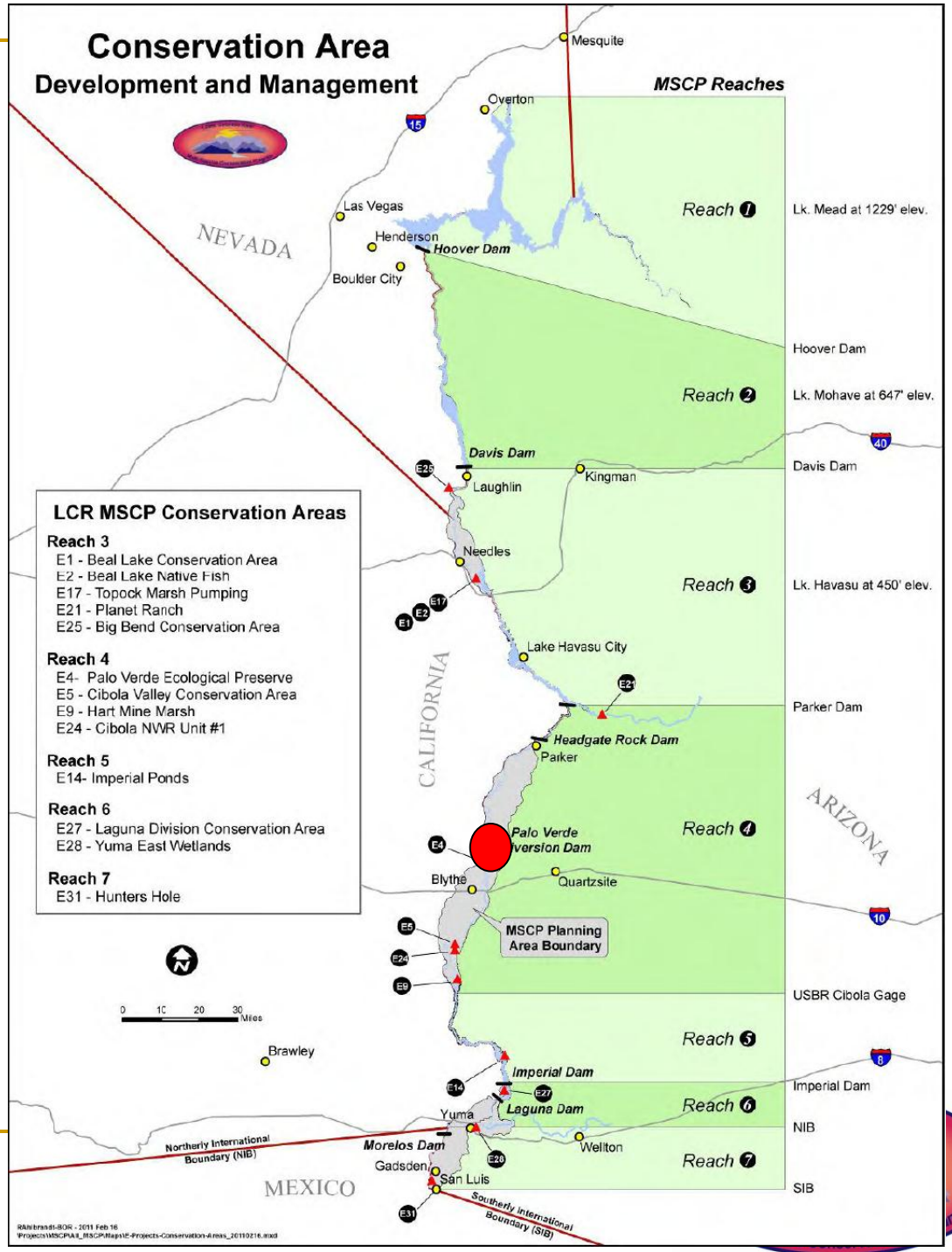
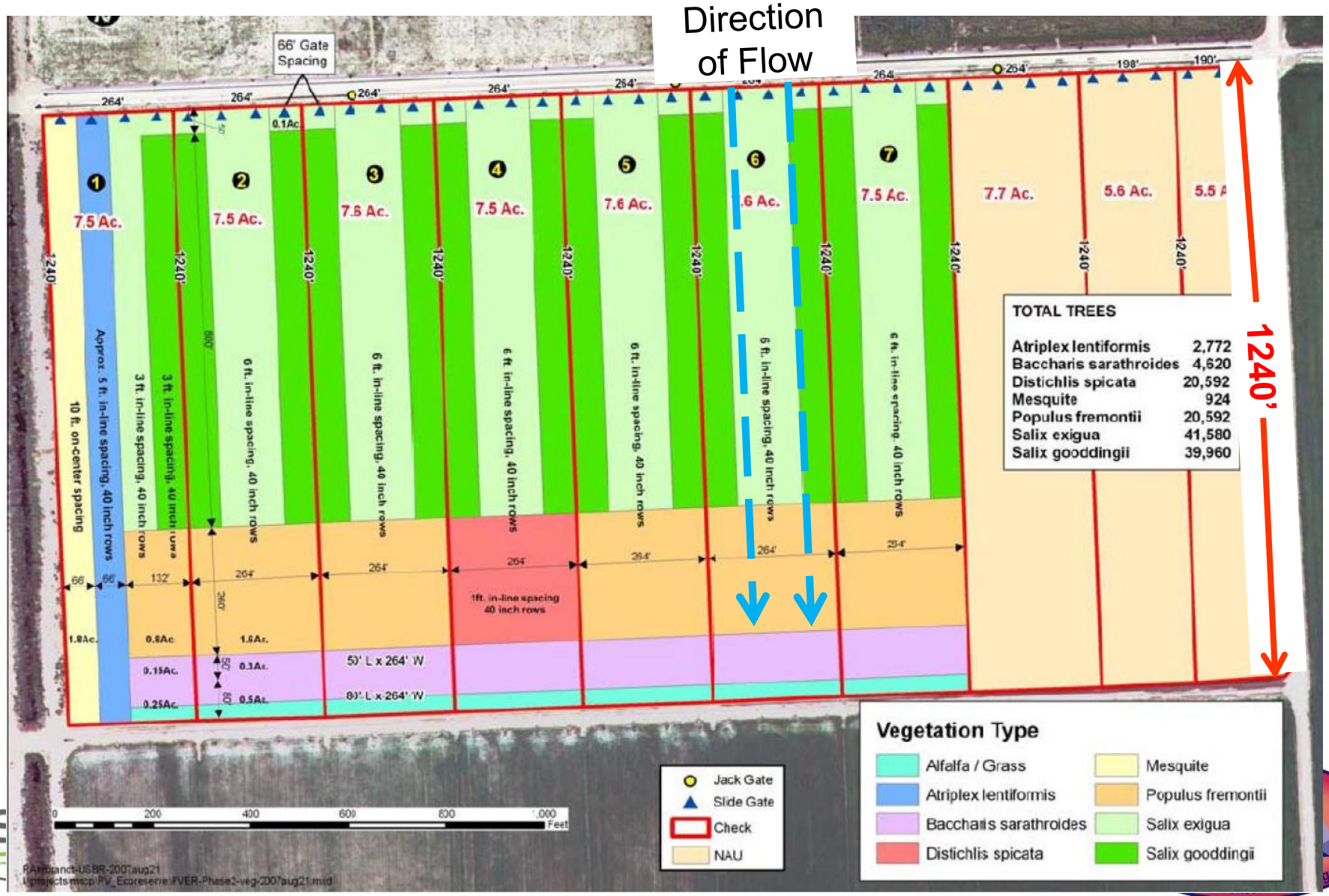
PVER


E4 - Palo Verde Ecological Reserve
Managed Acreage Through 2009
Phase 8 FY2014 (36 ac.)
(124 ac.)
Phase 7 FY2012 (226 ac.)
Phase 6 FY2011 (220 ac.)
Phase 5 FY2010 (216 ac.)
Phase 4 FY2009 (69 ac.)
Phase 1 FY2006 (40 ac.)
Phase 1 FY2006 (21 ac.)
Phase 4 FY2009 (31 ac.)
Phase 2 FY2007 (78 ac.)
(67 ac.)
Phase 3 FY2008 (84 ac.)
Area of Detail
Reach 2
Kingman
Laughlin
Reach 3
Lake Havasu City
California
Reach 4
Blythe
Arizona
Reach 5
Yuma
Reach 6
Reach 7
San Luis
Mexico
Legend
Managed
Proposed
CDFG Managed
River Mile
0 1,000 2,000 3,000 4,000 5,000 Feet


Conservation Area
Development and Management
MSCP Reaches
Mesquite
Overton
Las Vegas
Henderson
Hoover Dam
Boulder City
NEVADA
Reach 1
Lk. Mead at 1229' elev.
Hoover Dam
Reach 2
Lk. Mohave at 647' elev.
Davis Dam
Laughlin
Kingman
Davis Dam
Needles
Reach 3
Lk. Havasu at 450' elev.
Lake Havasu City
Parker Dam
Headgate Rock Dam
Parker
CALIFORNIA
ARIZONA
Reach 4
Palo Verde Diversion Dam
Blythe
Quartzsite
MSCP Planning Area Boundary
USBR Cibola Gage
Reach 5
Brawley
Imperial Dam
Imperial Dam
Reach 6
Laguna Dam
Yuma
NIB
Morelos Dam
Gadsden
San Luis
Wellton
Reach 7
SIB
MEXICO
Northerly International Boundary (NIB)
Southerly International Boundary (SIB)
LCR MSCP Conservation Areas
Reach 3
E1 - Beal Lake Conservation Area
E2 - Beal Lake Native Fish
E17 - Topock Marsh Pumping
E21 - Planet Ranch
E25 - Big Bend Conservation Area
Reach 4
E4- Palo Verde Ecological Preserve
E5 - Cibola Valley Conservation Area
E9 - Hart Mine Marsh
E24 - Cibola NWR Unit #1
Reach 5
E14- Imperial Ponds
Reach 6
E27 - Laguna Division Conservation Area
E28 - Yuma East Wetlands
Reach 7
E31 - Hunters Hole
0 10 20 30 Miles

Palo Verde Ecological Reserve Phase 2



Monitoring Levels and Objectives

- Irrigation Monitoring Stations
  - Irrigation Only
- Level 1
  - Irrigation, Surface Soil Moisture
- Level 2
  - Irrigation, Surface and Subsurface Soil Moisture
- Level 3
  - Irrigation, Soil Moisture, Soil Plant-Water Dynamics

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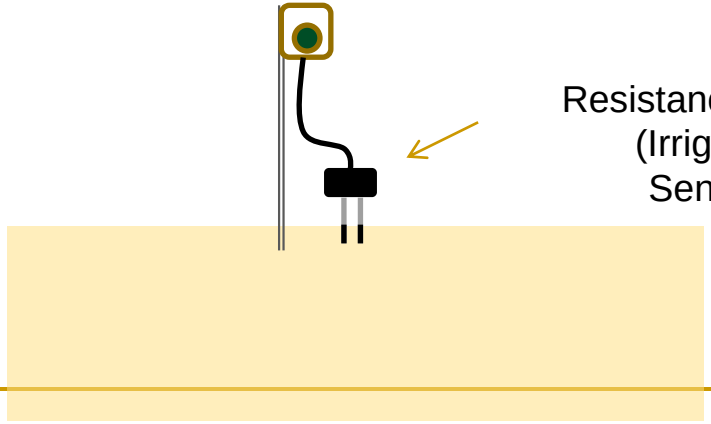
Irrigation Monitoring Station



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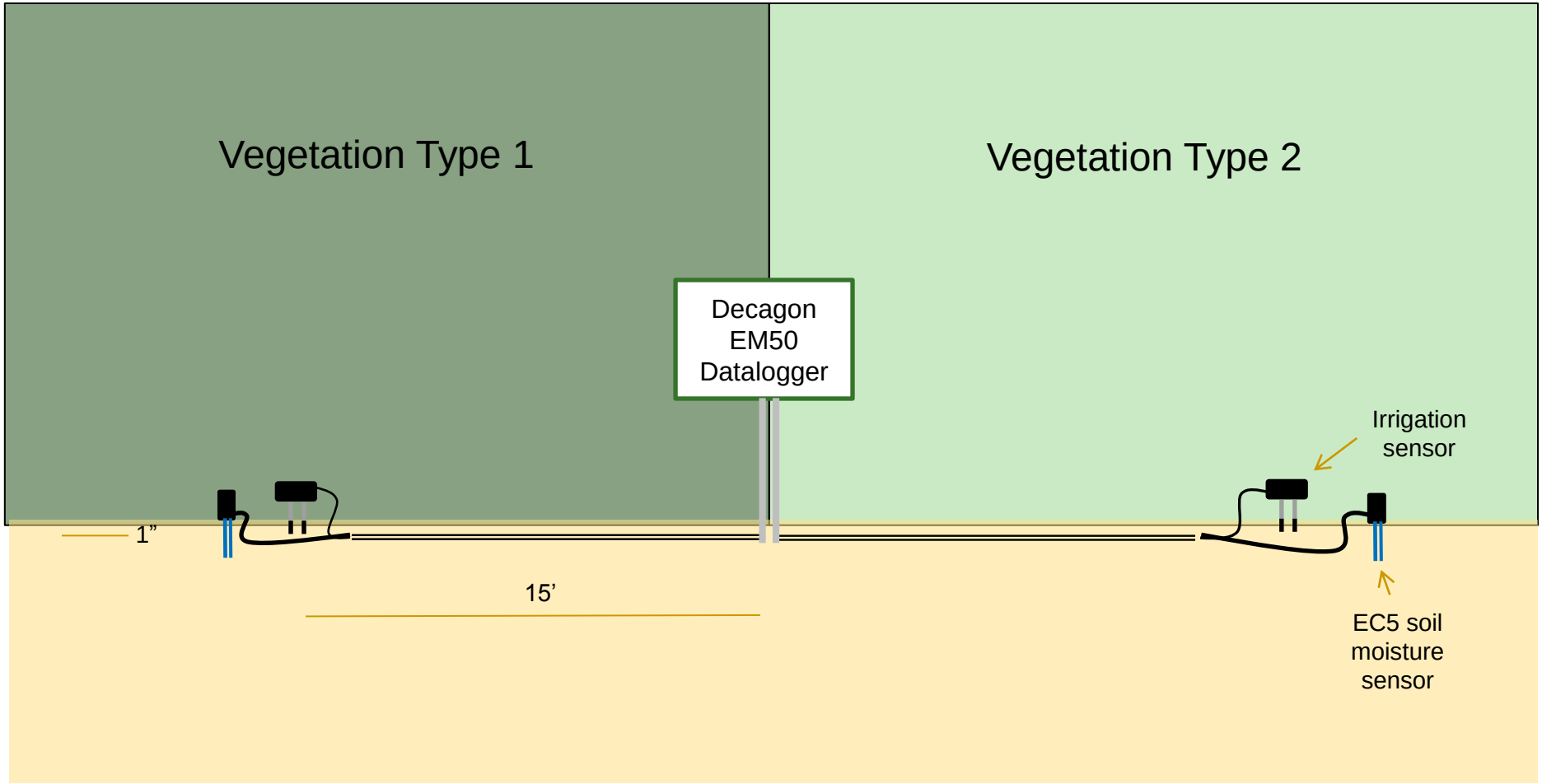
Level 1 Monitoring Station



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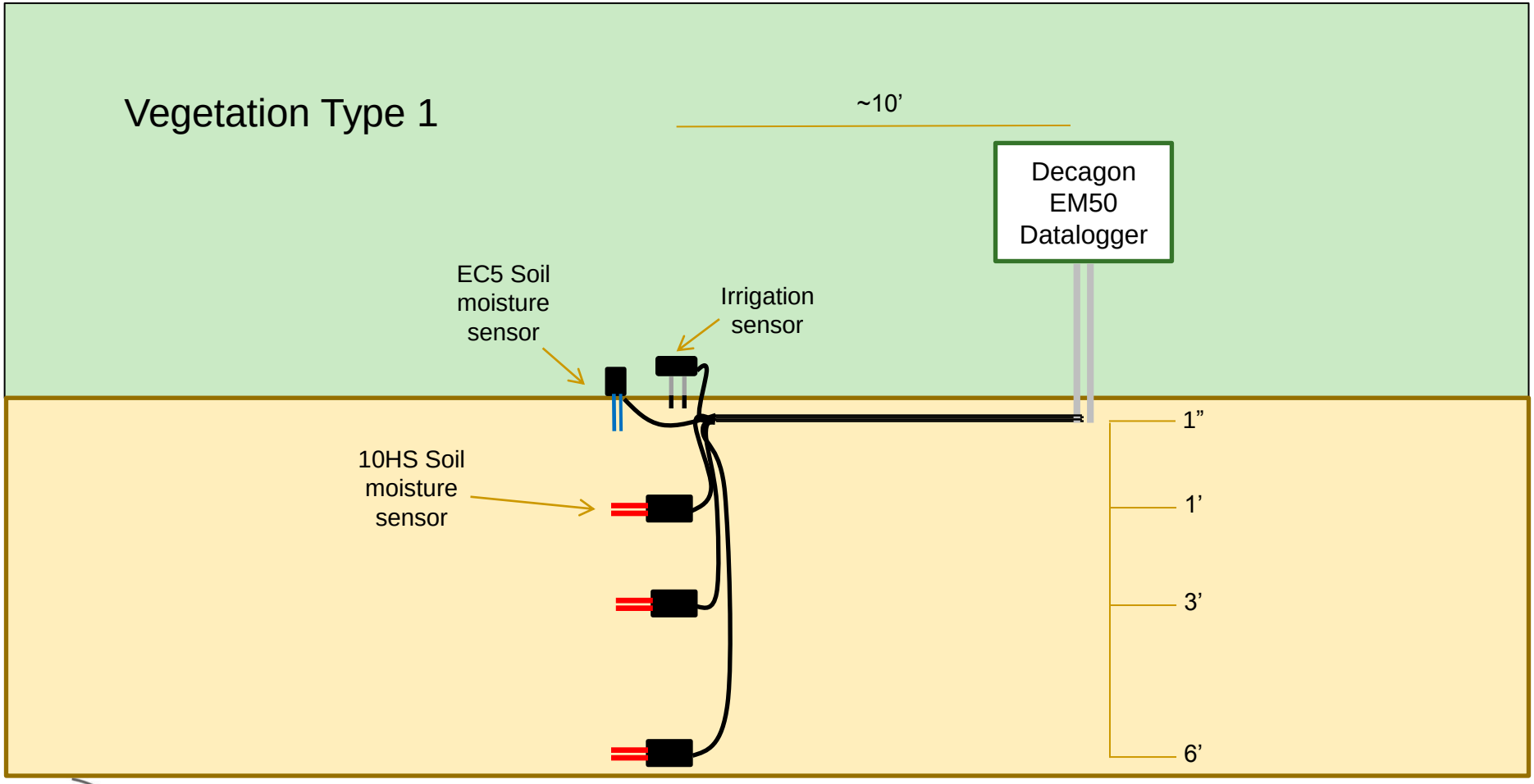
Level 2 Monitoring Station



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Level 1 and 2 Stations

Level 3 Monitoring Station

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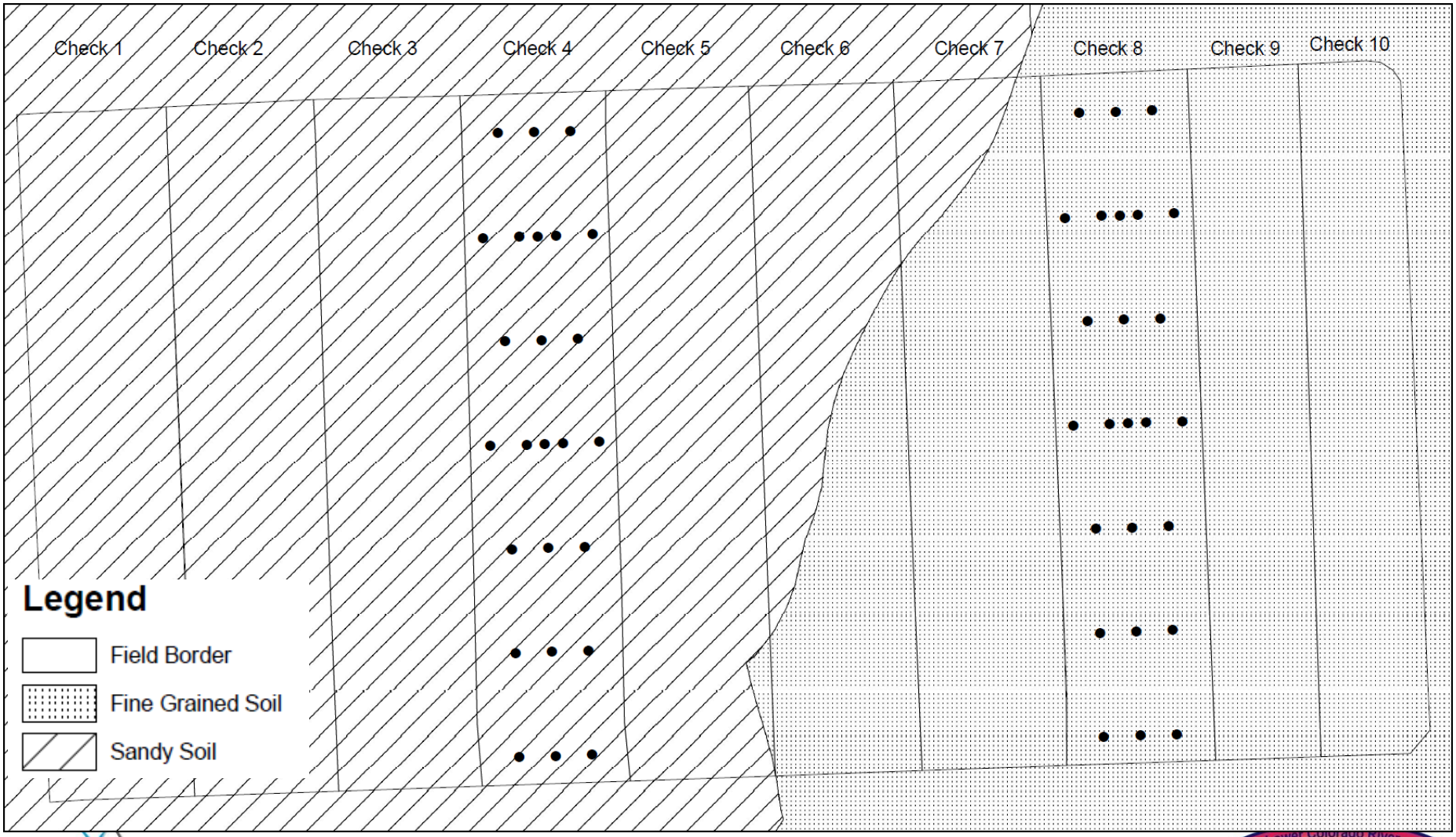
Irrigation Monitoring and Soil Types



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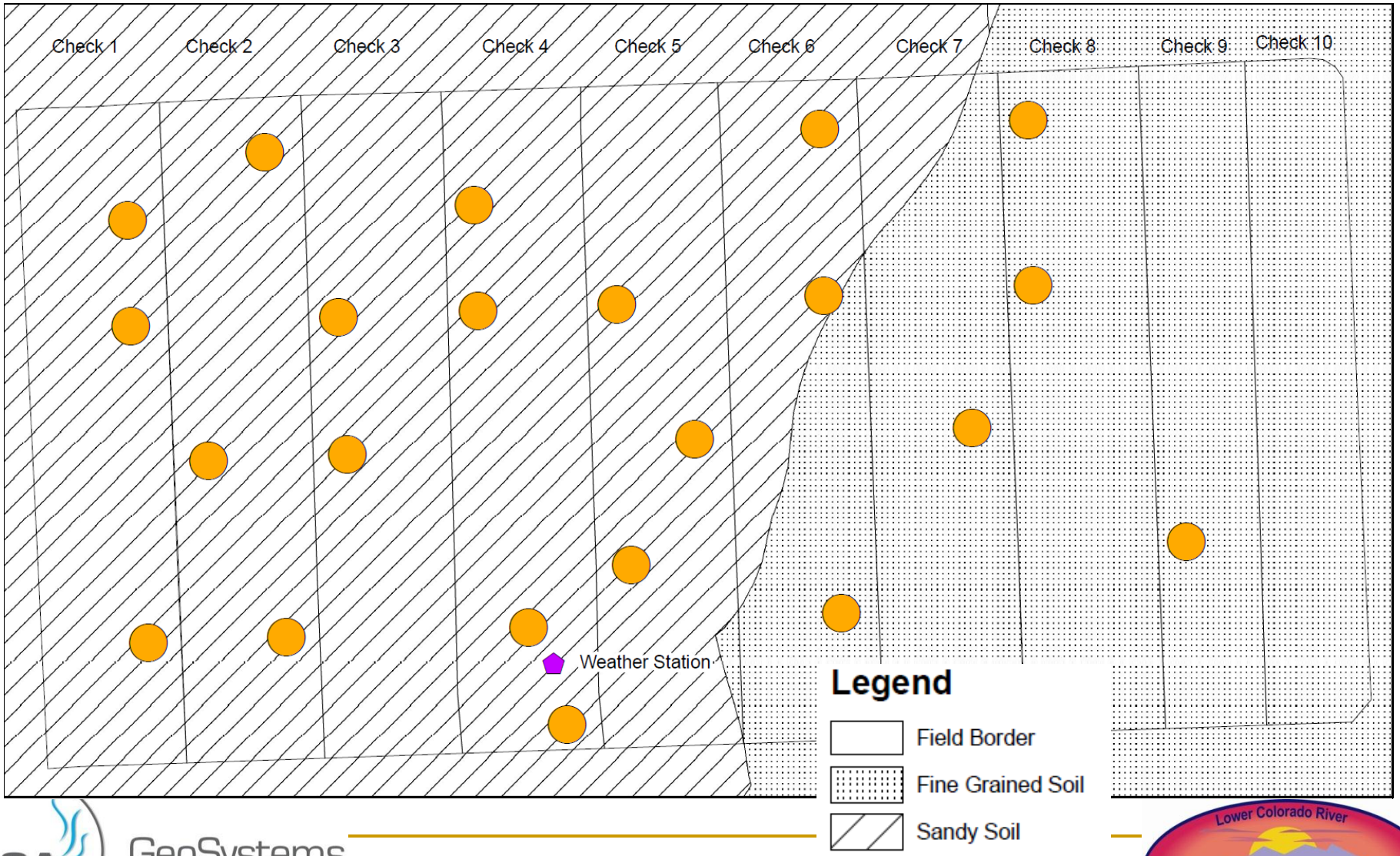
Vegetation Monitoring Locations



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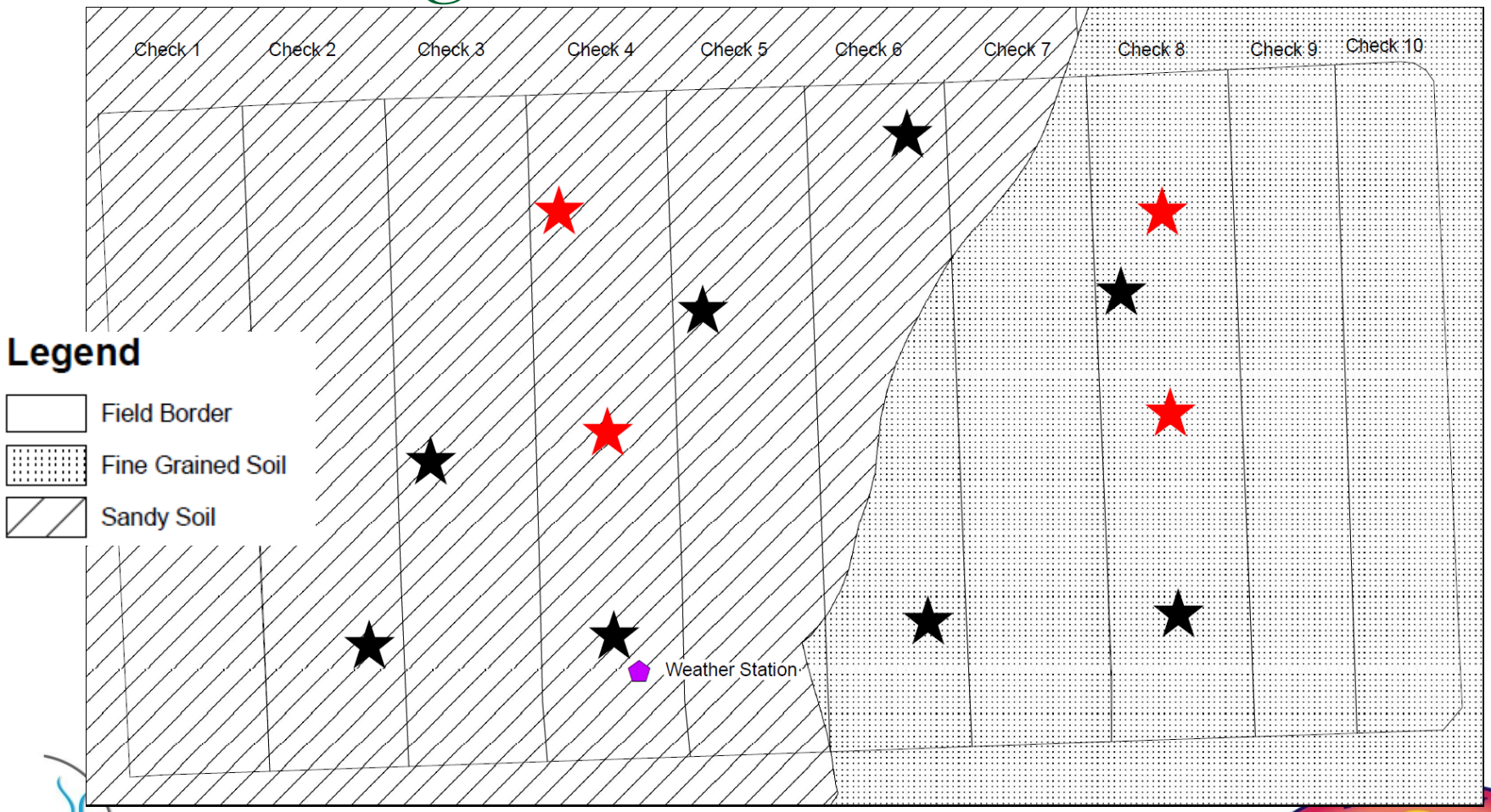
Level 2 (Black) and Level 3 (Red) Monitoring Stations



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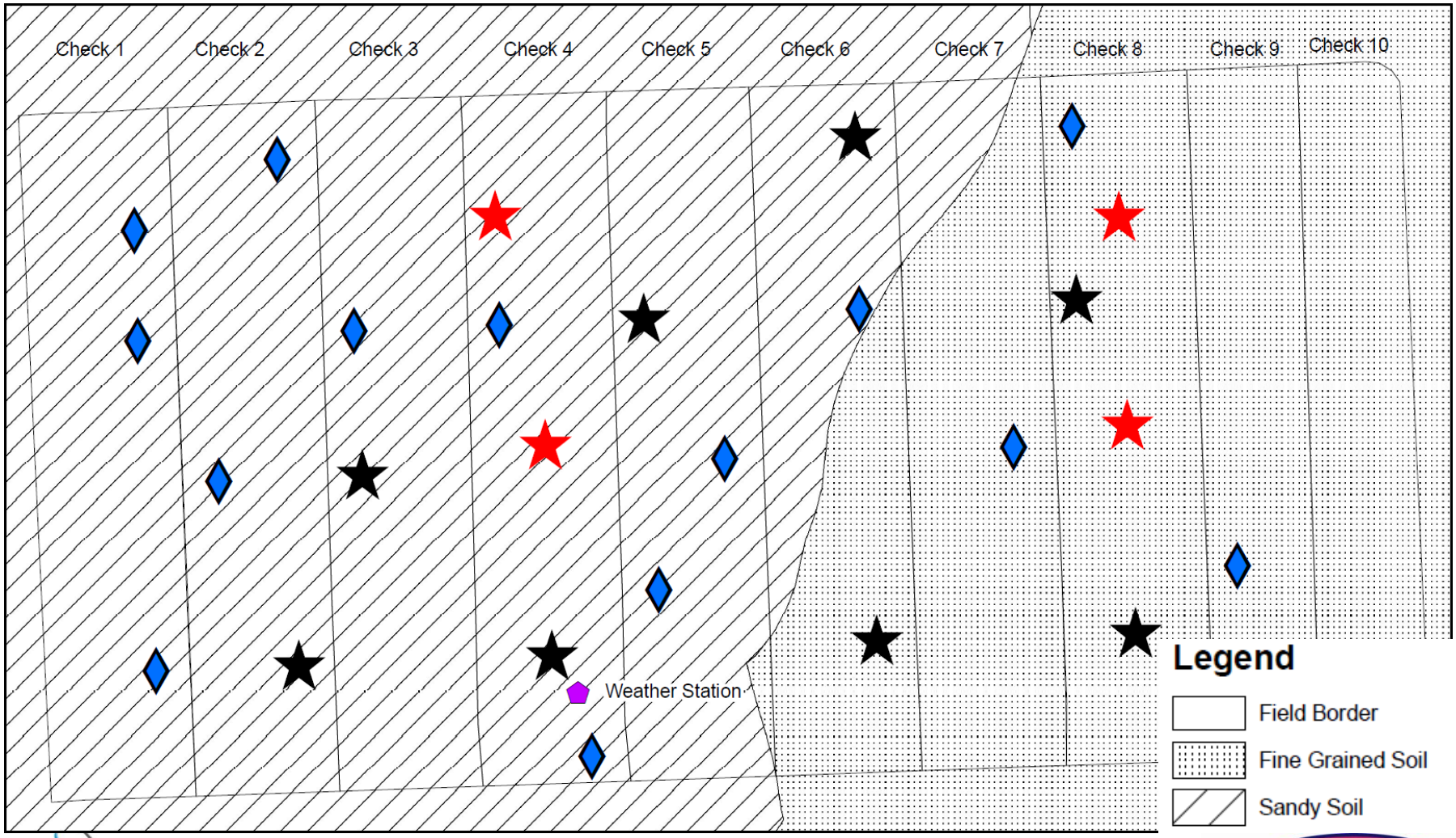
Multi-Species Conservation Program

Level 1, 2 and 3 Monitoring Stations



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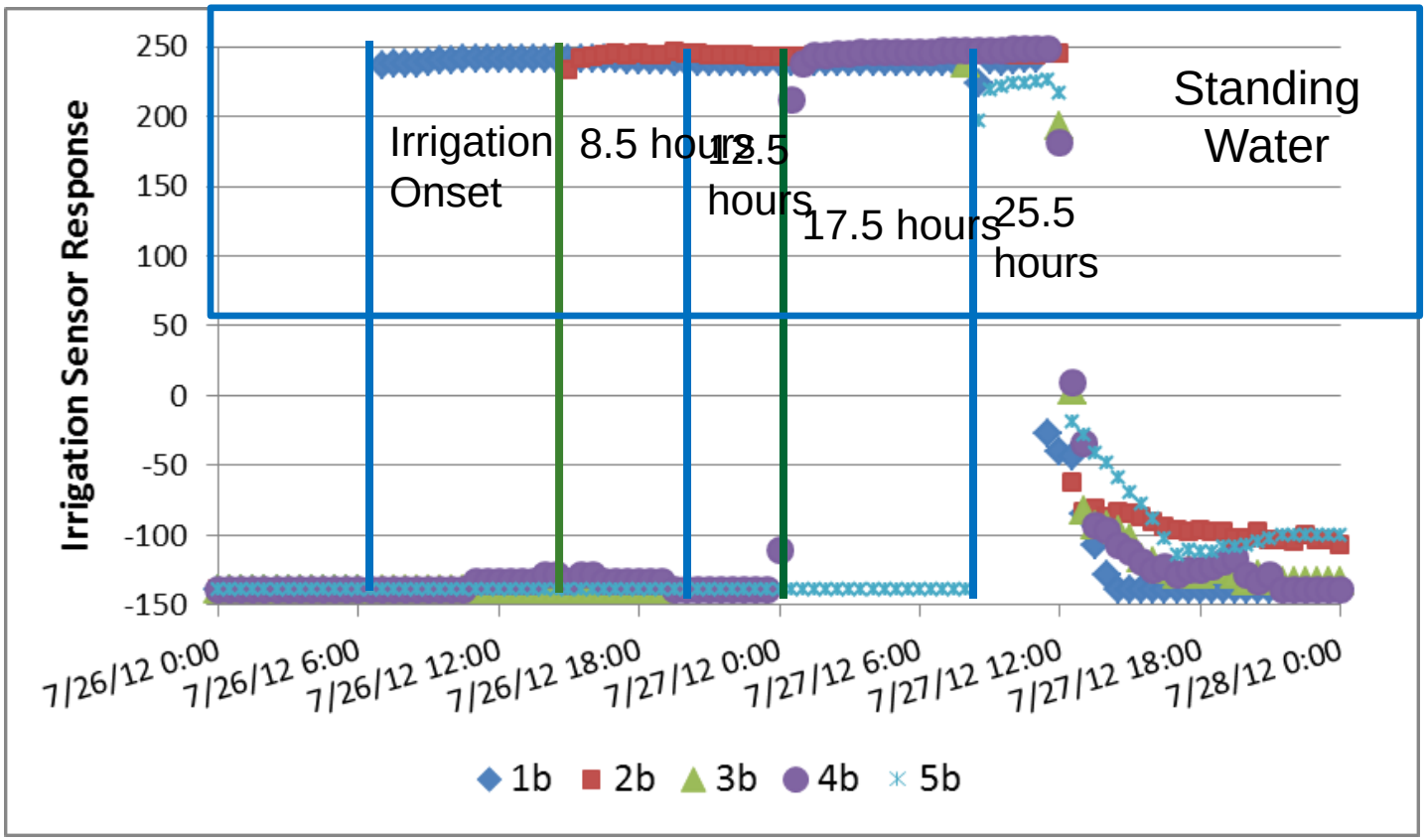
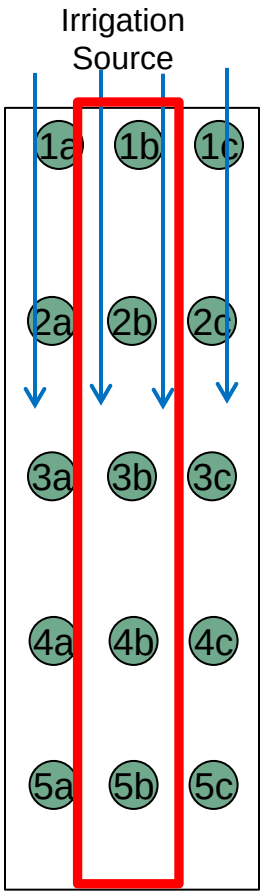
IRRIGATION MONITORING

Irrigation Monitoring Transect B
July 26-27, 2012





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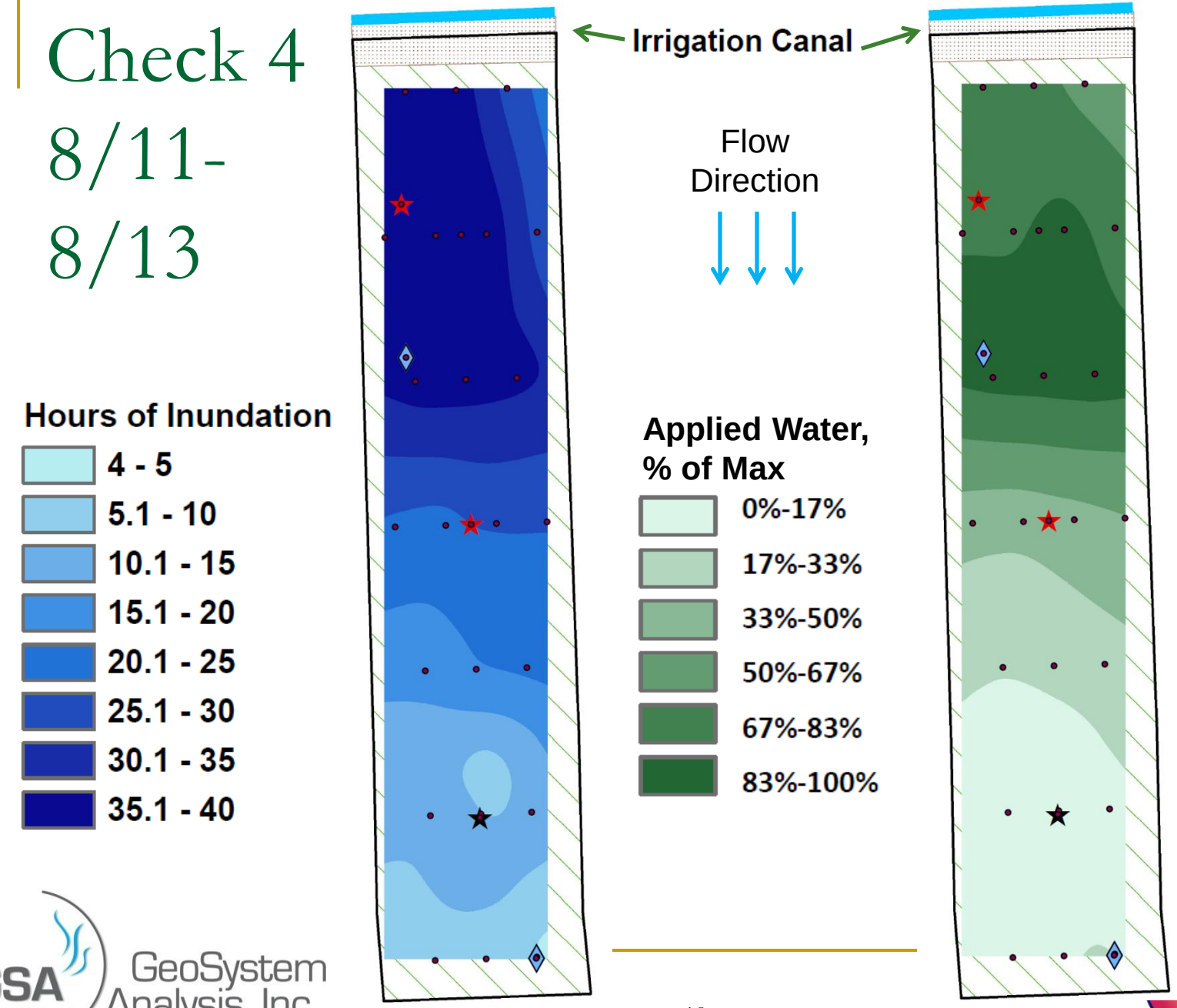
Check 4 8/11-8/13



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SOIL MOISTURE MONITORING

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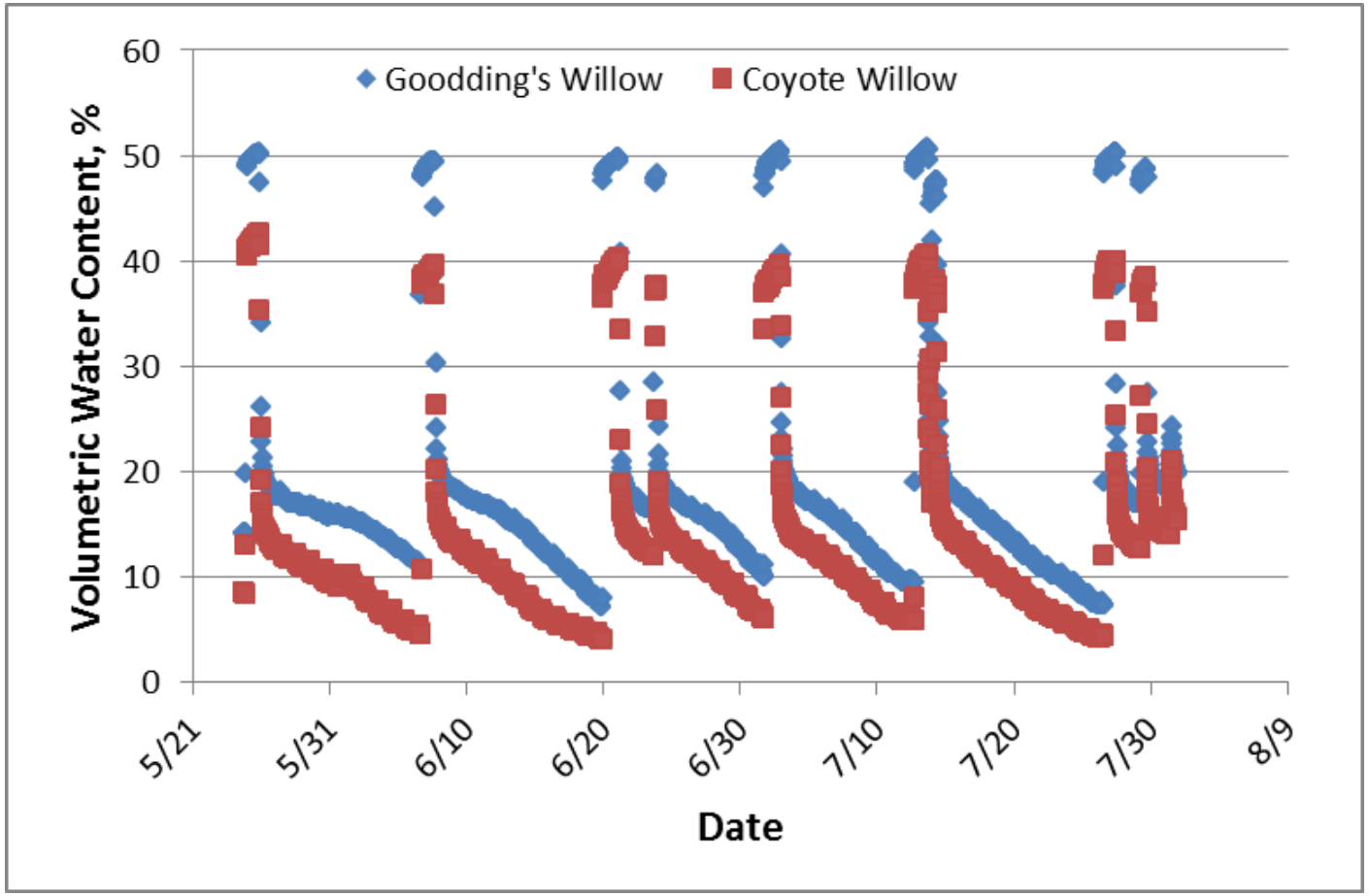
Level 1 Monitoring Data: Station 45, 78% Sand



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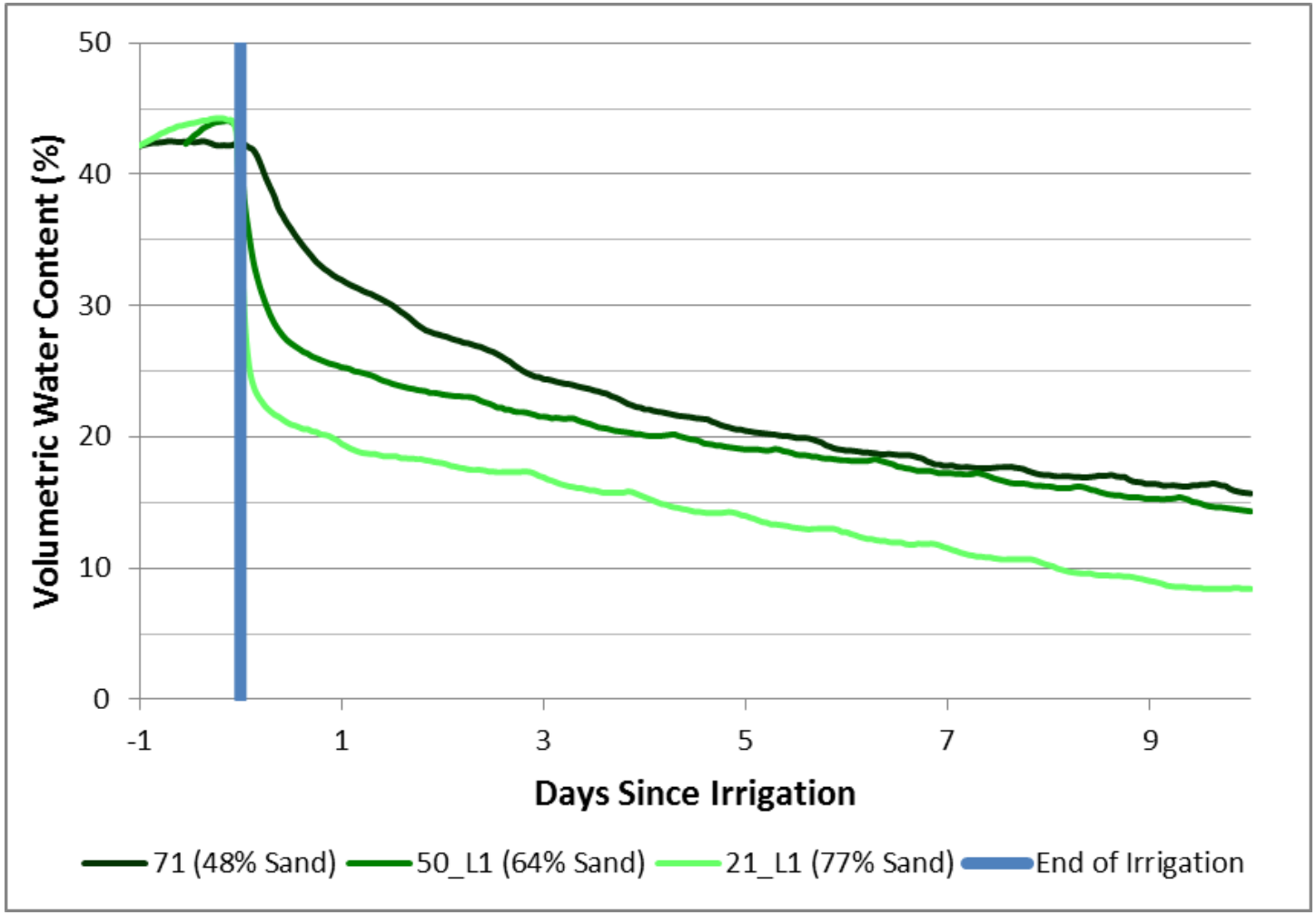
Level 1 Monitoring Data—July Irrigation



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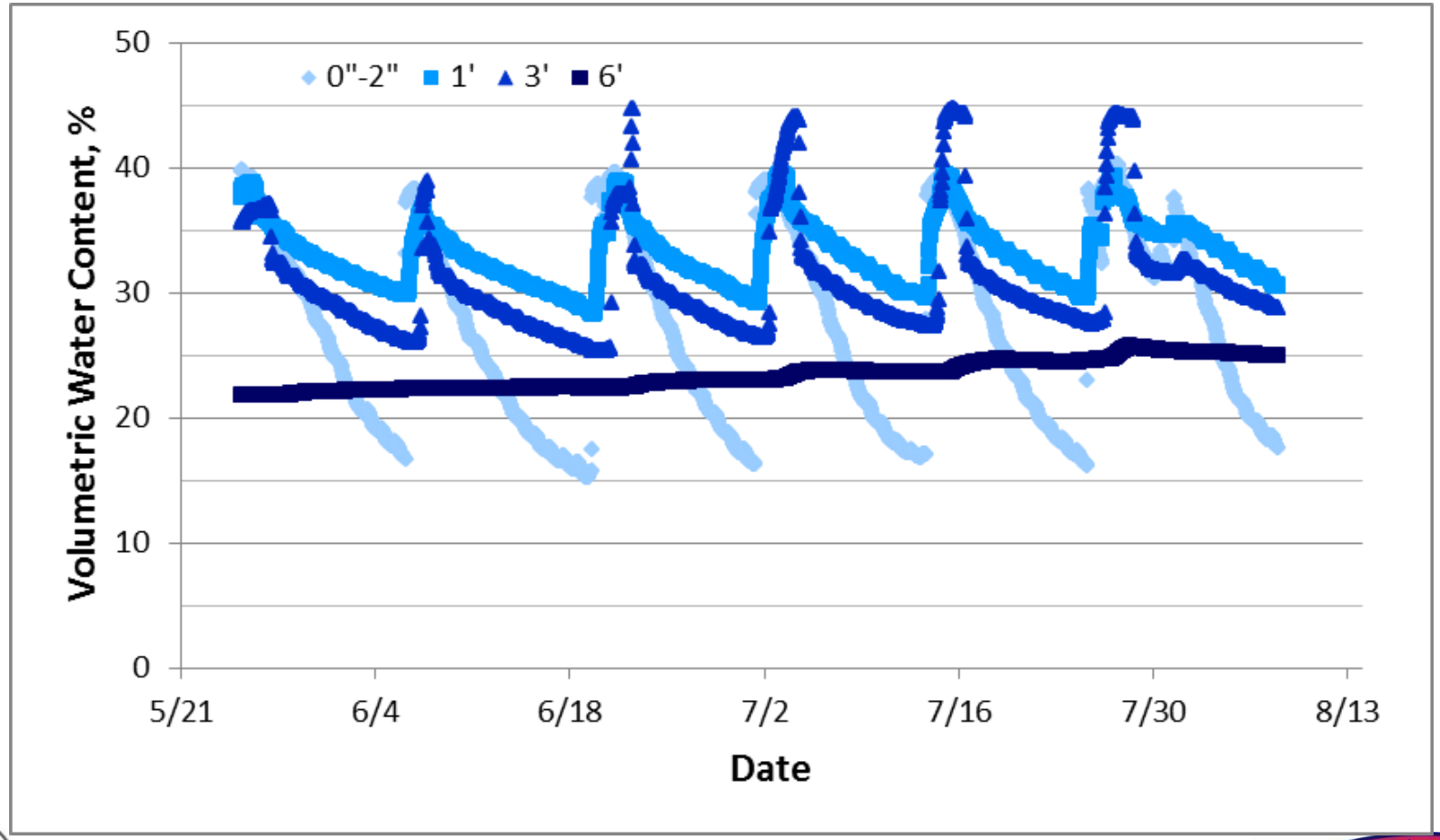
Level 2 Monitoring Data: Station 53, 54% Sand



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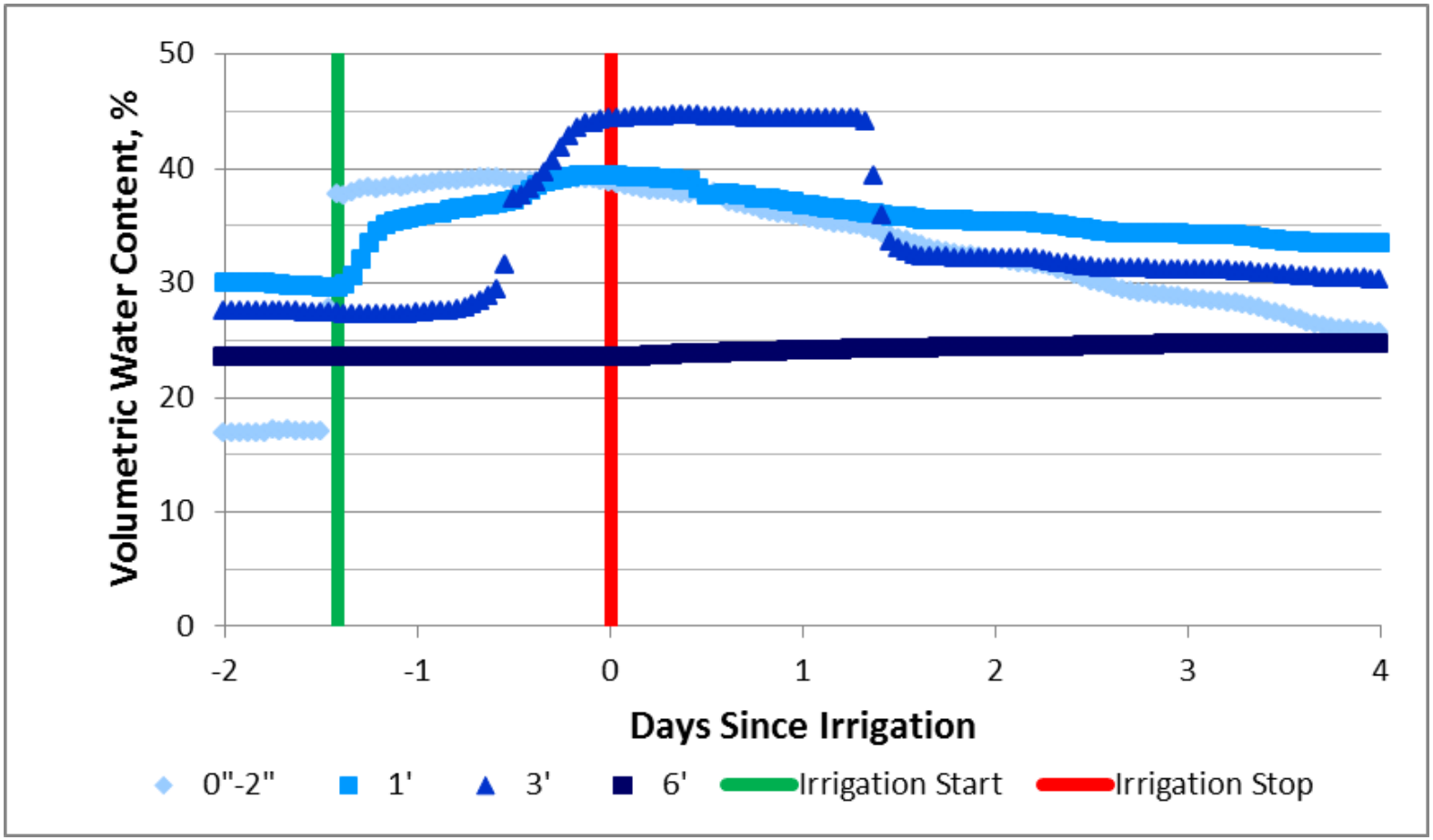
Level 2 Monitoring Data—July Irrigation 53_L2, 54% Sand



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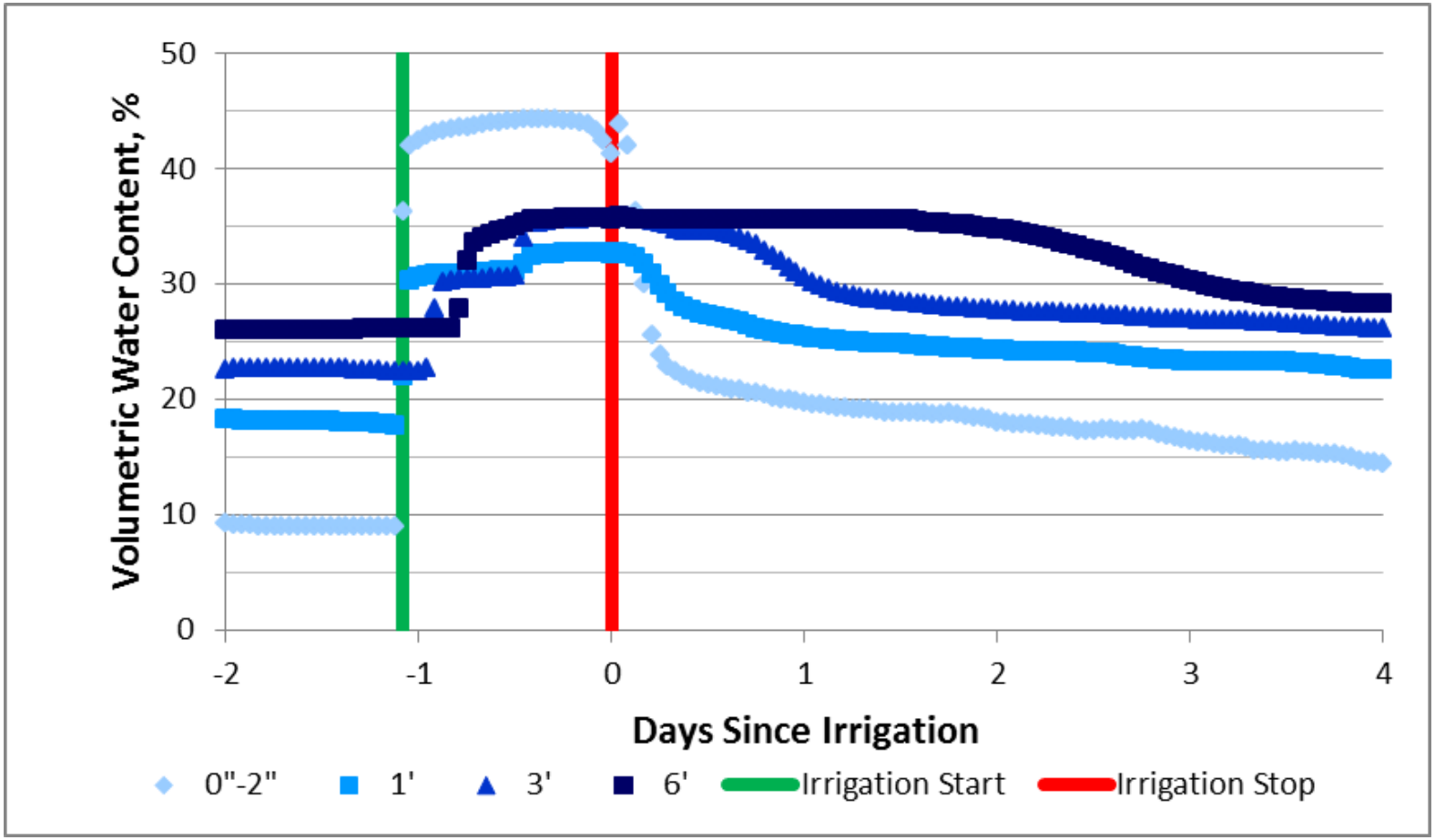
Level 2 Monitoring Data—July Irrigation 47_L2, 80% Sand



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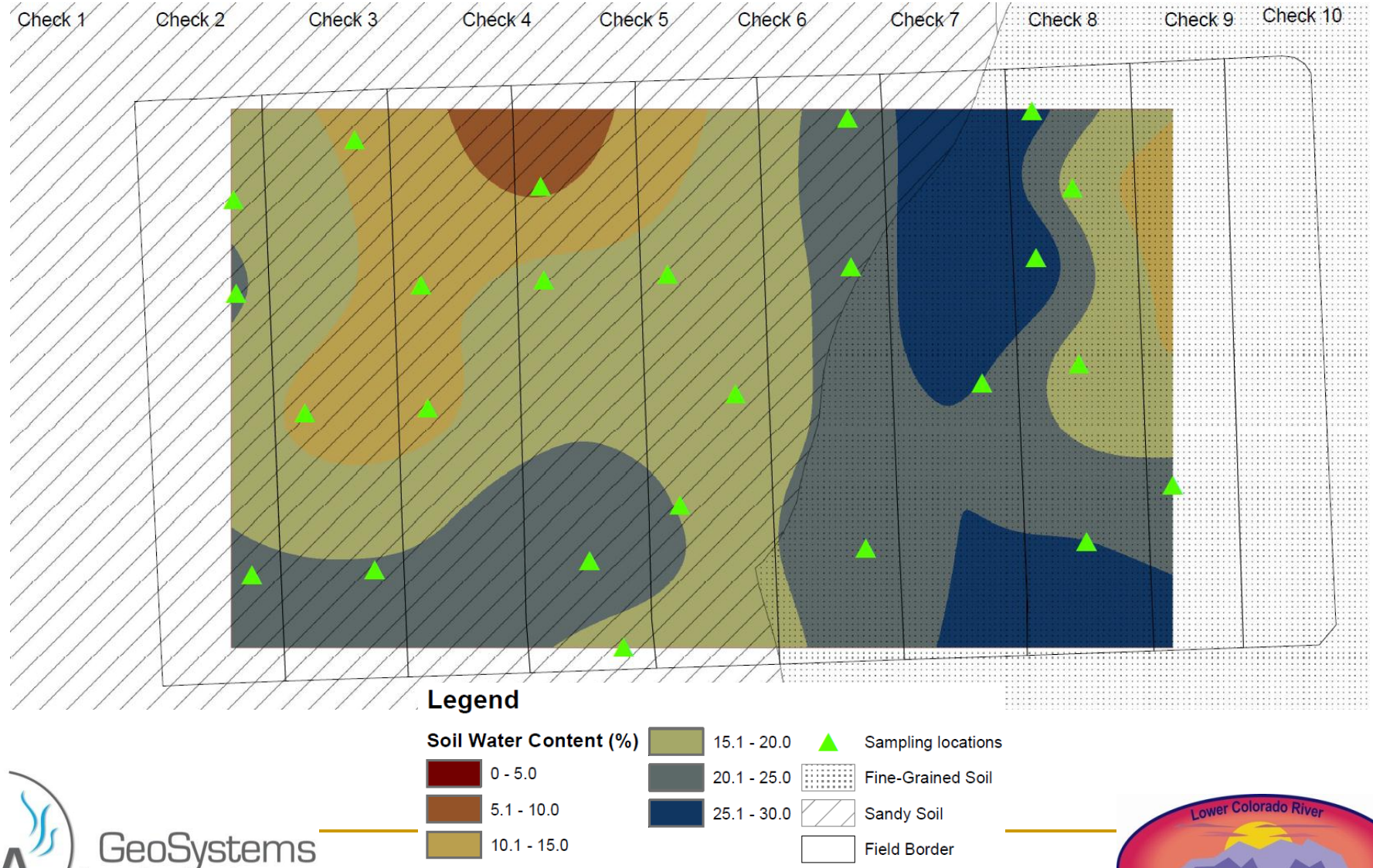
July 2012 Average Surface Soil Moisture



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2013 Monitoring

- Determine soil moisture and irrigation efficiency throughout the avian breeding season (through July).
- Evaluate evapotranspirative demand and soil moisture maintenance.
- Analyze monitoring density needed.
- Model irrigation efficiency and alternate irrigation scenarios

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Applications

- Soil moisture and irrigation monitoring applications:
  - Use data to manage irrigation frequency and maintain target soil moisture.
  - Determine irrigation distribution.
  - Determine success of management actions in achieving desired soil moisture and irrigation targets.
  - Determine soil moisture distribution in known habitat.

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