



COLUSA AND GLENN GROUNDWATER AUTHORITIES

# **Colusa Subbasin**

## Joint Technical Advisory Committee

### GSP Development

10/16/2020

October 16, 2020

# Discussion Topics

- GSP Development Timeline
- Draft Sustainability Goal and Undesirable Results Statements
- Hydrogeologic Investigation
- Well Monitoring Pilot Program
- Groundwater Dependent Ecosystems

## **4.a. GSP Development Timeline**

# GSP Development Timeline

- Roadmap for GSP completion
- Integrates GSP Technical Components with Outreach/Engagement Activities
  - TAC
  - GSA Boards
  - Public
- Regular (i.e. monthly) meetings anticipated for TAC and GSA boards with targeted, broader public outreach activities

# Draft GSP Development Timeline

GSP Component	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22
Basin Setting		Draft HCM, GW Conditions, and Water Budget GSP Sections			TAC Review		Public Review	GSA Board Review	Management Areas								
Sustainable Management Criteria (SMCs)	Draft SG and UR Statements			Draft MTs & MOs			Updated MTs and MOs		Public Review	Updated Sustainable Yield							
Monitoring			Draft Representative MN			Updated Representative MN			Public Review								
Projects and Management Actions (PMAs)			Initial PMA Identification and Assessment			Screening Analysis		Alternatives Analysis		Identify PMA mix and analyze uncertainty							
GSP Document Preparation and Adoption								Admin. Info., Plan Area, Notice & Comm. Monitoring Networks		Exec. Sum., SMC, PMAs, Plan Implementation		Public Review Draft GSP		Final GSP			
Funding Mechanisms			Initial Review and Comparison				Detailed Evaluation										
Hydrogeologic Investigation		Planning			Data Collection				Analysis and Incorporation into GSP								
Well Monitoring Pilot Program	Program Development				Advertising and Enrollment			Implementation and Analysis									

# Outreach and Engagement Primary Roles

- TAC
  - Information dissemination
  - Ongoing technical feedback and recommendations to GSA boards
- GSA Boards
  - Information dissemination
  - Policy decisions
- Public
  - Information Dissemination
  - Feedback to inform TAC, GSA Boards, GSA staff, and consultants

# TAC

- Monthly Meetings Anticipated
- Focus on Technical Components
- Key Items
  - Minimum Thresholds and Measurable Objectives
  - Project and Management Action Identification and Evaluation
  - Financing for GSA Operations and Implementation of Projects and Management Actions



# GSA Boards

- Monthly Meetings Anticipated
- Focus on Policy Components
- Key Items
  - Minimum Thresholds and Measurable Objectives
  - Project and Management Action Identification and Evaluation
  - Financing for GSA Operations and Implementation of Projects and Management Actions
  - GSP Review and Adoption



# Public (Workshops/Webinars/Etc.)

- Periodic Meetings at Key Milestones
- Information Dissemination and Input Gathering
  - Sustainability Goal and Undesirable Results Statements
  - Minimum Thresholds and Measurable Objectives
  - Identified Projects and Management Actions
  - Selected Projects and Management Actions

# Draft GSP Development Timeline and Outreach

GSP Component	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22
Basin Setting		Draft HCM, GW Conditions, and Water Budget GSP Sections			TAC Review		Public Review	GSA Board Review	Management Areas								
Basin Setting Outreach									★								
SMC	Draft SG and UR Statements			Draft MTs & MOs			Updated MTs and MOs		Public Review	Updated Sustainable Yield							
SMC Outreach				★			★		★								
Monitoring			Draft Representative MN			Updated Representative MN			Public Review								
Monitoring Outreach							★		★								
PMA			Initial PMA Identification and Assessment			Screening Analysis		Alternatives Analysis		Identify PMA mix and analyze uncertainty							
PMA Outreach				★													
GSP Document Preparation and Adoption								Admin. Info., Plan Area, Notice & Comm. Monitoring Networks		Exec. Sum., SMC, PMAs, Plan Implementation		Public Review Draft GSP		Final GSP			
GSP Outreach												★					
Funding Mechanisms			Initial Review and Comparison				Detailed Evaluation										
Hydrogeologic Investigation		Planning			Data Collection				Analysis and Incorporation into GSP								
Well Monitoring Pilot Program	Program Development				★	Advertising and Enrollment		Implementation and Analysis									

10/16/2020

Colusa Subbasin Joint TAC

10

# Draft Timeline for Public Workshops

- December 2020
  - Overview of SGMA and GSA Processes to Date
  - Basin Setting Findings and Approach to Develop Draft SMC
  - Implications of SMC to Beneficial Users
  - Potential Projects and Management Actions
- January 2021
  - Well Monitoring Pilot Program Workshop

# Draft Timeline for Public Workshops

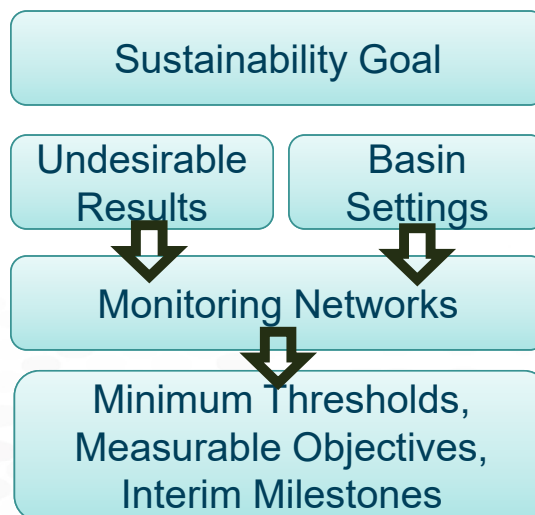
- March 2021
  - Finalization of Basin Setting GSP Chapter
  - Update on SMC Development
- May 2021
  - Potential Discussion of Management Areas
- August 2021
  - Release of Public Draft GSP

## **4.b. Draft Sustainability Goal and Undesirable Results Statements**

# Overview of Discussion of Sustainable Management Criteria

- Relationship of SGMA terms
- Sustainability Goal
- Undesirable Results Statements
- TAC Discussion:
  - Sustainability goal
  - Undesirable results statements
- Approach to Monitoring
- Draft Approaches to Monitoring and Thresholds
- TAC Discussion:
  - Approach to to monitoring and threshold considerations

# Relationship of SGMA Terms



For Each:





# Sustainability Goal

## What and Why

- §354.24 – “Each Agency shall establish in its Plan a sustainability goal for the basin that culminates in the absence of undesirable results within 20 years of the applicable statutory deadline.

The Sustainability Goal is an overarching statement that encompasses the goal of the entire Groundwater Sustainability Plan, providing a qualitative description of the objectives and desired conditions in the Subbasin. It is supported by other sustainable management criteria, including undesirable results, minimum thresholds, measurable objectives and interim milestones

# Sustainability Goal

## Draft Goal

- The sustainability goal for the Colusa Subbasin GSP is to maintain, through a cooperative and partnered approach, locally managed sustainable groundwater resources to preserve, and enhance the economic viability, social well-being and culture of all Beneficial Uses and Users, including domestic, agricultural, municipal, environmental, tribal, and industrial, without experiencing undesirable results by managing use within the sustainable yield.

# Undesirable Result Statements

## What They Are

- Considers stakeholder input
- Phrased broadly to meet regulations “significant and unreasonable effects...caused by groundwater conditions” (354.26)
- Drives monitoring network, thresholds, projects, and management actions portions of GSP

# Undesirable Results Statements

## Draft Statements

- Levels
  - The undesirable result for the chronic lowering of groundwater levels is a result that would cause significant and unreasonable reduction in the long-term viability of beneficial uses and users over the planning and implementation horizon of this GSP.
- Storage
  - The undesirable result for the reduction of groundwater in storage is a result that would cause significant and unreasonable reduction in the long-term viability of Beneficial Uses and Users over the planning and implementation horizon of this GSP.

# Undesirable Results Statements

## Draft Statements

- Seawater Intrusion
  - Seawater intrusion is not an applicable sustainability indicator, because seawater intrusion is not present and is not likely to occur in the Colusa Subbasin due to the distance from the Pacific Ocean, bays, deltas, or inlets.
- Language used for seawater intrusion is from DWR's *Sustainable Management Criteria Best Management Practices* (November 2017)
- Subsurface salinity falls under the groundwater quality sustainability indicator

# Undesirable Results Statements

## Draft Statements

- Quality
  - The undesirable result for degraded water quality is a result stemming from a causal nexus between groundwater quantity related activities, such as groundwater extraction or groundwater recharge, and groundwater quality that causes significant and unreasonable effects to Beneficial Uses and Users including reduction in the long-term viability of these uses over the planning and implementation horizon of this GSP.
- “Causal Nexus” is used to limit GSA’s responsibility where it overlaps with existing issues, is naturally occurring, or is being covered by other programs

# Undesirable Results Statements

## Draft Statements

- Land Subsidence

- The undesirable result for land subsidence is a result due to groundwater extraction that causes a significant and unreasonable reduction in the viability of the use of critical infrastructure over the planning and implementation horizon of this GSP.

- Depletion of Interconnected Surface Water

- The undesirable result for depletions of interconnected surface water is a result that causes significant and unreasonable adverse effects on Beneficial Uses and Users of interconnected surface water within the Colusa Subbasin over the planning and implementation horizon of this GSP.



# Discussion: Sustainability Goal

## Draft Goal

- The sustainability goal for the Colusa Subbasin GSP is to maintain, through a cooperative and partnered approach, locally managed sustainable groundwater resources to preserve, and enhance the economic viability, social well-being and culture of all Beneficial Uses and Users, including domestic, agricultural, municipal, environmental, tribal, and industrial, without experiencing undesirable results by managing use within the sustainable yield.

# Discussion: Undesirable Results Statements

- Levels
- Storage
- Seawater Intrusion
- Quality
- Subsidence
- Depletions of Interconnected Surface Water

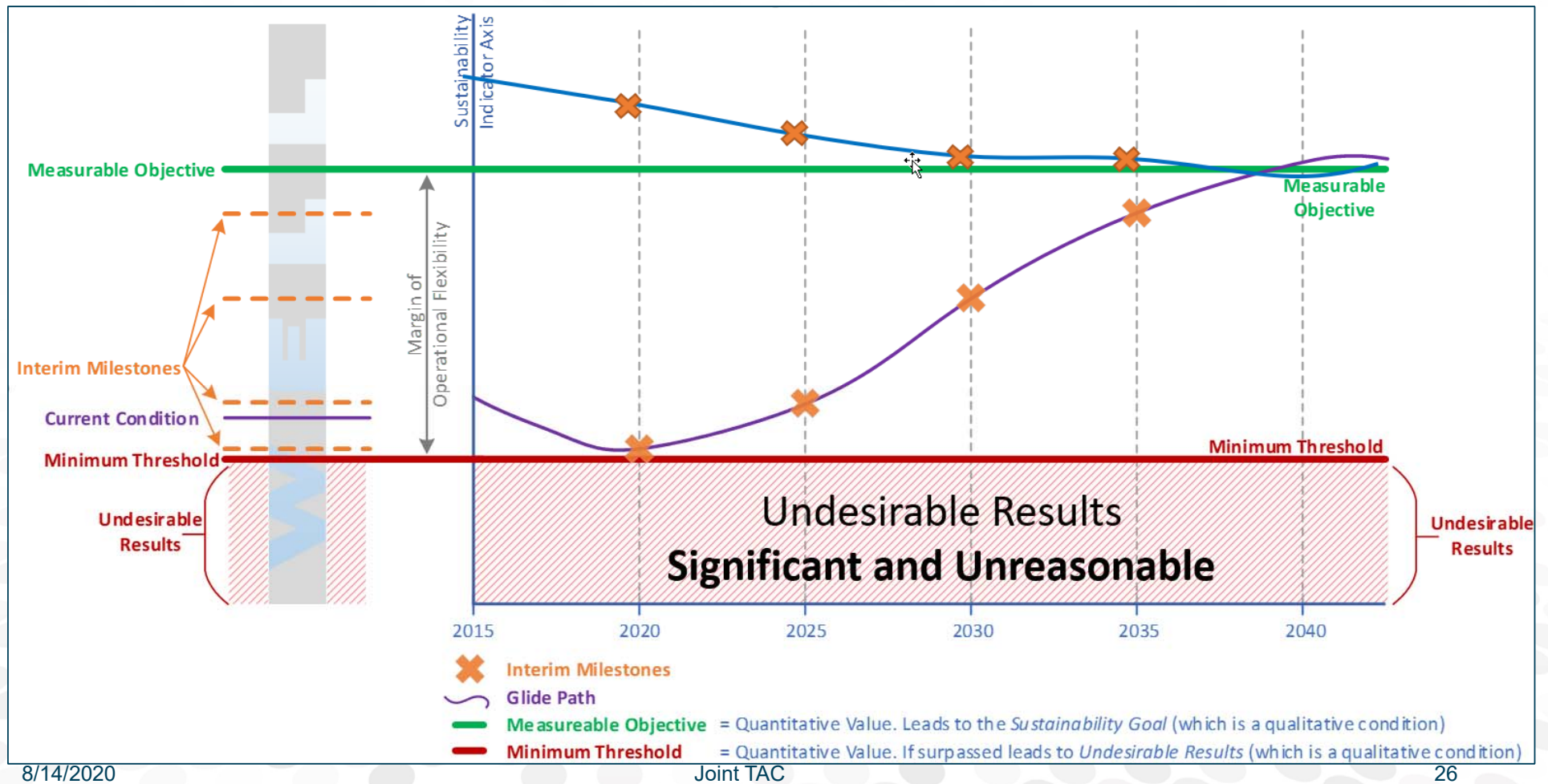


# Next Steps: Develop Thresholds

## Approach

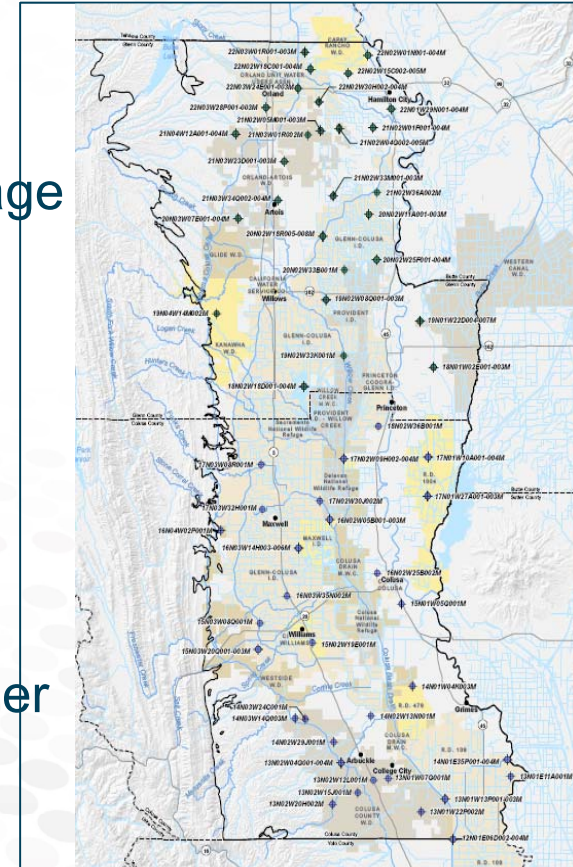
- Select monitoring network for each sustainability indicator
  - Select network for proxy monitoring (using measurement for levels as a replacement for another sustainability indicator)
- Develop minimum thresholds for each sustainability indicator
- Develop measurable objectives for each sustainability indicator
- Develop interim milestones (if needed) for each sustainability indicator

# Thresholds Explanation



# Monitoring Networks

- Monitors wells that have been specifically designated for monitoring by the GSA
- Does not include all wells in the basin (uses a small percentage of wells)
- Need to be monitored for levels, quality or subsidence consistently
- Monitored by Agencies, Districts, Counties, GSA, or in-basin stakeholders after agreement with the GSAs
- Only monitors production wells (e.g., irrigation, domestic) for levels or quality if an agreement is present between well owner and GSAs for use of that particular well as a monitoring well.
- Well production volumes and how to measure or estimate pumping are addressed in the Projects and Management Actions portion of the GSP





# Proposed Monitoring Networks and Proxies

Sustainability Indicator	Proposed Measurement Process
Groundwater Levels	Groundwater Elevations
Groundwater Storage	Groundwater Elevations
<del>Seawater Intrusion</del>	<del>Location of isocontour</del>
Degraded Groundwater Quality	???
Land Subsidence	Survey Points
Depletion of Interconnected Surface Waters	Groundwater Elevations

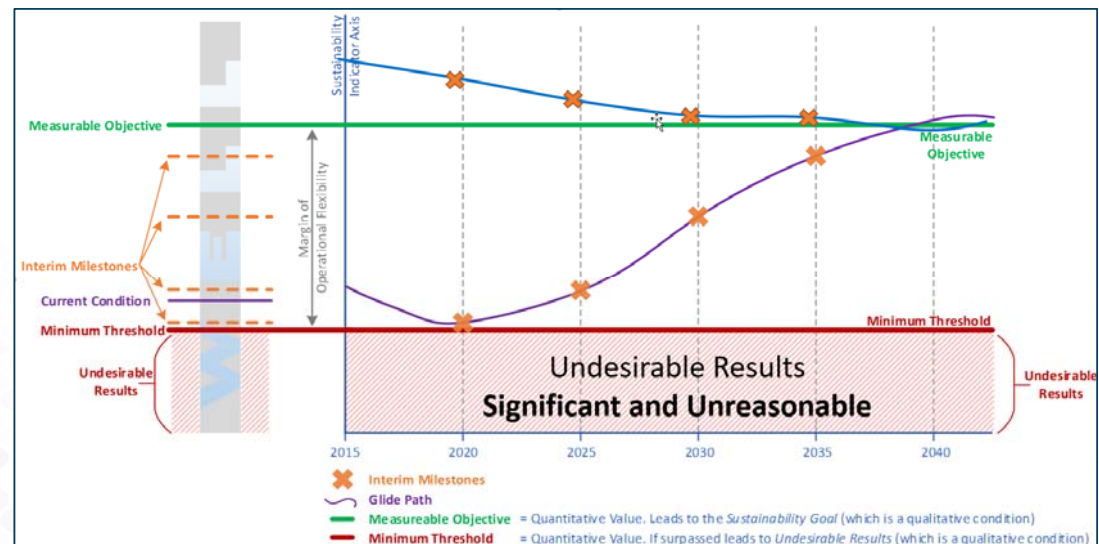
# Minimum Thresholds

- §351 (t): “Minimum threshold” refers to a numeric value for each sustainability indicator used to define undesirable results”
- Elevation set at a monitoring well so that when conditions are worse than that elevation in a % of the network, it indicates an undesirable result is occurring
- Are set at each point in a representative monitoring network for each sustainability indicator using a consistent methodology – actual values will vary by location to match local conditions



# Minimum Thresholds

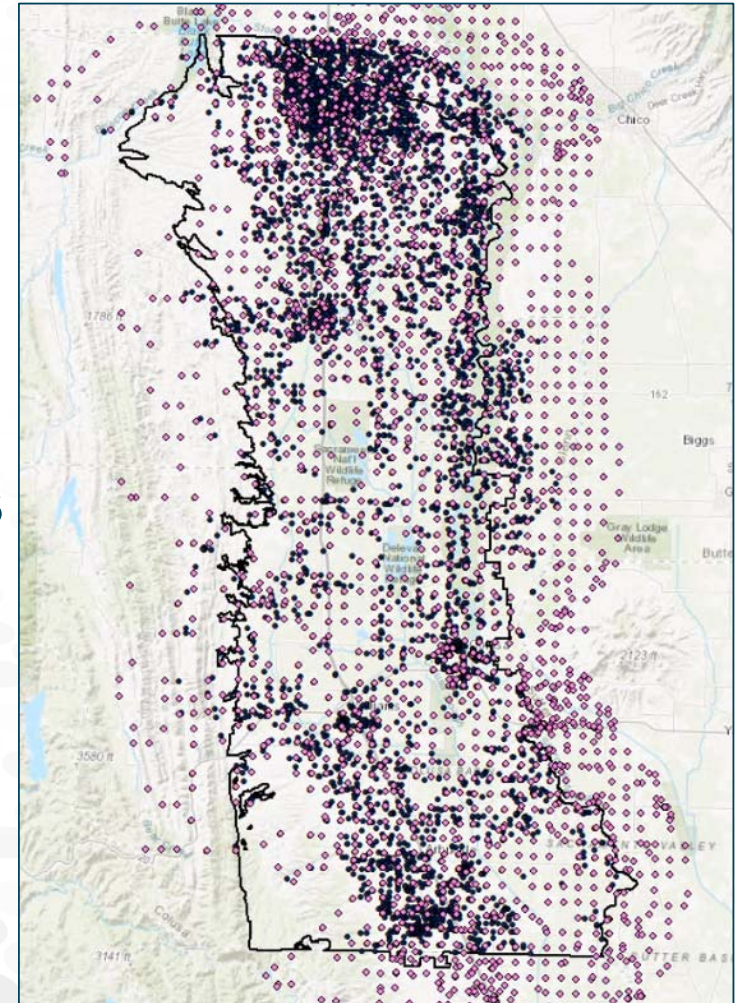
- Are set using a specific methodology that is applied to each monitoring well.
- Methodology includes consideration of spatial location and changing conditions across the Subbasin.



# Minimum Threshold Considerations

## Levels and Storage

- Well infrastructure
  - Well Completion Reports (WCRs)
    - Used to estimate well infrastructure near monitoring wells
    - Located by Section (1 Square Mile)
- Groundwater Dependent Ecosystems
  - Analysis is underway
- Conditions at January 1, 2015
- Historical low measurements
- Range of measurements



# Minimum Threshold Considerations

## Quality

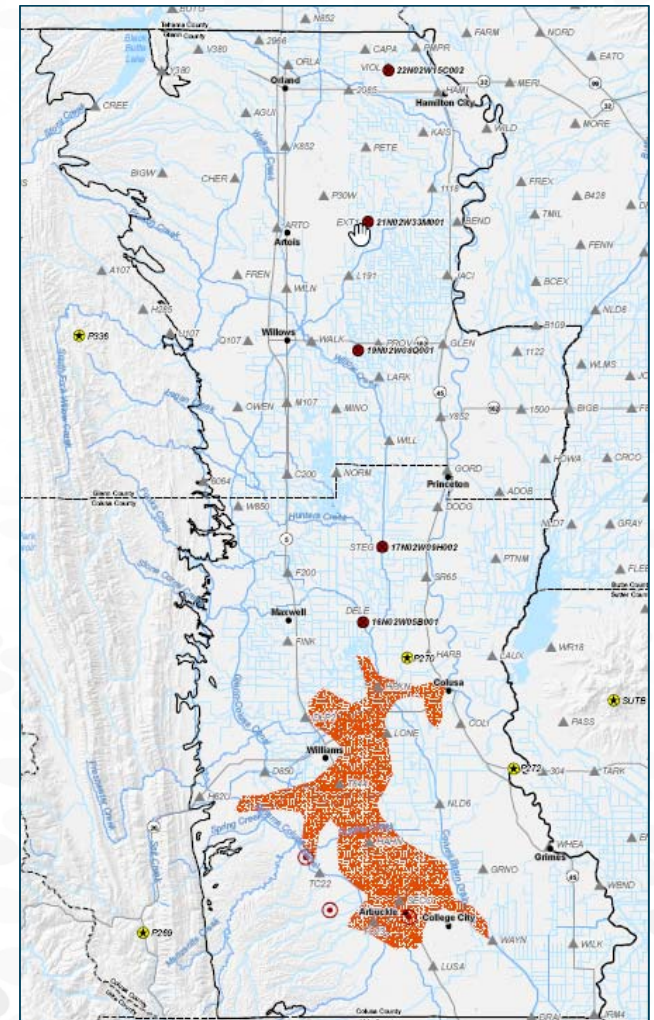
- Monitoring Network?
- Constituents of Concern?
- Maximum Contaminant Levels?
- Historical low measurements ?
- Range of measurements?
- Needs TAC discussion



# Minimum Threshold Considerations

## Land Subsidence

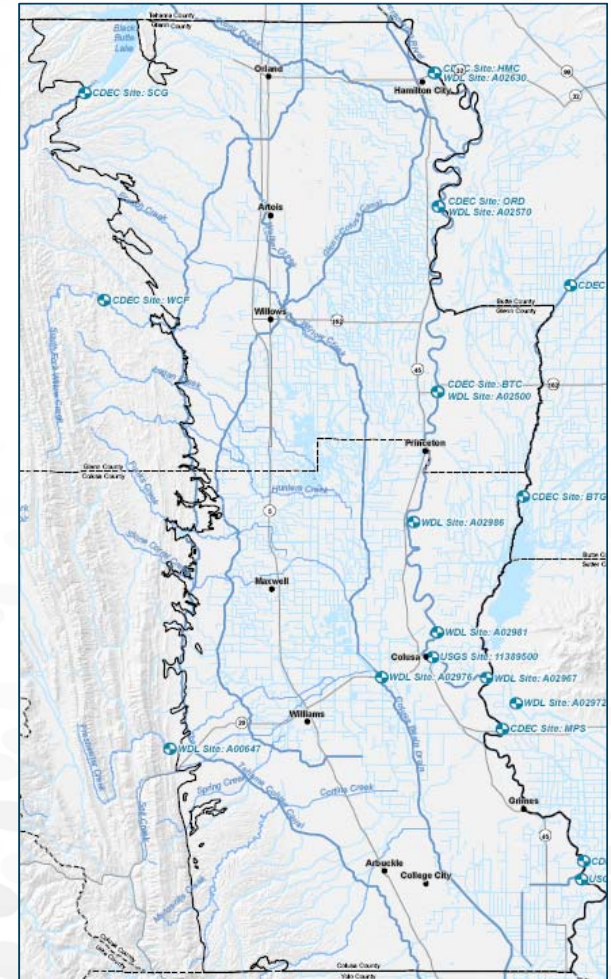
- Ground surface infrastructure
  - Canals
  - Flood channels
  - Other?



# Minimum Threshold Considerations

## Depletion of Interconnected Surface Water

- Estimates of depletions to be completed by numerical model
- Depletions to be estimated based on groundwater levels
- Select levels that match acceptable depletions
- May not apply to streams that are used for water conveyance or drainage



# Discussion: Minimum Threshold Considerations

- Levels
- Storage
- Seawater Intrusion
- Quality
- Subsidence
- Depletions of Interconnected Surface Water

## **4.c. Hydrogeologic Investigation**

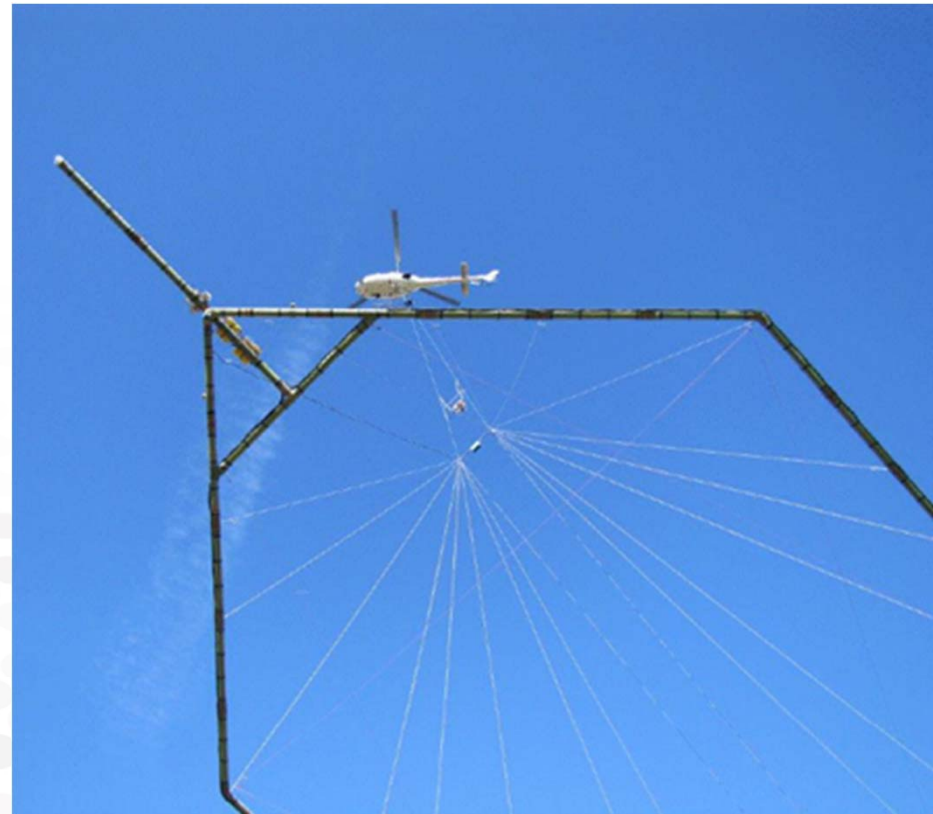


# Hydrogeologic Investigation

- Purpose
  - Fill data gaps in the GSP Basin Setting Section
  - Reduce uncertainty in development of management areas (if any) and SMCs
  - Support assessment of interbasin conditions
- Overall Scope
  - Plan for investigations and data analysis
  - Implement investigations
  - Assess investigation results
  - Integrate results and findings in the GSP
- Approximately \$314,000 budgeted
- Complete before October 2021

# Airborne Electromagnetic (AEM) Survey

- **Scope:** As an enhancement to DWR's planned AEM survey, drill and geophysically log borings to better characterize the western basin
- **Objectives:** Assess depth to bedrock, depth to water, subsurface faults influencing groundwater conditions
- **Potential Costs:** \$40-60K per location
- **Schedule:**
  - Needs to be completed before DWR flies the AEM survey
  - Inclusion in GSP depends on DWR's schedule

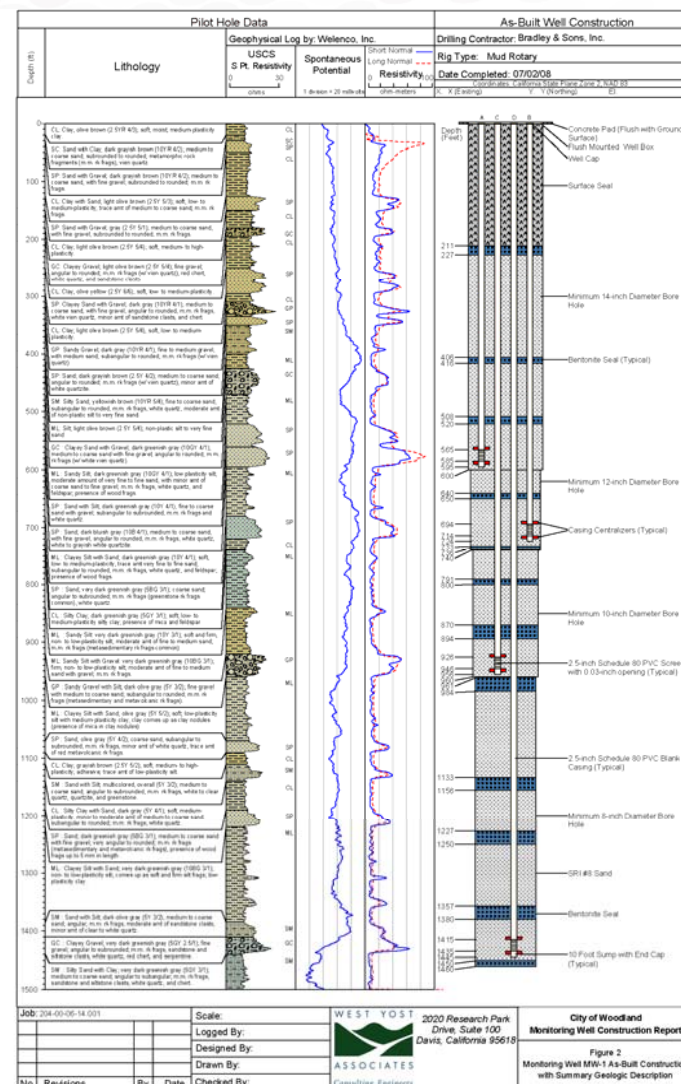


# Dedicated Monitoring Wells

- **Scope:** Construct and survey dedicated monitoring wells
- **Objectives:** Replace nondedicated network wells, fill data gaps, support SMC development
- **Potential Costs:** \$200K per location
- **Schedule:**
  - Depends on SMC development
  - Construction in late spring or early summer 2021 is feasible
  - Requires ongoing maintenance and monitoring

10/16/2020

Colusa Subbasin Joint TAC



39



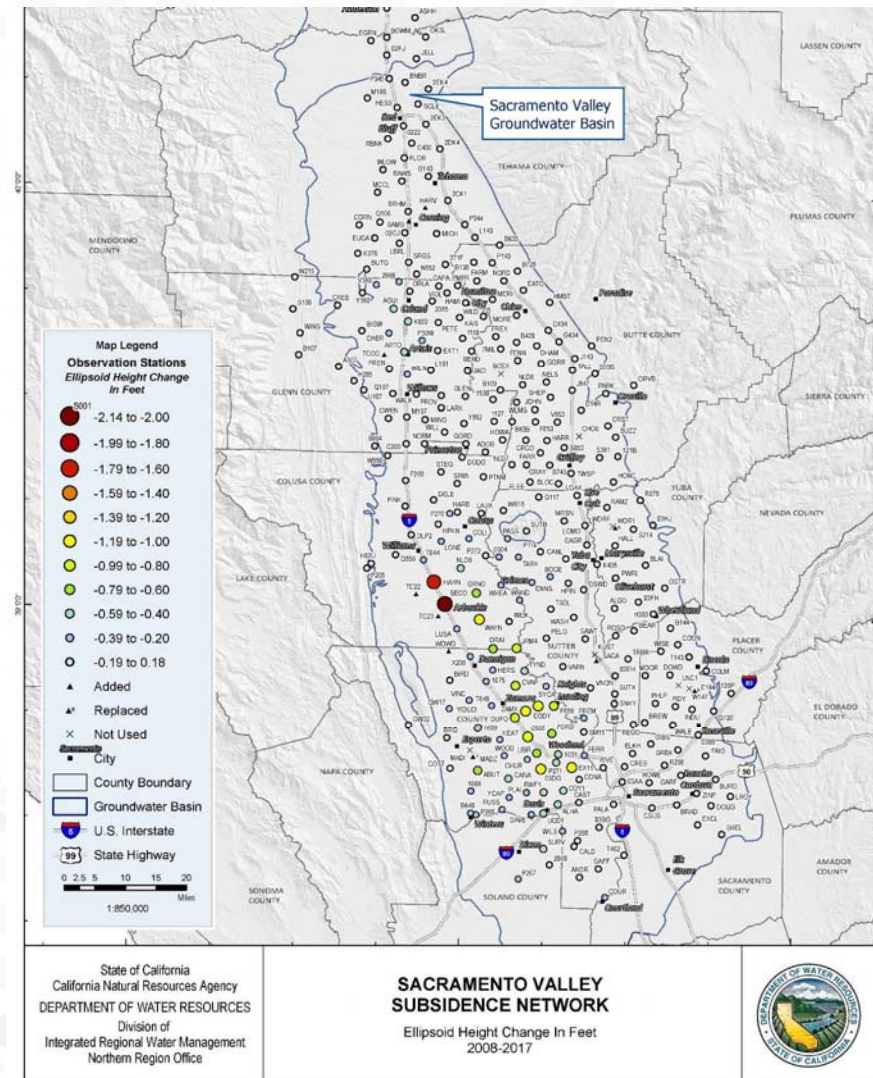
# Stream Gages

- **Scope:** Construct stream gages and develop rating curves
- **Objectives:** Fill data gaps critical to model and water budget
- **Potential Costs:** \$25K per location
- **Schedule:**
  - Depends on model and water budget results
  - Construction in late spring or early summer 2021 is feasible
  - Requires ongoing maintenance and monitoring



# Land Subsidence Benchmarks

- **Scope:** Construct and Survey land subsidence benchmarks
- **Objectives:** Fill data gaps near critical infrastructure in susceptible areas
- **Potential Costs:** \$25K per location
- **Schedule:**
  - Construction in late spring or early summer 2021 is feasible
  - Requires ongoing maintenance and monitoring
  - Usable results depend on resurvey of the Sacramento Valley network



## **4.d. Well Monitoring Pilot Program**



# Well Monitoring Pilot Program

- Encourage Participation by Groundwater Users and Provide Basis to Evaluate Potential Basin-Wide Implementation
- Monitoring of Pumping and Water Levels
- Approximate Budget of \$60k
- Initial Implementation for 2021 Growing Season



# Selection Criteria

- Willing to Share Data Publicly
- Location
  - Desire for sites in both Glenn and Colusa Counties
- Site Characteristics
  - Desire for pressurized systems
- Cost
  - Desire for sites with existing, properly installed flowmeters, limited additional investment by GSA

# Incentives

- Eligible Costs
  - Data Logger and Telemetry
  - Pressure Transducers
  - Flow Meters
- Limit on Amount Paid for Each Item
- Grant Funds Cannot Be Paid to Participants Directly



Pictured: Outpost Wideye endpoint hardware, website analysis tools & Smart phone installation tool.



# Next Steps

- Prepare Draft One-Page Flyer and Program Description
- Review/Approval by TAC
- Review/Approval by GSA Boards
- Advertisement, Selection and Enrollment
- Implementation

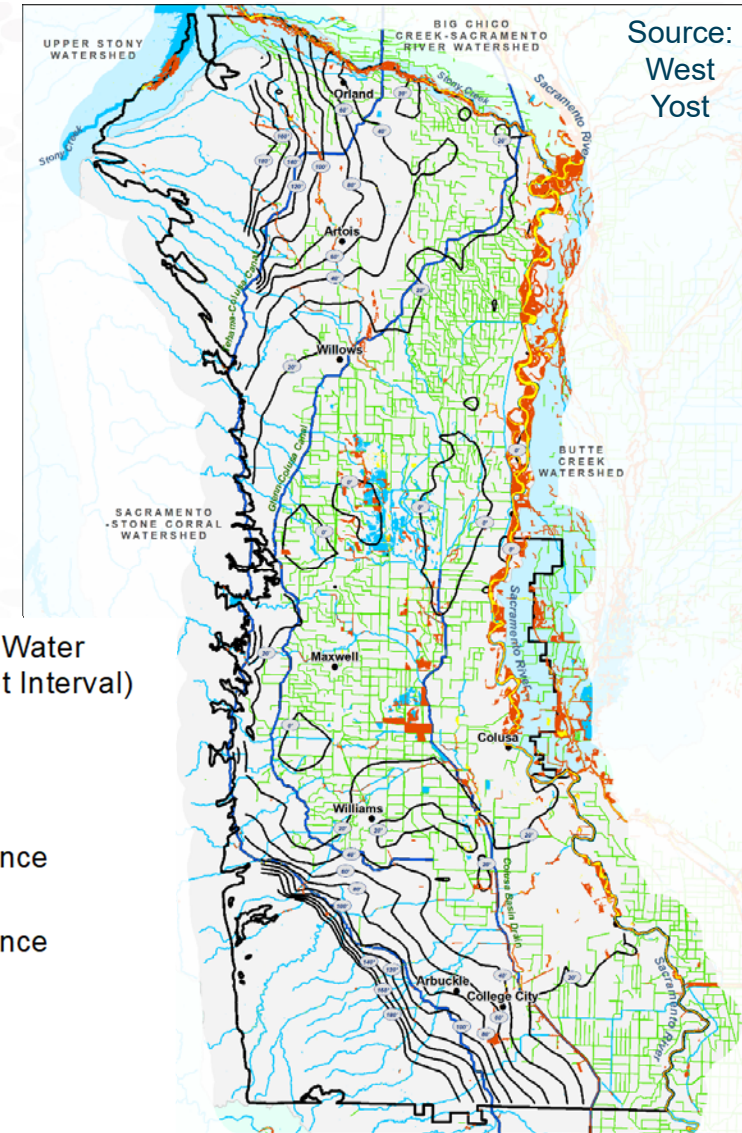
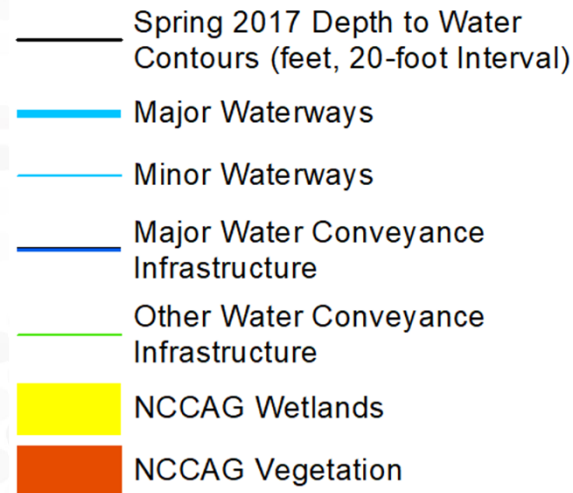
## **4.e. Groundwater Dependent Ecosystems**

# Groundwater Dependent Ecosystems (GDEs)

- *Ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface*
- Must be identified in Basin Setting chapter of GSP
- Must be considered in identifying Undesirable Results and Minimum Thresholds and in Monitoring

# Preliminary GDE Mapping

- Relatively few wetlands mapped
  - mostly in riparian corridors
- 2,795 polygons, 17,748 acres
- Major vegetation categories
  - Cottonwood ~ 31%
  - Bulrush ~22%
  - Willows ~15%
  - Valley Oak ~13%
  - Others ~18% (including Arundo ~4%)

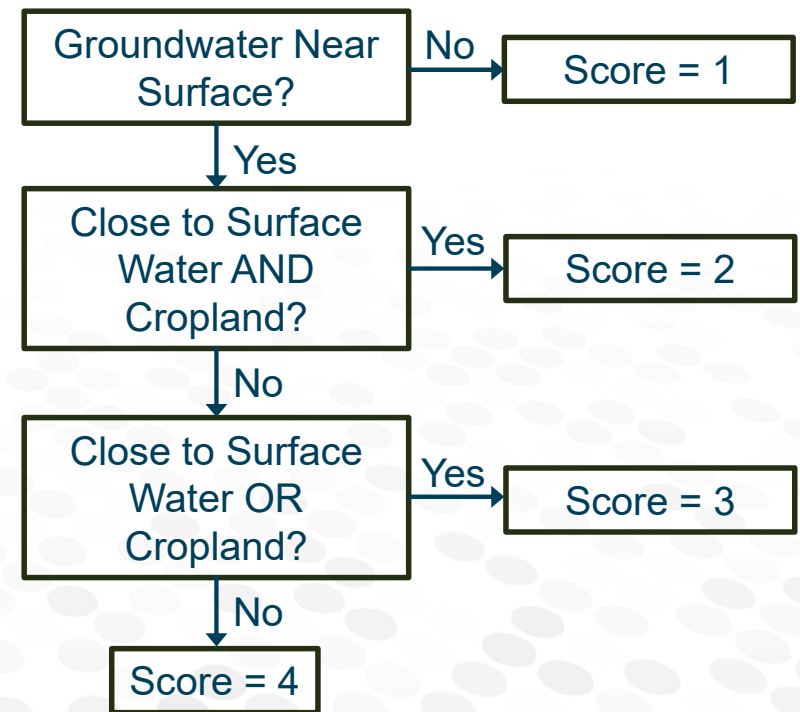


Source:  
West  
Yost



# Initial GDE Ranking

- Compiled Additional, Supporting Information
  - Depth to groundwater
  - Proximity to surface water bodies
  - Proximity to irrigated cropland
- Developed Preliminary Scoring Criteria
  - Range from 1 to 4
  - 1 = less likely
  - 4 = more likely

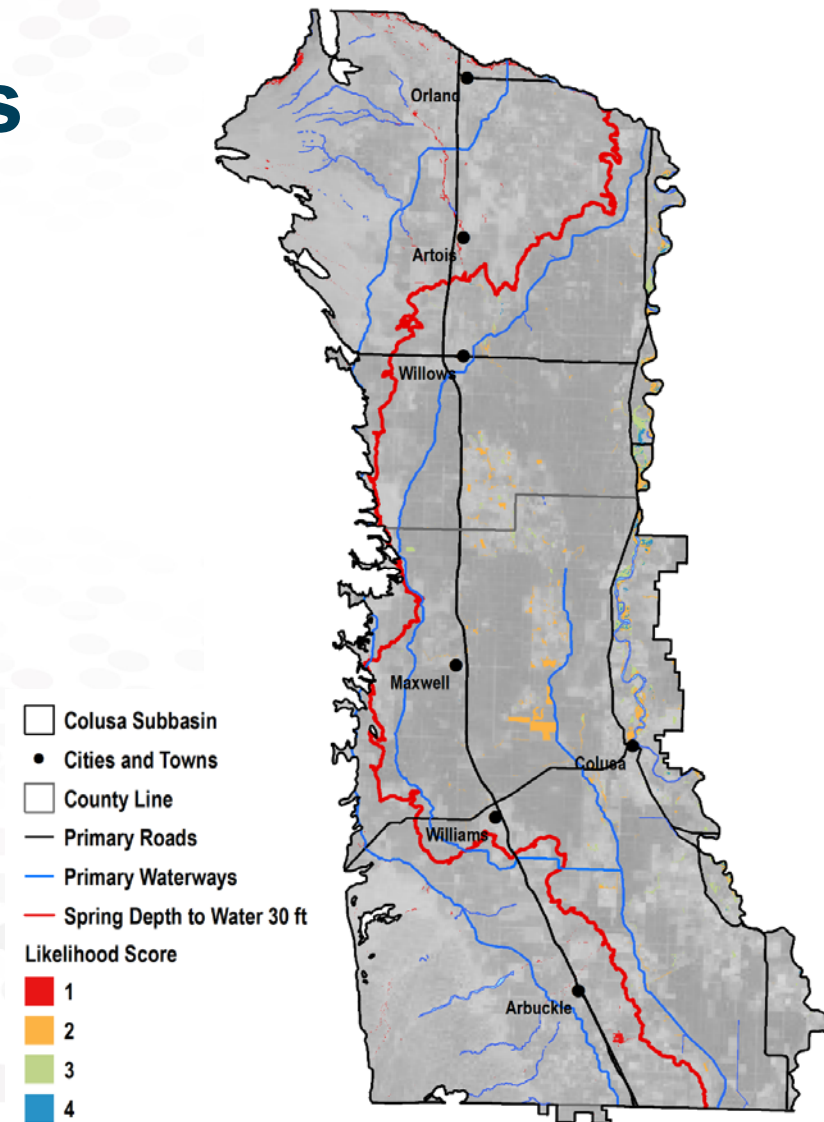




# Preliminary Scoring Results

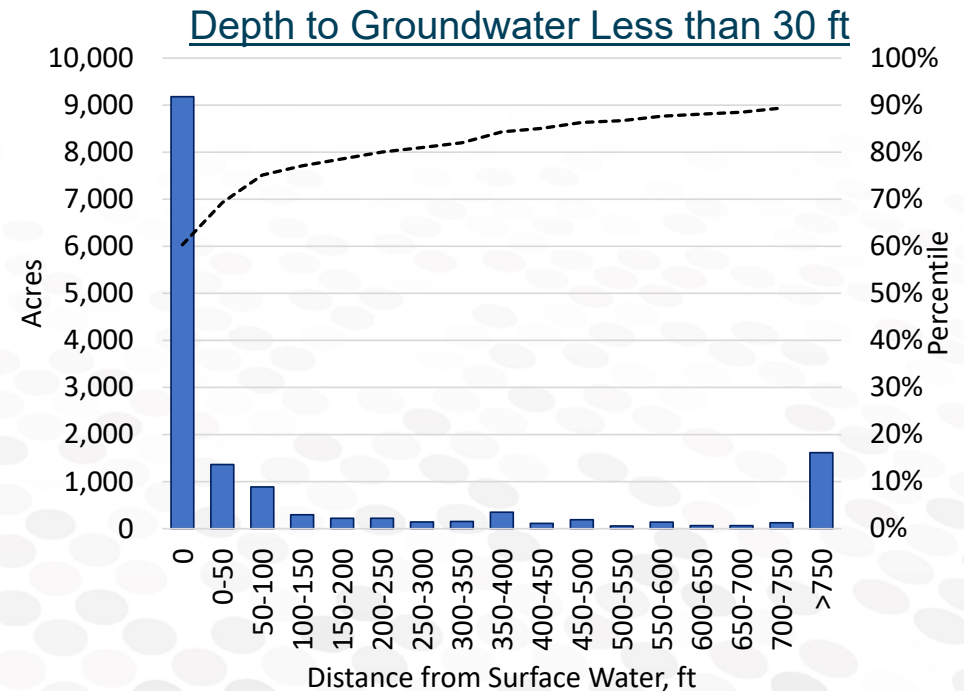
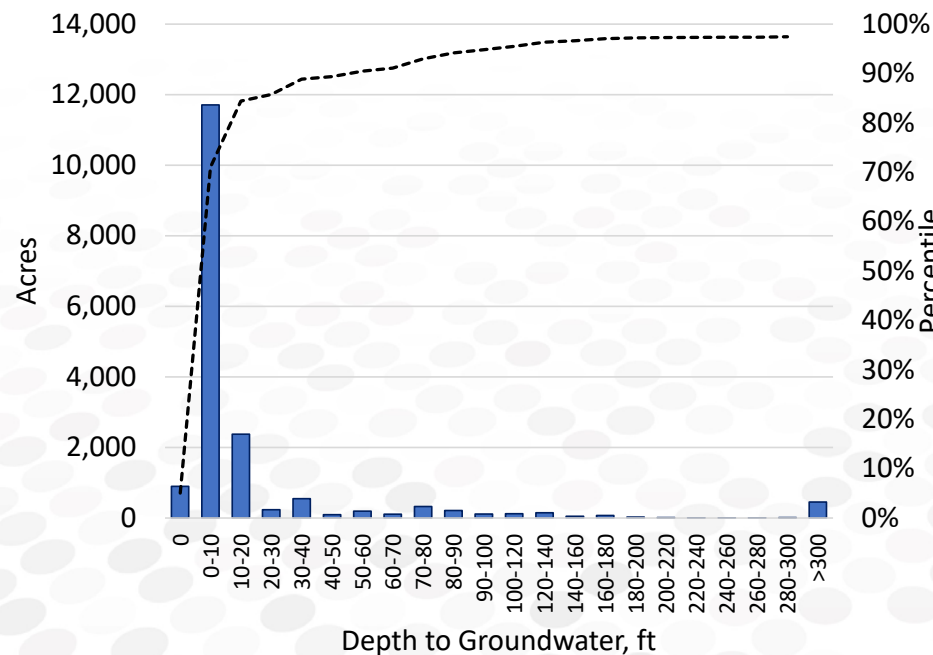
- Polygons and Acres by Scoring Category:

Score	Polygons	Acres
1 (less likely)	798	2,543
2	634	8,708
3	1,091	5,578
4 (more likely)	272	920
Total	2,795	17,748



# Evaluation of Sensitivity to Ranking Assumptions

- Evaluated Range of Depth to Groundwater and Proximity to Surface Water Values



# Observations and Potential Next Steps

- Observations
  - Results not highly sensitive to assumptions
    - ~90% of potential GDEs have groundwater within 30 feet of surface
    - ~75% of potential GDEs with accessible groundwater are within 100 feet of potential surface water sources
  - Recommend using ranking approach to prioritize potential GDEs for further review
- Potential Next Steps
  - Review vegetation types and root depths to further refine ranking
  - Consider outreach to further refine
  - Incorporate additional refinements and monitoring into GSP implementation