



COLUSA SUBBASIN

## Meeting Summary

**Colusa Subbasin SGMA-Series  
Sustainable Groundwater Meeting  
Colusa Groundwater Authority / Glenn Groundwater Authority  
December 9, 2020**

### **Attendees:**

Attachment A presents Colusa Groundwater Authority (CGA) and Glenn Groundwater Authority (GGA) Board members, staff, and consultant team attendees. In addition to these agency representatives, 49 members of the public participated in the meeting via zoom. Additionally, viewing was possible on Facebook Live.

### **Introduction:**

This meeting followed the agenda outlined in Attachment B. At the start of the meeting, Dave Ceppos of Sacramento State's Consensus and Collaboration Program, (facilitator), introduced the agenda, and then Colusa County Supervisor and CGA Chair, Denise Carter. Supervisor Carter opened the meeting with introductory comments, highlighting the importance of public input on the Colusa Subbasin Groundwater Sustainability Plan (GSP) process.

### **Overview of SGMA and GSP Preparation/Timeline Presentation:**

The facilitator introduced the first presenter, Byron Clark, of Davids Engineering, (primary consultant and project manager of the GSP technical team on behalf of the CGA and GGA). Mr. Clark presented an overview of the Sustainable Groundwater Management Act (SGMA) and GSP Preparation and Timeline (Attachment C).

Mr. Clark described key legislative and regulatory deadlines established by SGMA. He then discussed who is affected by SGMA and potential implications of State Water Resources Control Board intervention if the Colusa Subbasin fails to comply. Required components of the Groundwater Sustainability Plan (GSP) were discussed, as well as the current status of GSP development and planned schedule of releasing draft Basin Setting chapter of the Plan this spring, followed by a full draft of the GSP in late summer/early fall.

### **Question and Answer Segment:**

Upon conclusion of the presentation, the facilitator opened the floor for public comment. There was none at that time.

**Colusa Subbasin Setting and Conditions Presentation:**

The facilitator introduced the second presenter, Ken Loy of West Yost Associates, part of the technical team. Mr. Loy presented on the Colusa Subbasin Setting and Conditions (Attachment C).

Specifically, Mr. Loy described the Hydrogeologic Conceptual Model (HCM) for the Colusa Subbasin, discussed historical and current groundwater conditions in the subbasin, and provided an overview of additional hydrogeologic investigations underway.

Discussion of the HCM included the horizontal and vertical extent of the subbasin and water movement within the subbasin and interactions with neighboring subbasins. Groundwater conditions described included groundwater elevations, groundwater quality, land subsidence, interconnected surface waters, and groundwater dependent ecosystems (GDEs). The hydrogeologic investigation currently underway is currently being planned and will be completed in 2021. The workplan has been discussed with the Joint Technical Advisory Committee and is also being developed in coordination with DWR.

**Question and Answer Segment:**

Upon conclusion of the presentation, the facilitator opened the floor for public comment. The following input was received at that time.

1. A member of the public posed the following question: Has the consultant team ground-truthed the freshwater aquifer depths across the basin? Due to the seawater aquifer under the subbasin's groundwater system, these depths are an important consideration. The interplay between the two has resulted in areas where there are no wells due to water quality being impacted by the saltwater.
  - Mr. Loy responded that the technical team is using a US Geological Survey map as a starting point and then filling in details as they become available. It is true that the depth of freshwater does vary based on local conditions and that the ancestral trapped seawater (known in technical terms as "connate water") is a challenge for some groundwater users in the basin. This subject is front and center for stakeholder input because it is important to gain more information on local conditions, which are not otherwise available. This has been a concern when considering where to drill wells in the area.
2. The aforementioned member of the public also raised concern of drinking water quality and availability in Colusa County including arsenic contamination. He provided (via email) a document outlining this issue entitled "Arsenic in California Drinking Water".
3. The facilitator asked the consultant team if the issue of connate water might be explored during the Well Monitoring Pilot Program.
  - Mr. Clark replied that it is possible that the issue of connate water will be explored during the pilot program because the focus is groundwater pumping

and groundwater levels at participating wells. However, it should be noted that due to the limitations of the pilot program, the number of participating wells will likely not be representative of the entire basin.

4. A member of the public posed the following question: What type of studies might be done with Proposition 68 funds?
  - Mr. Loy responded that there is a wide range of studies that may be completed with these funds. The consultant team has been considering coordination with the Department of Water Resources (DWR) on aerial electromagnetic (AEM) surveys as a means of collecting large amounts of data with an airborne instrument. Other possible studies may include additional monitoring wells, stream gauges, and subsidence benchmarks. The technical team is leveraging financing limits with other partners that may have additional funding or data collection capabilities.

### **Water Budgets Presentation:**

The facilitator reintroduced Mr. Clark, who presented on Water Budgets (Attachment C).

Mr. Clark provided an overview of water budgets, followed by presentation of draft historical and projected water budgets being developed for inclusion in the GSP. The overview included general water budget principles, an overview of water budget components required for the GSP (e.g. inflows, outflows, and change in storage), and a description of the technical approach to develop water budgets for the Colusa Subbasin. The approach relies on DWR's C2VSimFG Integrated Hydrologic Model and includes several refinements to better represent local conditions.

The historical water budget represents the 16-year period from October 1989 to September 2015, and indicates an average annual decrease in groundwater storage of approximately 28 thousand acre-feet per year (TAF/yr) over the historical period. Water budget components vary over time due to changes in land use, hydrology, available surface water supplies, and other factors, with surface water representing approximately 72% of the irrigation and domestic water supply. Although the recent drought suggests a possible supply demand imbalance, the projected water budgets, which consider a full 50-year representative hydrologic period, likely provide greater insight into conditions in the subbasin in the future.

Four baseline water budgets have been developed to support GSP development and implementation, including evaluation of potential Projects and Management Actions that may be need to achieve or maintain sustainability into the future. The scenarios include:

1. Current Conditions – Current land use and surface water supplies, 50 years historical hydrology
2. Future Conditions, no Climate Change – Current land use, modified to represent planned development; current surface water supplies, 50 years historical hydrology

3. Future Conditions, 2030 Climate Change – Current land use, modified to represent planned development; current surface water supplies, modified to represent 2030 climate change; 50 years historical hydrology, modified to represent 2030 climate change
4. Future Conditions, 2070 Climate Change – current land use, modified to represent planned development; current surface water supplies, modified to represent 2070 climate change; 50 years historical hydrology, modified to represent 2070 climate change

Primary differences between current and potential future conditions water budget baselines include the following:

- Increased groundwater pumping to meet irrigation demands resulting from climate change and corresponding increases in consumptive demands (i.e. evapotranspiration).
- Changes in other water budget components in response to increased pumping. For the 2070 climate change scenario, increased pumping is offset by increased losses from streams (48 TAF/yr), increased net inflows from neighboring basin (8 TAF/yr), and decreased groundwater storage (-6 TAF/yr).

The baseline water budgets indicate that multi-year wet and dry cycles should be considered in establishing Sustainable Management Criteria, and that potential Projects and Management Actions should consider a toolbox of options to provide flexibility to implement based on observed conditions (surface water supply augmentation, increased recharge, demand management) and accrual of benefits over time, in anticipation of dry cycles and associated impact on groundwater conditions.

**Question and Answer Segment:**

Upon conclusion of the presentation, the facilitator opened the floor for public comment. The following input was received at that time.

5. A member of the public posed the following question: Under the Bay-Delta Plan, aren't we going to have only 40-50% of the surface water we had in the past? Have you tracked how much water we lose from the basin through water transfers? How much do we pump for groundwater substitution? These do not appear to be included in the budget.
  - Mr. Clark responded that in regard to the Bay-Delta Plan, the technical team has had several discussions with the joint CGA and GGA Technical Advisory Committee about assumptions around surface water supplies. The SGMA regulations require that the projections be based on current water supplies, although there is a risk that surface water supplies could decrease in the future. These decreases are uncertain, so the technical team has not tried to speculate on this as part of this initial GSP development. The GSP will be updated every five years, so as the impacts of the Bay-Delta surface water demands are better understood, the basin water budget can be updated and used to adaptively update the GSP to address any potential effects or impacts on groundwater



management in the basin. As for water transfers, the model accounts for these in a couple of different ways. For groundwater substitution transfers, the pumping is specified in the model as an input at individual wells over the historical time period (information provided by DWR). For idling-based transfers, in developing the land-use inputs for the model, fallowing is accounted for during those idling years. Thus, the reduction in planted acres during those years is reflected in the water budgets in terms of reduced applied surface water in those areas, as well as potentially reduced recharge from those areas that would otherwise occur if they were irrigated.

6. A member of the public posed the following question: Do models show any significant variation in storage in some parts of the subbasin compared to others, and if so, would some areas have more issues than others?
  - Mr. Clark responded that yes, because the model is spatially discrete, it does allow us to simulate water levels and storage at a fairly fine scale. The changes in storage and water levels will vary across the basin based on the conditions of water demands and water supplies. As a result, some areas may have more issues than others depending on how “significant and unreasonable” are defined locally and how undesirable results are defined locally (as per the SGMA GSP regulations).
  
7. A member of the public posed the following question: Have zone water budgets been created at this point for sub areas of the basin and if not, are they are planned?
  - Mr. Clark responded, that yes, as part of quality control and development of the model, the consultant team has developed the 38 zones mentioned earlier in the presentation. In areas where the water budget has been developed for a particular water supplier, it is possible to extract the results and use that as a way of quality controlling the model and ensuring it is accurate at the local scale. As part of the GSP, water budgets must be reported at the basin-scale, not for individual subareas, although the tool would allow for that, so it is possible.

### **Sustainable Management Criteria Presentation:**

The facilitator introduced the third presenter, John Ayres, of Woodard & Curran, part of the technical team. Mr. Ayres presented on Sustainable Management Criteria – Terms, Requirements, and Process (Attachment C).

Mr. Ayres provided a presentation describing Sustainable Management Criteria (SMC) being developed as part of the GSP, which provide a basis for evaluating sustainability during Plan implementation. These criteria include general descriptions of what sustainability means for the Colusa Subbasin and include the Sustainability Goal and descriptions of Undesirable Results (adverse groundwater conditions to be avoided in the long term). Additionally, the SMC include specific monitoring information developed for each monitoring site in the basin to evaluate sustainability over time. These include Minimum Thresholds (MTs), Measurable Objectives (MOs), and Interim Milestones (IMs).

**Question and Answer Segment:**

Upon conclusion of the presentation, the facilitator opened the floor to public comment. The following input was received at that time.

8. A GGA Alternate Board Member posed the following question: Since conditions vary between wet years and dry years, will you take into account dry years vs wet years when setting thresholds? Can you set multiple thresholds?
  - Mr. Ayres responded that the CGA and GGA cannot set separate thresholds in the GSP, but each threshold will be set below what would be expected in a drought year. SGMA does not require conditions to be better than they were on January 1, 2015 (the date the law was enacted). That date is also a reasonable reference point for drought conditions since the state was in a drought at that time. The goal in the regulations is for a basin to avoid chronic overdraft of groundwater in both drought and wet periods. Thresholds should be low enough so that a drought period on its own does not show as an undesirable result.
  - Mr. Clark added that another consideration is setting the Measurable Objectives. Part of that consideration would include drought conditions. We should build in what is called in SGMA, a “Margin of Operational Flexibility”, which is a buffer between where we are aiming to manage the basin as far as water levels and what we think conditions might look like after a long-term drought.
  
9. A member of the public provided the following general input: The residents in Colusa County rely on groundwater for drinking water. The County faces issues around water availability, such as when domestic wells run dry in critically dry years as a result of competition with agricultural use. Domestic use should be the priority and that use should grow in a reasonable way. Colusa County also faces issues around maintaining groundwater quality in critically dry years. The U.S. Environmental Protection Agency standard for arsenic is ten parts per million, and there are areas that exceed that. This issue will continue due to the connate water coming out of Sutter Buttes and can't be mitigated. In the future, Colusa County may need water from the Sacramento River, which is very expensive, but may be a good investment.

**Projects and Management Actions Presentation:**

The facilitator reintroduced Mr. Clark, who presented on Projects and Management Actions (PMA) (Attachment C).

Mr. Clark provided an overview of Projects and Management Actions (PMAs) and their inclusion in the GSP as activities that can be implemented to meet the sustainability goal as part of plan implementation. General categories of PMAs include supply augmentation, groundwater recharge, demand reduction, and monitoring to improve understanding of the basin over time. Mr. Clark described the process for identifying, screening analysis, assessment of combinations of PMAs to address sustainability challenges, and final assessment of PMAs for inclusion in the GSP.

**Question and Answer Segment:**

Upon conclusion of the presentation, the facilitator opened the floor to public comment. The following input was received at that time.

10. A member of the public provided the following general input: Regarding his concerns about the Sites Reservoir project and the proposed interconnect between the Tehama-Colusa Canal and Colusa Basin Drain, the speaker stated that this project should be in Colusa County, because Sites Reservoir is in Colusa County, and it needs to promote safe drinking water supply in Williams and Arbuckle. The interconnect should be close to Williams and Arbuckle. The Tehama-Colusa Canal jags southeast of Arbuckle. One of the closest distances between the canal and drain is south of Arbuckle. The County needs to push for the interconnect to be in Colusa County.

**Colusa Subbasin Well Monitoring Pilot Program Presentation:**

The facilitator reintroduced Mr. Clark, who presented on the Colusa Subbasin Well Monitoring Pilot Program (Attachment C).

Mr. Clark described a voluntary, incentive-based program to provide participants with near real-time information on pumping and water levels, while providing the GSAs with information to support GSP development. The program will be implemented in 2021 and continue through the 2023 growing season.

**Question and Answer Segment:**

Upon conclusion of the presentation, the facilitator opened the floor for public comment. There was none at that time.

**Groundwater Sustainability Planning – Next Steps Presentation:**

The facilitator reintroduced Mr. Clark, who presented on the next steps of Groundwater Sustainability Planning (Attachment C).

**Question and Answer Segment:**

Upon conclusion of the presentation, the facilitator opened the floor for public comment. There was none at that time.

**Closing:**

The facilitator provided a last call for input from the public and then reminded attendees of avenues to provide feedback in the future (communication links presented in Attachment C).

Supervisor Carter and Glenn County Supervisor and GGA Board member John Viegas provided closing remarks encouraging attendees to continue engaging in the GSP process and offering thanks to the technical team.

The facilitator adjourned the meeting after reiterating the importance of public engagement and reminding attendees of ways to engage in the future.

*This document summarized the public comment received at the December 9<sup>th</sup> meeting. To listen to these comments exactly as they were presented, please watch the recording of the meeting here: [https://fb.watch/2TiDIEi\\_8c/](https://fb.watch/2TiDIEi_8c/)*



**COLUSA SUBBASIN**

**Attachment A**

**Colusa Groundwater Authority and Glenn Groundwater Authority Board Members and Alternates, Staff and Consultant Team Meeting Attendees**

**Colusa Subbasin SGMA-Series  
Sustainable Groundwater Meeting  
December 9, 2020**

John Amaro, Glenn-Colusa Irrigation District / Chair—Glenn Groundwater Authority  
John Ayres, PE, CHG, Woodard & Curran  
Denise Carter, Colusa County Supervisor / Chair – Colusa Groundwater Authority  
Emil Cavagnolo, Orland-Artois Water District  
David Ceppos, California State University Sacramento Consensus and Collaboration Program (CCP)  
Byron Clark, PE, Davids Engineering  
Danaka DeBow, CCP  
Mary Fahey, CGA Staff  
Gary Hansen, City of Willows  
Lisa Hunter, GGA Staff  
Andrea Jones, Orland-Artois Water District  
Mark Lohse, Monroeville Water District  
Ken Loy, PG, CEG, CHG, West Yost Associates  
Evan Markey, Cal Water (Alternate for City of Willows)  
Jeff Moresco, Colusa Drain Mutual Water Company  
Leslie Nerli, Glide Water District  
Hilary Reinhard, Reclamation District 108  
Chuck Schonauer, Orland-Artois Water District  
Sajit Singh, City of Williams  
John Viegas, Glenn County Supervisor

# AGENDA

## COLUSA SUBBASIN SGMA-SERIES SUSTAINABLE GROUNDWATER MEETING

Hosted by the Colusa Groundwater Authority (CGA) and Glenn Groundwater Authority (GGA)

**December 9, 2020**

**5:30 p.m. – 8:30 p.m.**

<https://csus.zoom.us/j/82305540067?pwd=aUVoTXU4NXZsNktHc3E3ZE90N3pJZz09>

Meeting ID: 823 0554 0067

Passcode (Required): 105741

Phone In: 1-669-900-6833,,82305540067# (Not Toll Free)

**December 10, 2020**

**1:00 p.m. – 4:00 p.m.**

<https://csus.zoom.us/j/89917492421?pwd=bTR4YUxLYzhVMWhFd2I2Ym5vSEgyZz09>

Meeting ID: 899 1749 2421

Passcode (Required): 192684

Phone In: 1-669-900-6833,,89917492421# (Not Toll Free)

### 1. Log On / Sign In

*NOTE: All Agenda Items will include a Question and Answer Period*

### 2. Welcome, Agenda Review, Online Meeting Instructions

### 3. Overview - Sustainable Groundwater Management Act (SGMA) and Groundwater Sustainability Plan (GSP) Preparation and Timeline

### 4. Presentation - Colusa Subbasin Setting and Conditions

- Basin Setting and Conditions
- Water Budgets

### 5. Presentation - Sustainable Management Criteria – Terms, Requirements, and Process

- Sustainability Goal
- Significant and Unreasonable Conditions/Undesirable Results Statements
- Minimum Thresholds and Measurable Objectives

### 6. Presentation – Projects and Management Actions (PMA)

### 7. Presentation - Colusa Subbasin Well Monitoring Pilot Program

### 8. Discussion - Groundwater Sustainability Planning – Next Steps

### 9. Adjourn

*NOTE: A 10 minute break will be taken mid-way through the meeting at the discretion of the facilitator*



COLUSA AND GLENN GROUNDWATER AUTHORITIES

# Colusa Subbasin Public Workshops

December 9, 2020: 5:30 – 8:30 PM

December 10, 2020: 1:00 – 4:00 PM

# Outline

- Groundwater Sustainability Plan Overview and Timeline
- Basin Setting and Conditions
- Water Budgets
- Sustainable Management Criteria
- Projects and Management Actions
- Well Monitoring Pilot Program
- Schedule and Next Steps



# Zoom Input Methods

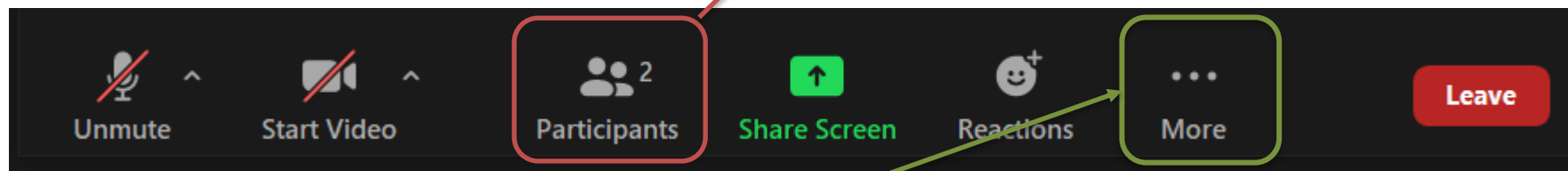
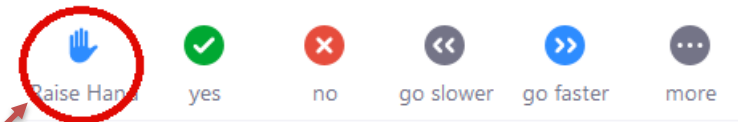
We will use the “Raise Hand” feature to add you to the queue. To do so, click on the raise hand in the “Participants” window.

To get in the queue from your phone, press “\*9”

You can also use the “Chat” feature to write a question (see image below)

We will keep everyone muted until it is your turn to speak

We will do our best to get to all questions and comments



If you need assistance you can use the chat window to Dave or Danaka

# **Groundwater Sustainability Plan Overview and Timeline**

Byron Clark, PE  
Davids Engineering

# Sustainable Groundwater Management Act (SGMA)

- Enacted by State of California in 2014
- Establishes Groundwater Sustainability Agencies (GSAs)
- Groundwater Sustainability Plan (GSP)
  - Due January 31, 2022
  - Annual reporting and GSP Update every 5 years
  - 20 years to achieve Sustainability (2042)
- Allows for Local Management of Groundwater
- Risk of State Intervention if Sustainable Management not Achieved

# Sustainable Groundwater Management Act (SGMA)

- Who is affected?



# Potential Implications of State Intervention

- Trigger: Department of Water Resources (DWR) determines GSP is Inadequate
- Potential State Water Board Actions
  - Designation as a “Probationary Basin”
  - Required extraction reporting by groundwater users for individual wells
  - State develops interim plan, including corrective actions, timeline to make the basin sustainable, and monitoring plan to ensure corrective actions are working
  - Fees
    - Current fee \$300 per well plus \$40 per acre-foot (~ \$21 million per year)
    - Potential for additional costs and fee increases over time

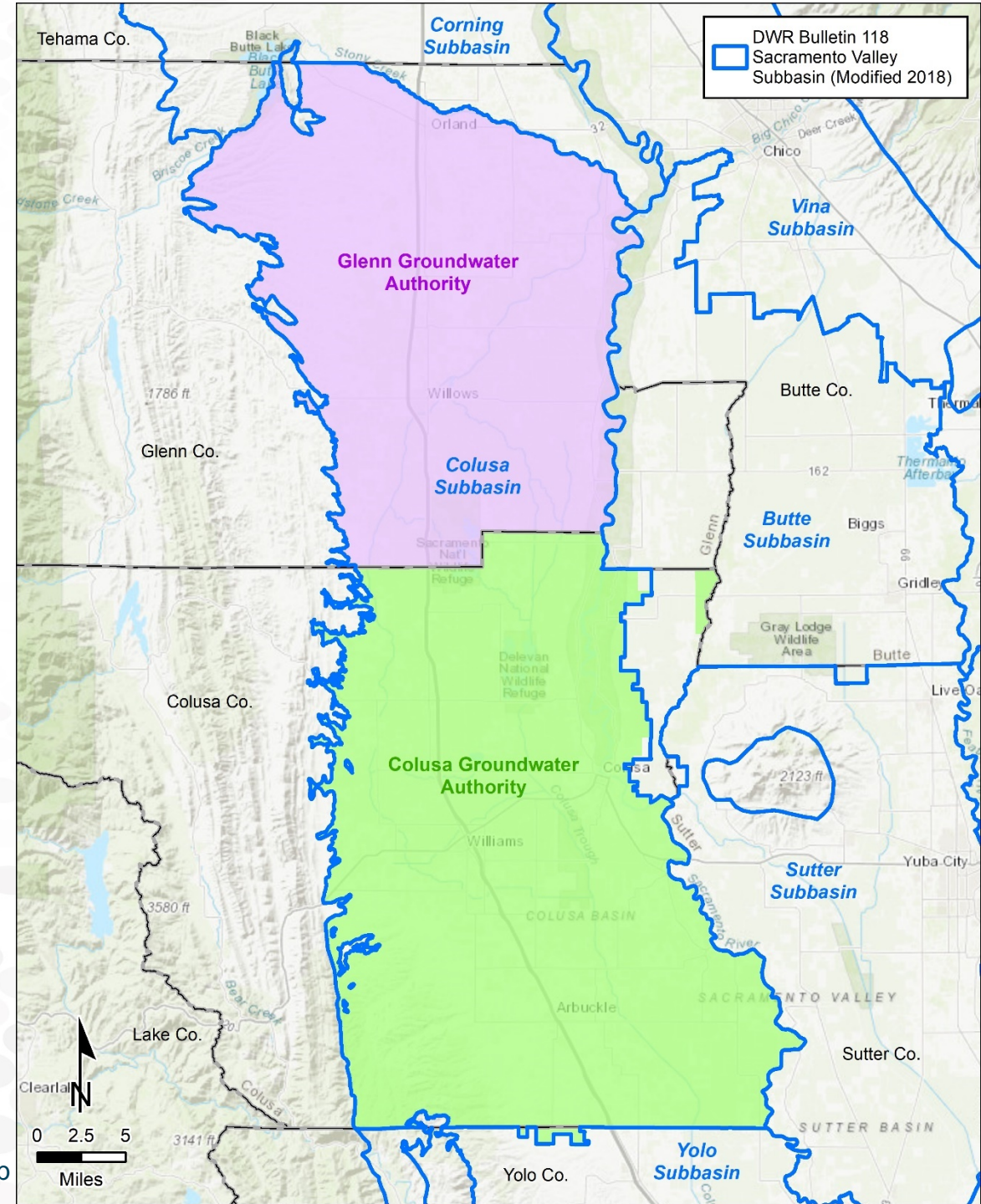


# Colusa Subbasin

- 1130 square miles (723,000 acres)
- Colusa Groundwater Authority
  - 12 Member Agencies
  - Cities, County, Water Districts, and Private Pumper Representatives
  - <https://colusagroundwater.org/>
- Glenn Groundwater Authority
  - 10 Member Agencies
  - Cities, County, and Water Districts
  - <https://www.countyofglenn.net/dept/planning-community-development-services/water-resources/glenn-groundwater-authority>







12/9/2020, 12/10/2020

Public Workshop



# Sustainable Groundwater Management Act (SGMA)

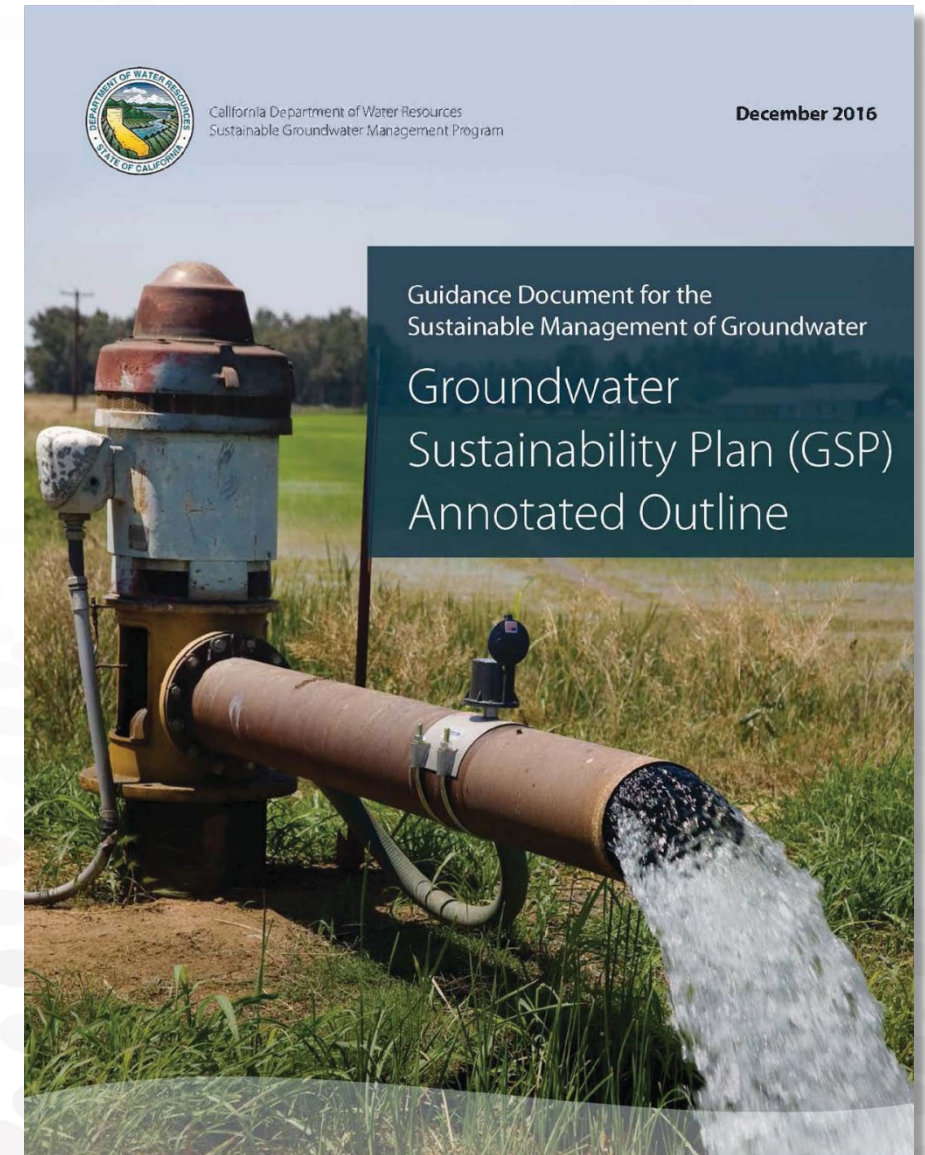
- Sustainability Indicators

Sustainability Indicators	 Lowering GW Levels	 Reduction of Storage	 Seawater Intrusion	 Degraded Quality	 Land Subsidence	 Surface Water Depletion
Metric(s) Defined in GSP Regulations	<ul style="list-style-type: none"> <li>Groundwater Elevation</li> </ul>	<ul style="list-style-type: none"> <li>Total Volume</li> </ul>	<ul style="list-style-type: none"> <li>Chloride concentration isocontour</li> </ul>	<ul style="list-style-type: none"> <li>Migration of Plumes</li> <li>Number of supply wells</li> <li>Volume</li> <li>Location of isocontour</li> </ul>	<ul style="list-style-type: none"> <li>Rate and Extent of Land Subsidence</li> </ul>	<ul style="list-style-type: none"> <li>Volume or rate of surface water depletion</li> </ul>



# Groundwater Sustainability Plan (GSP)

1. Agency Information
2. Plan Area
3. Basin Setting
  - Hydrogeologic Conceptual Model
  - Groundwater Conditions
  - Water Budgets
  - Management Areas
4. Monitoring Network
5. Sustainable Management Criteria
6. Projects and Management Actions
7. Plan Implementation





# Groundwater Sustainability Plan (GSP)

- Initial Hydrogeologic Conceptual Model (HCM) and Monitoring Network Sections Completed in 2018
  - Available at <https://www.countyofglenn.net/resources/water/grant-project-data-management-and-hydrogeologic-conceptual-modeling-support>
- Currently Being Updated to Reflect Recent Conditions and Incorporate Basin-Wide Groundwater Conditions and Water Budgets
- Draft Basin Setting for TAC and Public Review Anticipated in early 2021
  - Posted to GSA websites
  - Links sent to email lists, posted on social media (Facebook, Twitter)

**Colusa Subbasin GSP - Draft Timeline**

<b>GSP Component</b>	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	
<b>Basin Setting</b>		Draft HCM, GW Conditions, and Water Budget GSP Sections			TAC Review		Public Review	GSA Board Review	Management Areas									
Basin Setting Outreach				★			★		★									
<b>Sustainable Management Criteria</b>	Draft Sustainability Goal and Undesirable Results Statements			Draft Min. Thresholds & Measurable Objectives			Updated MTs and MOs		Public Review	Updated Sustainable Yield								
SMC Outreach				★			★		★									
<b>Monitoring Network</b>		Draft Representative MN			Updated Representative MN			Public Review										
Monitoring Outreach									★									
<b>Projects and Management Actions</b>		Initial PMA Identification and Assessment			Screening Analysis		Alternatives Analysis		Identify PMA mix and analyze uncertainty									
PMA Outreach				★														
<b>GSP Document Preparation and Adoption</b>								Admin. Info., Plan Area, Notice & Comm.		Exec. Sum., SMC, PMAs, Plan Implementation		Public Review Draft GSP		Final GSP				
GSP Outreach												★						
<b>Funding Mechanisms</b>		Initial Review and Comparison				Detailed Evaluation												
<b>Hydrogeologic Investigation</b>		Planning			Data Collection				Analysis and Incorporation into GSP									
<b>Well Monitoring Pilot Program</b>	Program Development				Advertising and Enrollment			Implementation and Analysis										
Well Mont. Outreach					★													

# More Information

- GSA Contacts
  - Colusa Groundwater Authority: Mary Fahey, Program Manager
    - (530) 458-0719; [Mfahey@countyofcolusa.com](mailto:Mfahey@countyofcolusa.com)
  - Glenn Groundwater Authority: Lisa Hunter, Program Manager
    - (530) 934-6540; [Lhunter@countyofglenn.net](mailto:Lhunter@countyofglenn.net)
- GSA Websites
  - Glenn Groundwater Authority: <https://www.countyofglenn.net/dept/planning-community-development-services/water-resources/glenn-groundwater-authority>
  - Colusa Groundwater Authority: <https://colusagroundwater.org/>
- Social Media
  - Facebook: <https://www.facebook.com/ColusaSubbasin>
  - Twitter: <https://twitter.com/ColusaSubbasin>
- Other Resources
  - California DWR: <https://water.ca.gov/Programs/Groundwater-Management/SGMA-Groundwater-Management>
  - Farm Bureau: <https://www.cfbf.com/top-issues/?tab=Water>

# Questions and Answers

- In ZOOM. To get in the queue:
  - Use “Raise Hand” Mode online, or
  - Use \*9 from your phone, or
  - Write a question / comment in the “Chat” feature.
- To provide written input on any topic:
  - Glenn Groundwater Authority
    - [glennsgma@countyofglenn.net](mailto:glennsgma@countyofglenn.net)
  - Colusa Groundwater Authority
    - [mfahey@countyofcolusa.com](mailto:mfahey@countyofcolusa.com)
    - <https://colusagroundwater.org/contact-us/>

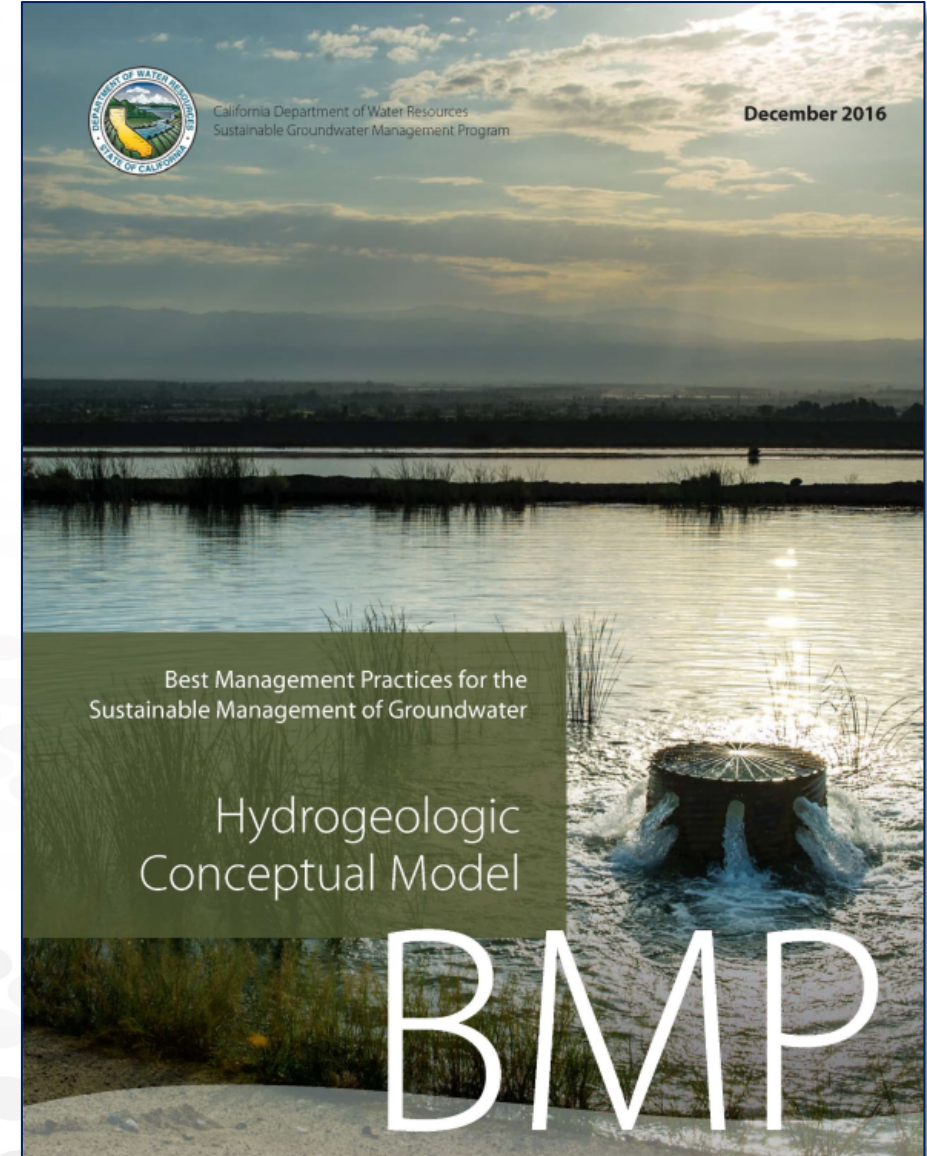
# Basin Setting and Conditions

Ken Loy, PG, CEG, CHG  
West Yost Associates



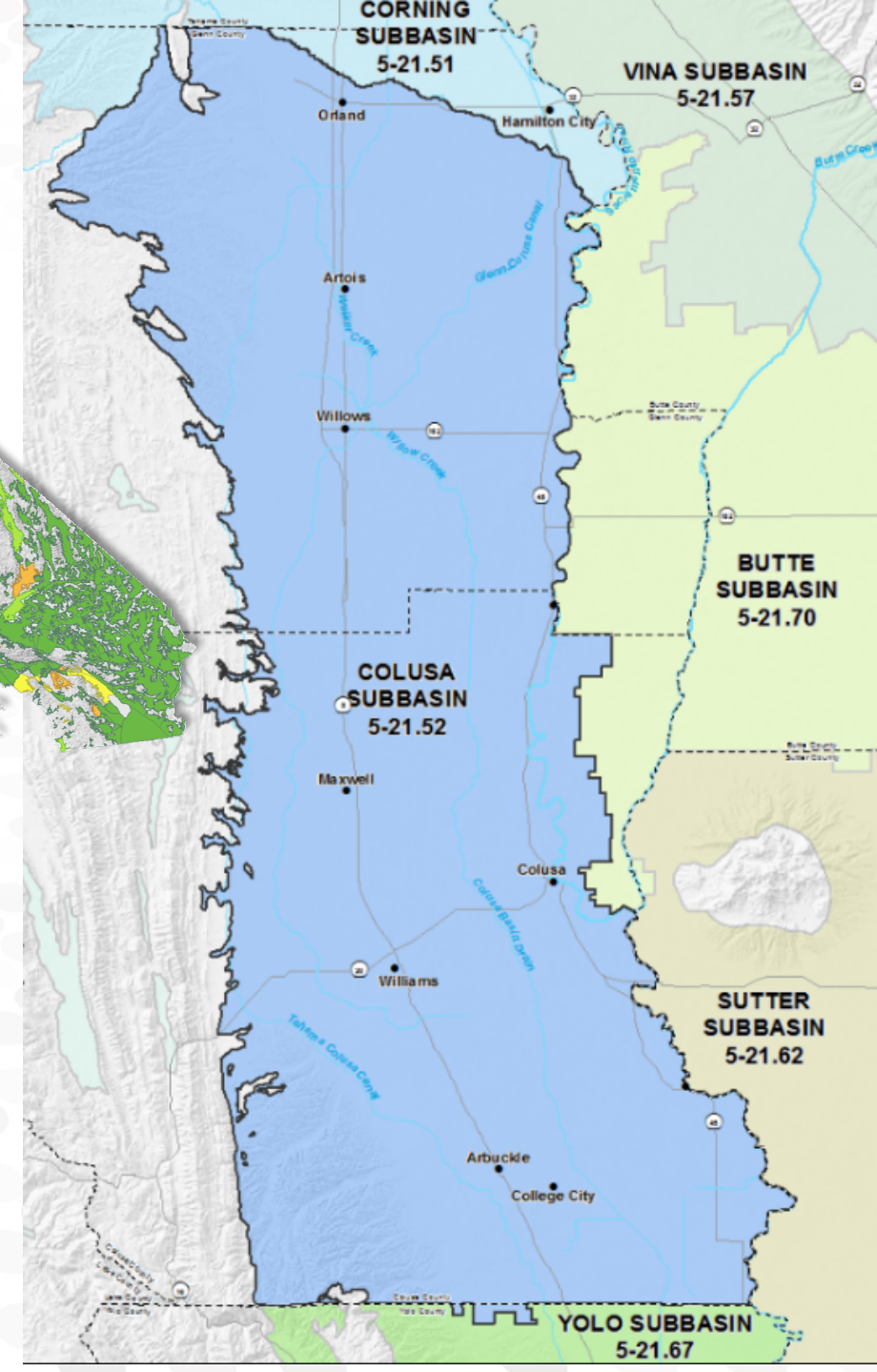
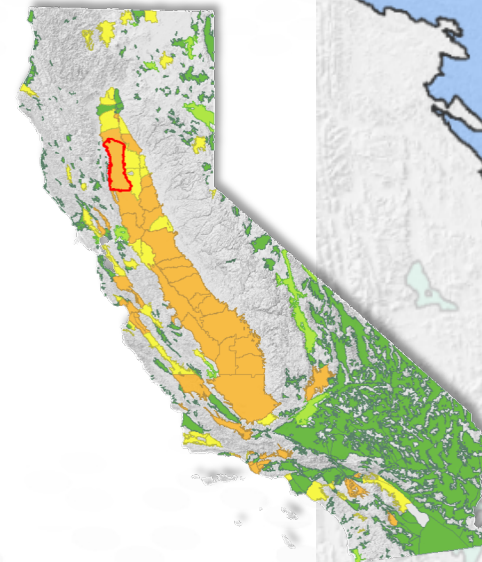
# Basin Setting and Conditions

- Hydrogeologic Conceptual Model
- Groundwater Conditions
- Prop 68 Additional Hydrogeologic Investigation



# Colusa Subbasin

- Largest Subbasin in the Sacramento Valley
- 724,000-acre Area
- 60 miles North-South
- 20 miles East-West
- 1,500 ft Thickness

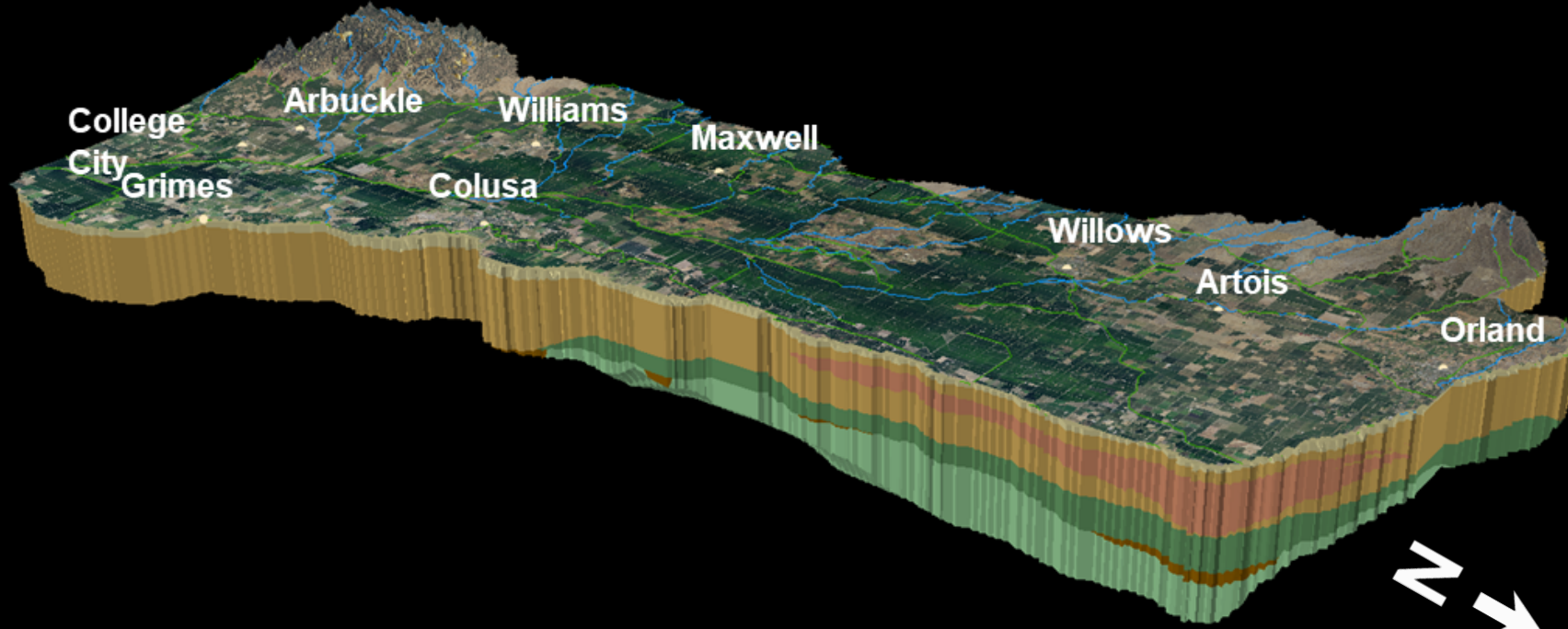




# Water Movement Through the Hydrogeologic Conceptual Model (HCM)

## Major Water Budget Components

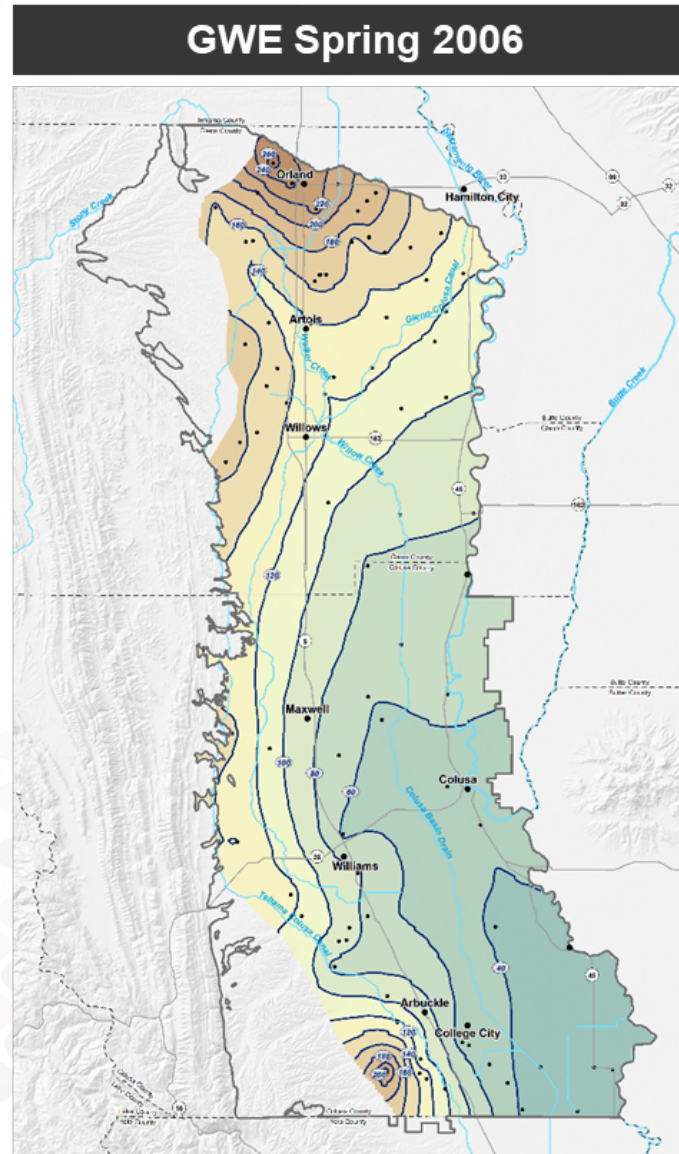
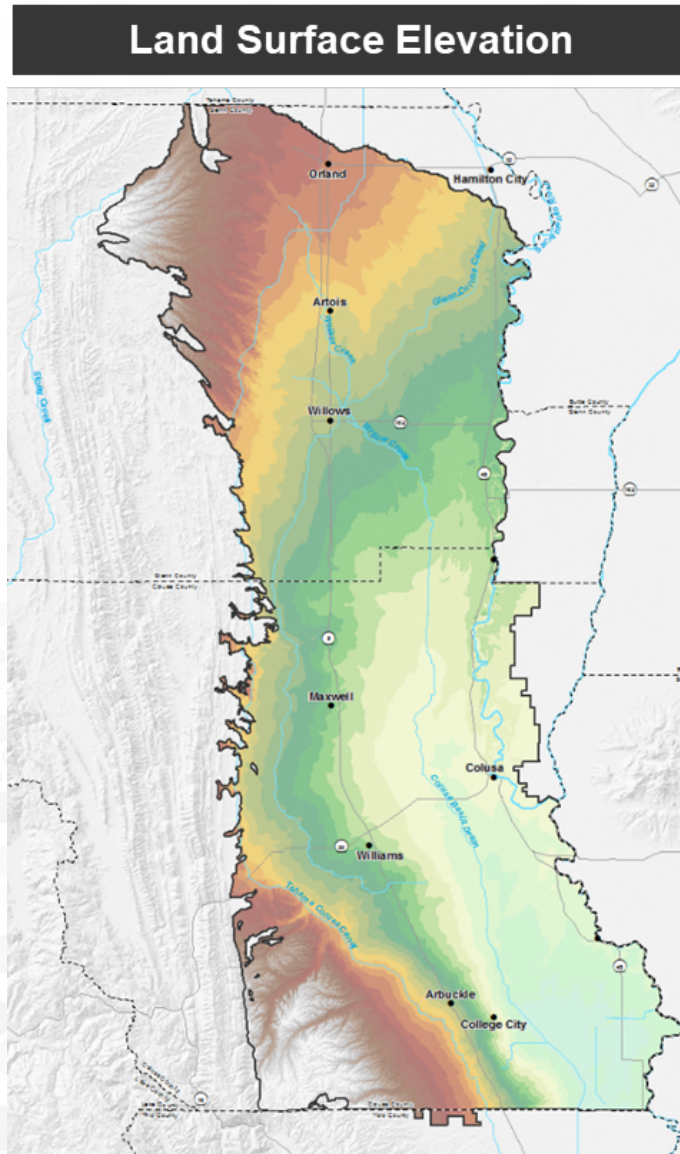
- Precipitation
- Surface Water Inflows
- Groundwater Pumping
- Evapotranspiration
- Surface Water Outflows
- Percolation
- Stream - Aquifer Interactions
- Interbasin Subsurface Flow



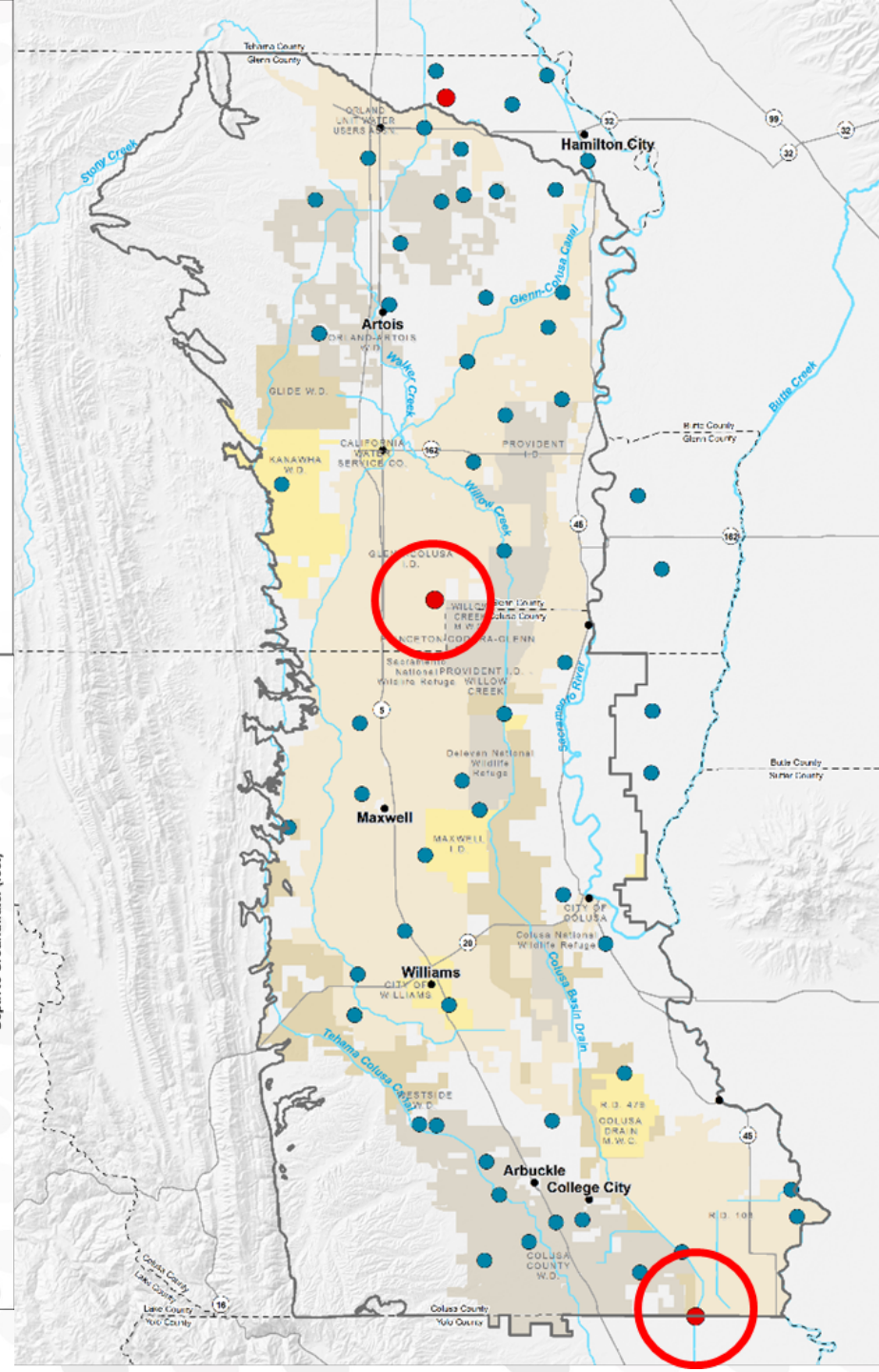
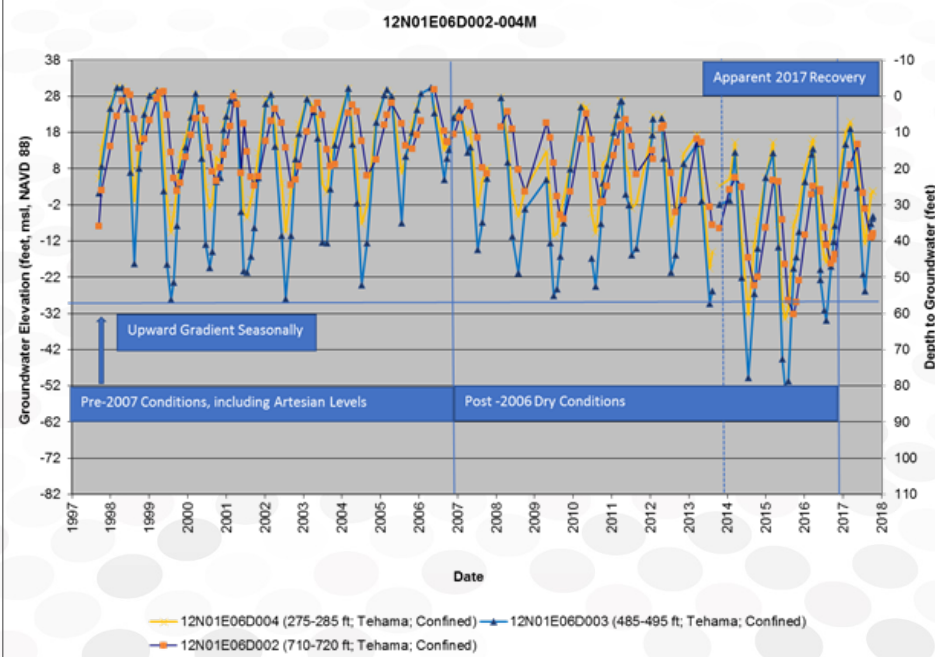
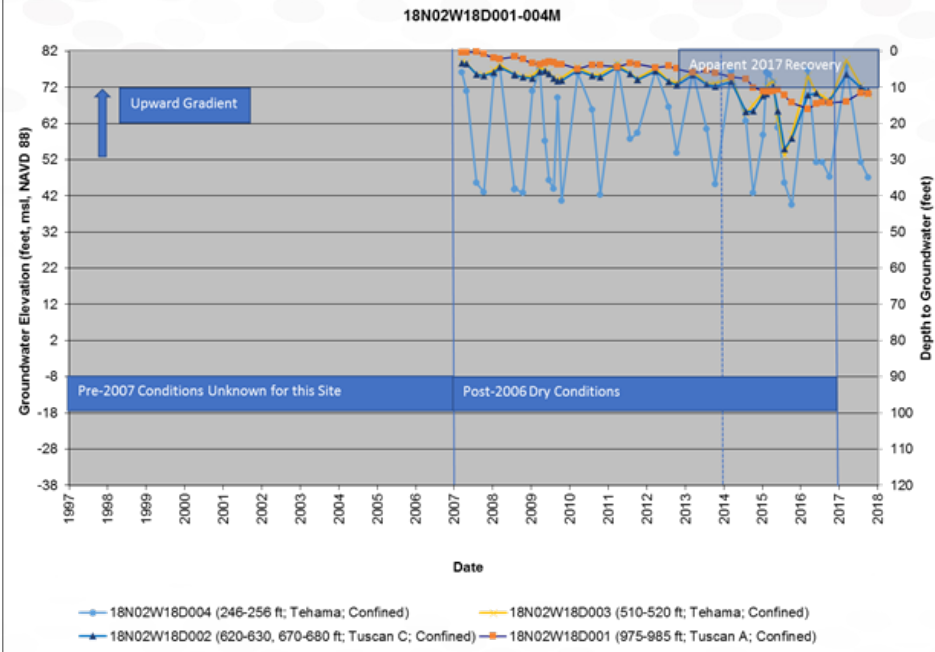
Vertical Exaggeration=10x



# Groundwater Flow Trends



# Hydrographs





# Groundwater Quality

- Current groundwater quality is generally “good” with potential for some isolated issues.
- GSP focus will be on impacts to groundwater quality due to pumping and potential recharge activities.
- GSP will address salinity.
- Existing water quality monitoring programs are sufficient and not expected to change due to GSP implementation.



**Irrigated Lands Regulatory Program (ILRP)**



[www.waterboards.ca.gov/centralvalley/water\\_issues/irrigated\\_lands](http://www.waterboards.ca.gov/centralvalley/water_issues/irrigated_lands)

For any questions or to find out more information, ILRP staff can be reached at:

**Sacramento** ILRP Tel: (916) 464-4611  
Office: Email: [irlands@waterboards.ca.gov](mailto:irlands@waterboards.ca.gov)

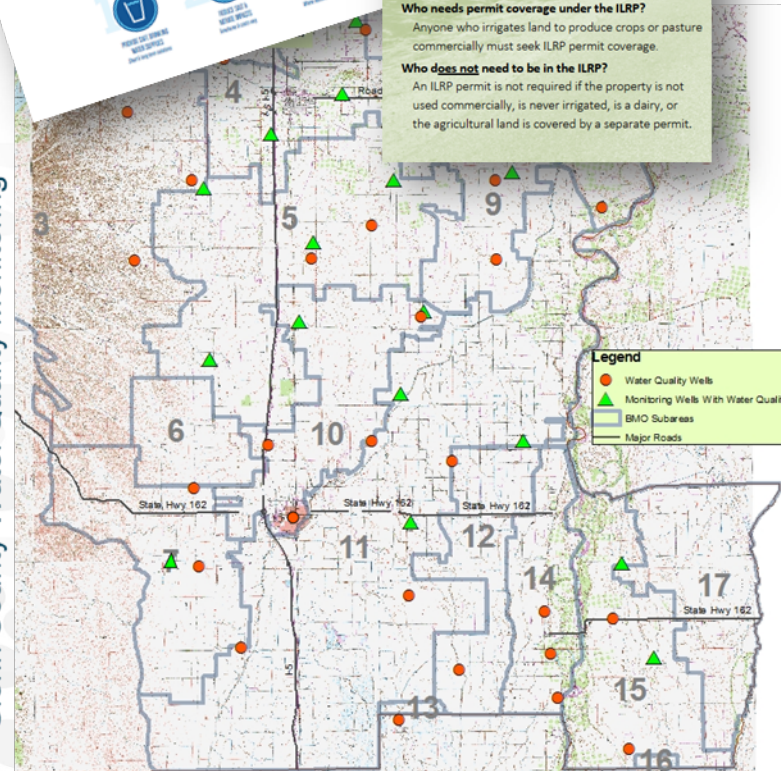
**Fresno** ILRP Tel: (559) 488-4396  
Office: Email: [irlpinfo@waterboards.ca.gov](mailto:irlpinfo@waterboards.ca.gov)

**What is the ILRP?**  
The ILRP is a Central Valley Water Board (CVWB) program that issues permits and conducts compliance and enforcement activities to ensure growers comply with CVWB regulations.

**Who needs permit coverage under the ILRP?**  
Anyone who irrigates land to produce crops or pasture commercially must seek ILRP permit coverage.

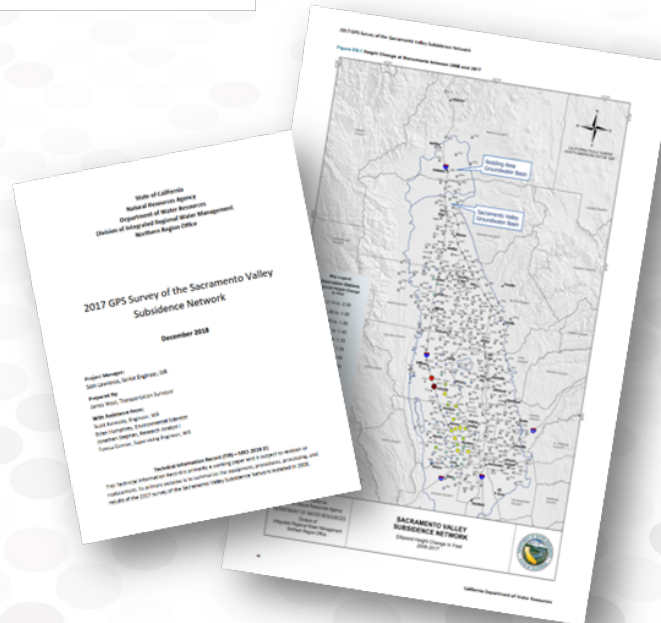
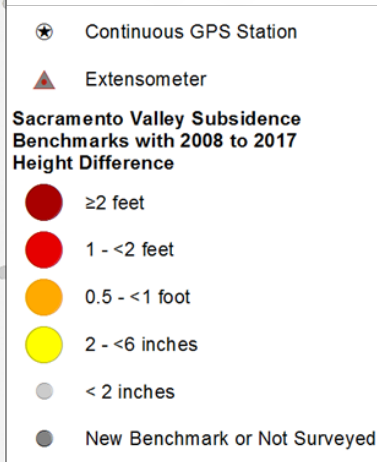
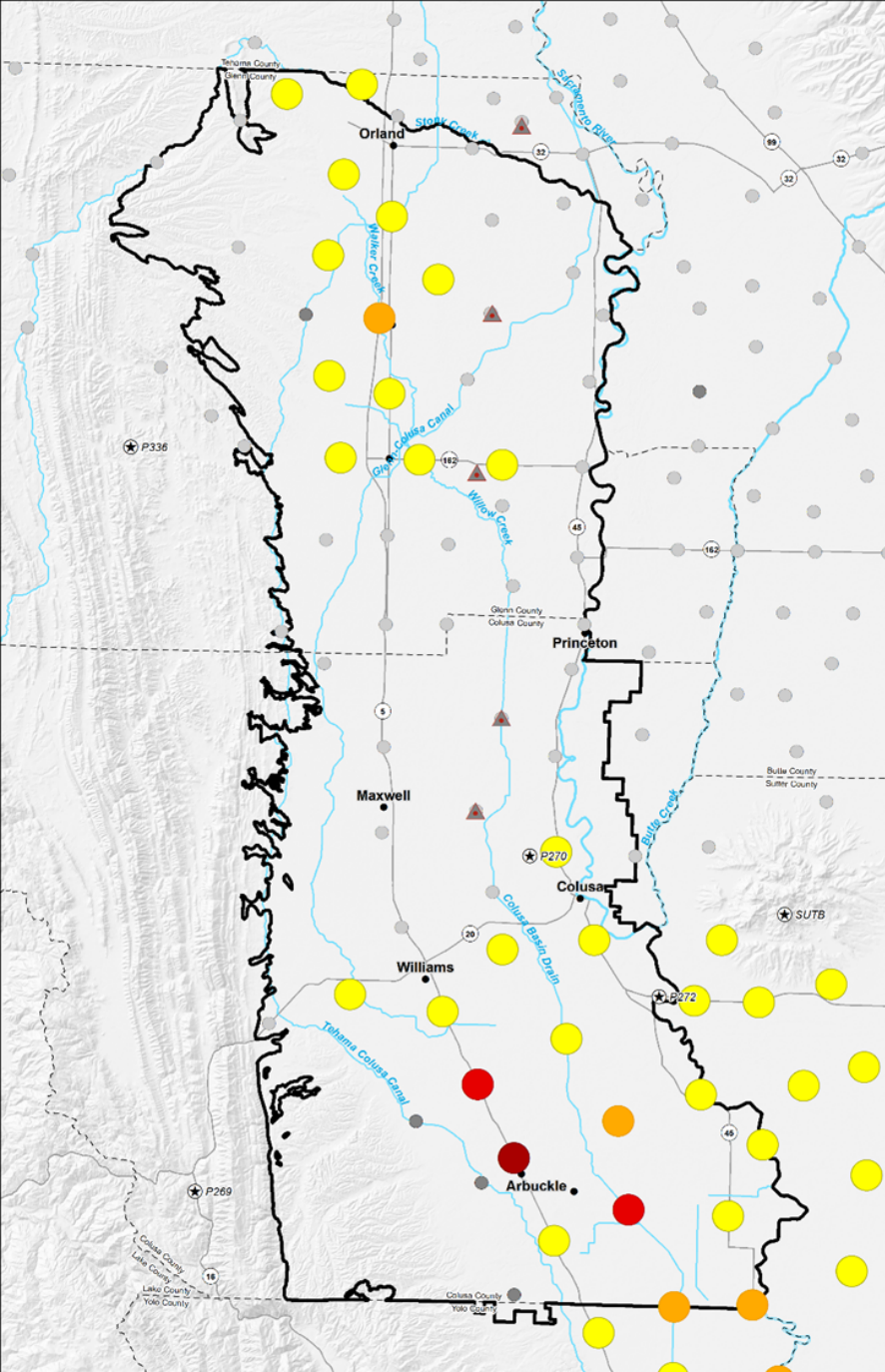
**Who does not need to be in the ILRP?**  
An ILRP permit is not required if the property is not used commercially, is never irrigated, is a dairy, or the agricultural land is covered by a separate permit.

Glenn County Water Quality Monitoring



# Land Subsidence

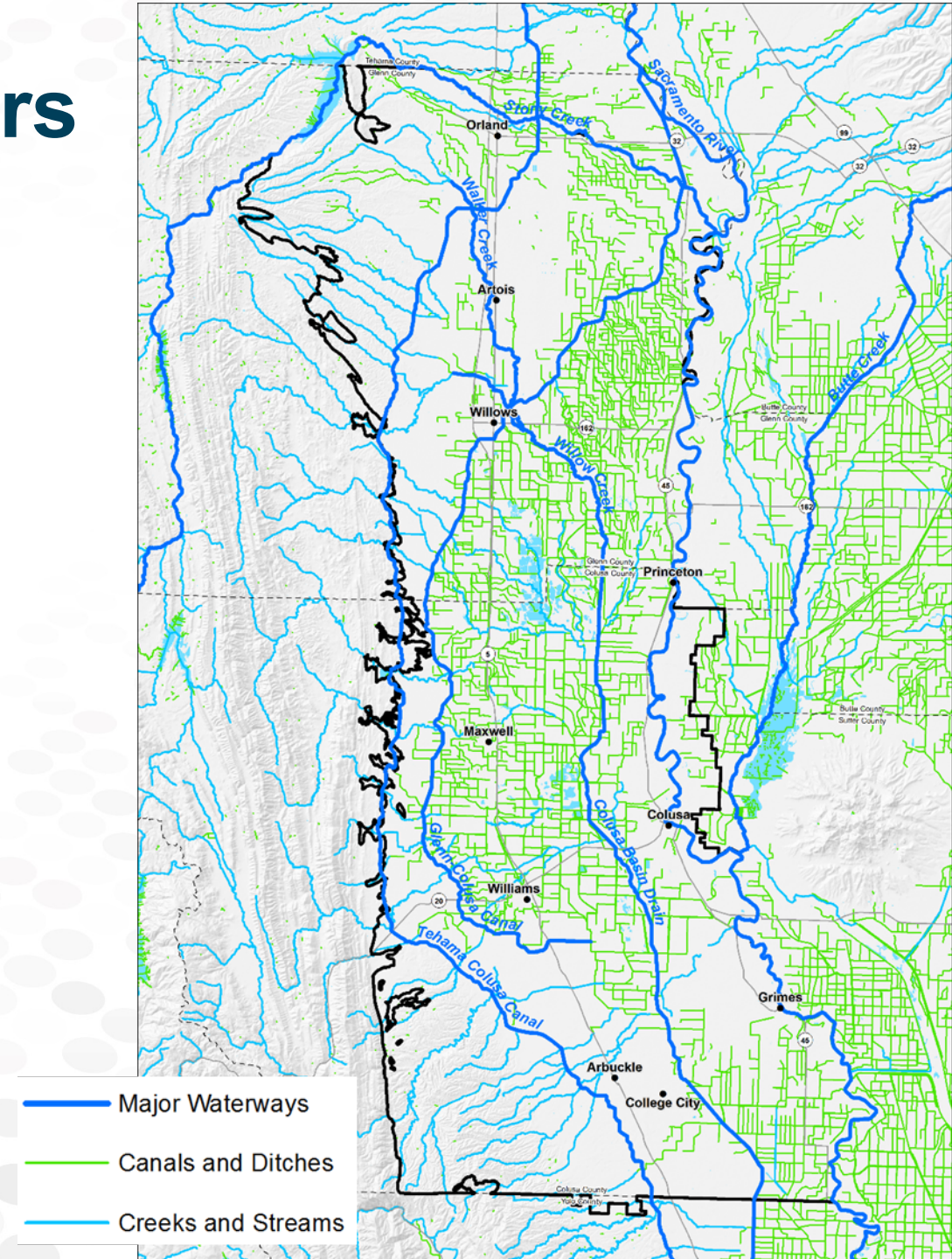
## 2017 GPS Survey Sacramento Valley Subsidence Network, December 2018





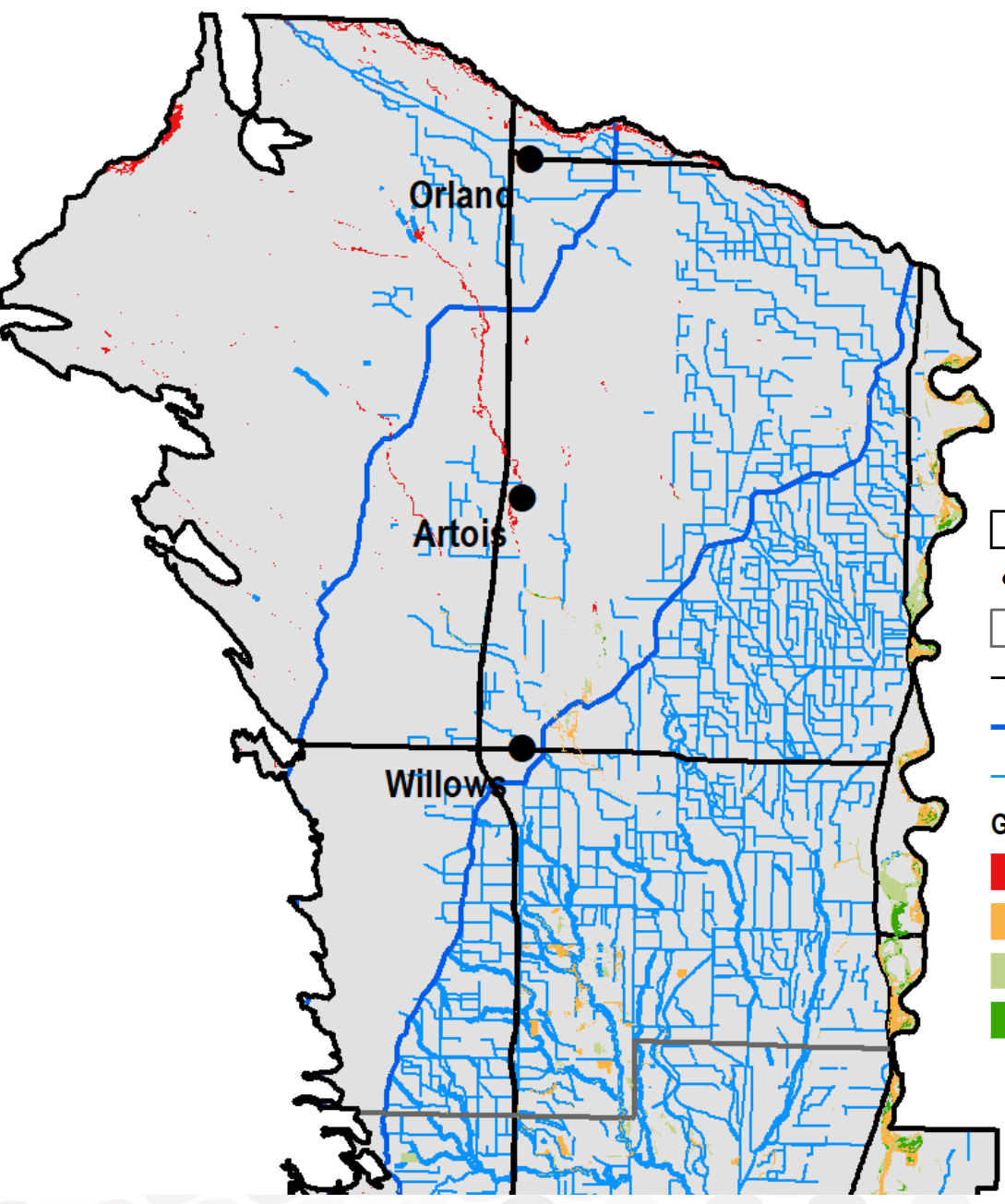
# Interconnected Surface Waters

- Interconnected surface waters exist within the Colusa Subbasin.
- Changes in groundwater could impact these surface waters.
- Numerical modeling for water budgets used to evaluate impacts to interconnected surface waters.
  - Opportunity for additional monitoring in the future

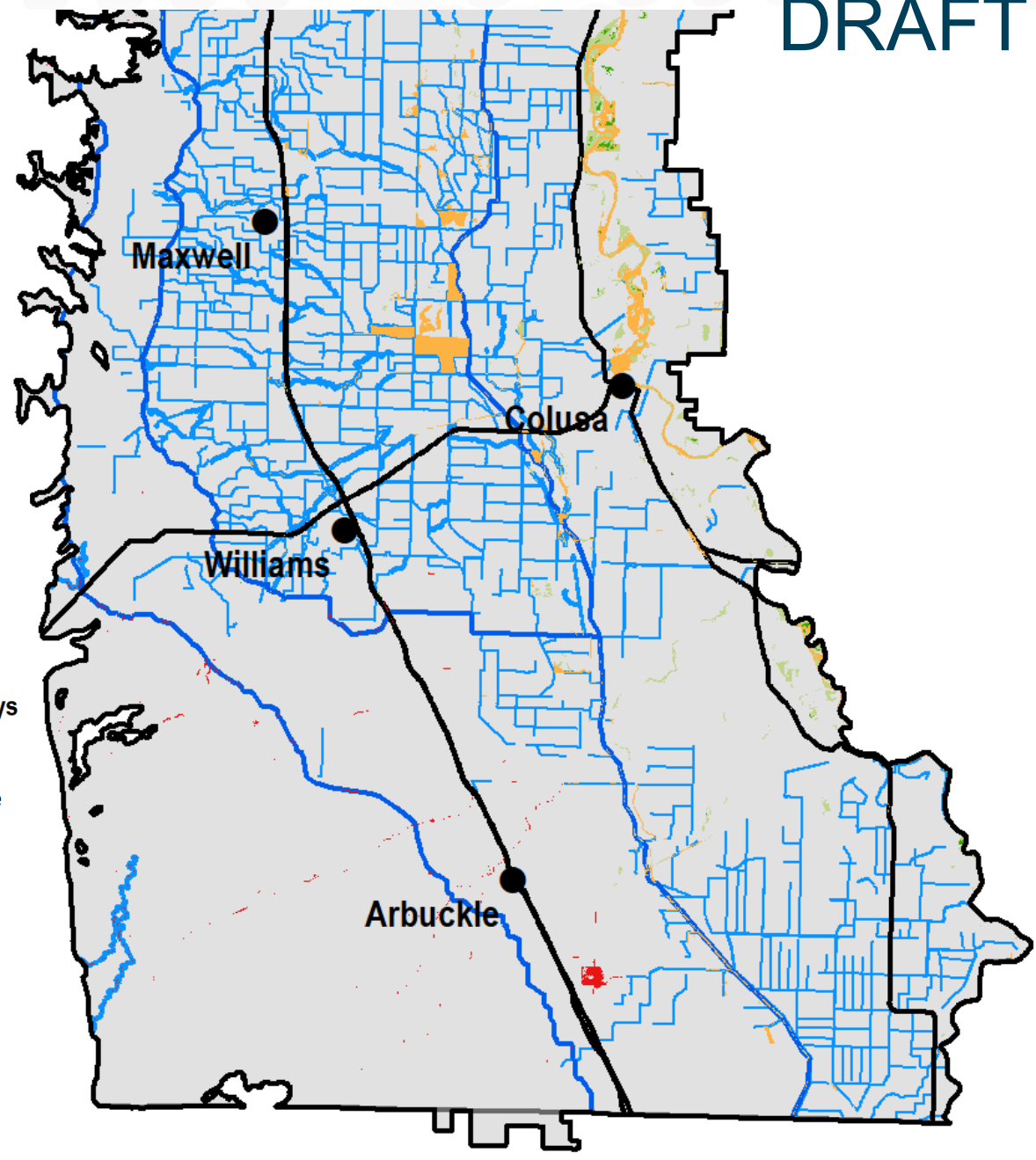


# Groundwater Dependent Ecosystems (GDEs)

- Ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface
- Potential GDEs identified by DWR/The Nature Conservancy
  - Wetlands and vegetation
  - 2,795 polygons, 17,748 acres
- Draft scoring developed
  - Scored from 1 – 4 (1 = less likely, 4 = more likely)
  - Recent historical spring depth to groundwater
  - Proximity to surface water sources
- Potential additional refinement supported by DWR Prop 68 grant



- Colusa Subbasin
- Cities and Towns
- County Line
- Primary Roads
- Primary Waterways
- Other Waterways
- GDE Likelihood Score
- 1
- 2
- 3
- 4





# Prop 68 Hydrogeologic Investigation

- Purpose
  - Fill data gaps to reduce uncertainty in GSP development
- Currently preparing an investigation work plan and coordinating with DWR
  - Discussions ongoing with GSA Technical Advisory Committee
  - Public participation welcome and encouraged
- Complete before October 2021



# Questions and Answers

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  - Colusa Groundwater Authority
    - [mfahey@countyofcolusa.com](mailto:mfahey@countyofcolusa.com)
    - <https://colusagroundwater.org/contact-us/>

# Water Budgets

Byron Clark, PE  
Davids Engineering

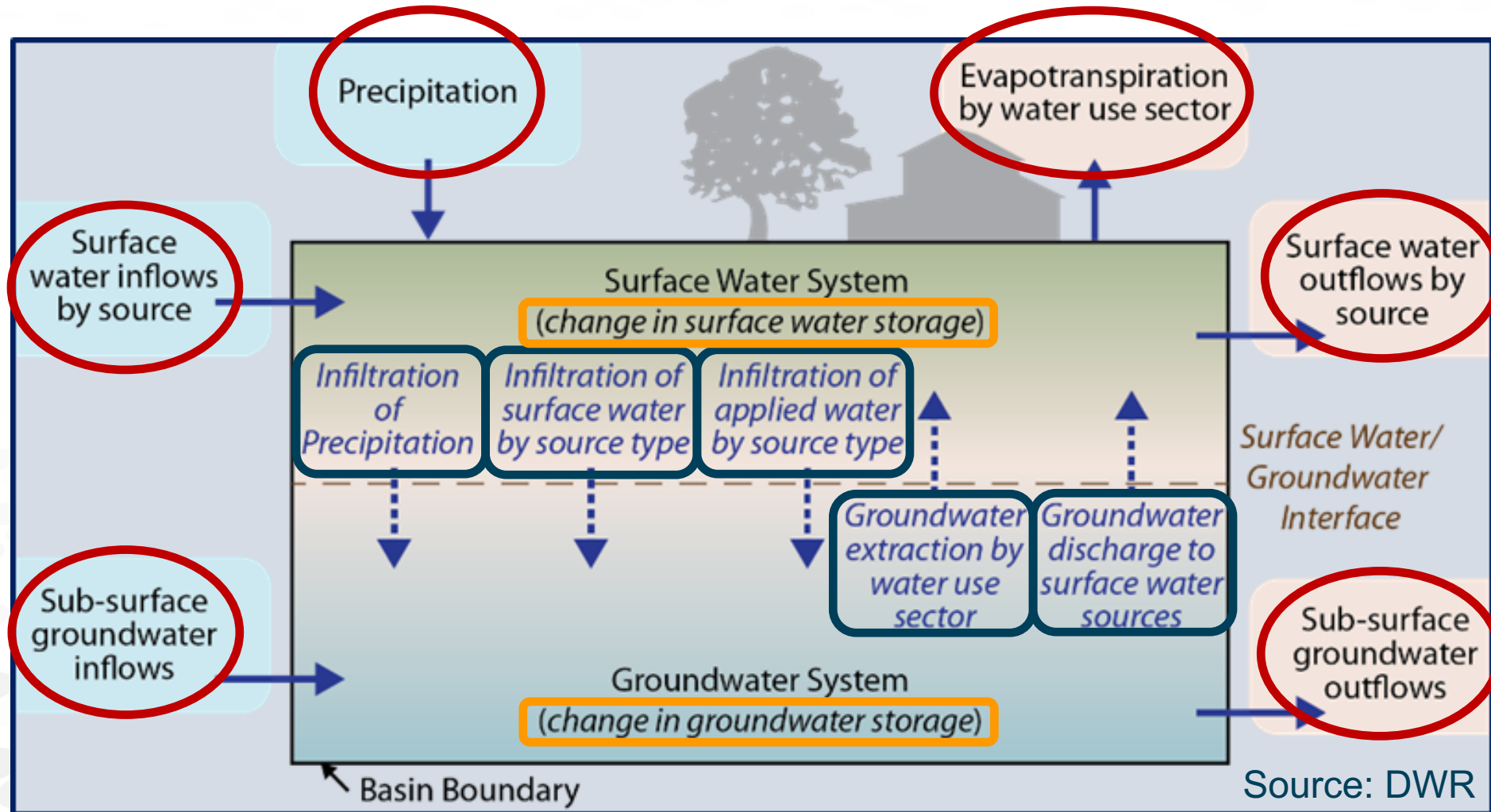
# Water Budgets

- Overview
- Historical
- Baseline and Projected

# Water Budget Overview

- Required for inclusion in the GSP
- Complete accounting of inflows, outflows, and change in storage (just like a checking account)
  - Deposits – Withdrawals = Balance Change, or
  - Inflows – Outflows = Change in Storage
- Developed for historical, current, and potential future conditions

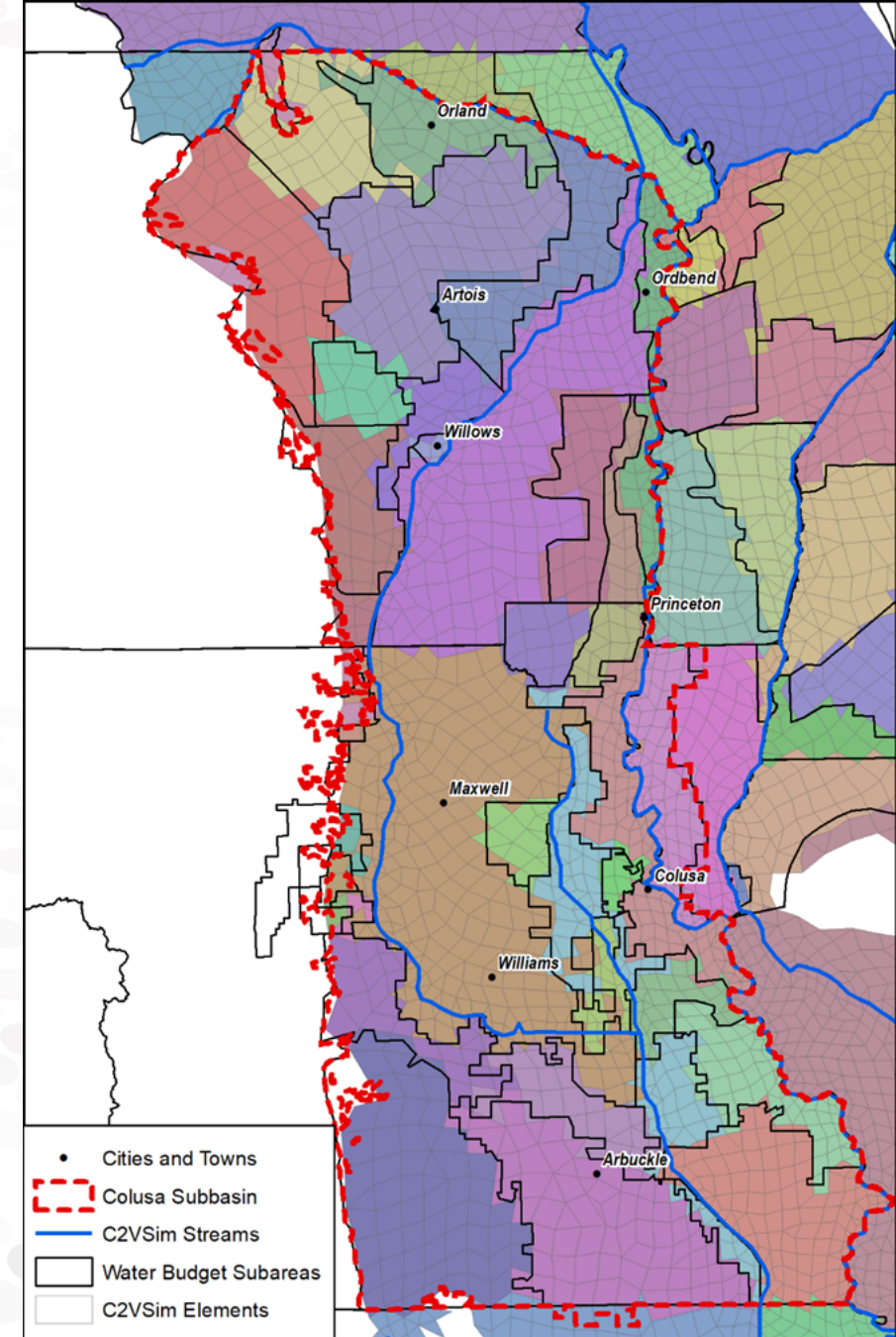
# Water Budget Structure





# Water Budget Approach

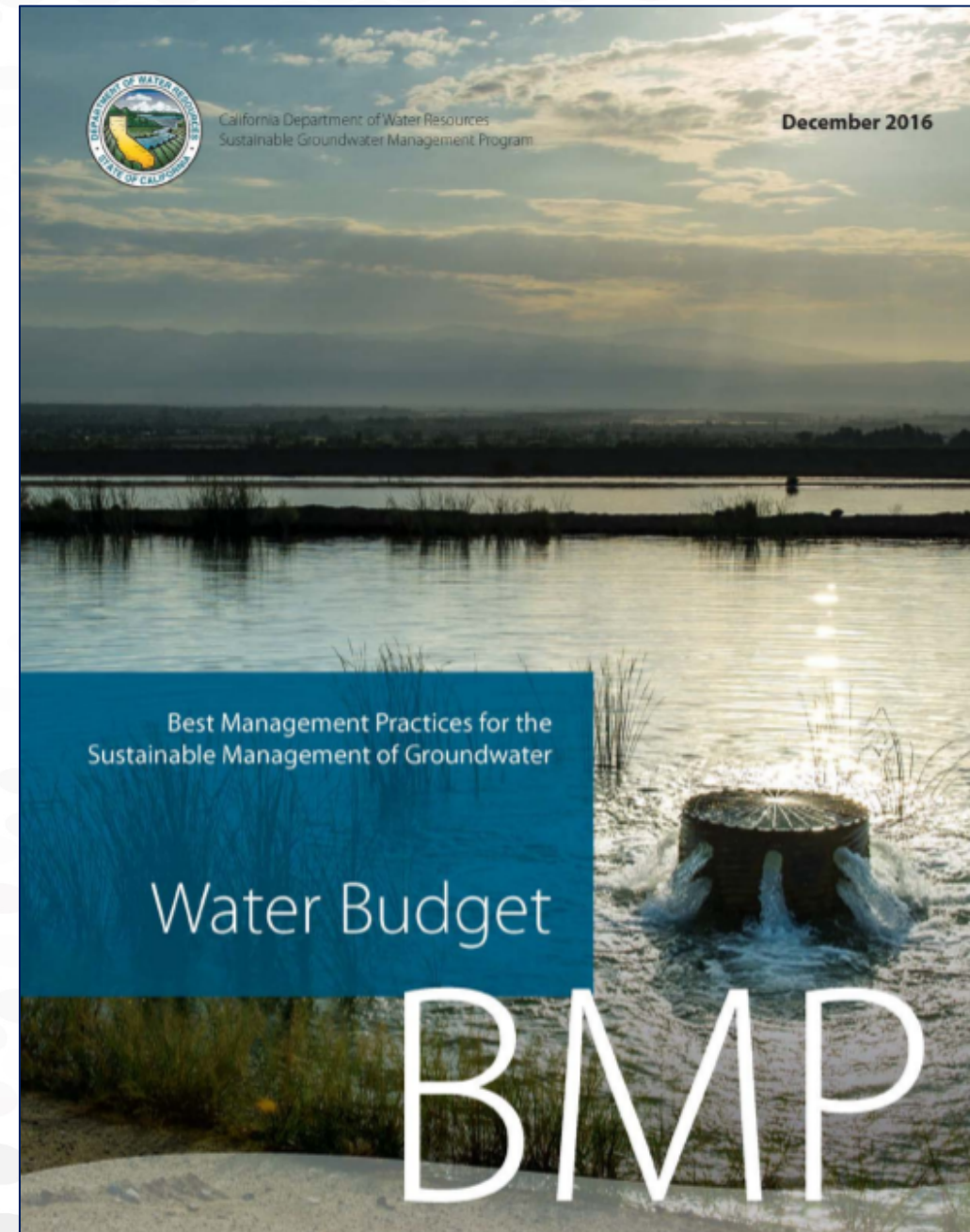
- Estimated using DWR's Integrated Hydrologic Model (C2VSimFG Beta2), with local refinements
- 38 Subareas in Colusa Subbasin
  - Water Suppliers/ Diverters
  - Counties
  - GW-Only Areas
- Ability to Report Out Water Budgets to Support Intrabasin Discussions



# Additional Water Budget Information

- Water Budget Fundamentals
- Technical Assistance
- Key Definitions
- Related Materials

<https://water.ca.gov/Programs/Groundwater-Management/SGMA-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents>



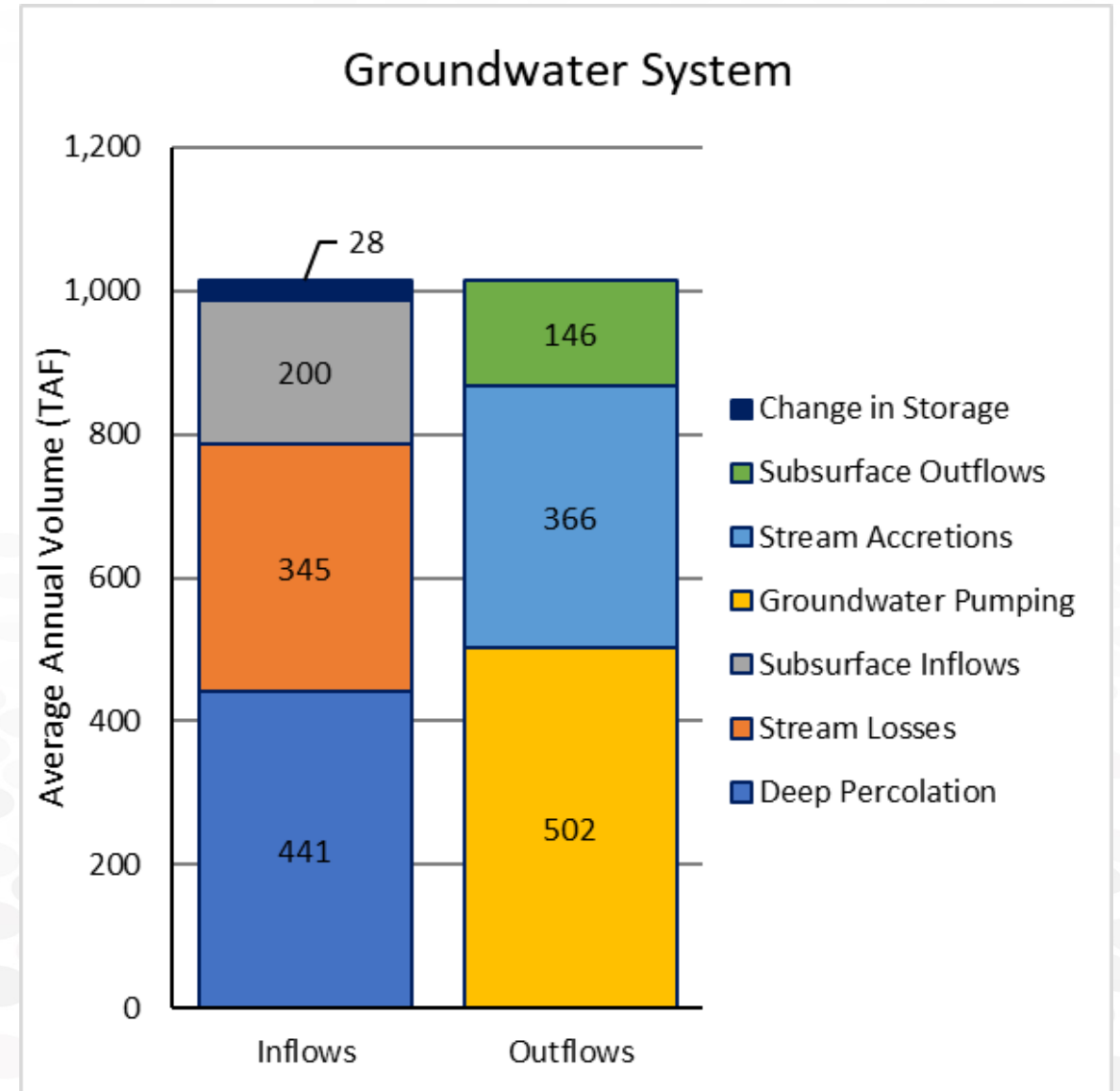
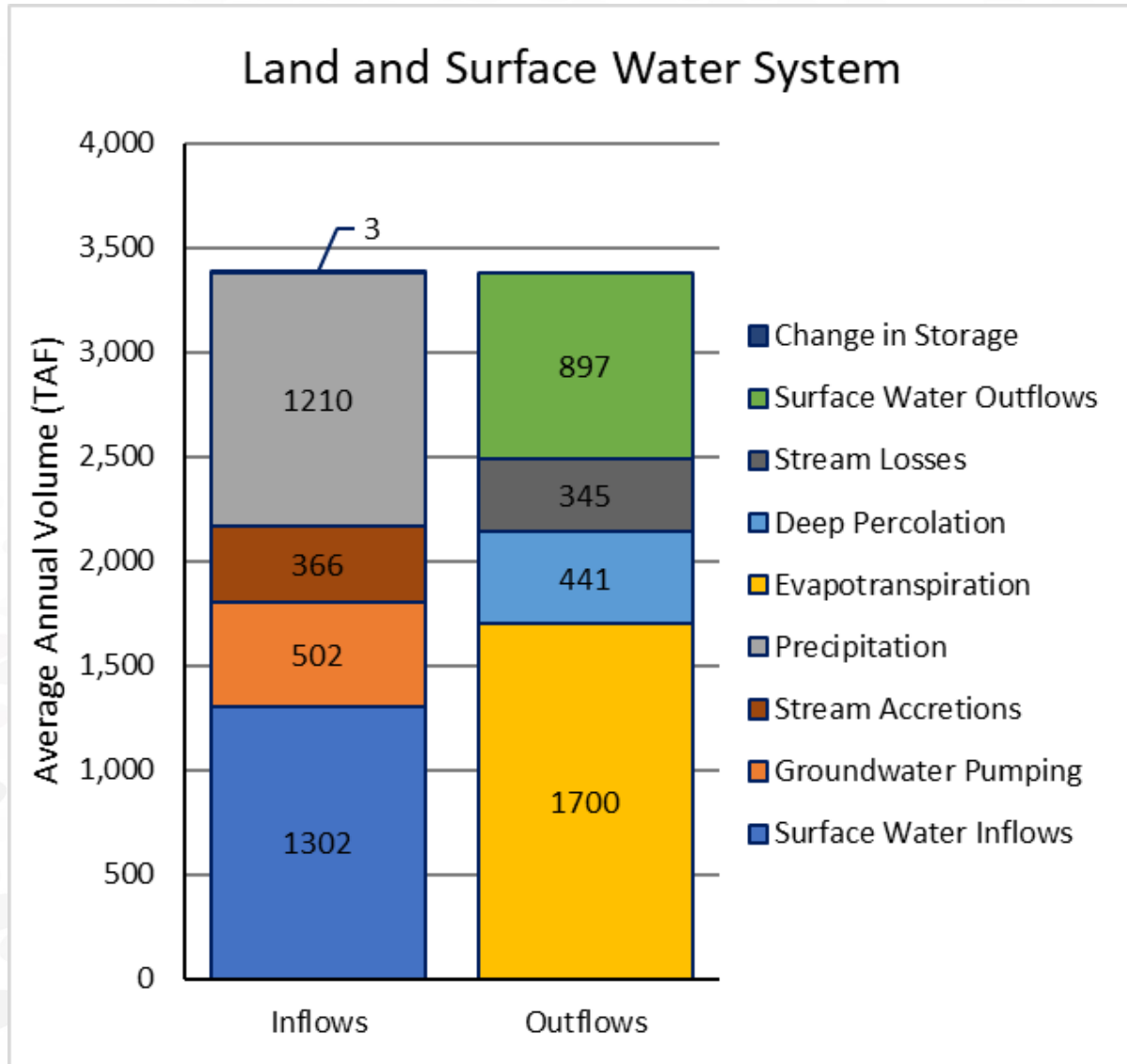
# DRAFT Historical Water Budget

- Provides Basis for Understanding how the Basin has Responded Historically to Changing Conditions
  - Precipitation
  - Land Use
  - Surface Water Supplies
- Supports Model Calibration to Estimate Baseline and Projected Water Budgets
- Focus on water years 1990 – 2015\*

\* A “Water Year” is defined as the period from October 1 of the previous year to September 30 of the current year.

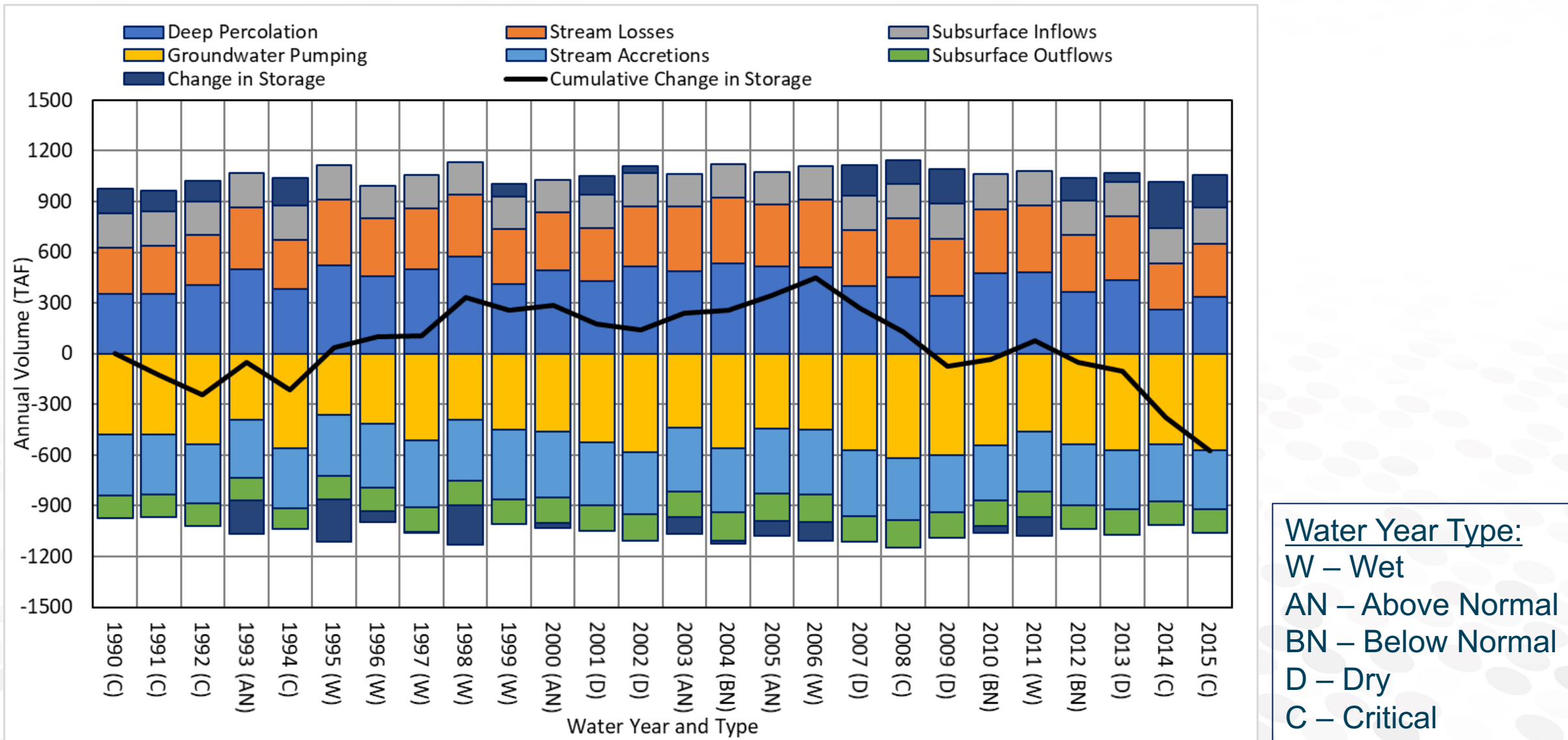


# Average Historical Water Budget



# Historical Annual Groundwater Budget

DRAFT



# Historical Water Budget Takeaways

- Conditions Have Changed over Time
- Surface Water Supplies Represent Primary Irrigation and Domestic Supply (~72%)
- Recent Historic Drought Suggests Possible Supply-Demand Imbalance
- Baseline and Projected Water Budgets Provide Broader Basis for Understanding Potential Future Conditions

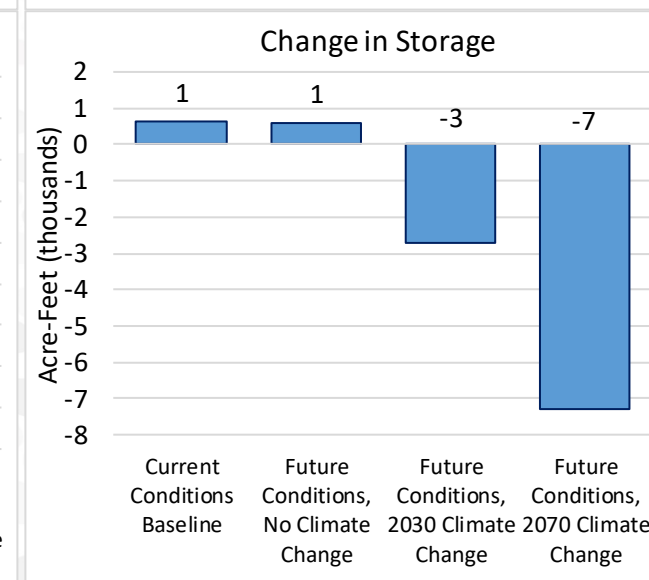
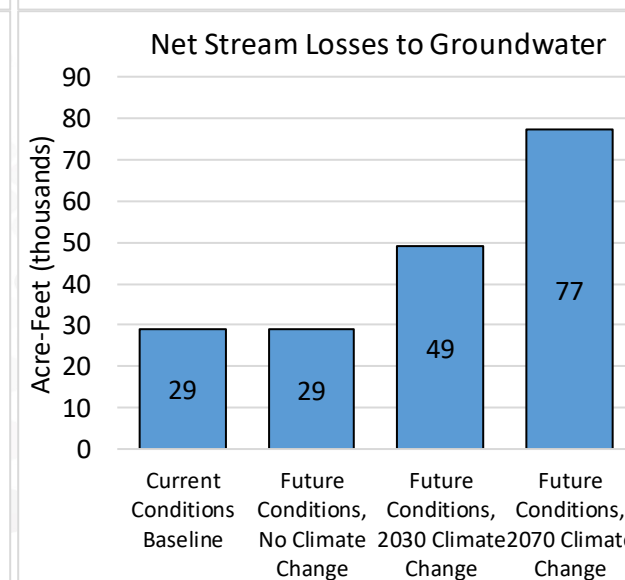
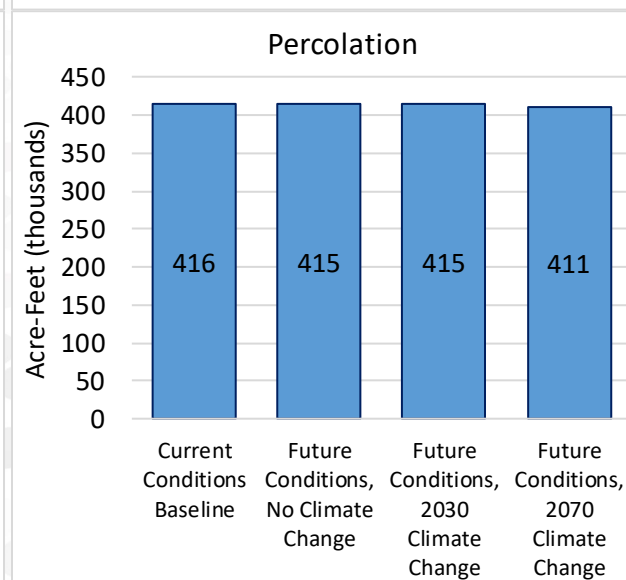
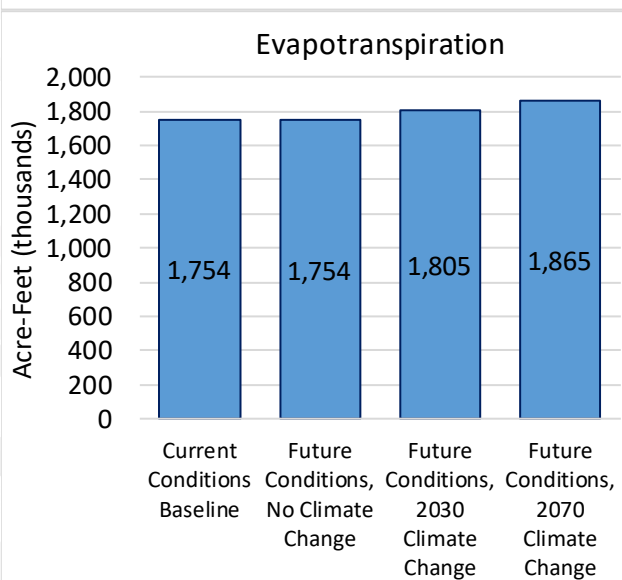
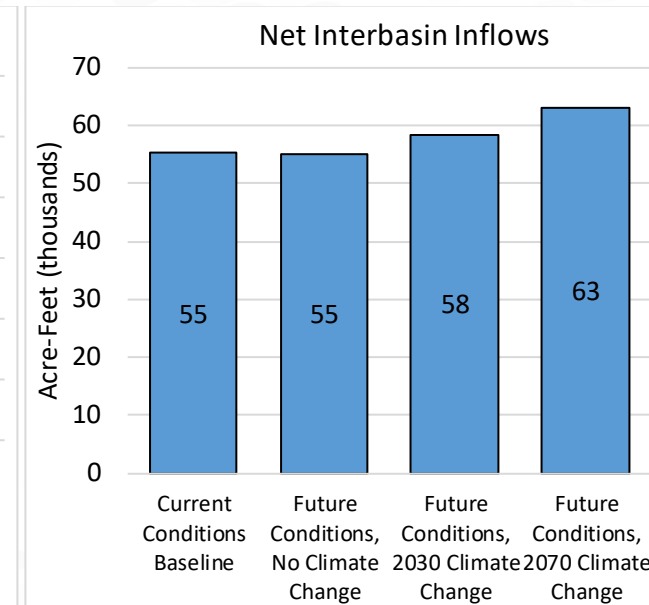
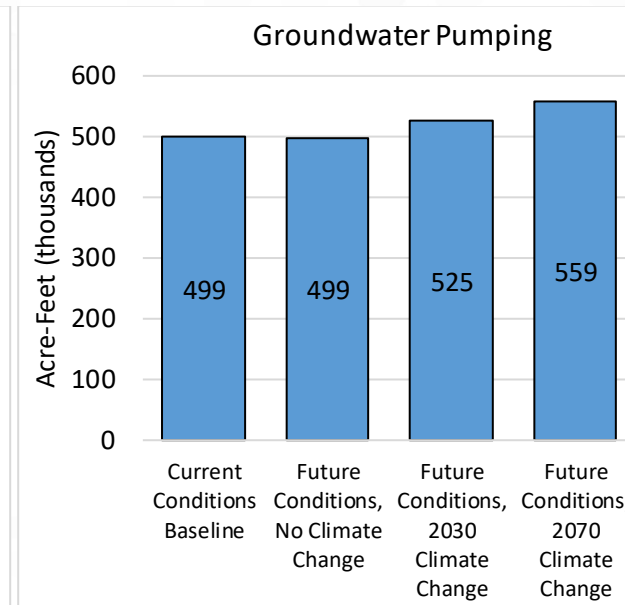
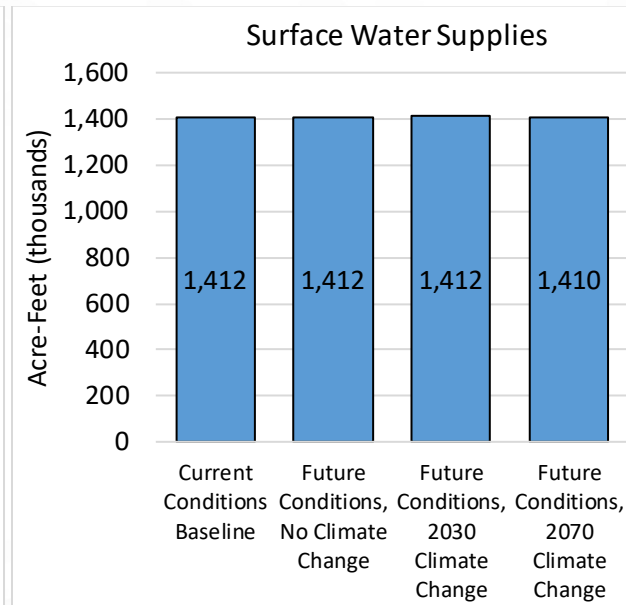
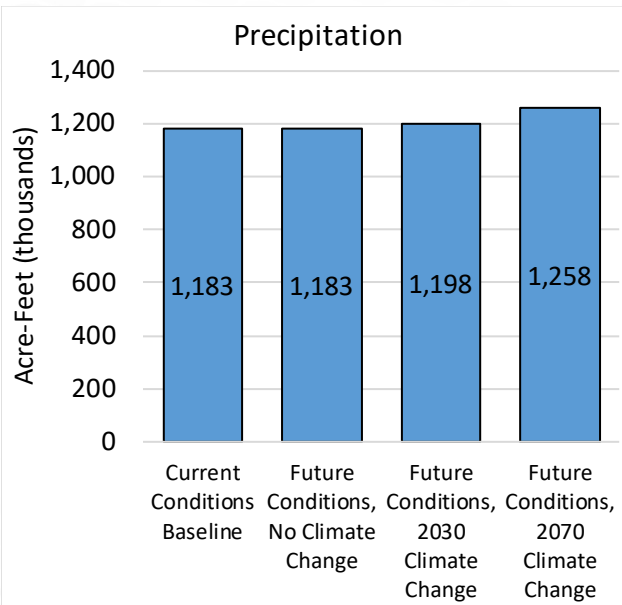
# Baseline and Projected Water Budgets

- Provide Basis to Understand Potential Uncertainty in Future Groundwater Conditions
- Support Evaluation of Potential Projects and Management Actions
- Not Used to Determine Sustainability
- Consider 50 Years of Hydrology
- Scenarios
  - Current
  - Future, no Climate Change
  - Future, 2030 Climate Change
  - Future, 2070 Climate Change



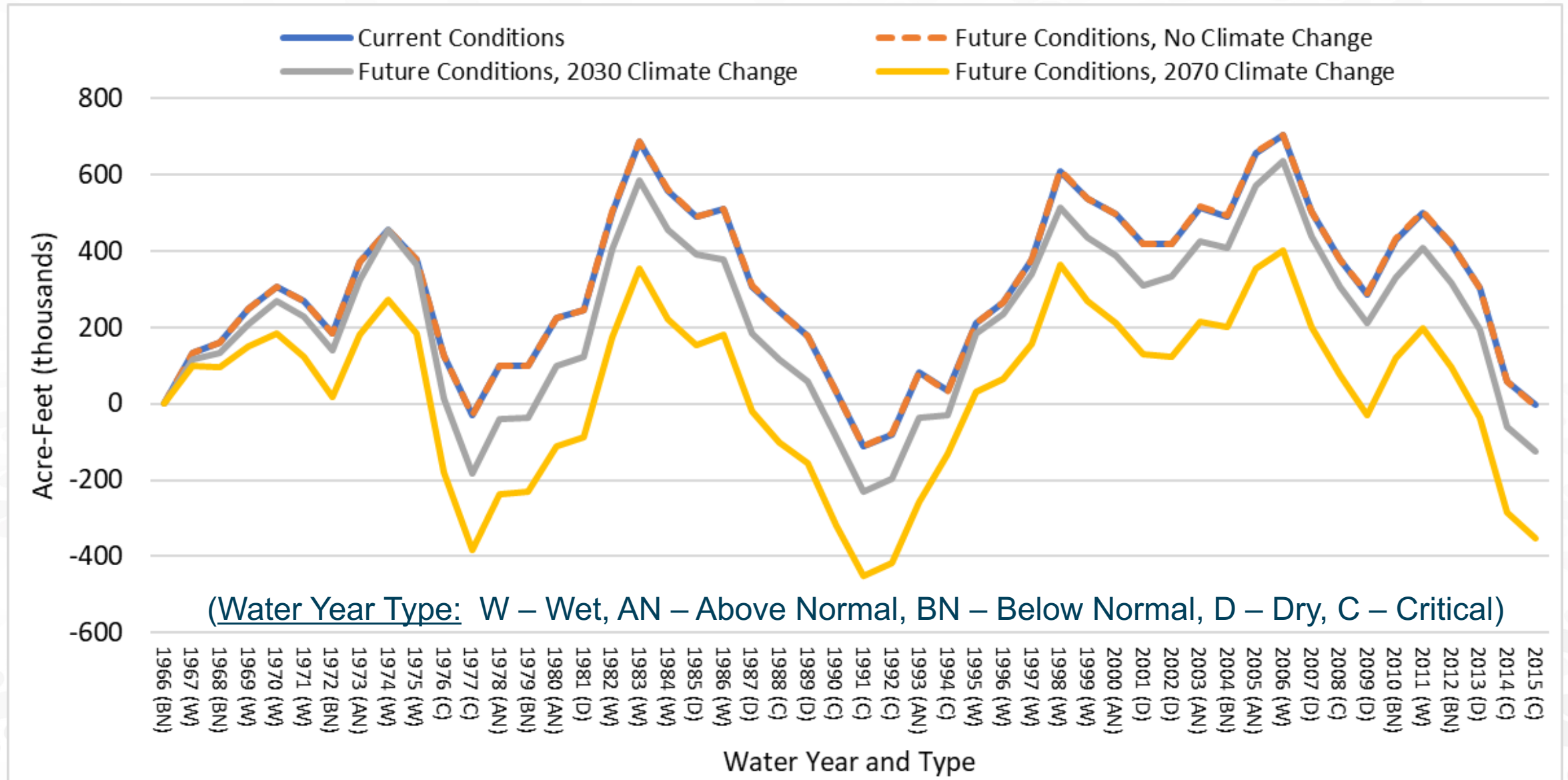
# Comparison of Water Budget Components

DRAFT



# Cumulative Change in Groundwater Storage

DRAFT



# Baseline and Projected Water Budget Observations

- Average annual change in storage differs between scenarios
  - Increase in groundwater pumping under climate change scenarios (+26 TAF/yr to +60 TAF/yr)
  - Modest decrease in storage under 2030 and 2070 conditions (-3 to -7 TAF/year)
  - Decrease in storage less than increased pumping due primarily to increased recharge from streams (+20 TAF to +48 TAF/yr) and increased interbasin inflows (+3 TAF/yr to +8 TAF/yr)
- Changes in storage (and groundwater levels) substantial over multi-year wet and dry cycles

# Baseline and Projected Water Budget Takeaways

- Multi-year wet and dry cycles should be considered in establishing Sustainable Management Criteria
- Projects and management actions should consider
  - Toolbox of options to provide flexibility to implement based on observed conditions (surface water supply augmentation, increased recharge, demand management)
  - Accrual of benefits over time, in anticipation of dry cycles and associated impact on groundwater conditions



# Questions and Answers

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    - <https://colusagroundwater.org/contact-us/>

# Sustainable Management Criteria

John Ayres, PG, CHG  
Woodard & Curran

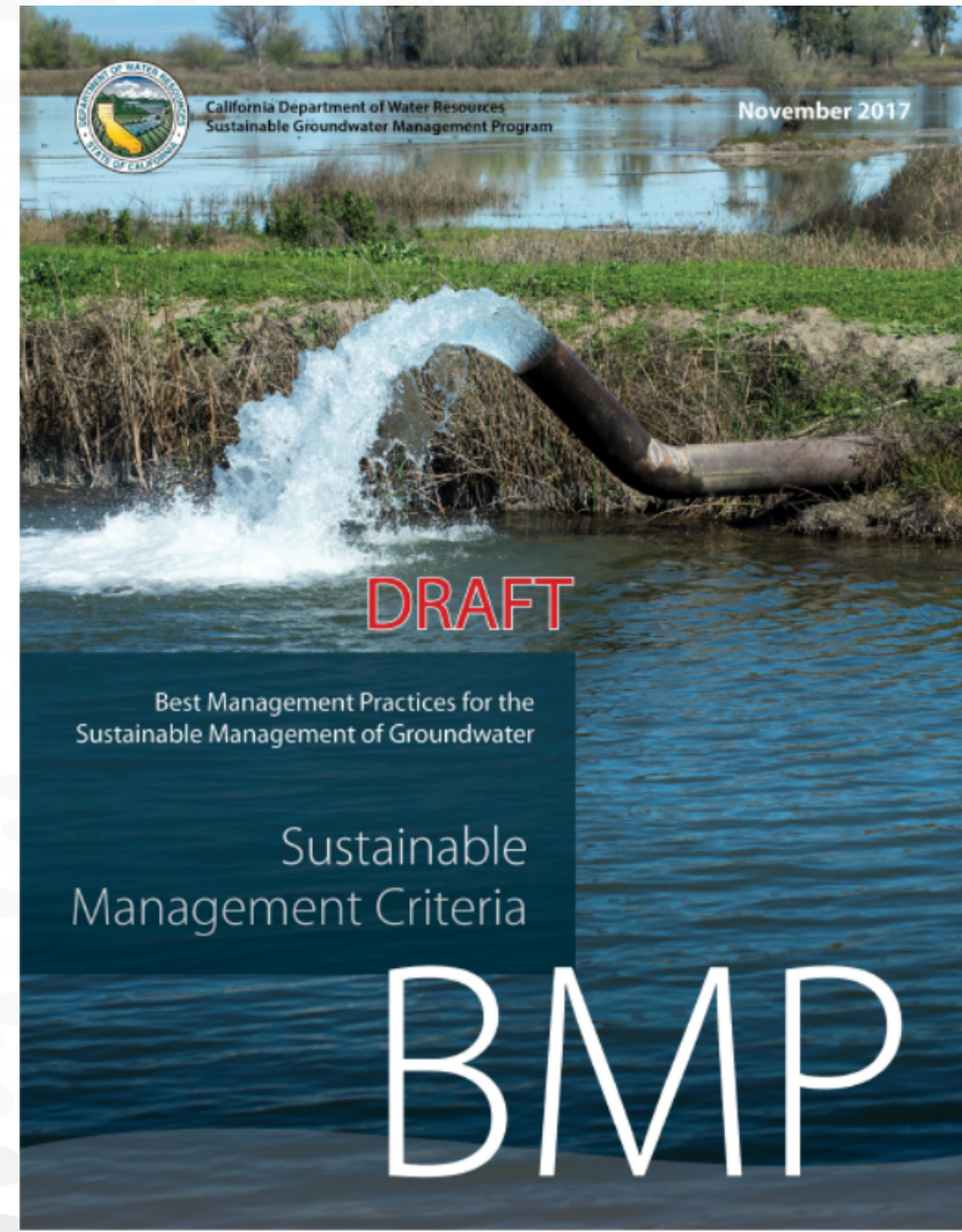
# Sustainable Management Criteria

- Overview
- Sustainability Goal
- Undesirable Results
- Minimum Thresholds,  
Measurable Objectives,  
and Interim Milestones

# SMC Component Parts

- Sustainability Goal
- Undesirable Results
- Minimum Thresholds, Measurable Objectives, and Interim Milestones
- Additional Information

<https://water.ca.gov/Programs/Groundwater-Management/SGMA-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents>





# Overview: Sustainability Goal

- Overarching Goal of the Entire Groundwater Sustainability Plan (GSP)
- Qualitative Description of Objectives and Desired Conditions in the Subbasin
- Supported by Undesirable Results, Minimum Thresholds, Measurable Objectives and Interim Milestones

# Draft Sustainability 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 without experiencing undesirable results.*

# Undesirable Results Statements

## Draft Statements

- Undesirable results statements and how they are detected are a key component of the GSP, and require careful wording
- Approach:
  - Considers stakeholder input
  - Phrased broadly to meet regulations “significant and unreasonable effects...caused by groundwater conditions”
  - Drives monitoring network, thresholds, projects, and management actions portions of GSP

# Undesirable Results Statements

## Draft Statements

- Set for each sustainability indicator
- Not required for sustainability indicators where undesirable results are not present and not likely to occur (e.g. Seawater Intrusion)
- Can be updated adaptively over time
- Are required to be updated as part of 5 year GSP updates



# 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.

- 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.

# 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

# What Does it Mean? (Groundwater Levels Version)

## Sustainability Goal

- Overarching objective of GSP

## Undesirable Result Statements

- Describes what/who can be affected by negative conditions

## Minimum Thresholds

- How far down groundwater at a particular monitoring well indicate conditions near that well are negative

# What Does it Mean?

- Local Control:
  - We decide how deep groundwater has to be (minimum thresholds) before we have a significant and unreasonable problem (and have to interact with State regulators)
    - If we decide that's shallower, we're less likely to see problems like dry domestic wells happen, but more likely to force the GSA to take actions, which have costs
    - If we decide that's deeper, we're more likely to see problems like dry domestic wells, but less likely to see the GSA forced to take actions
      - GSA *may* choose to mitigate dewatered domestic wells as part of its management
  - GSA *may* also take actions without exceedances below thresholds, is not limited to only acting when levels are below thresholds



# What is Undesirable?

- Groundwater Levels
  - Wells going dry
  - Increased pumping costs
  - Perennial/Intermittent streams staying dry longer
  - ??
- Subsidence
  - Damage to infrastructure (bridges, wells, etc.)
  - Water conveyance capacity
  - Flood protection
  - ??
- Groundwater Quality
  - Upwelling salinity
    - Drinking water
    - Irrigation uses
  - ??

Locally Driven

# Overview: Minimum Thresholds (MTs)

*Minimum Thresholds refer to numeric values for each sustainability indicator used to define undesirable results.*

- Quantitative value representing groundwater conditions at a representative monitoring site
- When exceeded individually or in combination with other monitoring sites, are used to detect an undesirable result

# Overview: Adaptive Management Threshold (AMTs)

*Adaptive Management Thresholds are a non-regulatory threshold under consideration by the GSA to guide the GSA's management of groundwater to avoid reaching minimum thresholds*

- Quantitative value representing groundwater conditions at a representative monitoring site
- When exceeded individually or in combination with other monitoring sites, may be used to trigger groundwater management by the GSA

# Overview: Measurable Objectives (MOs)

*Specific, quantifiable goals for the maintenance or improvement of specified groundwater conditions that have been included in an adopted GSP to achieve the sustainability goal for the basin.*

- Uses same measurement tools as minimum thresholds
- Provides a buffer above minimum thresholds for drought periods

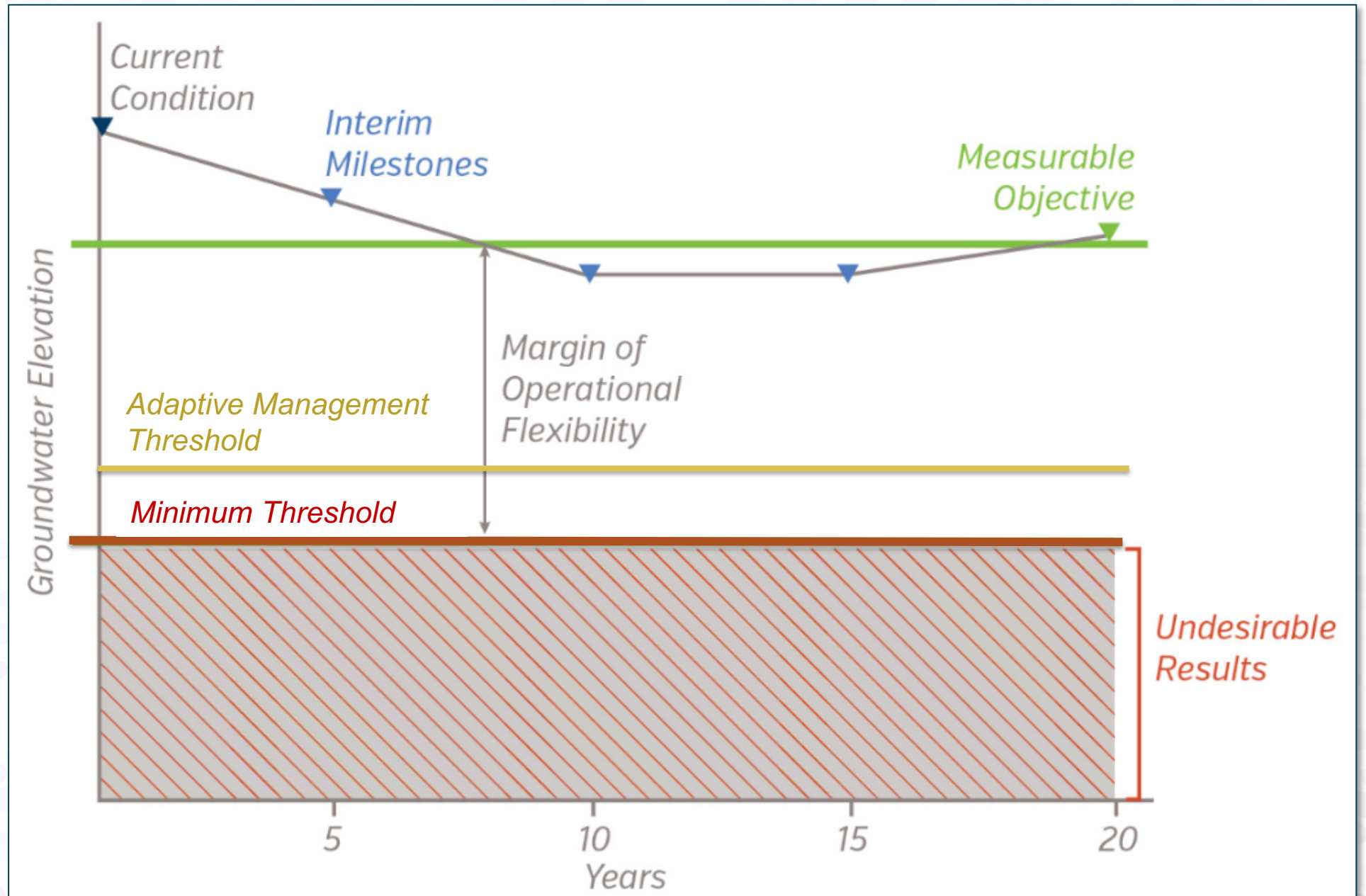


# Overview: Interim Milestones (MOs)

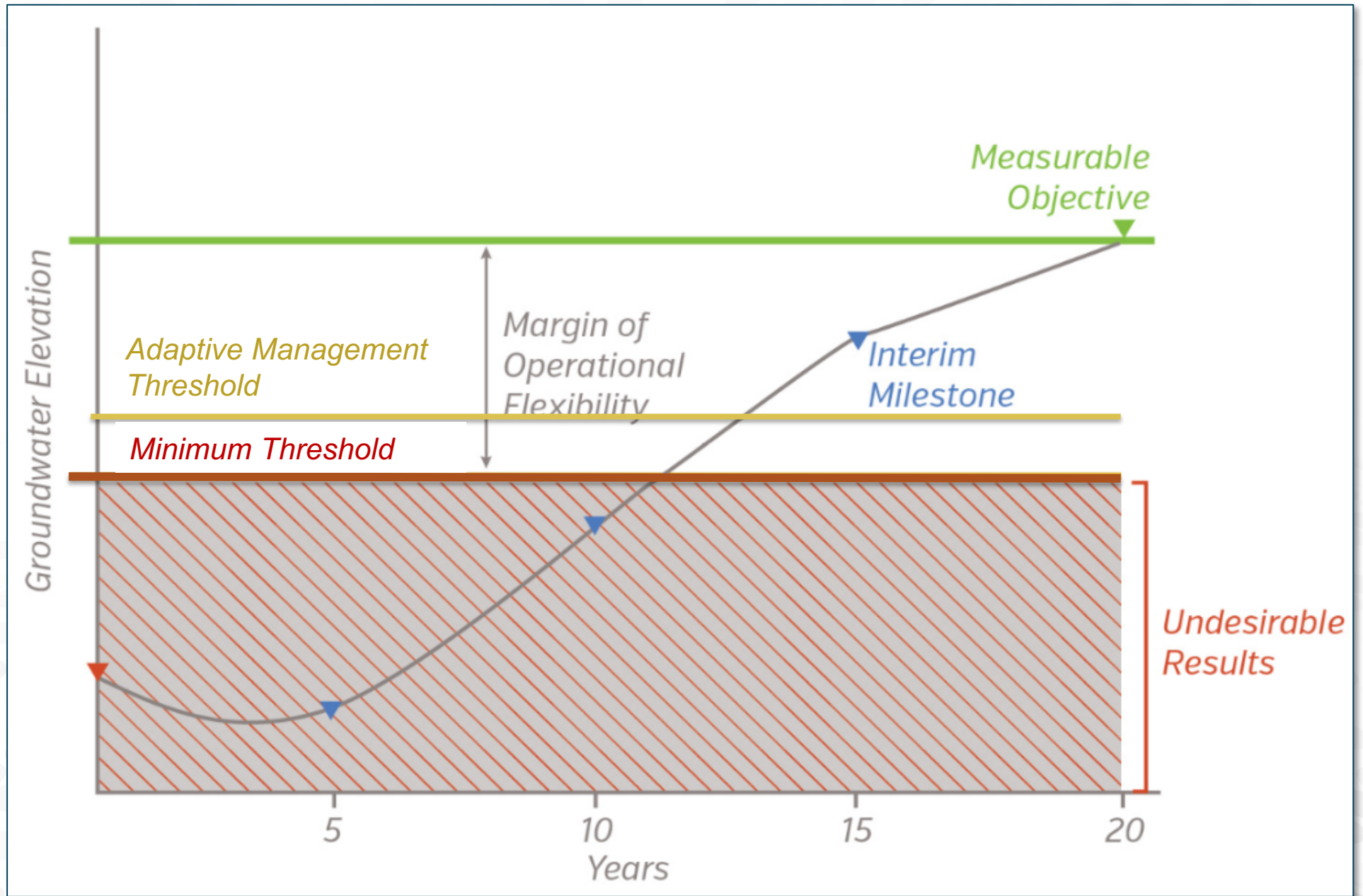
*Interim Milestones track progress toward meeting the basin's sustainability goal. Interim milestones must be coordinated with projects and management actions.*

- Uses same measurement tools as minimum thresholds
- Set in 5-year intervals, corresponding to required GSP updates

# Example: (Current Conditions Sustainable)



# Example: (Current Conditions Unsustainable)



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    - <https://colusagroundwater.org/contact-us/>



# Projects and Management Actions

Byron Clark, PE  
Davids Engineering

# Projects and Management Actions (PMAs)

- PMAs required to meet the sustainability goal over the planning and implementation horizon must be included in GSP
- Can be implemented adaptively, as needed
- Information Required:
  - Benefits and Costs
  - Implementation trigger(s) and schedule
  - Required permitting and regulatory process
  - Funding mechanism(s)
  - Etc.

# PMA Examples

- Supply Augmentation
  - Incentivize use of available (but unused) surface water supplies
  - Storage (e.g. Sites Reservoir)
- Recharge
  - Winter recharge (e.g. capturing flood flows)
  - In-lieu recharge (e.g. dual source irrigation systems)
- Demand Reduction
  - Water conservation (e.g. delivery infrastructure modernization, increased reuse)
  - Invasive species removal (e.g. Arundo)
  - Pumping allocations
- Monitoring programs
  - Groundwater pumping, Groundwater levels, Stream flows, etc.

# PMA Development Process

- Stakeholder engagement to develop initial inventory for discussion and evaluation
- Hydrologic, engineering, and economic analysis to screen initial PMAs
- Create and assess combinations of PMAs and evaluate potential impacts on groundwater conditions
- Rank, select, and perform final assessment of proposed PMAs for inclusion in GSP



# Draft Template to Gather PMA Ideas

- To be made available through GSA websites, mailing lists, etc. by late December
- Requested Information
  - Project Name and Contact Information
  - Project Description and Status
  - Supporting Information
- O.K. if not all requested information currently available

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# Well Monitoring Pilot Program

Byron Clark, PE  
Davids Engineering

# Well Monitoring Pilot Program

- Voluntary, Incentive-Based Program
- Equip Participants with Near Real-Time Information on Pumping and Water Levels
- Provides GSAs with Information to Support GSP Development
- Funded through DWR Prop 68 Grant





# Program Eligibility

- Potential Participants Agree to:
  - Allow GSAs to make information collected publicly available
  - Allow GSA representatives to make site visits
  - Participate for a period of three years
  - Install approved flow meter and access tube for pressure transducer in well casing, if not already present
  - Maintain cellular service for monitoring equipment telemetry during three-year enrollment period
  - Manually report pumping data during three-year enrollment period, in the event of device failure

# Selection Criteria

- Selection will Consider
  - Location within the subbasin (desire to enroll participants in both Glenn and Colusa counties)
  - Water source (fields relying primarily on groundwater preferred)
  - Presence of an existing flow meter installed per manufacturer specifications

# Incentives and Funding

- GSAs to Cover Costs of:
  - Flowmeter, if needed (up to \$2,500)
  - Purchase and installation of pressure transducer
  - Datalogger, solar panel, cellular modem, and a 3-year subscription for web and mobile access to data
- For Pilot Program, Funding Available for Approximately 6 Sites



# Anticipated Timeline

- Solicit Applications: Early January
- Landowner Workshop: Mid-Late January
- Selection and Deployment: February – April
- Implementation: 2021 – 2023 Growing Seasons



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    - <https://colusagroundwater.org/contact-us/>

# Schedule and Next Steps

Byron Clark, PE  
Davids Engineering

# GSP Development Schedule

- Big Picture
  - Public Review Draft Anticipated August 2021
  - Adopt in late 2021
  - Submit to DWR by January 31, 2022
- Near-Term
  - Draft Basin Setting released for comment early 2021
  - Well Monitoring Pilot Program workshop January 2021
  - GSA board and Joint TAC meetings (approximately monthly)
  - Next Public workshops late February – early March 2021

# Basin Setting Public Review Draft

- Sections
  - Hydrogeologic Conceptual Model
  - Current and Historical Groundwater Conditions
  - Water Budgets
- Distribution
  - Post to GSA websites
  - Links sent to email lists, posted on social media (Facebook, Twitter)
- Comment Process
  - Specific instructions to be provided with distribution



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    - <https://colusagroundwater.org/contact-us/>

# More Information

- GSA Contacts
  - Colusa Groundwater Authority: Mary Fahey, Program Manager
    - (530) 458-0719; [Mfahey@countyofcolusa.com](mailto:Mfahey@countyofcolusa.com)
  - Glenn Groundwater Authority: Lisa Hunter, Program Manager
    - (530) 934-6540; [Lhunter@countyofglenn.net](mailto:Lhunter@countyofglenn.net)
- GSA Websites
  - Glenn Groundwater Authority: <https://www.countyofglenn.net/dept/planning-community-development-services/water-resources/glenn-groundwater-authority>
  - Colusa Groundwater Authority: <https://colusagroundwater.org/>
- Social Media
  - Facebook: <https://www.facebook.com/ColusaSubbasin>
  - Twitter: <https://twitter.com/ColusaSubbasin>
- Other Resources
  - California DWR: <https://water.ca.gov/Programs/Groundwater-Management/SGMA-Groundwater-Management>
  - Farm Bureau: <https://www.cfbf.com/top-issues/?tab=Water>