



Stanislaus & Tuolumne Rivers Groundwater Basin Association Groundwater Sustainability Agency

1231 11th Street | Modesto, CA 95354
Phone: (209) 526-7564 | Fax: (209) 526-7352
Email: John.Davids@mid.org

STRGBA GSA AGENDA

April 14, 2021 (1:30 p.m. – 2:00 p.m.)

Webinar Digital Platform or Phone Meeting

<https://us02web.zoom.us/j/87846141611>

By phone: 1-669-900-9128

Webinar ID: 878 4614 1611

This meeting is being conducted via webinar for all seven member agencies, pursuant to Executive Orders signed by Governor Gavin Newsom related to the ongoing COVID-19 pandemic, including provisions regarding the Brown Act. Members of the public and member agency staff may join the meeting utilizing Zoom's webinar feature if desired, or a phone number as provided in this Agenda. Members of the public will continue to have the opportunity to provide public input via the webinar or phone features. Members of the public may also email public comments by 3:00 p.m. on the day preceding the GSA meeting to: strgba.org. If public comments are timely submitted by email, then those comments will be identified during the public input section of the Agenda or during a specific agenda item if the agenda item is identified in the email. The Brown Act does not require a member of the public to state her or his name; please indicate in your email if you would like your name stated or if you want to remain anonymous. _

PUBLIC PARTICIPATION

The public may participate in this meeting in the two ways described below.

Instructions for Participating in STRGBA GSA & Technical Advisory Meeting via Zoom Webinar or Phone

On your desktop/iPad or tablet/laptop:

1. To join the webinar, click the link published in the Agenda for the current meeting about 5 minutes before webinar begins.
2. Follow the on-screen instructions to install and/or launch the Zoom application.
3. If prompted, enter the Webinar ID published in the Agenda.
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5. If you wish to speak under Business from the Public, or after the Chairman calls for Public Comment, click on the "Raise Hand" button to request to speak.

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1. Call to Order/Welcome and Introductions
(Four agencies needed for a quorum)
2. Business from the Public
Who: Public
Expected Outcome: Interested persons are welcome to introduce any topic within the Agency's jurisdiction. Matters presented under this heading may be discussed but no action will be taken by the Agency at this meeting.
3. Topic: Approve 3/10/21 Meeting Minutes [[Action Item](#)]
Who: John Davids, Committee
Expected Outcome: Approval
4. Letter of Support for Water Smart Grant [[Action Item](#)]
Who: Gordon Enas, Committee
Expected Outcome: Approval
5. Seawater Intrusion Resolution [[Action Item](#)]
Who: Gordon Enas, Committee
Expected Outcome: Approval
6. Topic: Budget and Schedule Update
Who: Gordon Enas, Committee
Expected Outcome: Discussion
7. Topic: Public Outreach Update
Who: Gordon Enas/Samantha Wookey, Committee
Expected Outcome: Discussion
8. Topic: Monitoring Well Update
Who: Todd Groundwater, Committee
Expected Outcome: Discussion



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9. Next Meeting

May 12, 2021 at 1:30 p.m. via Zoom

10. Items too late for the agenda



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MEETING MINUTES

March 10, 2021 (1:30 p.m. – 2:00 p.m.)

The meeting was called to order at 1:30 p.m.

1. Welcome and Introductions

The following members of the Stanislaus and Tuolumne Rivers Groundwater Basin Association Groundwater Sustainability Agency (STRGBA GSA) attended via Zoom:

Modesto Irrigation District (MID): John Davids
City of Waterford: Mike Pitcock
City of Modesto: Miguel Alvarez
Stanislaus County: Walt Ward
City of Oakdale: Michael Renfrow
Oakdale Irrigation District: Eric Thorburn

Other Attendees:

Alexis Stevens, Somach, Simmons & Dunn	Amanda Peisch-Derby, DWR
John Beckman	Peter Drekmeier
Stacy Henderson, Terpstra Henderson	John Brichetto
Hilary Reinhard, Provost & Pritchard	David Orth
Gordon Enas, MID	Claudia Hidahl
Samantha Wookey, MID	Shelley Huskey
John Mensinger, MID	Nick Blom
Liz Elliott, Todd Groundwater	Steve Knell
Emily Sheldon	
Valerie Kincaid	
Khandriale Clark, Stantec	

2. Business from the Public

N/A

3. Approve 2/10/21 Minutes [[Action item](#)]

Ward moved, 2nd by Thorburn, to approve 2/10/21 meeting minutes. Motion carried.



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4. Budget and Schedule Update

Enas reported that Todd Groundwater has expended approximately 51% of the budget and 66% of the time scheduled through January 31, 2021.

5. Public Outreach Update

Enas reported on the approved near-term public outreach activities. The Public Outreach team solicited several volunteers for the proposed office hour sessions, as well as the prerecorded video sessions covering different SGMA topics. Ward and Alvarez volunteered to participate in the first office hours session scheduled for March 25, 2021. Thorburn and Alvarez volunteered to participate in the prerecorded video sessions which are scheduled to be produced in late March. Also, Stantec is preparing talking points for anyone interested in speaking to or giving a presentation to their constituents. The talking points will also be available by the end of March.

6. GSP Update

Elliott informed the group that the consulting team will be focusing on Sustainable Management Criteria development and model analysis of climate change and sustainable yield over the next several weeks.

7. Monitoring Well Update

Elliott stated Gregory Drilling has finished construction on Wells 7, 8, 9 and 10 and have encountered no issues so far. They will begin drilling Well 6 in Waterford next week.

8. Next meeting

April 14, 2021 at 1:30 p.m. via Zoom webinar

9. Items too late for the agenda

N/A



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April 8, 2021

Bureau of Reclamation
Financial Assistance Support Section
Attn: Applied Science NOFO
P.O. Box 25007, MS 84-27133
Denver, CO 80225

Re: 2021 WaterSMART – Applied Science Grant Application of Stockton East Water District

Dear Grant Application Committee:

As Chairman of the Stanislaus and Tuolumne Rivers Groundwater Basin Association Groundwater Sustainability Agency (STRGBA GSA) it is my pleasure to support the Stockton East Water District's ("District") application to the Applied Science Grant program to fund the Eastside Groundwater Use Measurement Project.

The purpose of the Eastside Groundwater Use Measurement Project is to estimate and produce spatial and temporal maps of monthly evapotranspiration (ET) and estimation of Net-to-From Groundwater within the boundary of Stockton East Water District (SEWD), North San Joaquin Water Conservation District (NSJWCD), and Central San Joaquin Water Conservation District (CSJWCD) boundaries. The data provided by the project is critical for conjunctive use management, accurate measurement of groundwater use, and Groundwater Sustainability Plan reporting.

STRGBA GSA consists of seven public agencies in Stanislaus County who elected to become one of two Groundwater Sustainability Agencies for the Modesto Sub-basin. Since its inception, STRGBA GSA has provided a forum for local agencies to work cooperatively in the pursuit of effective and sustainable groundwater management of the Modesto Sub-basin as well as neighboring sub-basins. The STRGBA GSA supports this project because it will provide much needed data to help meet the sustainability goal of the Eastern San Joaquin Sub-basin which shares a common boundary with the Modesto Sub-basin along the Stanislaus River. Accurate measurement of basin groundwater use is essential for basin management and to establish long-term sustainability.

We highly recommend this project for your Applied Science Grant opportunity. If you have any questions regarding this letter of support, please feel free to contact me at (209) 526-7564.

Sincerely,

John B. Davids, P.E.
STRGBA GSA Chairman



AGENDA REPORT

GSA Meeting Date: April 14, 2021

Subject:	Seawater Intrusion Sustainability Indicator.
Recommended Action:	Resolution making the determination that seawater intrusion does not exist and is not likely to occur in the future, and therefore a seawater intrusion sustainability indicator is not applicable in the Modesto Subbasin.
Background and Discussion:	<p>STRGBA GSA’s consultant Todd Groundwater (Todd) conducted an analysis on the applicability of the Seawater Intrusion sustainability indicator in the Modesto Subbasin. SGMA identifies six sustainability indicators that describe potential adverse groundwater conditions. If any of these indicators are determined to be significant and unreasonable in the Modesto Subbasin, that condition would define an Undesirable Result. However, if evidence shows that an undesirable result does not exist and is not likely to occur in the future, then that sustainability indicator can be removed from further consideration as stated in the SGMA paragraph §354.26 (d).</p> <p>Todd’s analysis showed that the Modesto Subbasin is not a coastal basin and does not have a direct connection to the ocean. Basement rocks of the Coast Range separate the Subbasin from any direct connectivity with the Pacific Ocean to the west. The Subbasin is upstream of the Sacramento-San Joaquin Delta (Delta) and not impacted by high salinity waters to the north. No elevated chloride/total dissolved solids (TDS) groundwater has intruded into the Subbasin from downstream areas and such a condition is not likely to occur in the future.</p>
Alternatives, Pros and Cons of Each Alternative:	<p>Pros: Eliminates need to develop and implement a measurable objective and minimum threshold from consideration in the GSP.</p> <p>Cons: None</p>
Concurrence:	<p>The recommendation to eliminate seawater intrusion from further consideration as a sustainability indicator is contained in the memo from Todd Groundwater to STRGBA GSA dated March 23, 2021. This recommendation is consistent with a similar finding made by the Turlock Subbasin to the south and the Eastern San Joaquin Subbasin to the north.</p>
Fiscal Impact:	<p>If the resolution is approved then there will be a cost saving since no further analysis is needed. If the resolution is not approved, a measurable objective and minimum threshold for the seawater intrusion sustainability indicator will need to be developed and implemented by the GSP, which will require additional analysis by the consultant team and additional cost.</p>

Recommendation: Resolution making the determination that seawater intrusion does not exist and is not likely to occur in the future, and therefore a seawater intrusion sustainability indicator is not applicable in the Modesto Subbasin.

Attachments: Supporting documents attached:
 Resolution Presentation Other supporting docs None attached

Note: Original contracts and agreements are housed in the GSA Secretary's Office, phone (209) 526-7360.

Presenter

Gordon Enas
4/9/2021
Date Signed

GSA Chairman

John B. Davids, P.E.
4/9/2021
Date Signed



AGENDA REPORT

DRAFT

RESOLUTION NO. 2021-2

RESOLUTION MAKING THE DETERMINATION THAT SEAWATER INTRUSION DOES NOT EXIST AND IS NOT LIKELY TO OCCUR IN THE FUTURE, AND THEREFORE A SEAWATER INTRUSION SUSTAINABILITY INDICATOR IS NOT APPLICABLE IN THE MODESTO SUBBASIN.

WHEREAS, the Sustainable Groundwater Management Act (SGMA) identifies six sustainability indicators that describe potential adverse groundwater conditions and that if any of these indicators should be determined to be significant and unreasonable in the Modesto Subbasin, that condition would define an Undesirable Result; and

WHEREAS, SGMA states that a Groundwater Sustainability Agency (GSA) is not required to establish criteria for undesirable results for those sustainability indicators that do not exist and are not likely to occur in the future; and

WHEREAS, SGMA defines Seawater Intrusion as “the advancement of seawater into a groundwater supply that results in degradation of water quality in the basin and includes seawater from any source”; and

WHEREAS, the Stanislaus and Tuolumne Rivers Groundwater Basin Association Groundwater Sustainability Agency (STRGBA GSA) has conducted a technical analysis which concluded that seawater intrusion is not occurring and not likely to occur in the future in the Modesto Subbasin.

BE IT RESOLVED, The Stanislaus and Tuolumne Rivers Groundwater Basin Association Groundwater Sustainability Agency does hereby make the determination that seawater intrusion does not exist and is not likely to occur in the future, and therefore a seawater intrusion sustainability indicator is not applicable in the Modesto Subbasin.

March 23, 2021

DRAFT MEMORANDUM

To: Modesto Subbasin Technical Advisory Committee (TAC)

From: Phyllis Stanin, Vice President/Principal Geologist

Re: Consideration of the Seawater Intrusion Sustainability Indicator
Modesto Subbasin GSP

In a public meeting held on January 13, 2021, the TAC reviewed technical information on the six sustainability indicators as defined in the Sustainable Groundwater Management Act (SGMA), including the Seawater Intrusion indicator. In that meeting, the technical consulting team provided a summary of the GSP requirements for considering whether the Seawater Intrusion indicator was applicable to the Modesto Subbasin. Regulations allow the GSAs to determine that an indicator is not applicable to conditions in the Subbasin; in that case, the GSAs are not required to select sustainable management criteria for that indicator.

To assist the TAC in its consideration of this sustainability indicator, the consulting team has prepared this memorandum summarizing the technical and regulatory considerations for seawater intrusion in the Modesto Subbasin. The final decision on the inapplicability will be made by the GSAs with a recommendation from the TAC.

BACKGROUND

SGMA identifies six sustainability indicators that describe potential adverse groundwater conditions. If any of these should be determined to be significant and unreasonable in the Modesto Subbasin, that condition would define Undesirable Results; sustainability indicators are tabulated below.

SGMA Sustainability Indicators

					
Chronic Lowering of Water Levels	Reduction of Groundwater in Storage	Degraded Water Quality	Seawater Intrusion	Inelastic Land Subsidence	Depletion of Inter-connected Surface Water

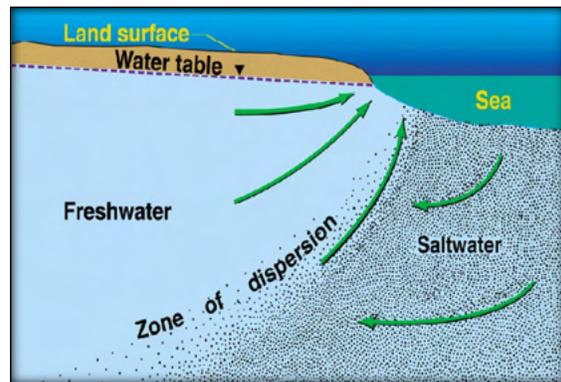
DWR's Best Management Practices (BMPs) for sustainable management criteria state that the default position for GSAs should be that all six sustainability indicators apply to their subbasin. However, if evidence shows that an undesirable result does not exist and are not likely to occur in the future for a sustainability indicator, then that sustainability indicator can be removed from further consideration as stated in the GSP regulations below.

An agency that is able to demonstrate that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin shall not be required to establish criteria for undesirable results related to those sustainability indicators (§354.26 (d)).

SEAWATER INTRUSION SUSTAINABILITY INDICATOR

GSP regulations define *Seawater Intrusion* as "the advancement of seawater into a groundwater supply that results in degradation of water quality in the basin and includes seawater from any source." The minimum threshold for the indicator "shall be defined by a chloride concentration isocontour...where seawater intrusion may lead to undesirable results." Further, the seawater intrusion minimum threshold must consider the effects of "current and projected sea levels" (§354.28 (c)(3)).

Typically, these conditions would occur in a *coastal* groundwater basin where aquifers are in communication with ocean water, either directly or by interconnected waterways. Such conditions are illustrated on the conceptual diagram at right, developed by the U.S. Geological Survey (USGS). In that diagram, freshwater aquifers are in direct connection with the sea and have the potential for inducing the movement of saltwater inland if water levels decline significantly below sea level. If that occurred, the example basin would be able to identify and map isocontours of chloride as an indicator of ocean water. However, these groundwater conditions are not consistent with the Modesto Subbasin.



The Modesto Subbasin is not a coastal basin and does not have a direct connection to the ocean. Basement rocks of the Coast Range separate the Subbasin from any direct connectivity with the Pacific Ocean to the west. The Subbasin is upstream of the Sacramento-San Joaquin Delta (Delta) and not impacted by high salinity waters to the north. No elevated chloride/total dissolved solids (TDS) groundwater has intruded into the Subbasin from downstream areas and such a condition is not likely to occur in the future. Subbasin groundwater is not affected by "current or projected sea levels."

The BMP for sustainable management criteria (DWR, 2017) provides an example statement that appears to be applicable to the inland Modesto Subbasin:

GSA's in basins not adjacent to the Pacific Ocean, bays, deltas, or inlets may determine that seawater intrusion is not an applicable sustainability indicator because seawater intrusion does not exist and could not occur.

CONSIDERATION OF SEAWATER INTRUSION ANALYSIS IN ADJACENT SUBBASINS

The joint TACs in the adjacent Turlock Subbasin have also concluded that this sustainability indicator is not applicable to the Turlock Subbasin because of a lack of connection to a seawater source. The TACs noted that elevated salinity has been identified at depth in older marine deposits beneath the Subbasin, but that condition has not been caused by modern-day seawater intrusion mechanisms. The TACs note that any future issues with deep salinity groundwater can be more reasonably managed through the water quality sustainability indicator. Although deep connate water also occurs beneath the Modesto Subbasin, the freshwater zone is thick and extends to depths of more than 1,100 feet beneath some parts of the Subbasin (see Figure 3-7 in the Modesto Subbasin Draft GSP). If upconing of deep saline water becomes a concern in the future, it can also be addressed with the water quality indicator rather than the seawater intrusion indicator.

As documented in the adjacent Eastern San Joaquin (ESJ) Subbasin GSP, the GSA's concluded that seawater intrusion is not present and is not reasonably expected to occur in that Subbasin. Even with elevated groundwater salinity detected historically in the Stockton area, the GSP concludes that the saline water is due to other factors and not the result of seawater intrusion. The GSP also acknowledges that the Delta is managed to maintain freshwater flows through a combination of hydraulic and physical barriers and channel alterations.

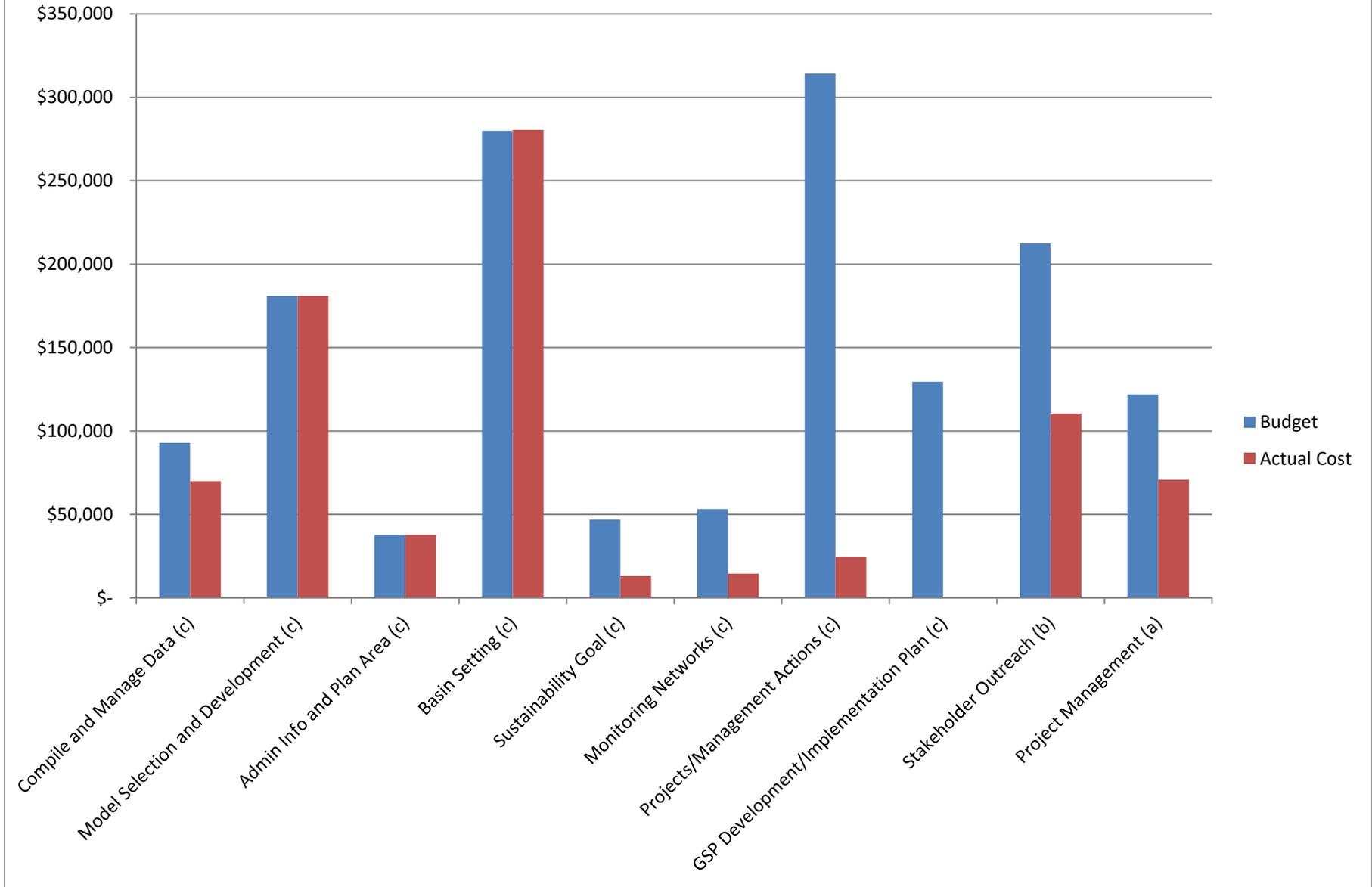
Nonetheless, given the ESJ Subbasin's closer proximity to the Delta, and in consideration of its historical salinity issues and the possibility of future changes in the Delta, the ESJ Subbasin GSP established sustainable management criteria for this indicator and monitoring using chloride concentrations in wells where elevated salinity had been detected in the western Subbasin. These criteria were consistent with its water quality indicator.

Again, similar historical salinity conditions do not exist in the Modesto Subbasin, and there are not increasing chloride concentrations that could be contoured for groundwater management. No historical salinity issues from migrating water at depth has not been identified. The monitoring program established for the Eastern San Joaquin Subbasin coincides with the GSP monitoring network for the water quality indicator, and the Modesto Subbasin could also address any future salinity issues with the water quality indicator.

RECOMMENDATION

If the TAC agrees with the technical analysis herein that seawater intrusion is not occurring and not likely to occur in the Modesto Subbasin in the future, then the TAC should recommend this finding to the Subbasin GSA's and seek a final determination that the sustainability indicator of seawater intrusion is not applicable in the Modesto Subbasin.

Cost To Prepare GSP (September 2018 - February 2021)





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TECHNICAL ADVISORY COMMITTEE AGENDA

April 14, 2021 (2:00 p.m. – 3:00 p.m.)

Webinar Digital Platform or Phone Meeting

<https://us02web.zoom.us/j/87846141611>

By phone: 1-669-900-9128

Webinar ID: 878 4614 1611

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2. Business from the Public
Who: Public
Expected Outcome: Interested persons are welcome to introduce any topic within the Agency's jurisdiction. Matters presented under this heading may be discussed but no action will be taken by the Agency at this meeting.

3. Topic: Approve 3/10/21 Meeting Minutes [[Action Items](#)]
Who: John Davids, Committee
Expected Outcome: Approval

4. Topic: Climate Change Modeling
Who: Woodard & Curran, Committee
Expected Outcome: Discussion

5. Topic: GSP Monitoring Network Considerations
Who: Todd Groundwater, Committee
Expected Outcome: Discussion

6. Next Meeting
May 12, 2021 at 2 p.m. (following STRGBA GSA monthly meeting) via Zoom

7. Items too late for the agenda



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**TECHNICAL ADVISORY COMMITTEE
MEETING MINUTES**

March 10, 2021 (2:00 p.m. – 3:00 p.m.)

The meeting was called to order at 2:00 p.m.

1. Welcome and Introductions

The following members of the Stanislaus and Tuolumne Rivers Groundwater Basin Association Groundwater Sustainability Agency (STRGBA GSA) attended via Zoom:

Modesto Irrigation District (MID): John Davids
City of Waterford: Mike Pitcock
City of Modesto: Miguel Alvarez
Stanislaus County: Walt Ward
City of Oakdale: Michael Renfrow
Oakdale Irrigation District: Eric Thorburn

Other Attendees:

Alexis Stevens, Somach, Simmons & Dunn
John Beckman
Stacy Henderson, Terpstra Henderson
Hilary Reinhard, Provost & Pritchard
Gordon Enas, MID
Samantha Wookey, MID
John Mensinger, MID
Liz Elliott, Todd Groundwater
Emily Sheldon
Valerie Kincaid
Khandriale Clark, Stantec

Amanda Peisch-Derby, DWR
Peter Drekmeier
John Brichetto
David Orth
Claudia Hidahl
Shelley Huskey
Nick Blom
Steve Knell

2. Business from the Public

N/A



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3. Approve 2/10/21 Minutes [Action item]

Renfrow moved, 2nd by Ward, to approve 2/10/21 meeting minutes. Motion carried.

4. Technical Workshop #12 – Sustainable Management Criteria

Elliott gave a presentation on the continued development of Sustainable Management Criteria for the Modesto Subbasin. A copy of the presentation can be accessed at the STRGBA GSA website: www.strgba.org. Elliot first addressed the “chronic lowering of groundwater levels” sustainability indicator.

- Knell asked how many domestic wells in Stanislaus County are still at risk of failure due to lowering of groundwater levels? Elliot responded approximately 600-800 domestic wells could be at risk, but uncertain as to how many of those wells are still active. Also, 150-170 wells had problems and were replaced during the recent drought, but other older wells may also be vulnerable.
- Davids asked if that number included new wells or only replacement wells? Elliot didn't know for certain, but said it's very likely to include new wells.
- Davids asked if there is any value in looking at the broader picture of domestic well vulnerability instead of only those new/replacement wells constructed since 2015? Elliot responded that they can evaluate pre-2015 wells also.
- Davids also asked if the four wells replaced by OID during the drought were normal life-cycle replacements? Thorburn responded that the wells were replaced due to dropping water levels and were not life-cycle replacements.

Elliot next presented the process of selecting representative wells for the minimum threshold designation.

- Ward asked how the decline in water levels affects the reduced saturated thickness of the aquifer and do we want to preserve a certain percentage of the aquifer? Davids asked if Ward was questioning whether minimum thresholds should be set below historical lows? Ward added that maybe the GSA should be protecting the resource rather than the shallowest wells, and should we rely on shallow, inefficient domestic wells as representative wells? Elliot responded that in the eastside there is a huge bathtub of groundwater, but if you continue to lower water levels there will be undesirable results. Also, the continued lowering of water levels will impact the rivers. We don't know how much lower we can go, but forthcoming modeling should provide some answers in the next few months.



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- Peisch-Derby asked if the GSA had defined undesirable results for chronic lowering of groundwater? If not, consider the GSP as an implementation plan and that it doesn't need to be perfect right now. You can change the minimum thresholds in the future as you gain more data from monitoring wells. Elliot responded that undesirable results have not been defined yet since we don't have enough data on water levels below the Corcoran clay layer. Most wells on the westside are screened above the Corcoran and only a few below.
- Kincaid added that the GSA needs to develop a metric for determining undesirable results before setting a minimum threshold.
- Knell stated that you also need to look at energy costs when developing metrics and setting minimum thresholds, since the pumping cost will increase as water levels drop.
- Pitcock requested a summary of the well installation project for Waterford's Facebook page. Elliot will send an email after the meeting.

5. Next Meeting

April 14, 2021

6. Items too late for the agenda

N/A



MODESTO SUBBASIN GSP

2070 CLIMATE CHANGE SCENARIO

STRGBA TECHNICAL ADVISORY COMMITTEE

Presented on April 14, 2021



TODD
GROUNDWATER

AGENDA

- Climate Change
 - Regulatory Requirements
 - Approach and Assumptions
 - Input Data
 - Model Results

DWR SGMA REGULATIONS FOR CLIMATE CHANGE

§ 354.18. (c) Each Plan shall quantify the ... projected water budget for the basin as follows:

(3) Projected water budgets ... shall ... estimate future baseline conditions concerning hydrology, water demand and surface water supply availability or reliability over the planning and implementation horizon:

(A) Projected hydrology shall utilize **50 years of historical precipitation, evapotranspiration, and streamflow information** ... (and) shall also be applied ... to evaluate future scenarios of hydrologic uncertainty **associated with projections of climate change** and sea level rise.

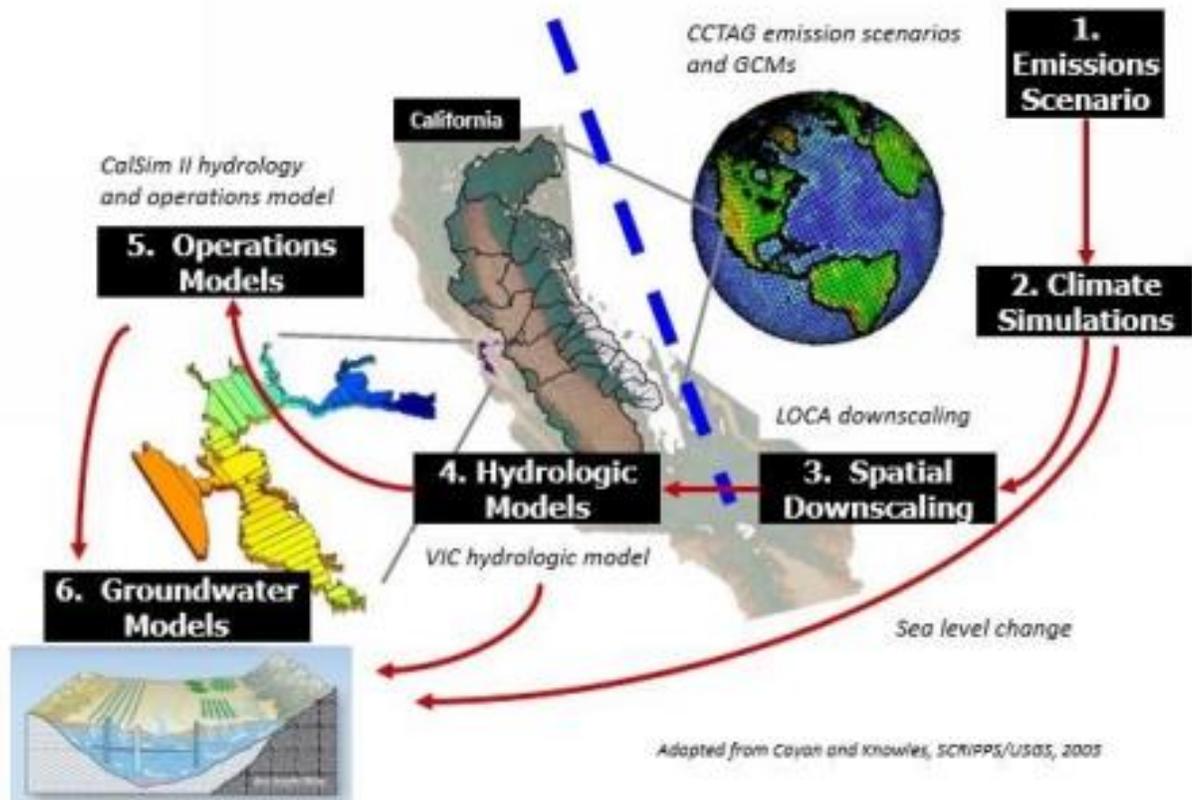
(B) Projected water demand shall utilize **the most recent land use, evapotranspiration, and crop coefficient information** ... (and) shall also be applied ... to evaluate future scenarios of water demand uncertainty associated with projected changes in local land use planning, population growth, and **climate**.

(C) Projected surface water supply shall utilize **the most recent water supply information** as the ... (and) shall also be applied ... to evaluate future scenarios of surface water supply availability and reliability as a function of the ... projected changes in local land use planning, population growth, and **climate**.

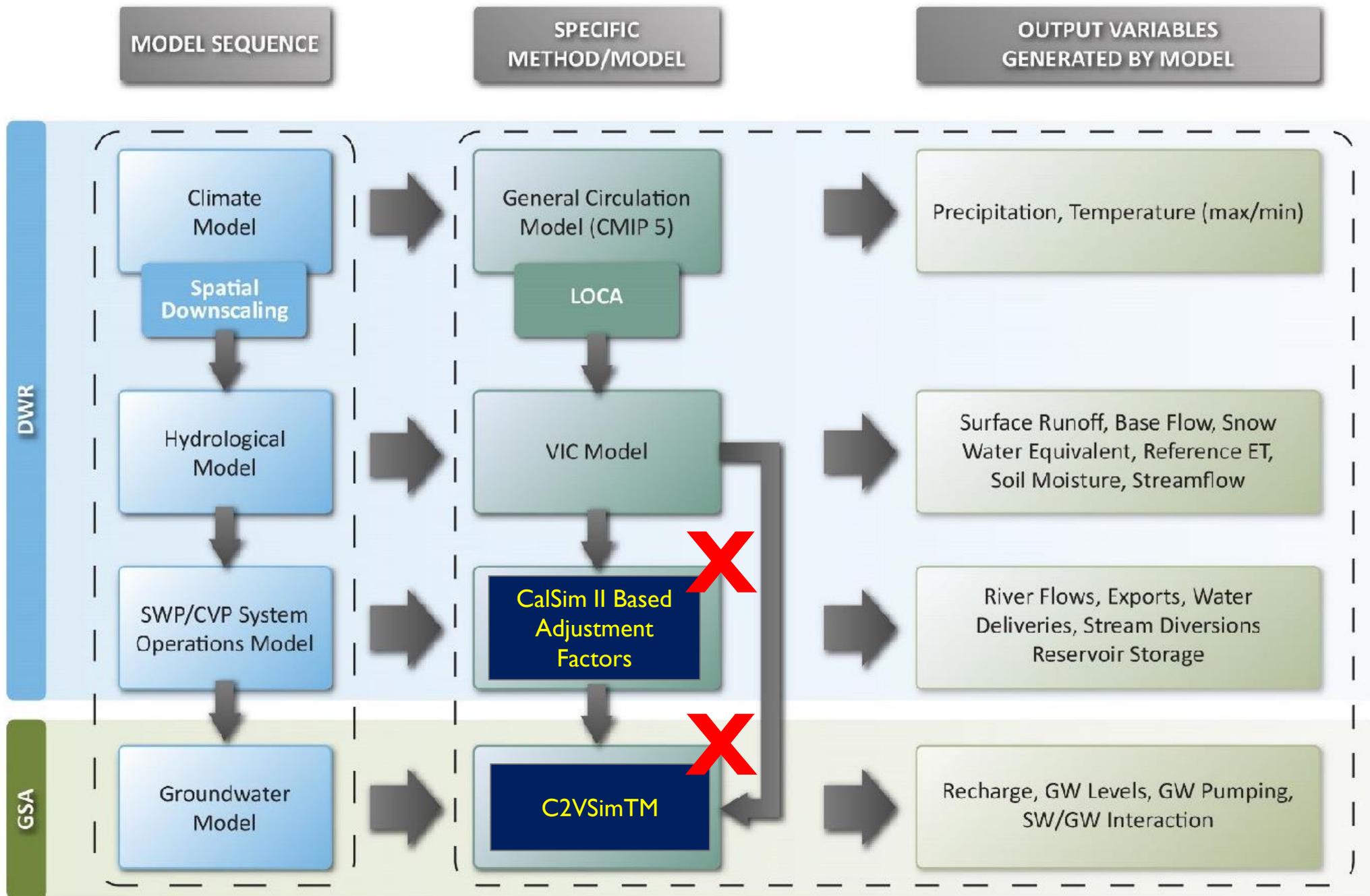
CLIMATE CHANGE ANALYSIS GOALS

- Meet the GSP regulatory requirements
- Reasonably represents the climate change conditions in Modesto Subbasin and Tuolumne/Stanislaus River Watersheds.
 - Use the methodology developed by, and described in, DWR's Water Budget BMP (DWR, 2018a) with refinements to facilitate local surface water operations.
 - Provide a uniform approach to the climate change scenarios that is spatially distributed and possesses appropriate temporal trends that is applicable to both the upper watersheds and the valley floor.

CLIMATE CHANGE DATA DOWNSCALING TO GROUNDWATER MODEL APPLICATIONS

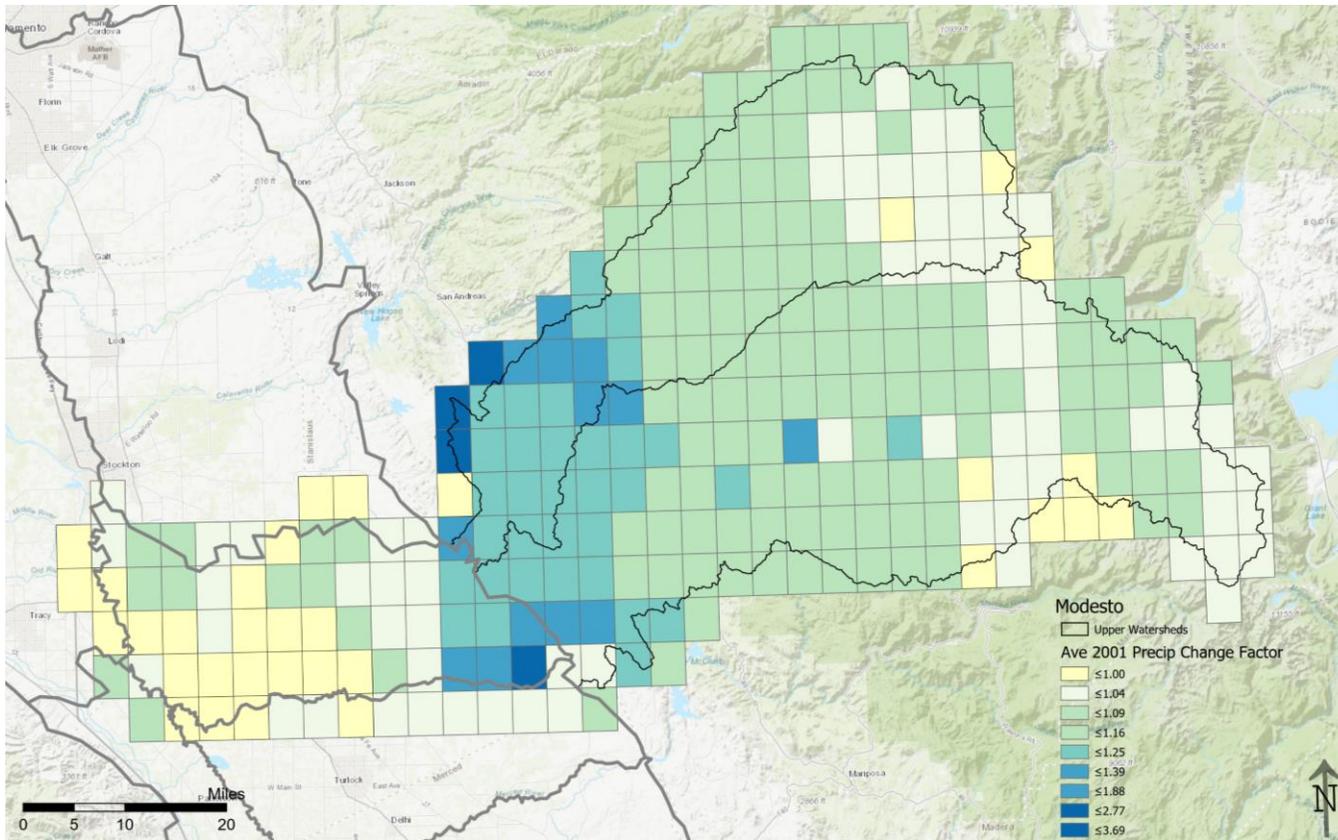


- Data from Global Climate Models (GCMs) are downscaled to a regional planning scale
- Downscaled data is available in pre-existing datasets by VIC grid cells:
 - Temperature
 - Precipitation
 - Evapotranspiration



PRECIPITATION

2001 (AVG) CHANGE FACTORS

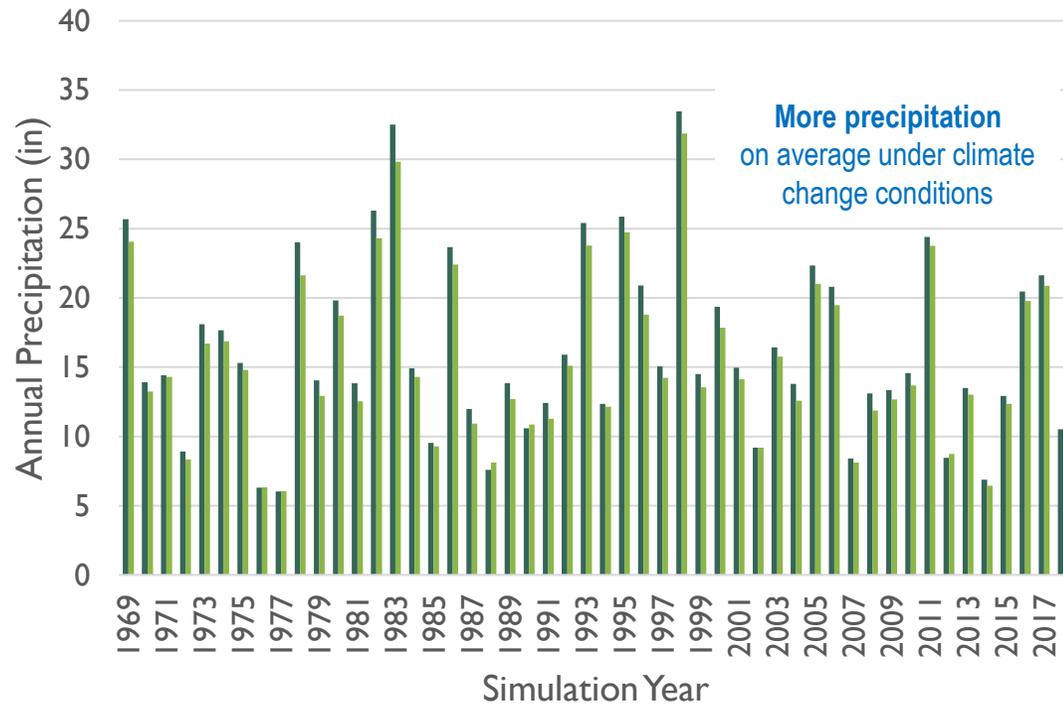


Annual Change Factors

- Source: VIC
- Upper Watershed
 - Min 0.96
 - Avg 1.09
 - Max 1.33
- Lower Watershed
 - Min 0.69
 - Avg 1.13
 - Max 2.28

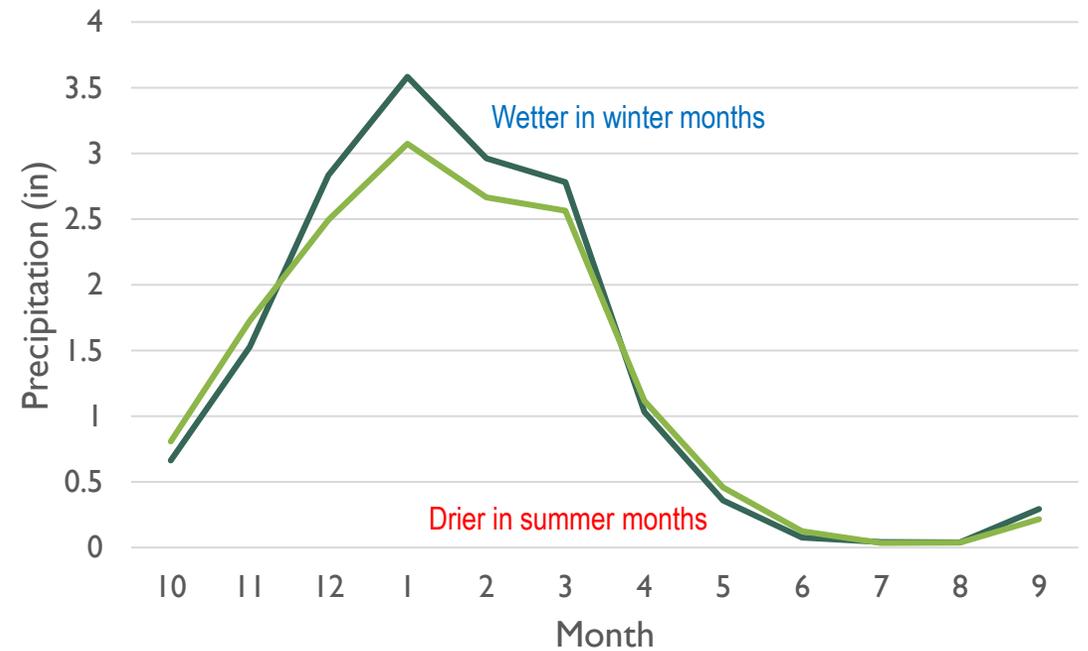
PRECIPITATION

Annual Precipitation - Modesto Subbasin



■ Climate Change 2070 ■ Projected Conditions Baseline

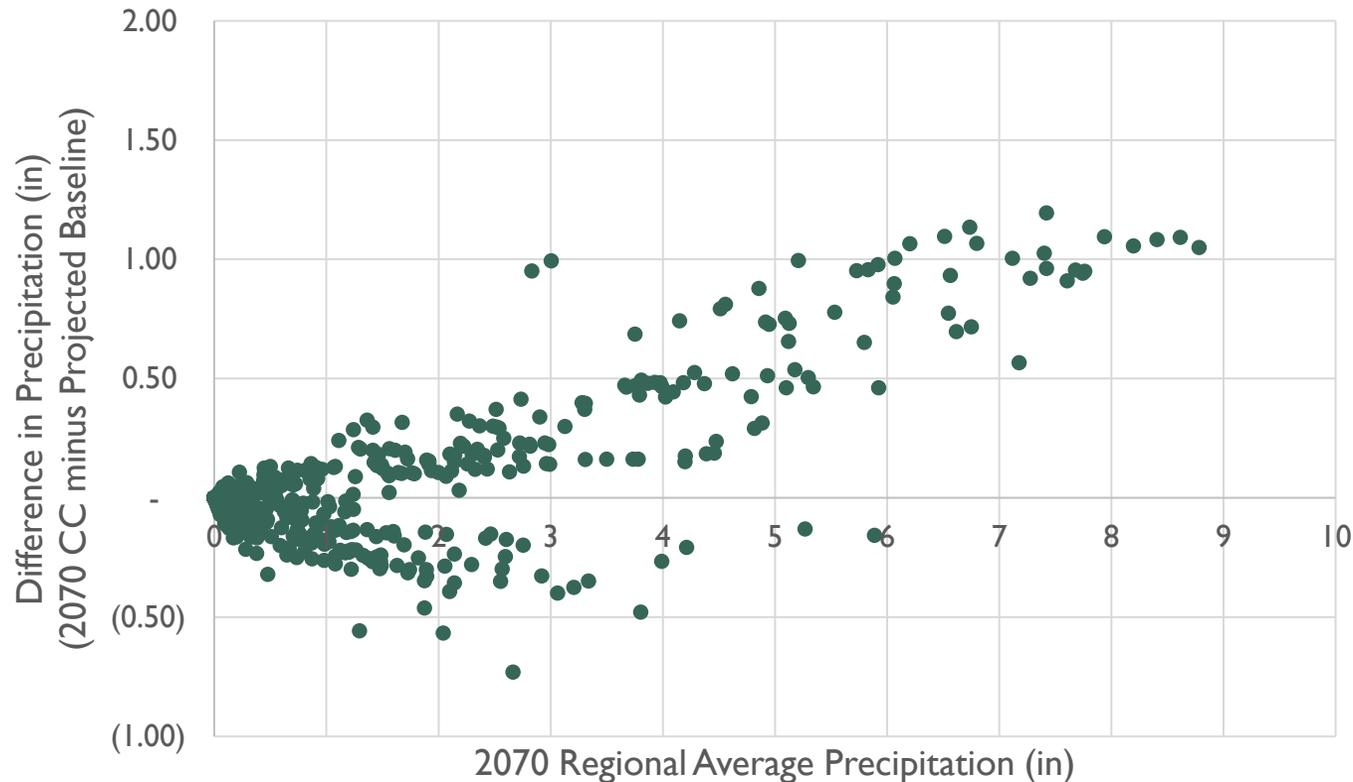
Average Monthly Precipitation - Modesto Subbasin



— Climate Change 2070 — Projected Conditions Baseline

PRECIPITATION – MODESTO SUBBASIN

Variation from Baseline of Perturbed Precipitation

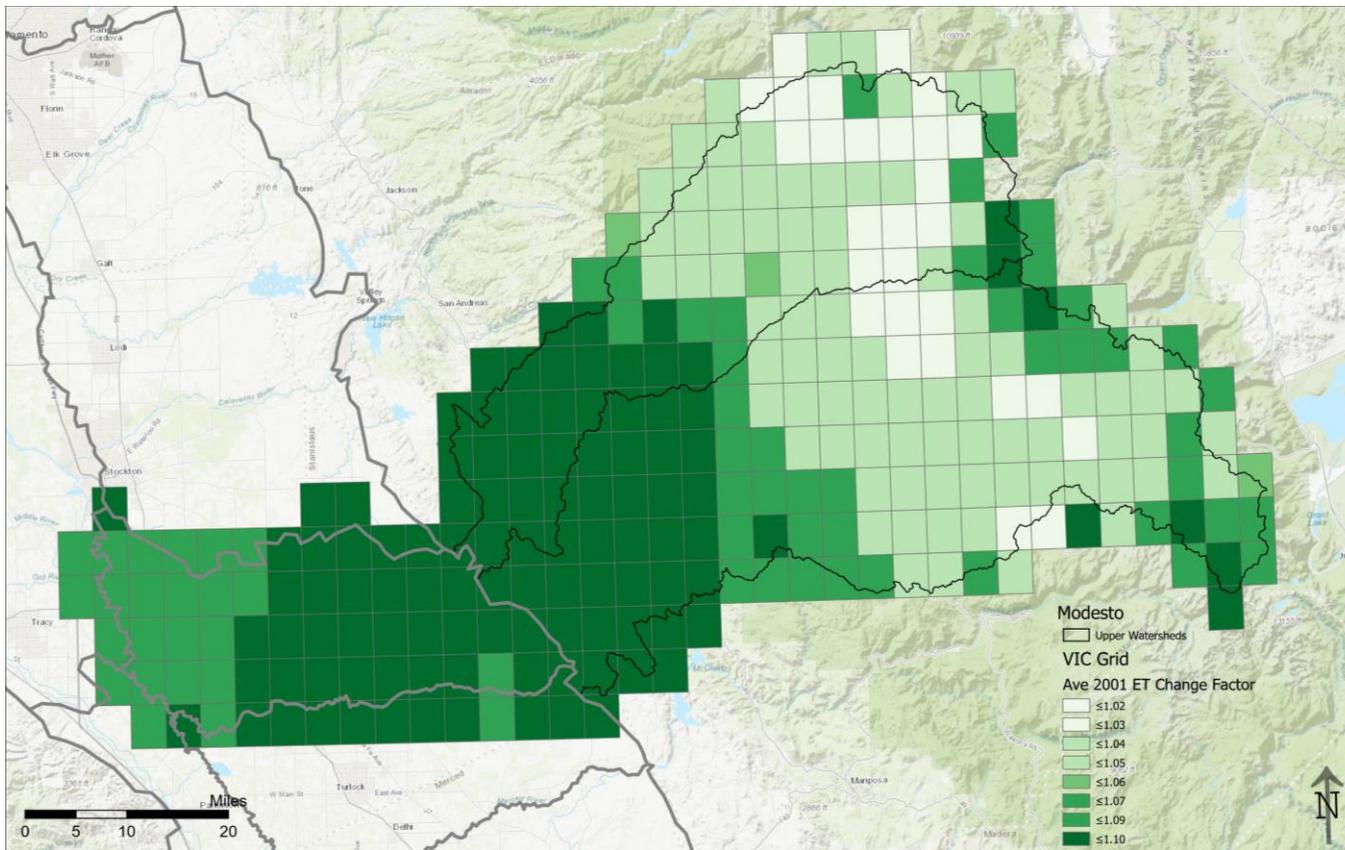


Annual Precipitation

- Projected Conditions
 - Min 6.05 in
 - Avg 15.32 in
 - Max 31.87 in
- Climate Change (2070)
 - Min 6.02 in
 - Avg 16.20 in
 - Max 33.48 in

ET₀ CHANGE FACTOR

2001 (AVE) CHANGE FACTORS

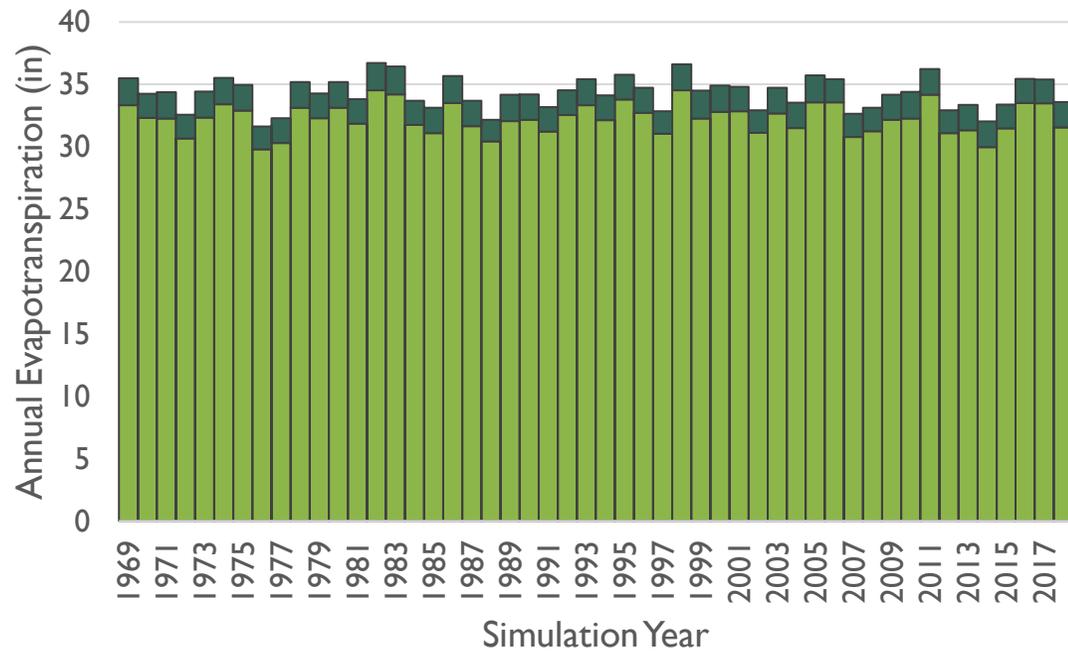


Annual Change Factors

- Source: VIC
- Upper Watershed
 - Min 1.01
 - Avg 1.06
 - Max 1.09
- Lower Watershed
 - Min 1.01
 - Avg 1.08
 - Max 1.28

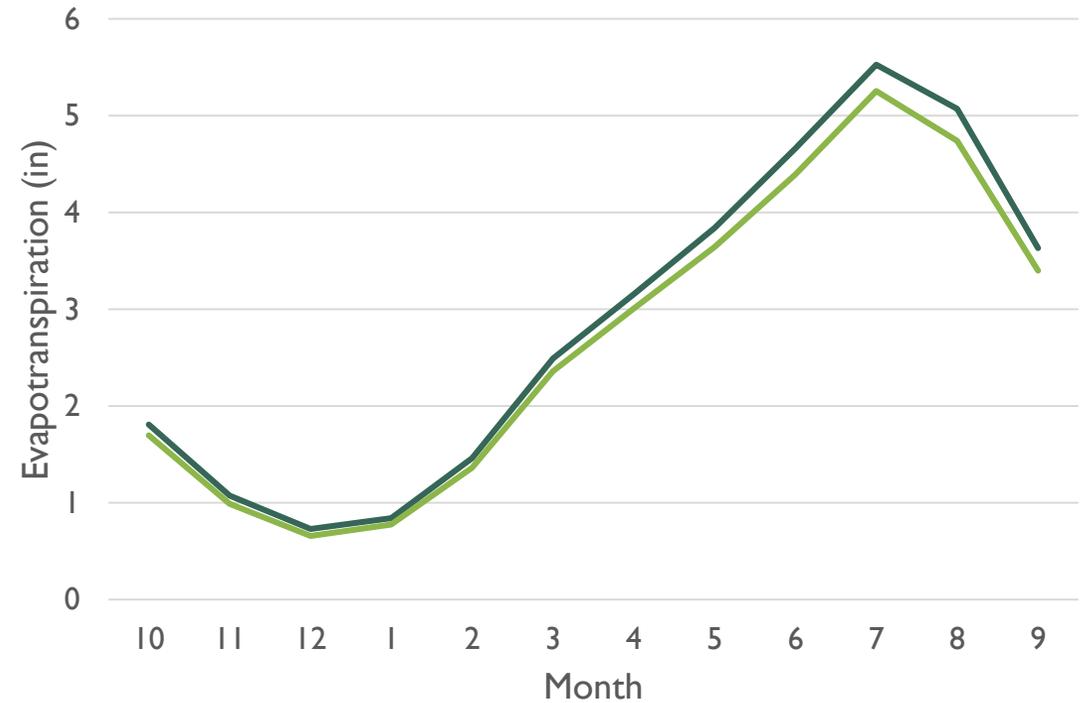
ET₀ CHANGE FACTOR

Annual Evapotranspiration - Modesto Subbasin



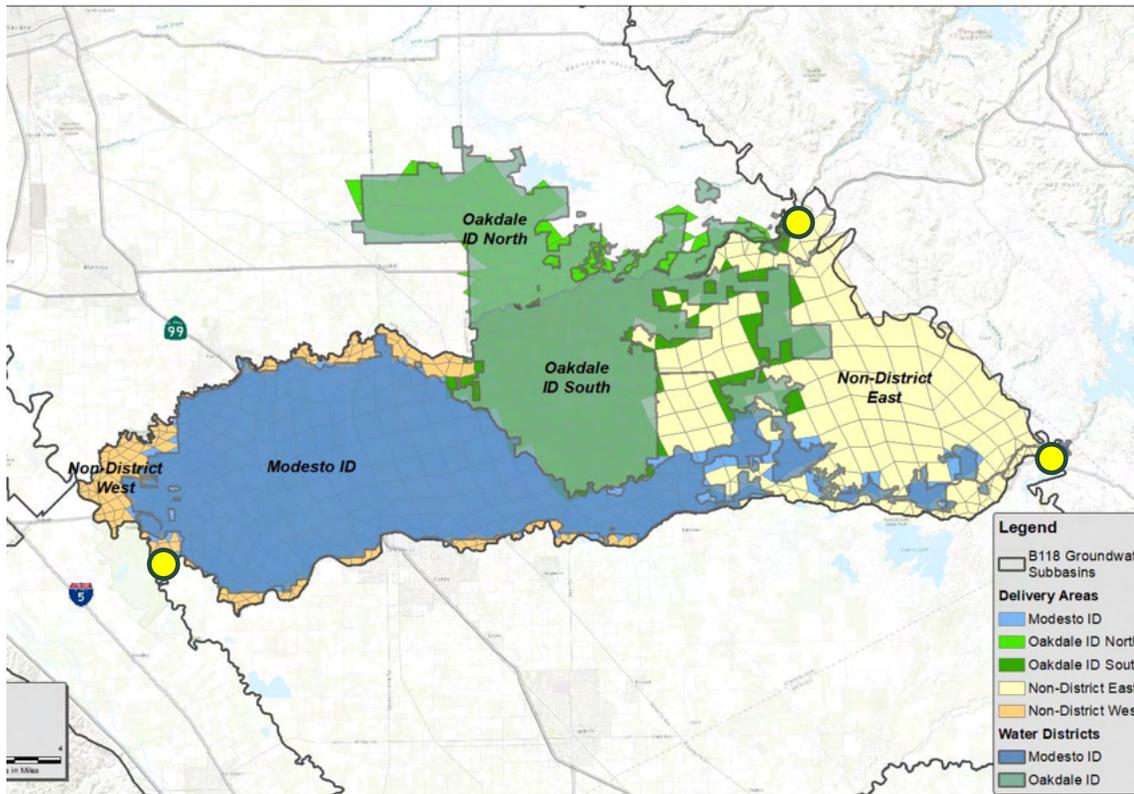
■ Projected Conditions Baseline ■ Climate Change 2070

Average Monthly ET - Modesto Subbasin



— Climate Change 2070 — Projected Conditions Baseline

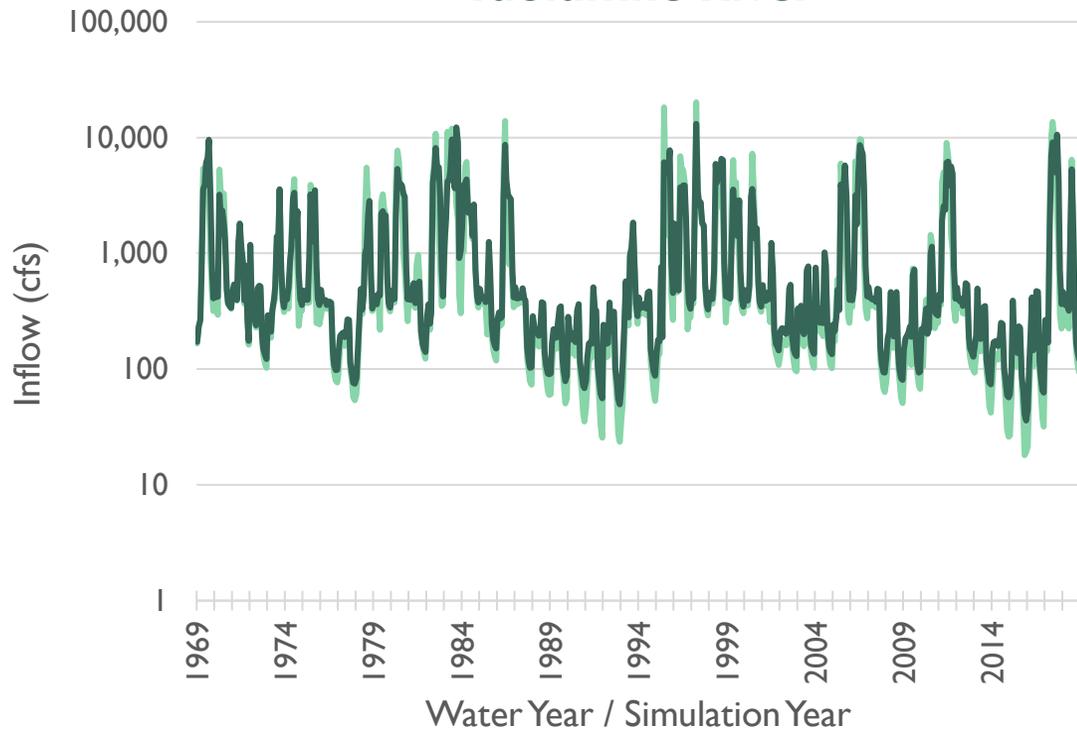
STREAM SYSTEM



- **Modeling Approach**
 - Based on CalSIM II Water Storage Investment Program (WSIP)
 - CalSim II generated perturbation factors
- **Stream Inflow**
 - Merced River
 - Tuolumne River
 - Stanislaus River
 - San Joaquin River
- **Surface Water Deliveries**
 - Turlock Irrigation District
 - Merced Irrigation District
 - Modesto Irrigation District
 - Oakdale Irrigation District
 - Riparian Diverters

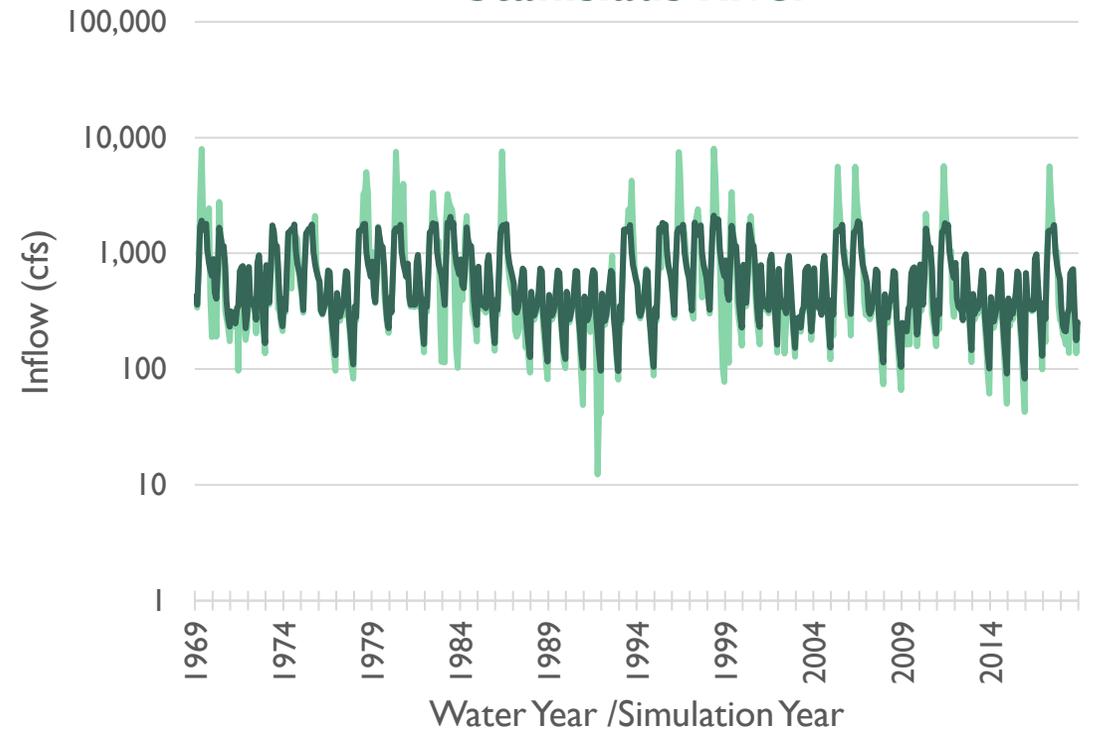
STREAM INFLOW

Tuolumne River



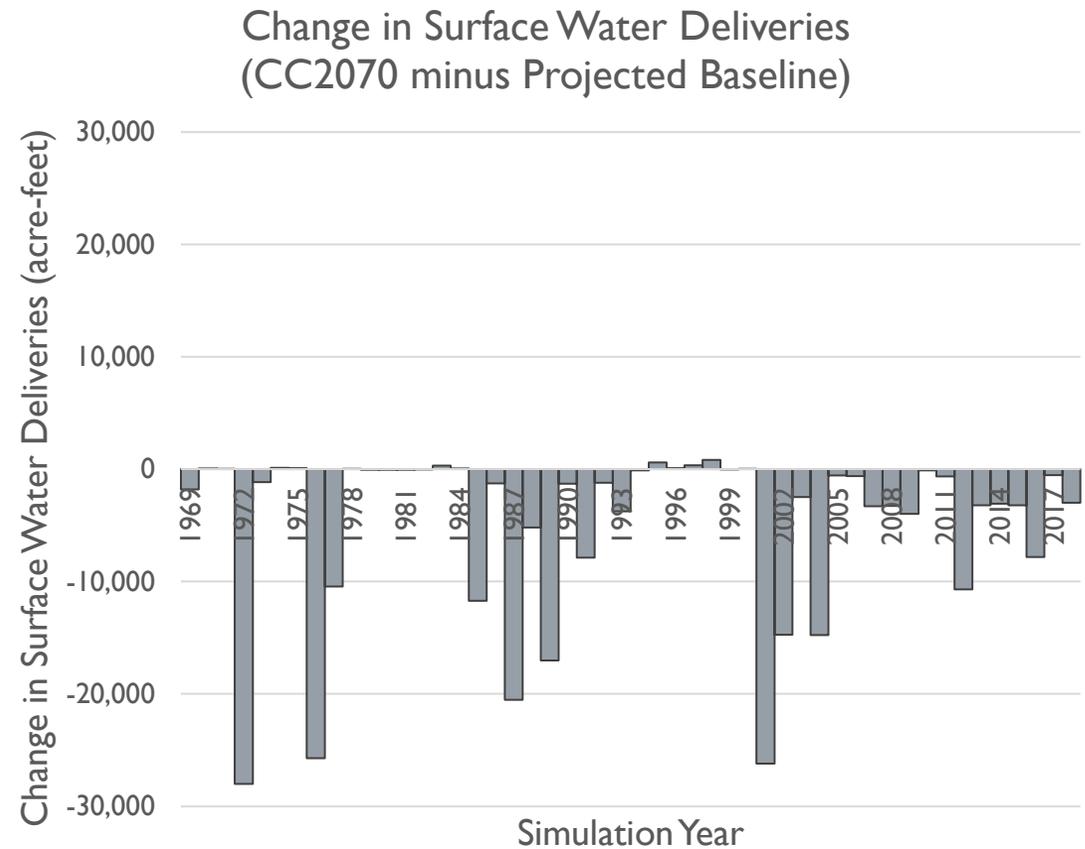
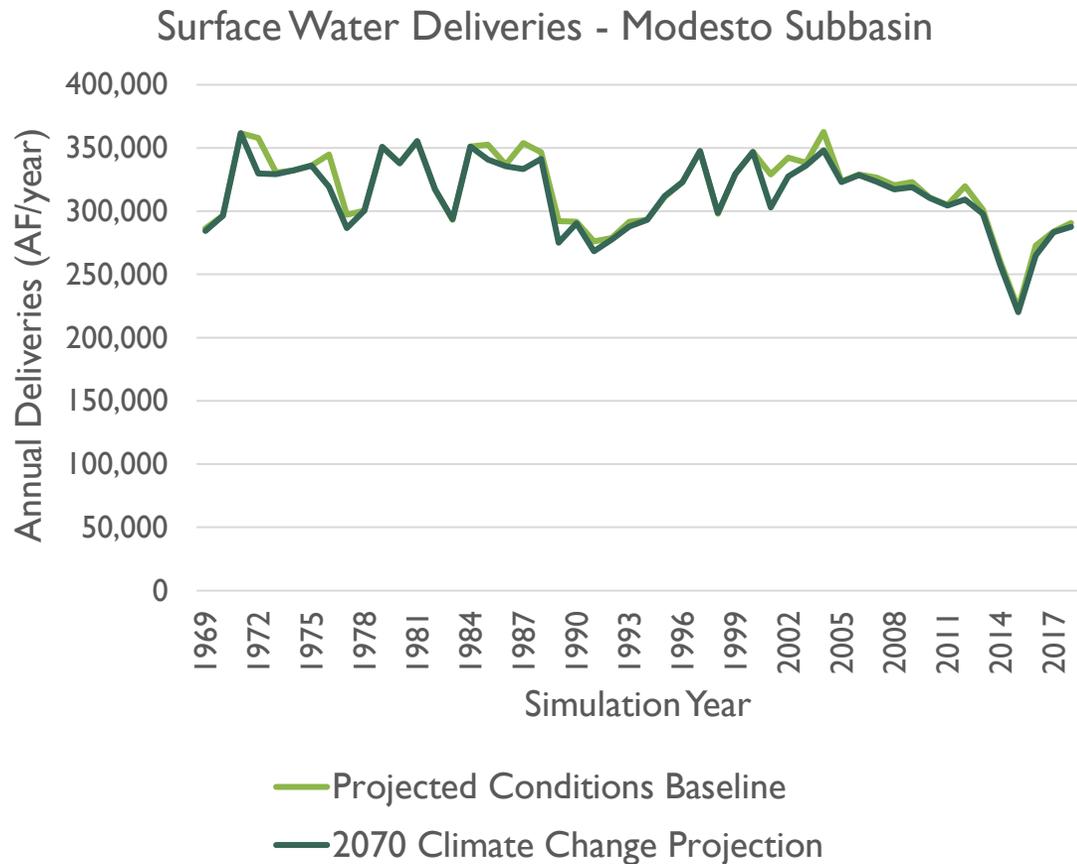
— 2070 Climate Change Projection
— Projected Conditions Baseline

Stanislaus River

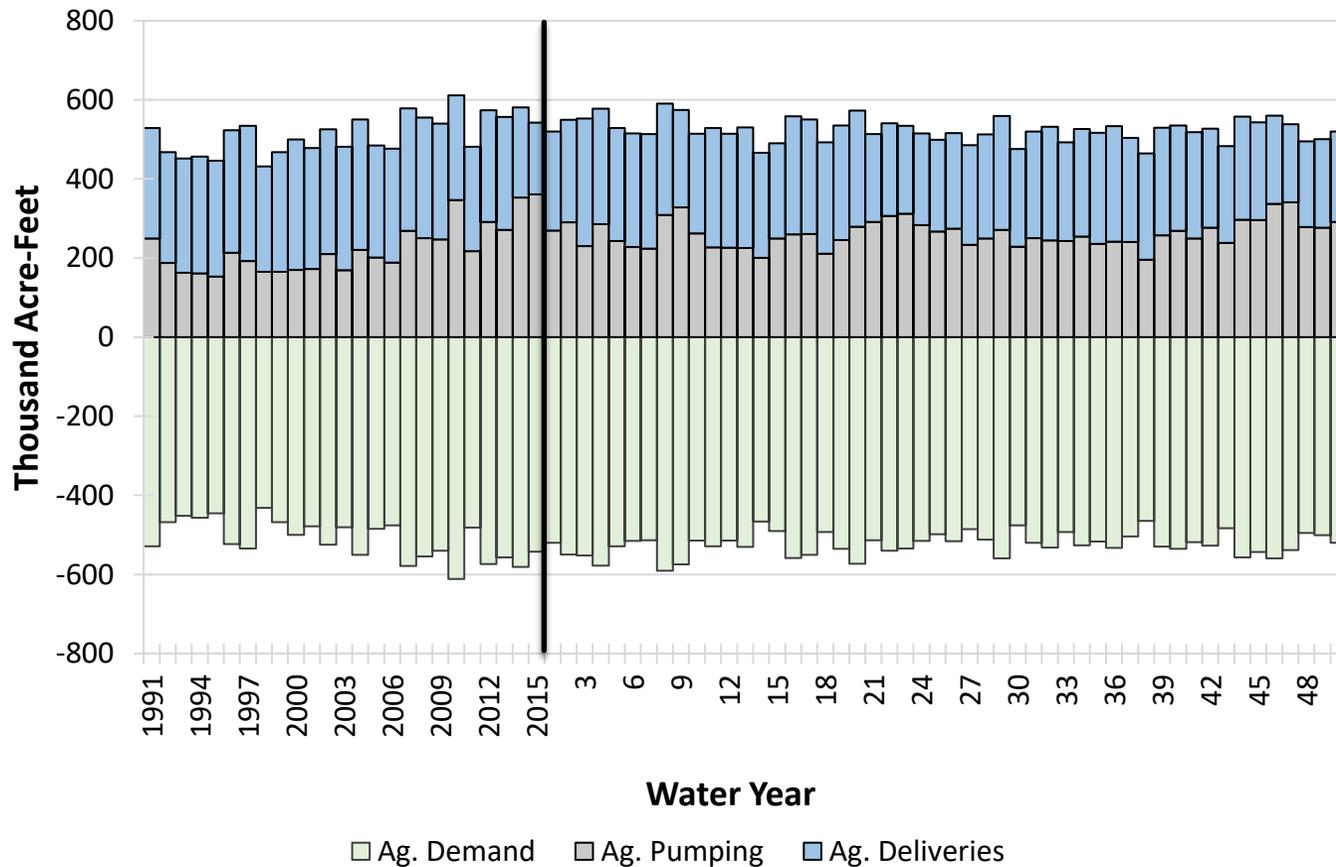


— 2070 Climate Change Projection
— Projected Conditions Baseline

SURFACE WATER DELIVERIES – MODESTO SUBBASIN



LAND AND WATER USE UNDER CLIMATE CHANGE

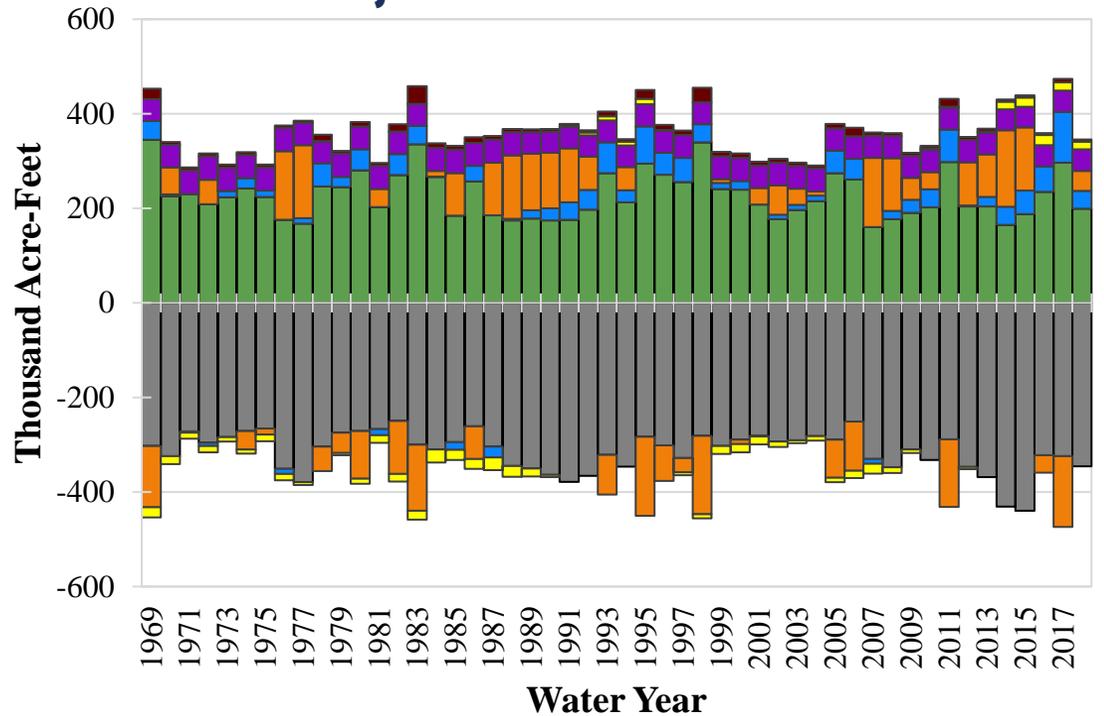


Budget Summary (CC ÷ Baseline)

■ Ag. ETAW	108%
■ Ag. SW	99%
■ Ag. GW	114%

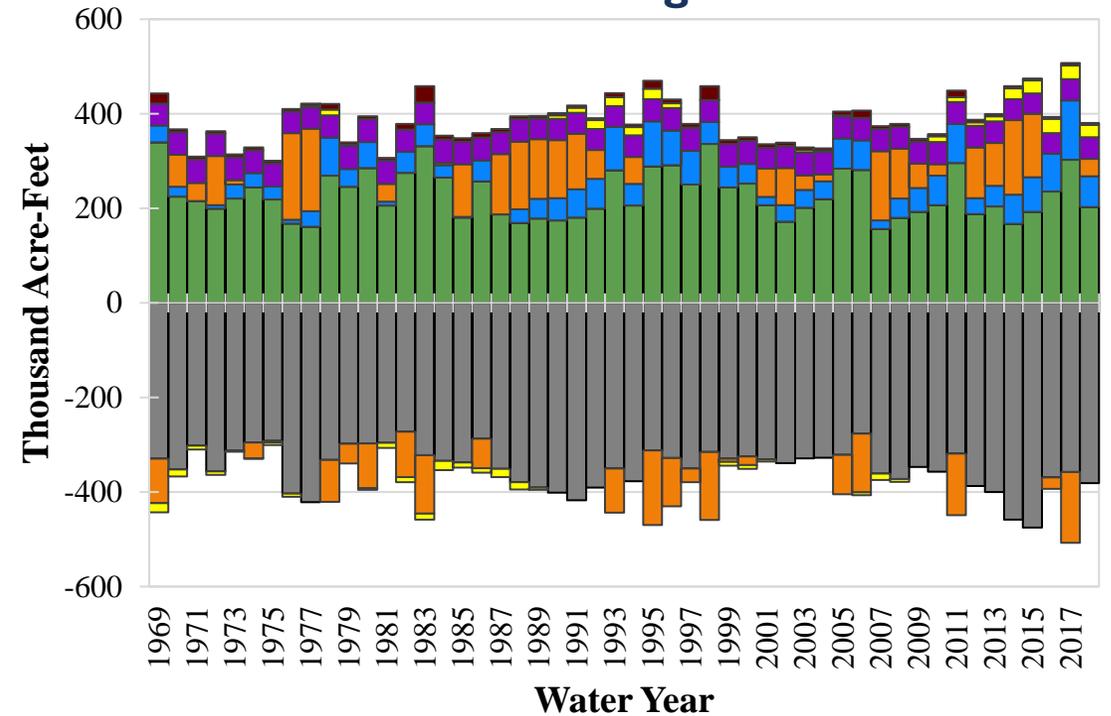
GROUNDWATER BUDGET UNDER CLIMATE CHANGE

Projected Conditions Baseline



- Inflow from Foothills
- Canal and Reservoir Recharge
- Stream/Aquifer Interaction
- Groundwater Pumping
- Subsurface Flow from Adjacent Areas
- Change in GW Storage
- Deep Percolation

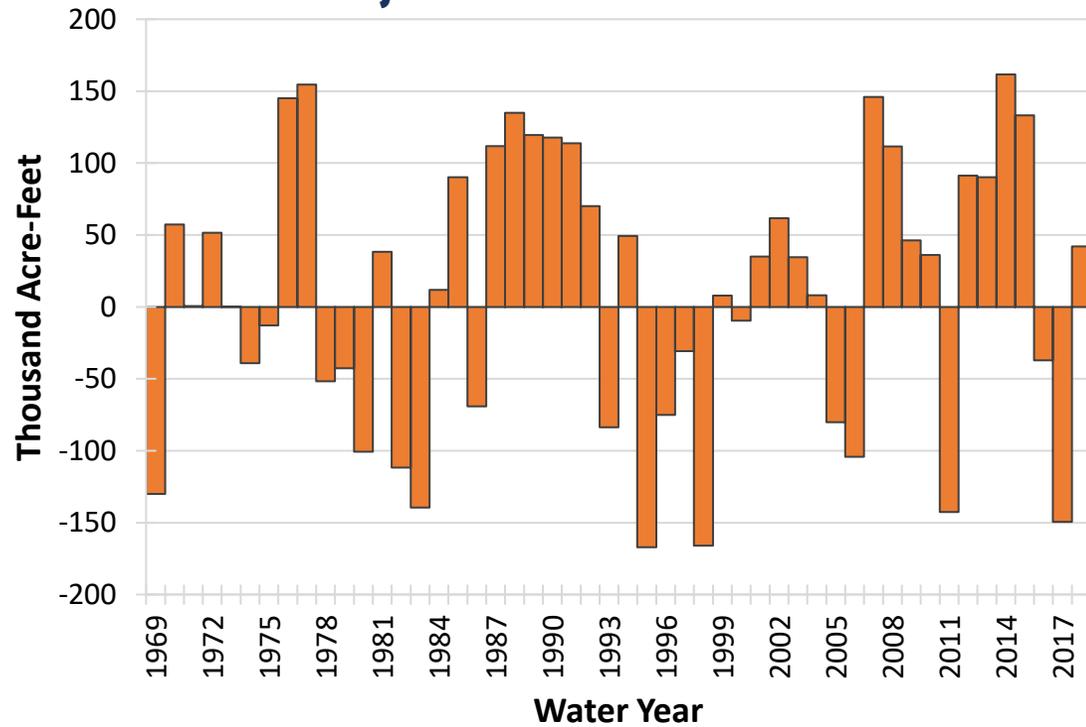
Climate Change Scenario



- Inflow from Foothills
- Canal and Reservoir Recharge
- Stream/Aquifer Interaction
- Groundwater Pumping
- Subsurface Flow from Adjacent Areas
- Change in GW Storage
- Deep Percolation

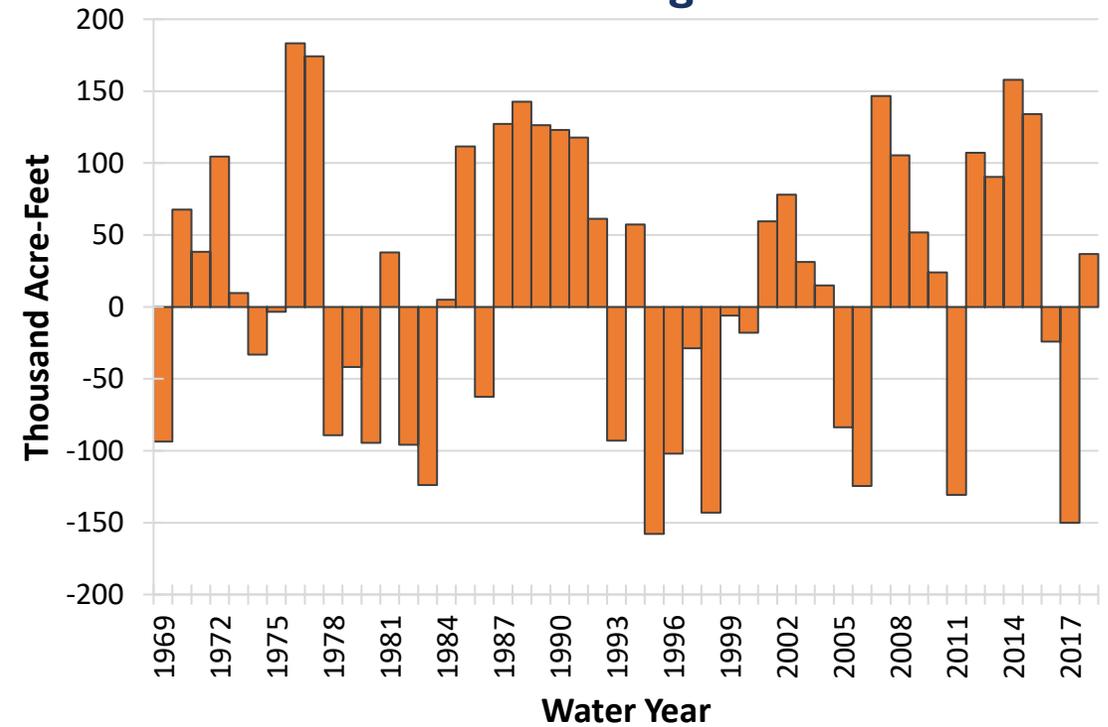
CHANGE IN STORAGE UNDER CLIMATE CHANGE

Projected Conditions Baseline



Reduction in GW Storage

Climate Change Scenario



Reduction in GW Storage

CLIMATE CHANGE SUMMARY

Conditions under the climate change scenario (DWR 2070) indicates:

- **Land Surface System**

- Increased agricultural demand due to higher evapotranspiration
- Decreased surface water supply due to earlier precipitation and snowmelt
- Increased groundwater pumping meet agricultural demand

- **Groundwater System**

- Declining groundwater storage and water levels due to increased production
- Increased stream seepage due to lower groundwater levels

CONCLUSIONS

- DWR's 2070 scenario is one of many potential climate change scenarios.
- The Modesto GSP will focus on adaptive management:
 - The existing scenario does not include any projects or management actions, which may have a significant impact on operations under climate change.
 - MID/OID/TID are actively working to optimize surface water availability under a variety of conditions and uncertainties.
 - Even given the existing limitations, such scenarios offer insight into potential opportunities for sustainability actions (e.g. reservoir operations, managed aquifer recharge)

QUESTIONS?





MODESTO SUBBASIN GSP GSP MONITORING NETWORK CONSIDERATIONS

TECHNICAL ADVISORY COMMITTEE (TAC) MEETING

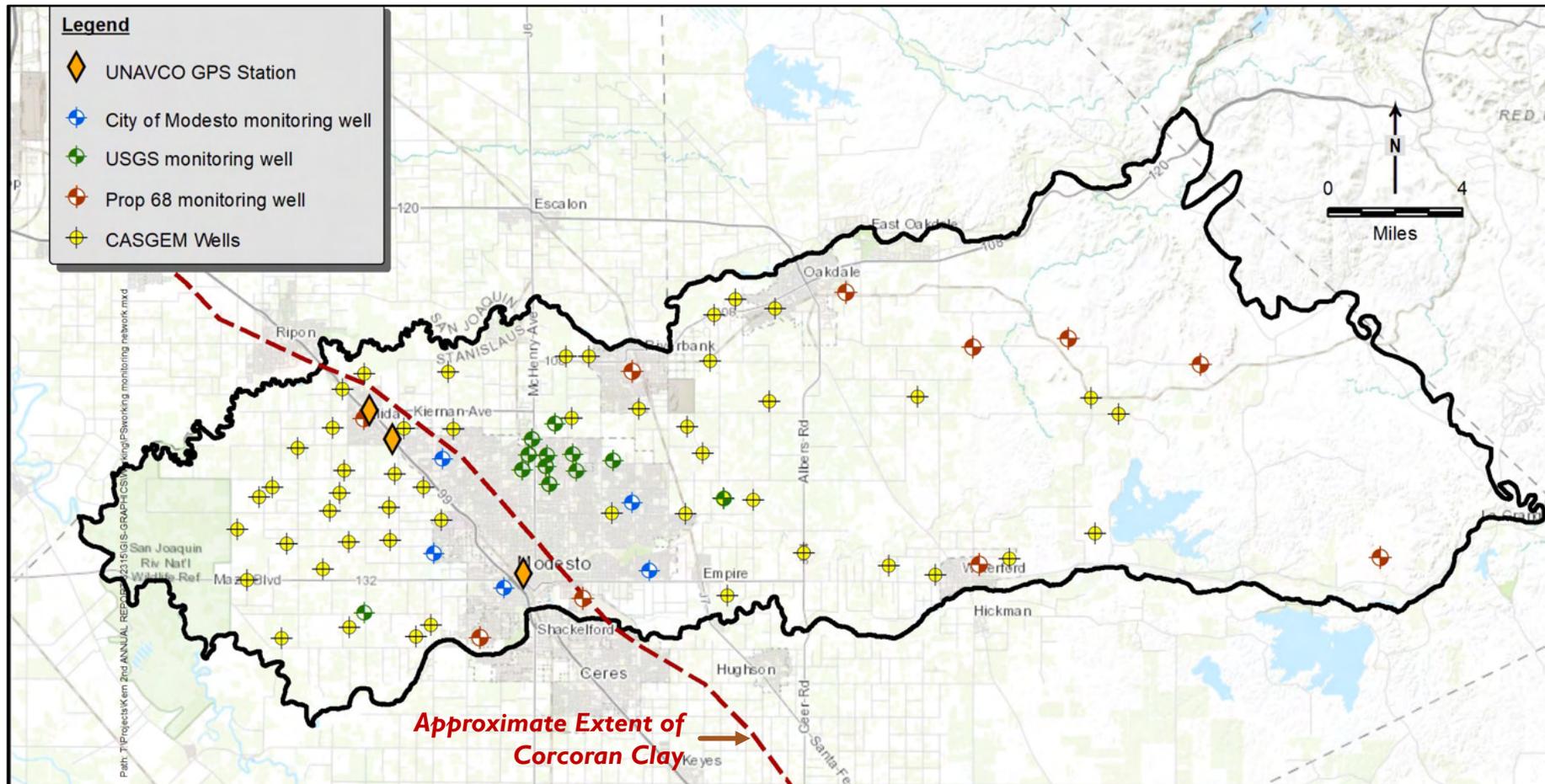
April 14, 2021

TODD
GROUNDWATER

CRITERIA FOR GSP MONITORING SITE SELECTION

Program	# of Sites	# of Wells	Access	Construction Data?	Historical Water Levels?	Well Use?
CASGEM	50	50	Yes	Depth: 50 Screens: 45	Yes	Irrigation
USGS	12	30	Limited; in progress	Yes	Limited (2003-2006)	Monitoring
City of Modesto	5	19	Yes	Yes	2019 only	Monitoring
STRGBA GSA (Prop 68)	10	16	Yes	Yes	No	Monitoring
UNAVCO	3	GPS station	Access to data monitored by others	Yes	N/A	N/A

CANDIDATE GSP MONITORING SITES



- Network of wells and GPS stations
- Select representative sites for each indicator

Draft

QUESTIONS?

