2025 GSP Update

August 14, 2024

Agenda

1. Work Updates Since June
    - Recommended Corrective Actions 3, 4, 6
    - Demand Management Program Approach
2. Next Steps & Schedule

Items in your packet:

1) DWR's Approval Letter (for Recommended Corrective Actions)

Current Budget Snapshot
We Are on Track to Meet Budget

Task	Fee	Budget Remaining
Project Management & Coordination	$ 128,860	$ 57,000
Outreach & Communications	$ 66,710	$ 45,000
Compliance Actions	$ 401,120	$ 27,000
5-Year Periodic Evaluation	$ 27,420	$ 6,000
GSP Amendment	$ 426,580	$339,000
Optional Task 6: Additional Meeting Support	$ 79,430	$ 79,430
TOTAL cost to GWA	$1,050,690	$474,000
TOTAL w optional	$1,130,120	$553,000

Work is Overseen by Project Management Committee

Ashley Couch	Water Resources Manager, SJ County
Steve Schwabauer	GM, NSJWCD
Mitch Maidrand	Deputy Director MUD, City of Stockton
Scot Moody	GM, Oakdale Irrigation District
Justin Hopkins	GM, Stockton East Water District
Brandon Nakagawa	Water Resources Coordinator, SSJID

PMC meets **twice per month** to provide **technical direction**

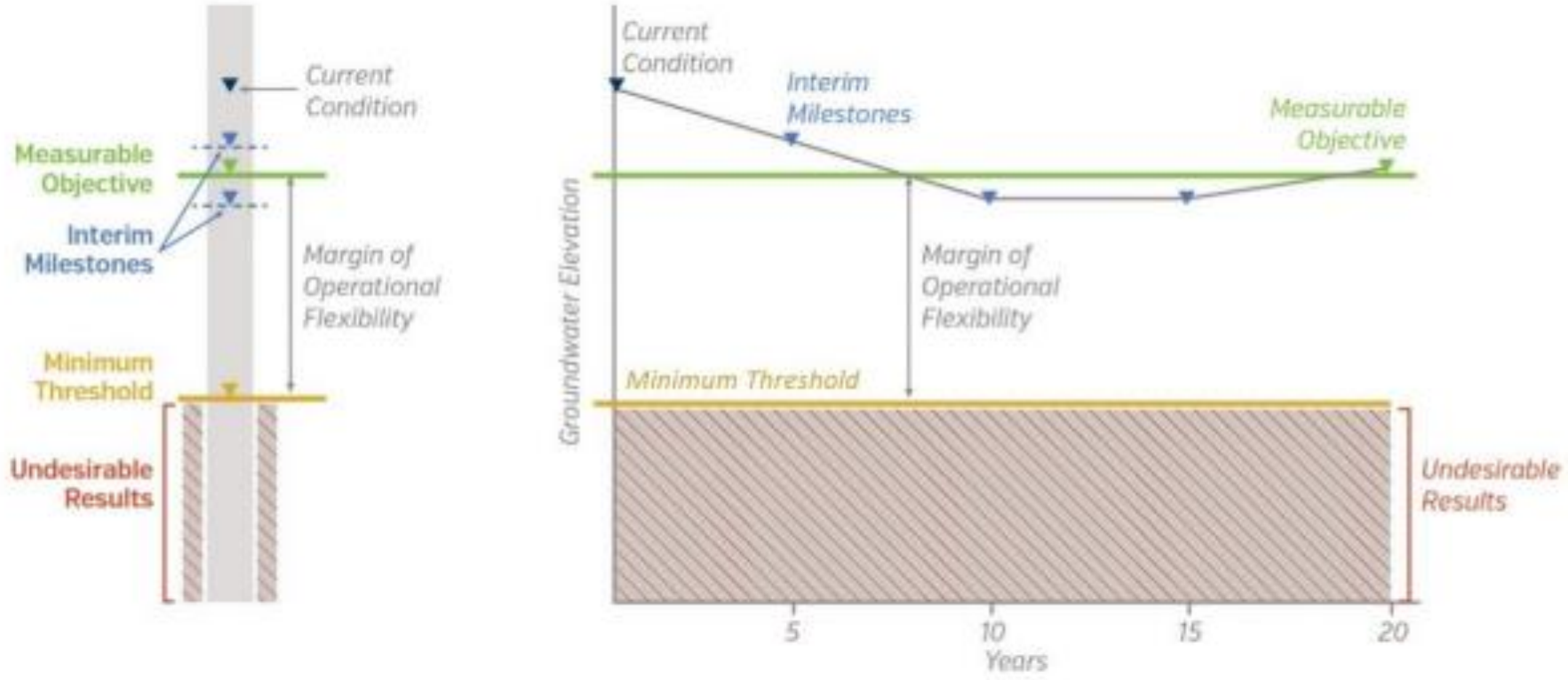
Team reports progress to Steering Committee and Board at **work mid-point**, **draft plan**, and **final plan**

1/29	Kick off Meeting
Feb	Recommended Corrective Actions (RCA) 1 & 2
Mar	RCA 5, 7, 8
Apr	Model updates & follow up on RCA's
May	Projected water budgets, PMAs
June	*Steering Committee/Board Meeting: Progress on RCA 1, 2, 5, 7, 8*
June	RCA 3, 4
June	*Stakeholder Meeting*
July	RCA 6
July	*Stakeholder Meeting*
Aug	Remaining items (W&C writing evaluation & GSP update)
Aug	*Board Meeting: Progress on RCA 3, 4, 6*
Sep	Review comments from GSAs and how to address, public draft release
Sep	*Steering Committee & Board Meeting: Draft*
Sep	*Public Meeting*
Oct	Public comments
Nov	Addressing public comments
Dec	Check in on GSA adoptions
Dec	*Steering Committee & Board Meeting: Final*
Jan 2025	Check in on GSA adoptions; final page turn & submit

Some Useful SGMA Acronyms

- RCA = recommended corrective action
- PMA = projects & management actions
- ISW = interconnected surface water
- RMN = representative monitoring network
- SMC = sustainable management criteria
  - MT = minimum threshold
  - MO = measurable objective
  - UR = undesirable result

Brief Review of Sustainable Management Criteria



Groundwater Levels Example

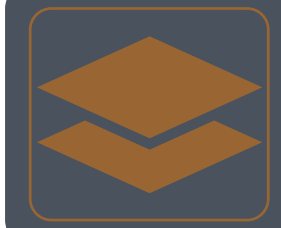
Source: DWR

Work Updates

DWR's Recommended Corrective Actions (RCAs)

Discussed in June

1) Justify GWL MT and undesirable results



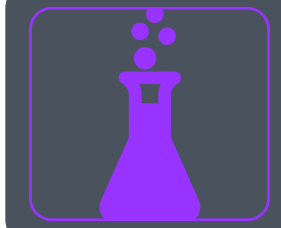
2) Revise subsidence SMC using direct subsidence monitoring data

3) Update water budgets using recalibrated model

4) Revise estimate for reduction of groundwater storage volume and UR definition

5) Add additional justification for 2,000 mg/L chloride isocontour line

6) Revise ISW SMC and monitoring network

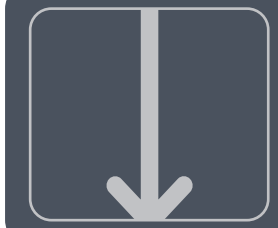


7) Improve Rep MN for GWQ

8) Develop chloride isocontour line in western portion of Subbasin

DWR's Recommended Corrective Actions (RCAs)

Discussing Today



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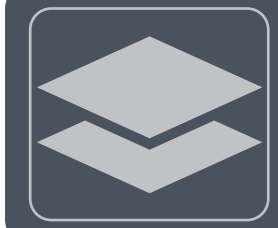

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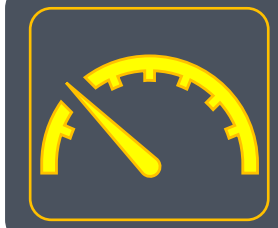

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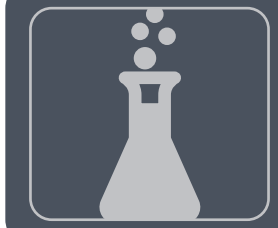

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8) Develop chloride isocontour line in western portion of Subbasin

Before Addressing Second Batch of RCAs…

Eastern San Joaquin Water Resources Model (ESJWRM) was Updated

Response to DWR's RCA 3

- Historical
- Current Conditions
- Projected Conditions
- Projected Conditions with Climate Change

Model maintenance updates

- Extend hydrology
- Land use updates
- Urban demand updates

Other Scenarios to Address Additional Needs

- **Demand Reduction:** Estimation of sustainable yield
- **Projects & Management Actions:** Impact of PMAs on GWL
- **Minimum Thresholds**: Used for water storage sustainability indicator
- **Interconnected Surface Water**: Used for historical estimate of stream depletion

What's new in ESJWRM Version 3.0?

- Updated and calibrated historical model
- Updated model scenarios
  - PCBL
  - PCBL-CC
  - PCBL-DR and PCBL-CC-DR
  - PCBL-PMA and PCBL-CC-PMA
- Updated water budgets

No major changes to approach used in 2022

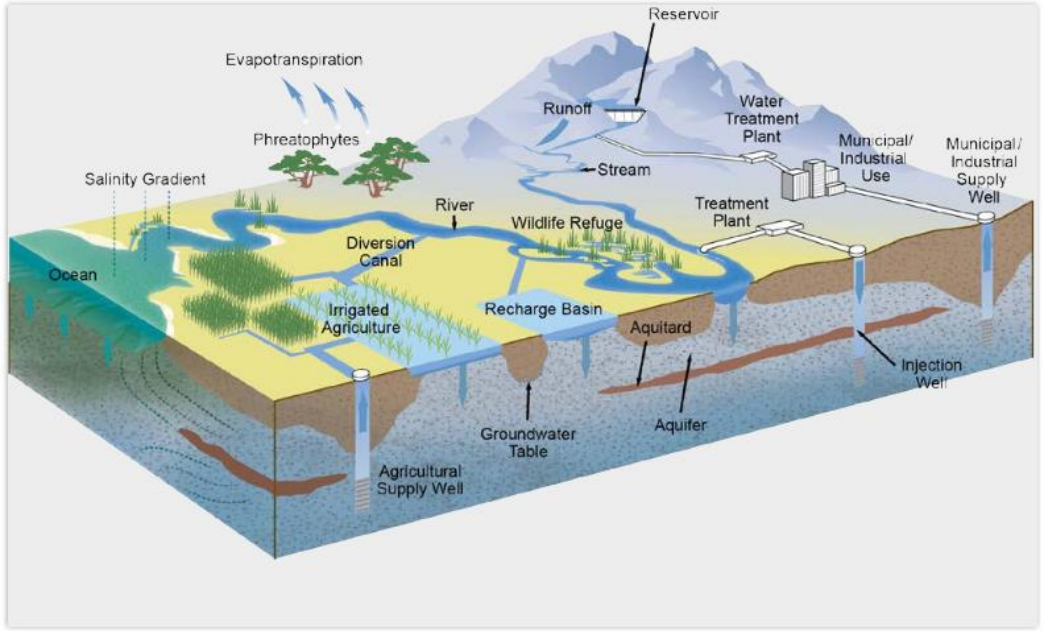


Figure 1 – Example 3-D Graphic Representing a HCM

Benefits of 2024 Model Updates

More of latest and greatest data/understanding incorporated

Added an additional layer to better model shallow GW processes

Re-calibrated historical model and developed new projected model and scenarios

Used it to model new sustainability indicators: groundwater storage and interconnected surface water

Updated models now available as a tool for GWA to use to answer pertinent groundwater management questions

Future Model Updates

- Catalogue of model requests and updates
  - Calaveras River seepage
  - ET
  - Use of ESJWRM for MICUP
- Ongoing improvements incorporating new data
  - Land use
  - PMA updates
  - Etc.

Recommended Corrective Action 3

Department staff recommend that in the first periodic evaluation of the GSP, only **water budgets developed from the most recent or best available data** be included. As currently presented, it is **unclear whether the sustainable yield estimate and estimated groundwater offset required to achieve sustainability are based on the updated modeling results** (based on ESJWRM Version 2.0) **or are from the modeling scenarios presented in the original GSP submitted in 2020** (based on ESJWRM Version 1.0).

In other words:

- Periodic evaluation should include latest water budgets
- Clarify which model version the water budgets and sustainable yield calculation are based on

Updated Water Budgets for GSP

- Table shows water budgets using updated 5-layer model
- Conclusions are not significantly different from prior water budgets

Simplified Land Surface System

Component	Historical Calibration (AF/year)	Current Conditions (AF/year)	Projected Conditions Baseline (AF/year)	Projected Conditions Baseline With Climate Change (AF/year)
Hydrologic Period	**WY 1996 - 2023**	**WY 2019 - 2023**	**55 Years**	**55 Years with 2070 CT**
Inflows				
Precipitation	988,000	1,063,000	992,000	1,087,000
Total Surface Water Supply	568,000	562,000	525,000	525,000
Agricultural	512,000	497,000	452,000	452,000
Urban and Industrial	56,000	65,000	73,000	73,000
Total Groundwater Supply	732,000	830,000	799,000	879,000
Agricultural	666,000	777,000	732,000	812,000
Urban and Industrial	66,000	53,000	67,000	67,000
Riparian Intake from Streams	30,000	26,000	26,000	29,000
Total Inflow	**2,318,000**	**2,481,000**	**2,342,000**	**2,521,000**
Outflows				
Evapotranspiration	1,309,000	1,352,000	1,302,000	1,384,000
Agricultural	1,006,000	1,080,000	999,000	1,089,000
Municipal and Domestic	59,000	58,000	80,000	81,000
Refuge, Native, and Riparian	243,000	213,000	214,000	214,000
Runoff to the Stream System	629,000	741,000	656,000	753,000
Return Flow to the Stream System	96,000	95,000	111,000	112,000
Deep Percolation	275,000	284,000	270,000	268,000
Other Flows	8,000	9,000	4,000	5,000
Total Outflow	**2,318,000**	**2,481,000**	**2,342,000**	**2,521,000**

Updated Water Budgets for GSP

- Table shows water budgets using updated 5-layer model
- Conclusions are not significantly different from prior water budgets

Simplified Groundwater System

Component	Historical Calibration (AF/year)	Current Conditions (AF/year)	Projected Conditions Baseline (AF/year)	Projected Conditions Baseline With Climate Change (AF/year)
Hydrologic Period	**WY 1996 - 2023**	**WY 2019 - 2023**	**55 Years**	**55 Years with 2070 CT**
Inflows				
Deep Percolation	275,000	284,000	270,000	268,000
Stream Seepage	234,000	262,000	297,000	329,000
Other Recharge	170,000	174,000	165,000	168,000
Carriage/Canal Recharge	103,000	113,000	98,000	98,000
Managed Aquifer Recharge	5,000	5,000	11,000	11,000
Reservoir Seepage	17,000	14,000	14,000	14,000
Ungauged Watershed Drainage	45,000	42,000	45,000	48,000
Subsurface Inflow	176,000	188,000	204,000	222,000
Total Inflow	**854,000**	**907,000**	**935,000**	**987,000**
Outflows				
Groundwater Outflow to Streams	75,000	63,000	57,000	53,000
Groundwater Pumping	732,000	830,000	799,000	879,000
Agricultural	666,000	777,000	732,000	812,000
Urban and Industrial	66,000	53,000	67,000	67,000
Subsurface Outflow	96,000	104,000	110,000	111,000
Total Outflow	**903,000**	**997,000**	**965,000**	**1,043,000**
Change in Groundwater Storage (Inflows Minus Outflows)				
Change in Groundwater Storage	**-48,000**	**-89,000**	**-30,000**	**-56,000**

PMC Decision

Use ESJWRM Version 3.0 in updated GSP water budgets and periodic evaluation

Recommended Corrective Action 6

The GSA should work to address the following items by the first periodic evaluation: (*in brief)*

a) Work to **establish SMC** consistent with the GSP Regulations. Measurable objectives are to use the same metric used for minimum thresholds, including **quantifying the location, quantity, and timing of depletions** of interconnected surface water due to groundwater extraction.

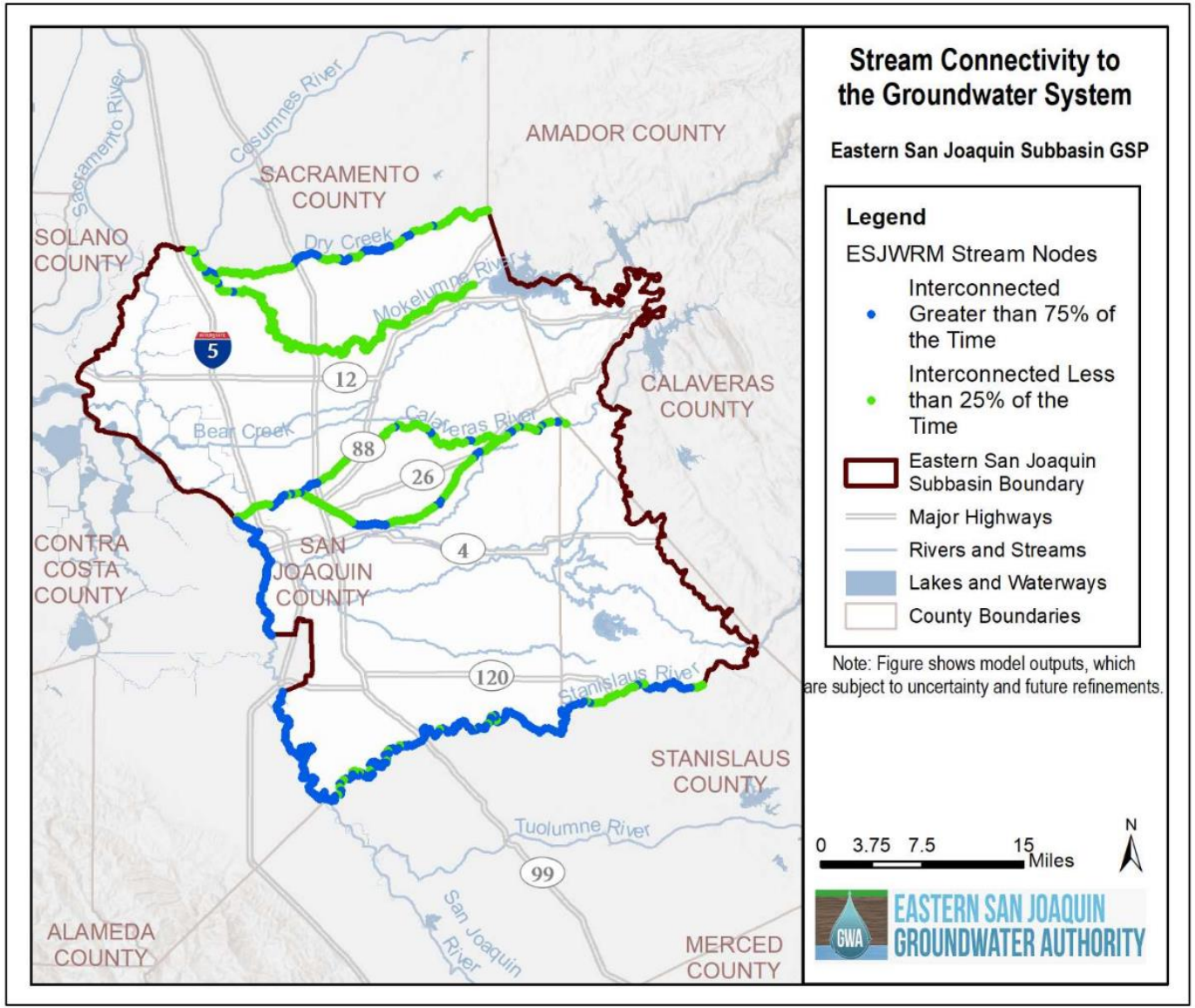
b) Continue to **fill data gaps, collect additional monitoring data**, and implement current strategy to manage depletions of interconnected surface water and define segments of interconnectivity and timing. The **monitoring network should be updated** to reflect any corresponding changes and approaches.

c) C**ollaborate and coordinate** with all interested parties to better understand **those impacted** by pumping induced surface water depletions.

Depletions of Interconnected Surface Water

2020 GSP Approach

- No SMC developed
  - Used groundwater level SMC as a proxy for ISW
- No separate monitoring network developed
- Identified locations of gaining and losing reaches based on ESJWRM modeling



Points of Reference

Other Subbasins

Most Subbasins only have identified locations of depletions, no quantification:

- **2020 GSPs:** Most used GWL RMN as a proxy. DWR gave a pass to GSPs in 2020 for this indicator.
- **Revised and 2022 GSPs**: Many Subbasins using GWLs at ISW monitoring sites and better monitoring depletions

Guidance from DWR

Expected to come in multiple parts:

- **Part 1**: Depletions of ISW: An introduction – Released February 2024
- **Part 2**: Approaches for estimating depletions of ISW
- **Part 3**: Examples for estimating depletions of ISW
- **Guidance**: Managing for depletions of ISW

Not yet released

Approach

2025 Updated GSP

Quantify location, quantity, and timing of historical ISW depletions using ESJ WRM stream-aquifer interactions

- Challenging to quantify depletions due to pumping with existing toolset, so using "standard" definition of stream losses and seepage from ESJ WRM

Use **groundwater levels as a metric** for tracking depletions and developing SMC

- Regulations state rate or volume, but all other GSPs and future DWR guidance may allow for GWLs as a metric, and we do not have the resources to effectively measure rates for future compliance.

Establish a **new ISW representative monitoring network** combining the following:

- 5 new shallow wells drilled for ISW
- New Delta well
- Groundwater level RMN wells within 5 miles of ISW (6)

Develop **SMCs**:

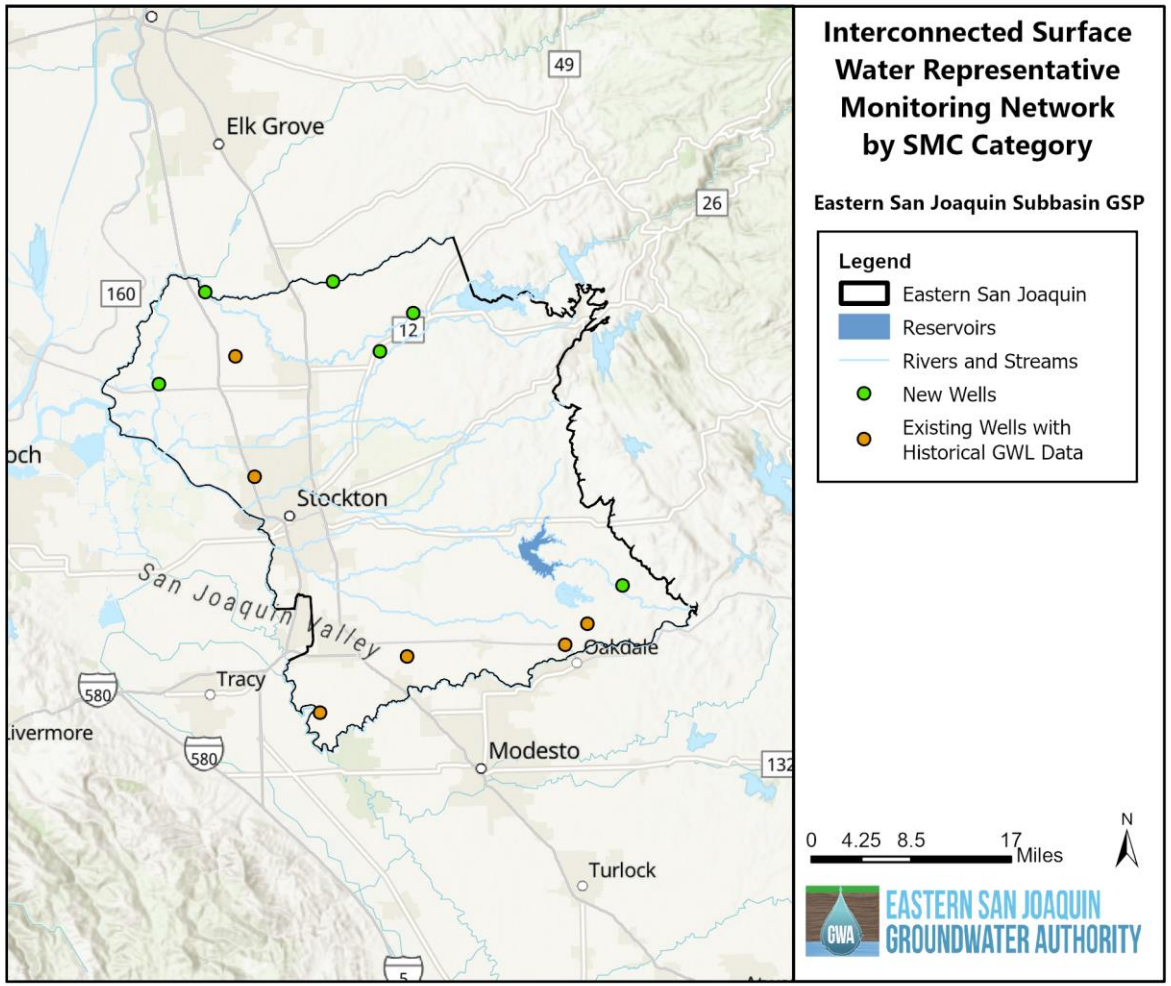
- Use groundwater level SMC for now, where available
- Collect 3-5 years of data before setting unique SMCs for ISW

New Representative Monitoring Network

Undesirable Result:

- Keep connected streams in 2015 connected
- No additional depletions compared to 2015 that would impact beneficial users of the streams

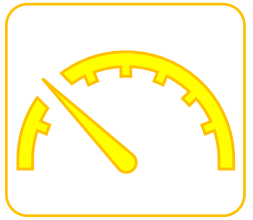
Wells	SMC
Subset of GWL RMN (<5-mi from connected streams)	Same as groundwater levels SMC for now. GWLs already being monitoring for other sustainability criteria.
New grant-funded ISW wells + Delta well	Delta and ISW wells will not have SMC for now until additional data is collected. Will incorporate future high and low GWL.



PMC Decision

- In absence of DWR guidance, PMC decided to conduct analysis with existing tools and **standard stream loss definition** to be updated once there is more guidance
- Identified **ISW representative monitoring network** utilizing new wells + subset of GWL RMN
- Developed temporary **SMCs** for GWL SMCs using groundwater levels as a metric

Recommended Corrective Action 4



Department staff recommend the GSP **provide a revised estimate for the reduction of groundwater storage volume that is considered an undesirable result.**

Alternatively, the GSP could highlight how the maximum reduction of groundwater storage related to the chronic lowering of groundwater level minimum thresholds would not result in significant and unreasonable impacts related to groundwater storage and omit the 23 MAF estimate.

In other words:

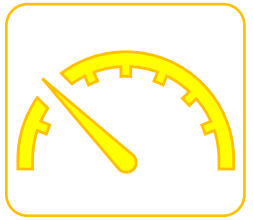
- Revise undesirable result definition for GW storage

and

- Explain how the GWL minimum thresholds are protective of the maximum reduction of GW storage

Groundwater Storage SMC

2020 GSP Approach

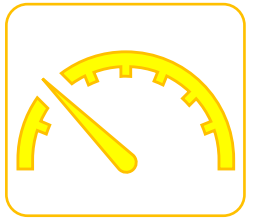


- Undesirable Result = point at which groundwater storage volumes are insufficient to satisfy beneficial uses
  - Beneficial use (zone of pumping) was estimated to occur within the shallowest 23 MAF of the aquifer
  - UR defined at 23 MAF of reduced storage
- Sustainable Management Criteria = used groundwater level SMC as a proxy

DWR says a reduction in storage of every last drop of water in the zone of pumping is unrealistic: Revision needed to UR

Groundwater Storage SMC

Nearby Subbasins



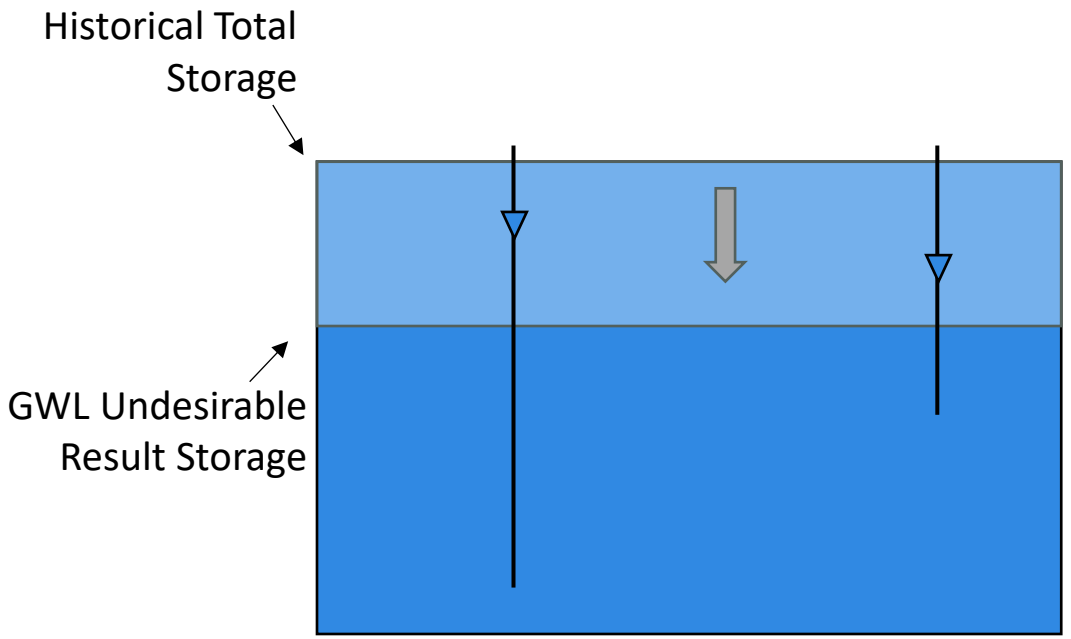
- Modesto
  - SMC: Used GWLs as a proxy
  - UR: Used a modified version of the GWLs UR
- South American
  - SMC: Used GWLs as a proxy
  - UR: Used GWLs UR, with some modeling to add to justification
- Tracy
  - SMC: Used GWLs as a proxy
  - UR: Used GWLs UR

- Chronic lowering of groundwater levels drives overdraft conditions.
- Groundwater levels SMC are already protective of reductions in storage.

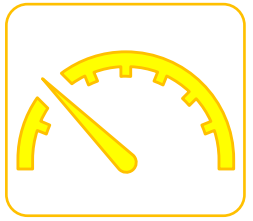
Revising the Undesirable Result

2025 GSP Approach

1) Simulate new scenario under which the Subbasin is experiencing a GWL undesirable result
2) Determine new estimate of groundwater storage when GWLs are at UR level
3) Iterate approach over a variety of different well groups at MT level
4) Establish revised undesirable result for reduction in GW storage based on groundwater levels



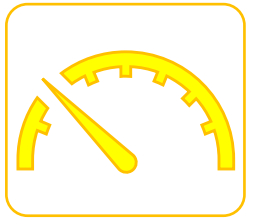
New Undesirable Result for Groundwater Storage



- An undesirable result for groundwater levels can take many forms, depending on which 5 wells exceed their MT
  - Resulting reduction in storage varies by location of exceedances and climate change impacts
- Reporting a range:
  - Incorporates model uncertainty
  - Allows for variation in climate change impacts and location of exceedances

	Lower Bound	Upper Bound
Reduction in Storage (AF)	10,000,000	13,000,000

PMC Decision



- Continue to use GWL SMC as a proxy for storage indicator, given groundwater levels drive storage
- Response to RCA will just be a text change in the GSP; no additional work needed
- Revise undesirable result number to be a range based on upper and lower bounds of GWL minimum threshold scenario analysis

Motivation:

Need for a Demand Management Program

- No guarantees of future hydrology or surface water availability
- DWR/SWRCB has indicated need for demand management/pumping reduction program as backstop against non/under-performance of projects
- Need to be able to focus reductions locally within the basin in addition to basin-wide

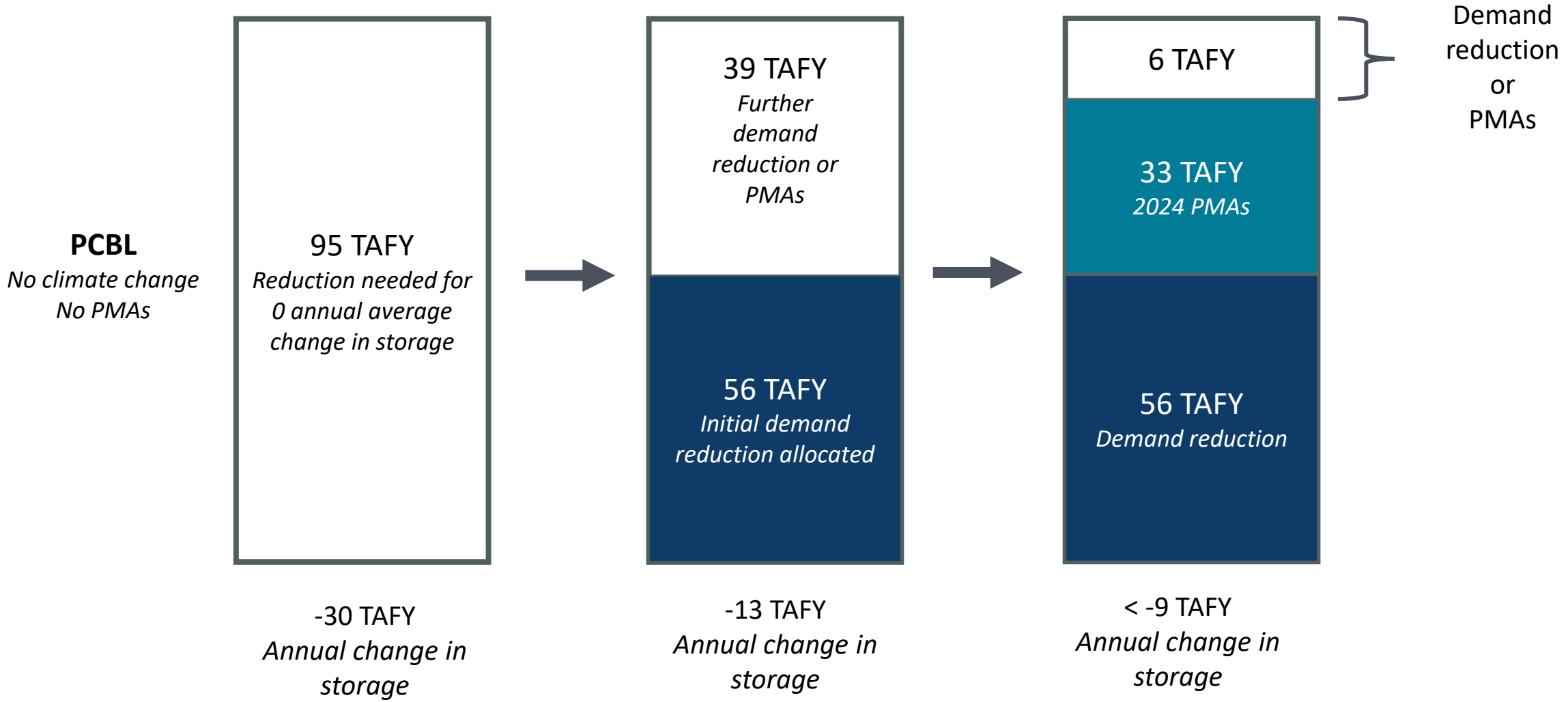
What has been done?

- The PMC has been working on a Subbasin-wide demand management program framework to be used as a backup plan if supply-side strategies are not sufficient to offset storage deficit
- Presented to the Steering Committee earlier this morning and they've provided a recommendation
- Work presented is based on results of numerical modeling

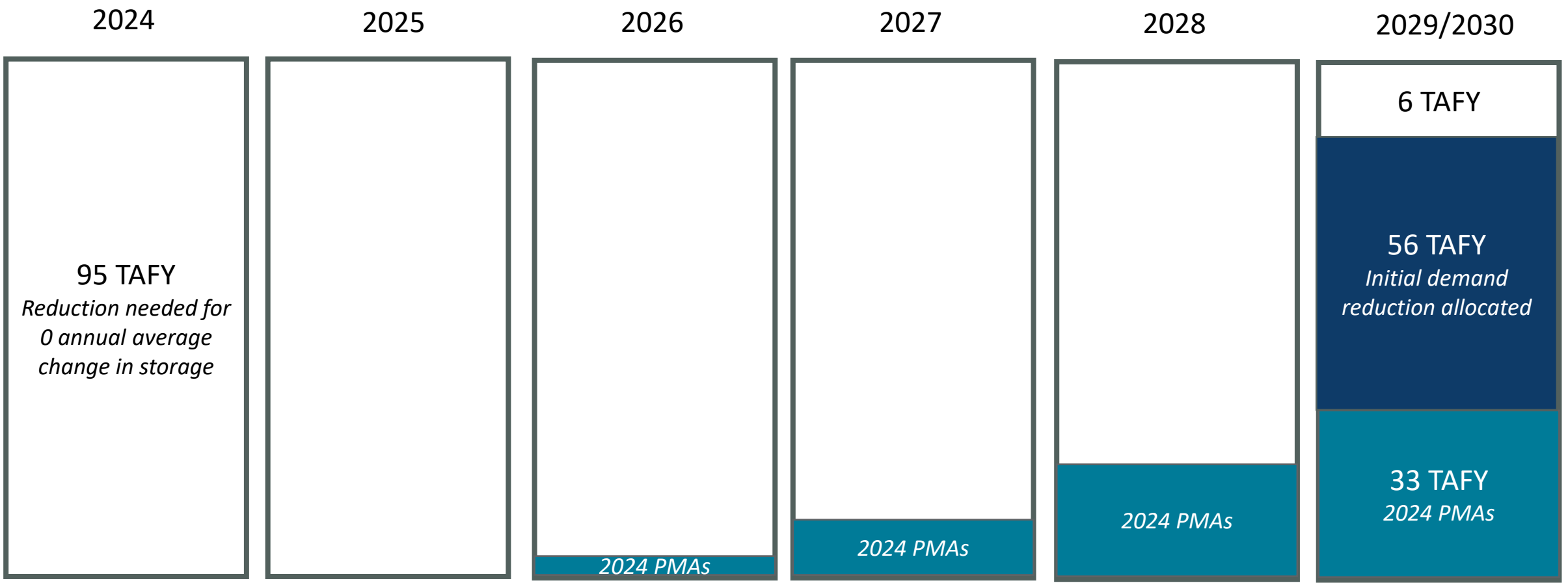
Modeling Summary

- Recommend using projected conditions baseline (PCBL) scenario to assess pumping reduction impacts
- Basin needs to reduce groundwater demand by 95 TAF to avoid undesirable results for sustainability indicators
- A 56 TAFY pumping reduction gets us from a -30 TAF annual change in storage to -13 TAF

Working Towards Meeting the 95 TAFY Pumping Reduction



Concept: No DR until after 2030

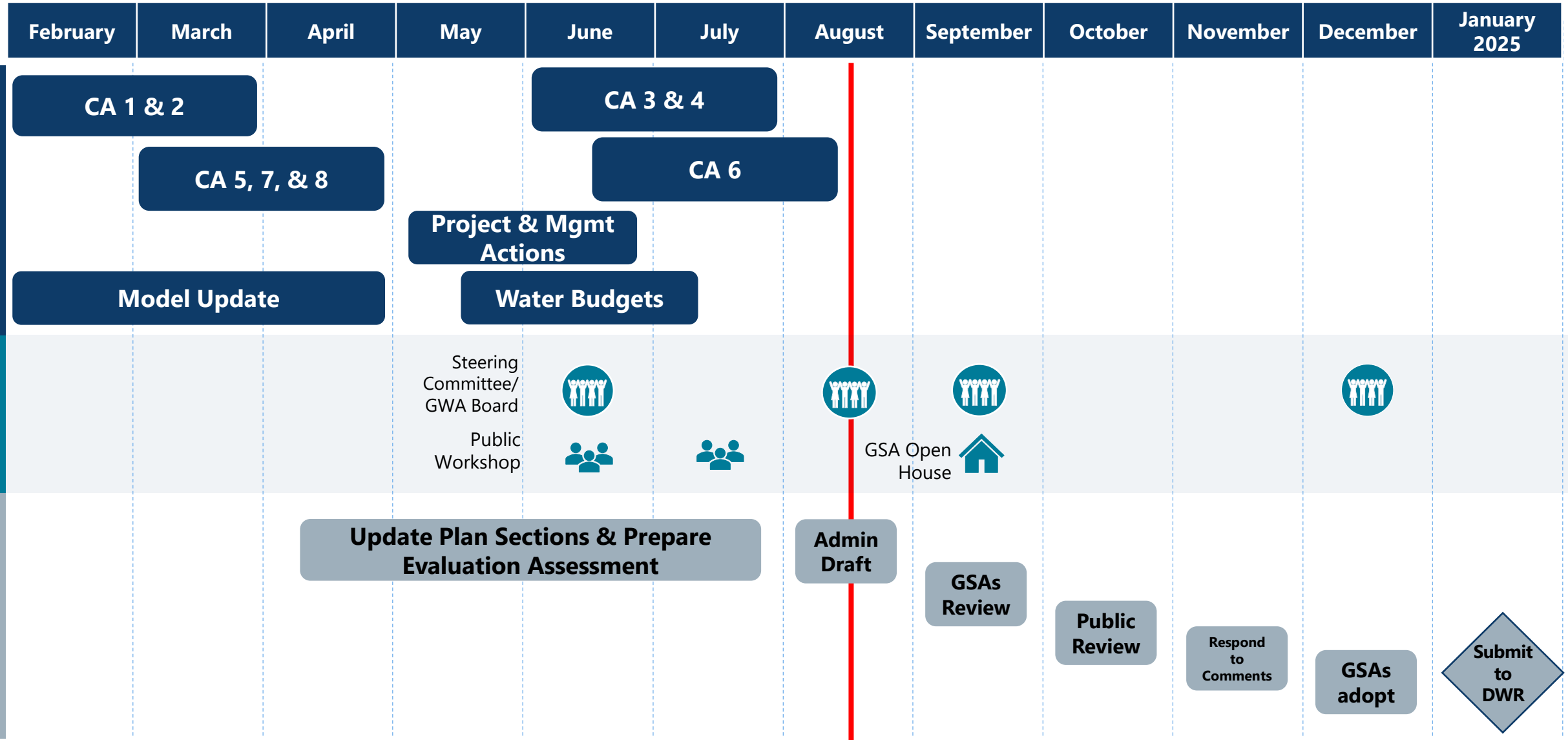


Steering Committee Recommendation

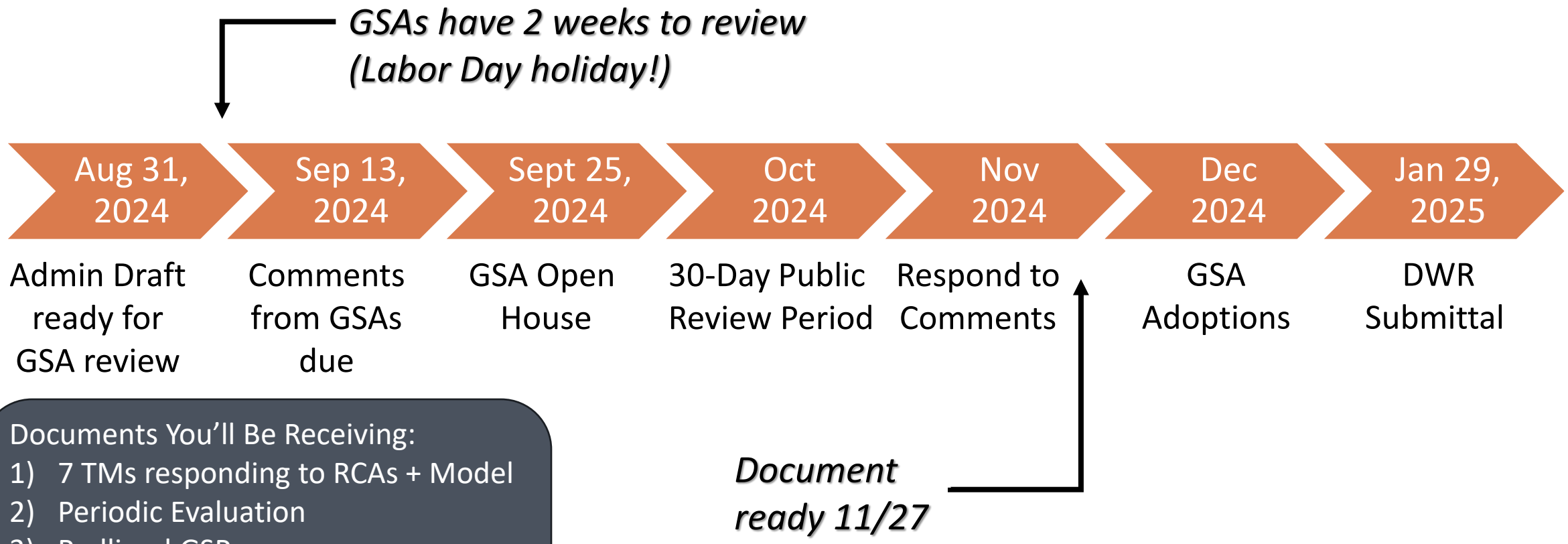
- *To be filled in following Steering Committee meeting on morning of August 14*

Next Steps

Simplified Schedule of Activities



When GSA's Need to Get Involved



Documents You'll Be Receiving:

1) 7 TMs responding to RCAs + Model
2) Periodic Evaluation
3) Redlined GSP
4) Clean GSP
5) Elements Guide
6) RMN information

Summary

Summary by Topic

ESJWRM	• Model was updated to Version 3.0 • Improvements to model stratigraphy, land use, and demand assumptions • Used it to address recommended corrective actions from DWR
Water Budgets	• Updated in response to recommended corrective action • Will be reported in the Updated GSP
Interconnected Surface Water	• Prepared temporary analysis until DWR releases guidance • Using groundwater levels as a metric to measure depletions • Developed a new representative monitoring network for ISW
Groundwater Storage	• Updated the undesirable result for groundwater storage in response to recommended corrective action • Continuing to use groundwater levels SMC as a proxy • Undesirable result now linked to storage level when groundwater level minimum thresholds are exceeded
Demand Management Program	• A demand management program must be developed to be used as a backstop • PMC recommends to develop program by 2030, implement program beginning in 2031 to reach sustainability by 2040

Work Plan Items in 2024 GSP

- Continue semi-annual monitoring for groundwater level and groundwater quality
  - Using new/streamlined monitoring networks
- New annual monitoring for subsidence (survey benchmarks)
- Continue to implement model updates, annually
- Execute outreach & engagement plan
- Develop demand management policy and implementation program
  - Significant model updates to inform policy development
  - GSA engagement throughout policy development

Reminder

- SGMA is a regulatory program: compliance is not voluntary
- Proposed 2024-2025 budget includes appropriations for new/or expanded items in GWA's annual work plan, such as:
  - Increased monitoring
  - Coordination with other basins
  - Initial steps to implement a groundwater demand reduction management action

Shared Goal:
Be proactive about funding the necessary activities to implement the GSP, while being conscious to not create excess burden on the agricultural and urban communities in the Subbasin.

Thank you!

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

BACKUP