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Borrego Springs Watermaster

Technical Advisory Committee Meeting

December 9, 2024

Today's Agenda

1. Public Comment
2. Review of Board Comments on the draft Redetermination of the 2025 Sustainable Yield
3. Scope of Work for the 2030 Redetermination of the Sustainable Yield
4. Analysis of Carryover Rules
5. Draft Results of the Storage Change Calculation for Spring 2023 to Spring 2024
6. Pumping Projections to Support the GMP Assessment Report
7. Public Comment

Redetermination of the 2025 Sustainable Yield

- Board approved a 2025 Sustainable Yield of **7,952 afy** at their December 5th meeting
- Results from the uncertainty analysis should be stated along with the Sustainable Yield, and it should be stated that the SY will be updated again in 2030
- Board comments :
  - This is the first redetermination and will set a precedent for future redeterminations
  - The Judgment defines the Sustainable Yield as the "maximum quantity of water… that can be cumulatively Pumped on an annual basis from the Basin without causing an Undesirable Result…"
  - The Sustainable Yield should be based on the most defensible BVHM version (*i.e.* 7,952 afy)

Next Steps

- Legal Counsel will report the redetermined Sustainable Yield to the Court as part of the February 2025 Status Conference report
- Watermaster staff will prepare notice to Parties, including tables describing new pumping allocations
  - Board recommended that communication should emphasize that:
    - There was a range of values from an uncertainty analysis (7,800 – 7,952 afy)
    - Another redetermination will be performed in 2030

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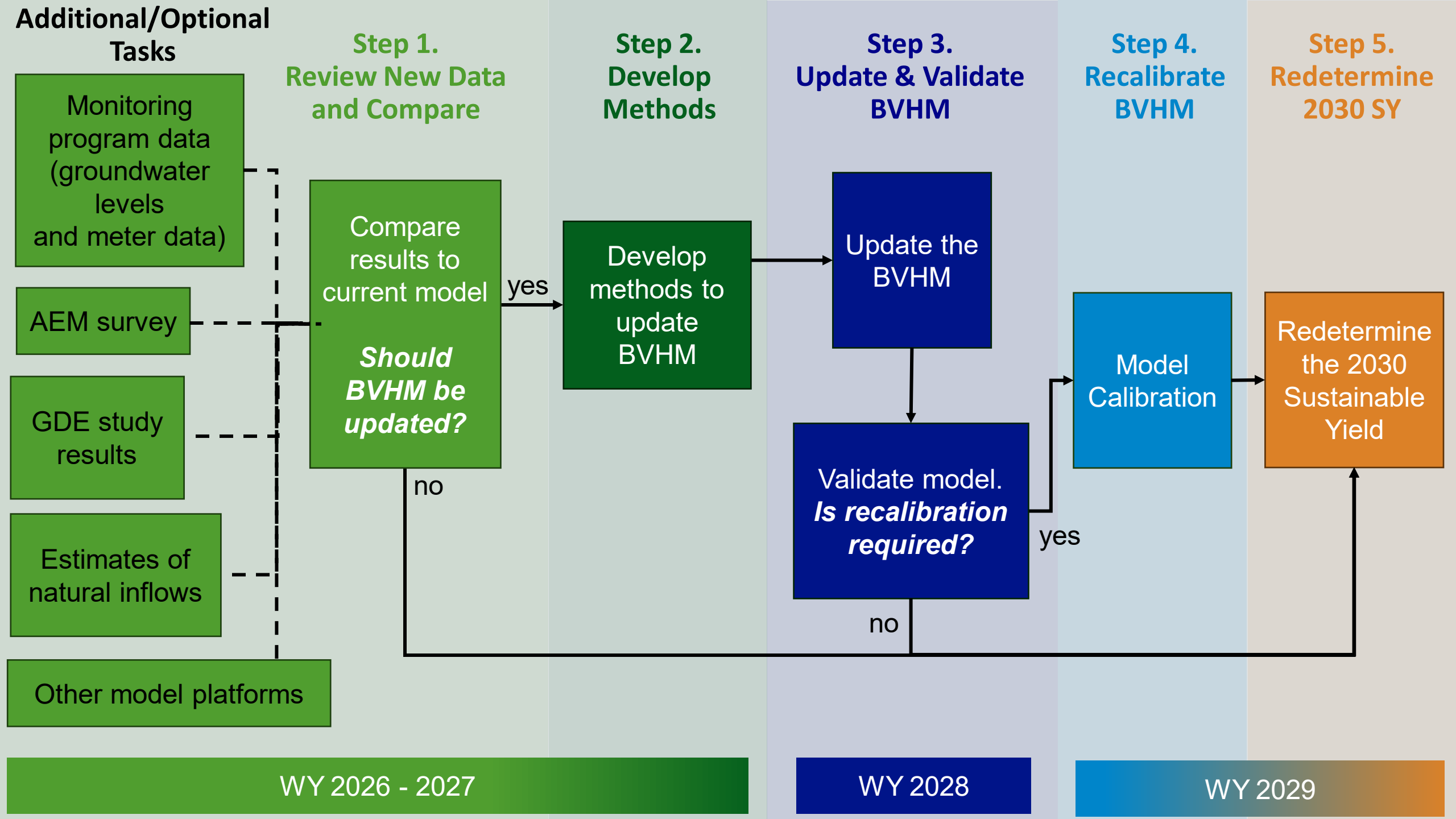
2030 Sustainable Yield Scope of Work

- The Judgment requires the Board to approve a scope of work for WY 2026-2029 to redetermine the 2030 Sustainable Yield by January 1, 2030
  - Scope of work should rely on best available science
- Scope will be used by the Board to establish budget priorities for WY 2026-2029
- Recent progress to prepare the recommendation:
  - Prepared draft TAC Recommendation Report for TAC review
  - Prepared draft Technical Consultant Report
  - Presented scope options and preliminary recommendations to the Board at Dec. 5th meeting to solicit Board feedback

Additional/Optional Tasks Considered by TAC

- These are optional tasks that *could be* implemented to improve the BVHM and its ability to estimate the water budget
  - Performed ***in-lieu*** of the Minimum Required Scope-of-Work
- The additional/optional tasks are focused on reviewing/evaluating/incorporating new data and information
- **Workflow Concept** → The evaluation of new data/info could necessitate the update and recalibration of the BVHM, but that need is unknown until the data/info are evaluated
- All TAC members recommended one or more additional/optional tasks be performed


Additional/Optional Tasks
Monitoring program data (groundwater levels and meter data)
AEM survey
GDE study results
Estimates of natural inflows
Other model platforms
Step 1. Review New Data and Compare
Compare results to current model
Should BVHM be updated?
yes
no
Step 2. Develop Methods
Develop methods to update BVHM
Step 3. Update & Validate BVHM
Update the BVHM
Validate model. Is recalibration required?
yes
no
Step 4. Recalibrate BVHM
Model Calibration
Step 5. Redetermine 2030 SY
Redetermine the 2030 Sustainable Yield
WY 2026 - 2027
WY 2028
WY 2029

Preliminary TAC Recommendation:

All TAC members recommend performing Optional/Additional Tasks:

Task No.	Task	Cost Estimate for Step 1	TAC Member Recommendations (Y/G/N)?[1]						Tally of TAC Member Recommendations		
			AAWARE	Borrego Springs Community	BWD	County of San Diego	Rams Hill	Roadrunner Club	Yes	Yes, if Grant Funded	No
1	AEM Results	**$55,000**	N	G	Y	Y	Y	G	3	2	1
2	GDE Study Results	**$40,000**	Y	Y	Y	Y	Y	Y	6	0	0
3	Monitoring Program Data	**$55,000**	Y	Y	Y	Y	Y	Y	6	0	0
4	Estimates of Natural Inflows	**$50,000**	N	G	Y	N	N	N	1	1	4
5	Other Model Platforms	**$60,000**	G	G	N	N	Y	G	1	3	2
	Total Cost of Tasks	**$260,000**	**$95,000**	**$95,000**	**$200,000**	**$95,000**	**$210,000**	**$95,000**			

Y = "Yes"
G = "Yes, but only if grant-funding available"
N = "No"

Technical Consultant Recommendation:

Scope of Work that relies on Best Available Science

- **Do not perform the Minimum Required Scope of Work →** scope does not consider new data/information, and hence, may not be considered best available science
- **Perform Step 1 of Additional/Optional Tasks 1, 2, and 3**
  - Task 1. AEM data (WY 2026)
  - Task 2. GDE study results (WY 2026)
  - Task 3. Groundwater Monitoring Program Data (WY 2027)
- Steps 2-4 will be informed and potentially recommended based on results of Step 1
- All other Additional/Optional Tasks (Tasks 4-5) should only be considered if grant funding is available

Board Comments

- Interest in evaluating the estimates of natural inflows but understanding that monitoring equipment is impractical and expensive in this type of environment
  - Recommendation to rely on expertise of Director Jorgensen that its not practical
- Workflow process helps to understand how scope may unfold over next 4 years
- Concern about the high costs for Additional/Optional Tasks
  - Costs and scope are high level estimates that will be refined during the Watermaster/TAC budgeting process.
  - **Costs include TAC process, not just technical work → Economies of scale are possible**
- Future redeterminations will have more data available to assess Basin responses (*e.g.* groundwater-levels) to reduced pumping
- Hope that less work will be needed on the model in future redeterminations because significant improvements were made for the 2025 Sustainable Yield

TAC Recommendations for 2030 Scope of Work

- **Consensus TAC Recommendation:** Additional/Optional Tasks should be performed. All 6 TAC members recommend performing:
  - Task 2 - *GDE Study Results*
  - Task 3 – *Monitoring Program Data*
- **Majority TAC Recommendations:**
  - Task 1 – *AEM Results* should be performed (recommended by 5/6 members)
    - 2 of the 5 recommendations are to perform this task *only if* grant funding is available
  - Task 5 – *Other Model Platforms*, should be performed (recommended by 4/6 members)
    - 3 of the 4 recommendations are to perform this task *only if* grant funding is available
  - Task 4 – *Estimates of Natural Inflows* should not be performed (recommended by 2/6)

TAC Discussion

- Seeking input on the draft TAC Recommendation Report and Board comments
- What changes should be made to the draft recommendation, if any?

Next Steps

- **December 10, 2024 (tomorrow):** TAC comments due on the *draft* TAC Recommendation Report
- **December 12, 2024:** *Final* TAC and Technical Consultant Recommendation Reports published
- **December 19, 2024:** Board meeting to consider approval of the Scope of Work

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Analysis of Carryover Rules

Objective: Perform a ***simple analysis*** of the Carryover rules to make a recommendation to the Board, and obtain Board approval, by January 1, 2025

Work performed to-date:

- Evaluated the following questions:
  - Could Carryover rules enable Parties to pump in excess of the Sustainable Yield beyond 2040?
  - If yes, will this lead to Undesirable Results?
- Presented draft analysis to TAC at November meeting
- Published and distributed draft TM on analysis
- Presented analysis and draft recommendations to the Board at December 5th meeting

Questions to Consider in Evaluating Carryover Rules

#1 - Could Carryover rules enable Parties to pump in excess of the Sustainable Yield beyond 2040?

- Yes, there is a potential for pumping by individual Parties to exceed the Sustainable Yield for some Parties based on current pumping plans of the Parties under existing Carryover Rules
- In the short term (through 2040), there are unlikely to be Undesirable Results as Parties are ahead of schedule on the required Rampdown

#2 - If yes, will this lead to Undesirable Results?

- Modeling is needed to assess potential for long-term Undesirable Results – this will be done as part of pumping projections analysis (to be completed by March 2025)

Limitations of Analysis

- Although there is a demonstrated potential for pumping to exceed Annual Allocations of WY post 2040, it is still early in the Rampdown implementation and Parties are uncertain as to exactly how things will change in the next 5-10 years

Conclusions and Recommendation

- Too soon to make a definitive finding that existing Carryover rules could lead to Undesirable Results beyond 2040
- Use model to assess the long-term sustainability of the current Carryover rules under Parties' current best guess of future pumping:
  - What are the water level and storage outcomes if parties pump in excess of the Sustainable Yield as enabled by the Carryover rules?
- Carryover Rules should be revisited in 2030 as part of the 2030 Sustainable Yield update process when there is more certainty of future pumping plans

Board Comments/Feedback

- The analysis needs to acknowledge how important Carryover is to achieving the Rampdown - Pumpers have made financial decisions to remain in the Basin with the expectation that Carryover will be available
  - The analysis of Carryover rules should acknowledge the difference between the original, linear Rampdown in the GSP and accelerated Rampdown in the Judgment
- The analysis should be of the entire Basin, not a subset of Parties. Sustainability is not judged against individual or subset of parties – it is judged on total pumping and basin-wide conditions

Anticipated Edits to Final Report

- Expand discussion on why Carryover was critical to the Rampdown agreement
- Explain how subset example does not mean entire basin will be pumping in excess of the SY, but simply used as an example of how things could potentially work and that it is to highlight we should be aware of this
- Emphasize that total pumping under the projection is less than is allowed by the Judgment
- Add summary at the top to emphasize the conclusions and recommendations:
  - Too soon to consider any changes to Carryover
  - Carryover should be evaluated in 2030 when there is more certainty in future pumping projections

TAC Discussion

- Seeking input and feedback from TAC on draft analysis and Board comments
- What concerns do you have with the draft recommendation, if any?
- What else should we look at, if anything, in this analysis?

Next Steps

- **December 10, 2024 (tomorrow):** Deadline for TAC comments/recommendations on the Carryover analysis
- **December 16, 2024:** Final memo published on Carryover analysis (part of Board package)
- **December 19, 2024:** Board meeting to consider approval of the Carryover analysis

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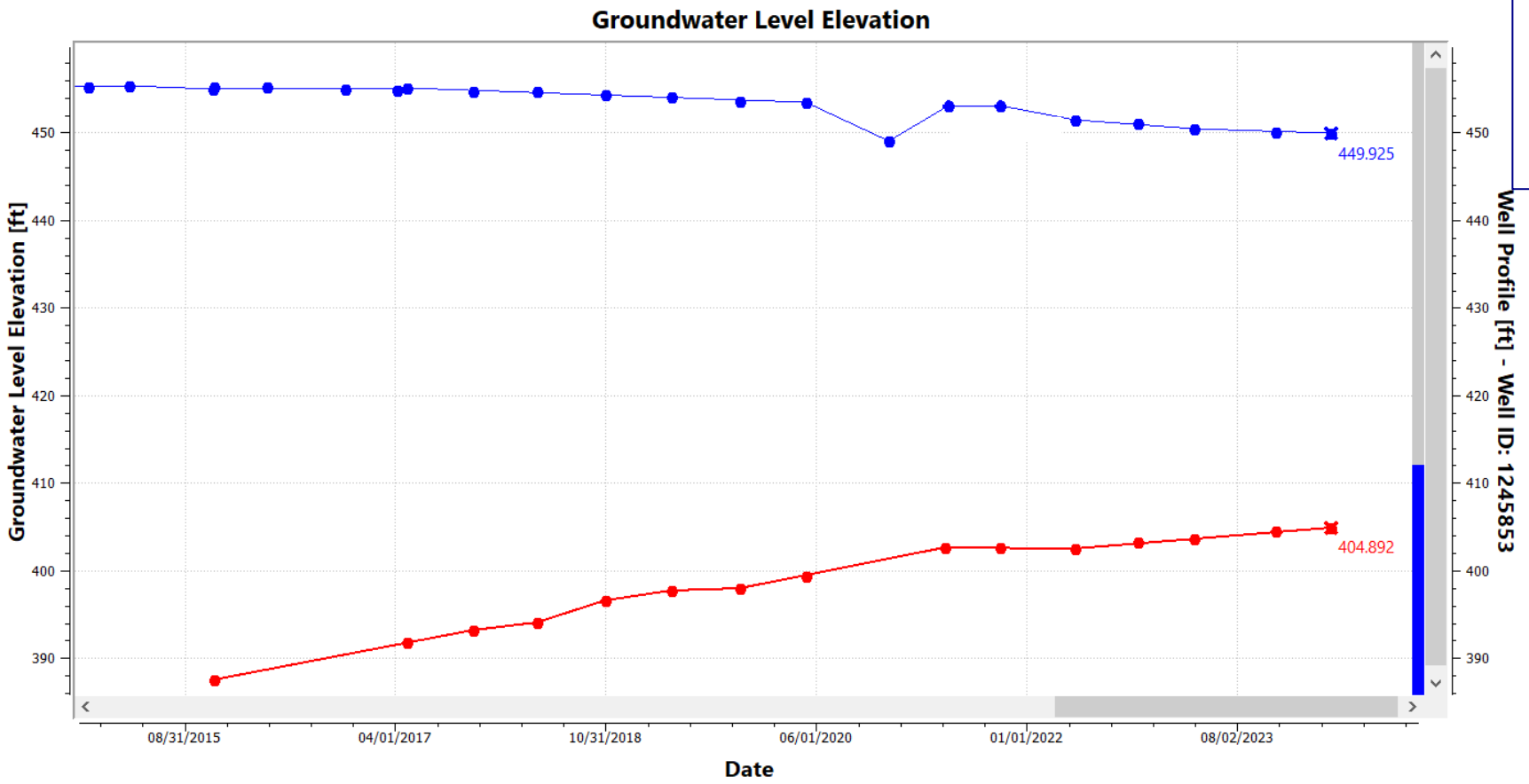
Choosing static groundwater-elevation data for Spring 2024

Groundwater Level Time Series [Well Collection #1]

Chart



Wells

Data

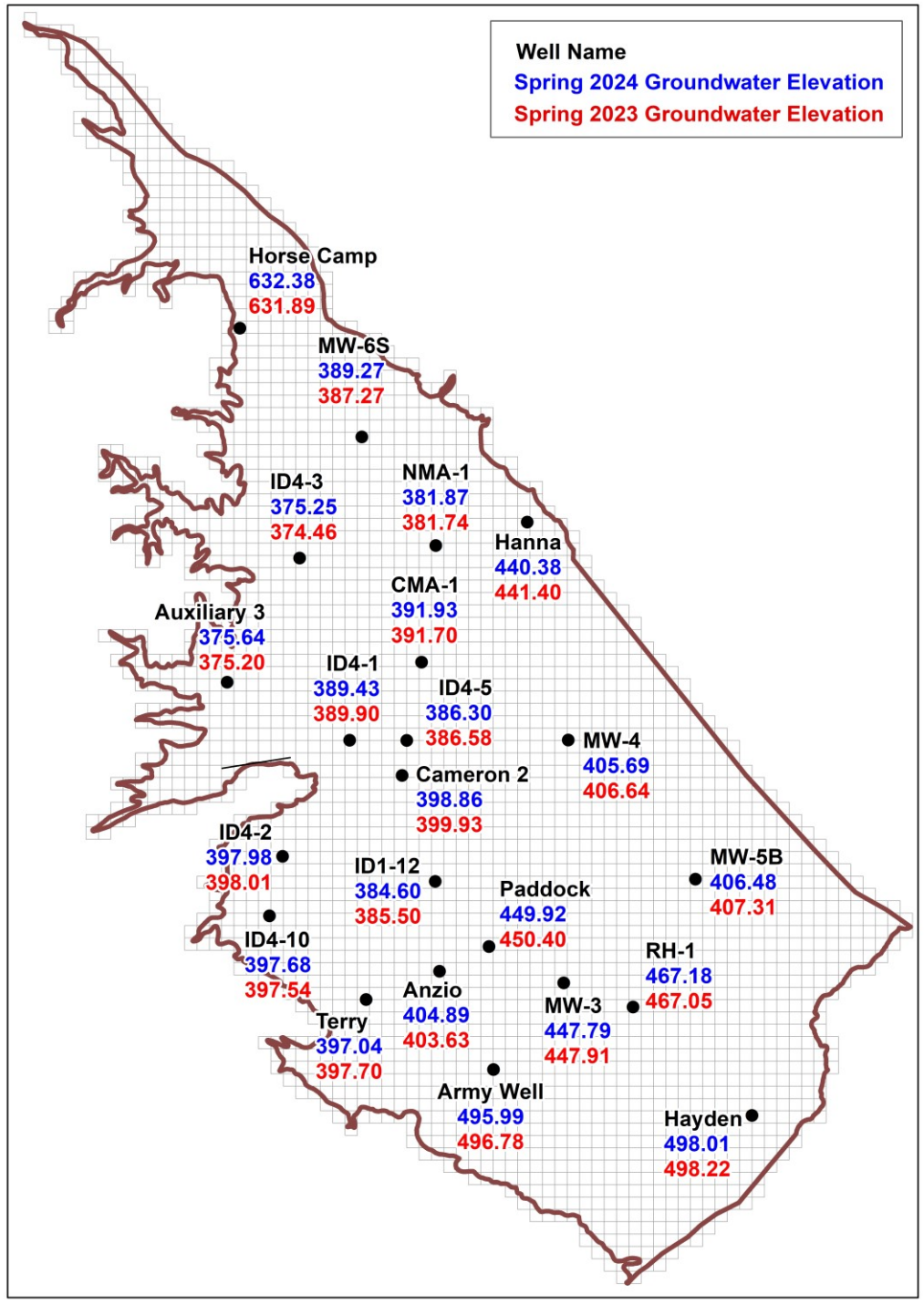
Line Color	Symbol	Symbol Color	Well ID	State Well ID	Well Name	Longitude	Latitude	WL Measurement Frequency	Owner	Ground Surface Elevation [ft]	Reference Point Elevation [ft]	Well Depth [ft]	
	Circle		1245853	011S006E2...	Anzio/Yaqui Pass	-116.347150	33.206040	Semi_Annual	Borrego Water District	662.00	663.63	500.00	250.(
	Circle		1245903	011S006E2...	Paddock	-116.334036	33.211593	Semi_Annual	Unknown	536.47	537.10	430.00	185.(

Dubious Data | Dynamic WL | EDD Marks

Pan To | Zoom To | Options | More Actions | Close

Monitoring wells and groundwater-elevation data that were used to compute annual change in storage

Spring 2023 to Spring 2024



Method to Estimate Annual Storage Change in the Subbasin

1. Change in storage is calculated at the grid-cell level using the following equation:

$$Change\ in\ Storage_i = \left(GWE_i^{t1} - GWE_i^{t0}\right) \times S_{y_i} \times A$$

i represents a unique cell within the storage change calculation grid

GWE is the interpolated groundwater elevation at cell i

Sy is the specific yield defined at cell i *(from the BVHM)*

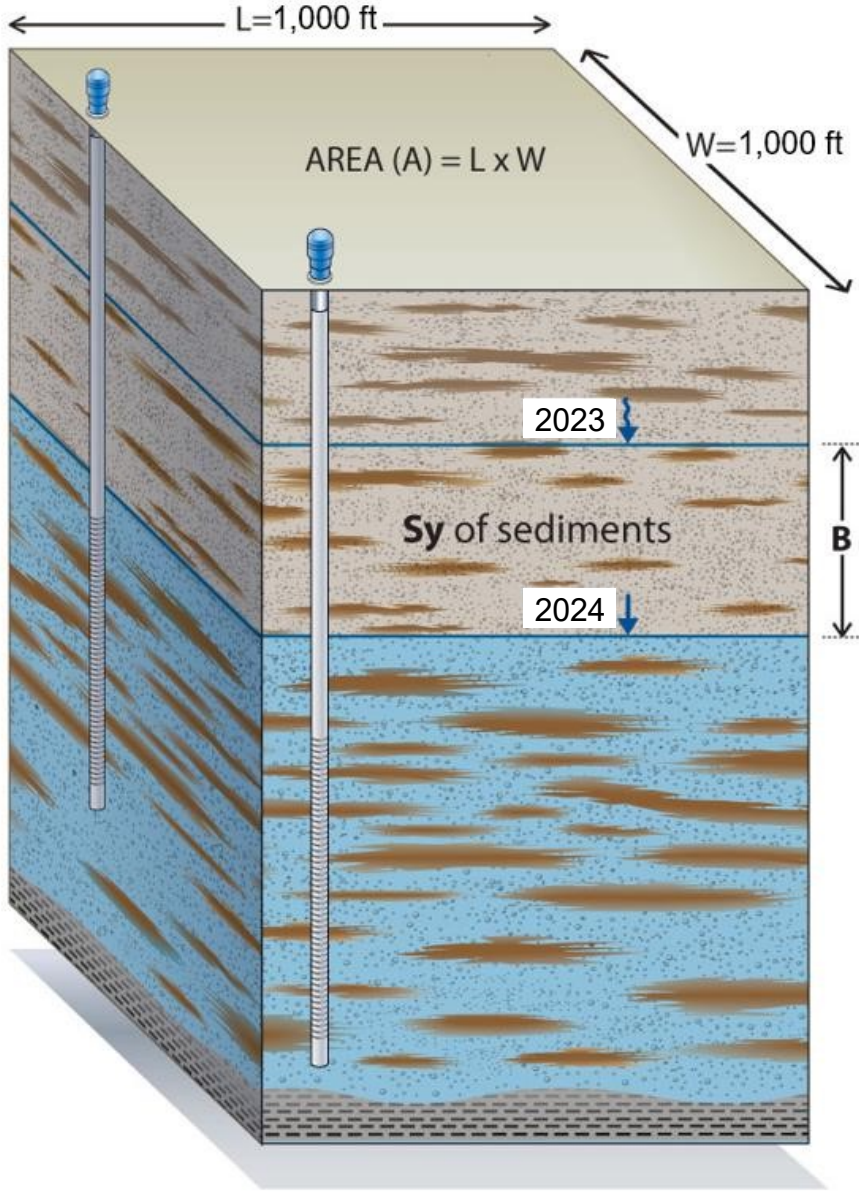
A is the area of each cell

$t1$ and $t0$ are the two years between which storage change is calculated

2. The sum of the change in storage values by grid cell provide an estimate of the total annual change in storage in the Subbasin.

ESTIMATION of STORAGE CHANGE WITHIN A GRID CELL

$\triangle S = A \times B \times Sy$



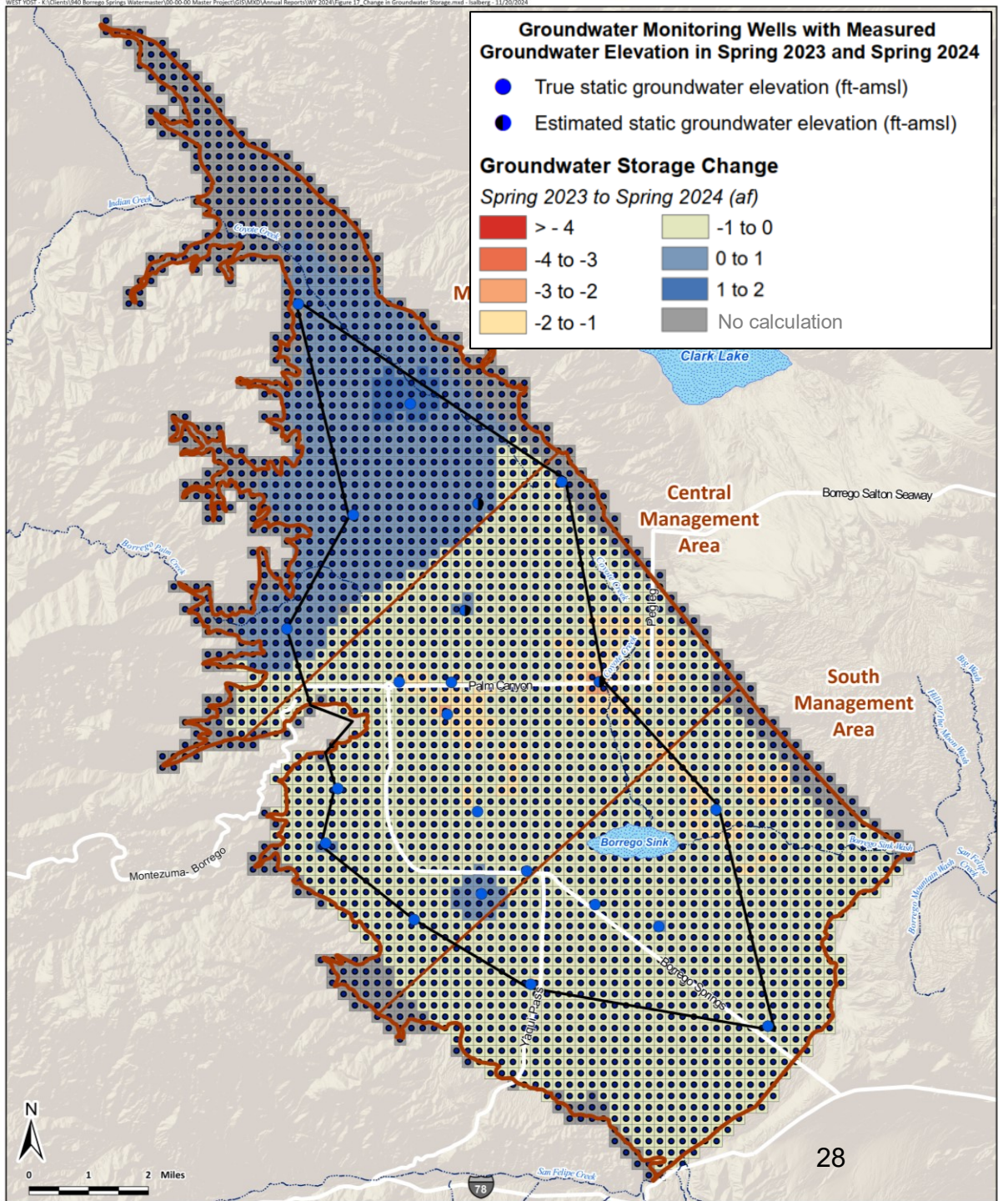
B is the thickness of aquifer where the storage change occurred. **B** is determined from groundwater-elevation maps.

Sy is the depth-averaged Specific Yield of the sediment package within the grid cell (i.e., average **Sy** of all three BVHM layers)

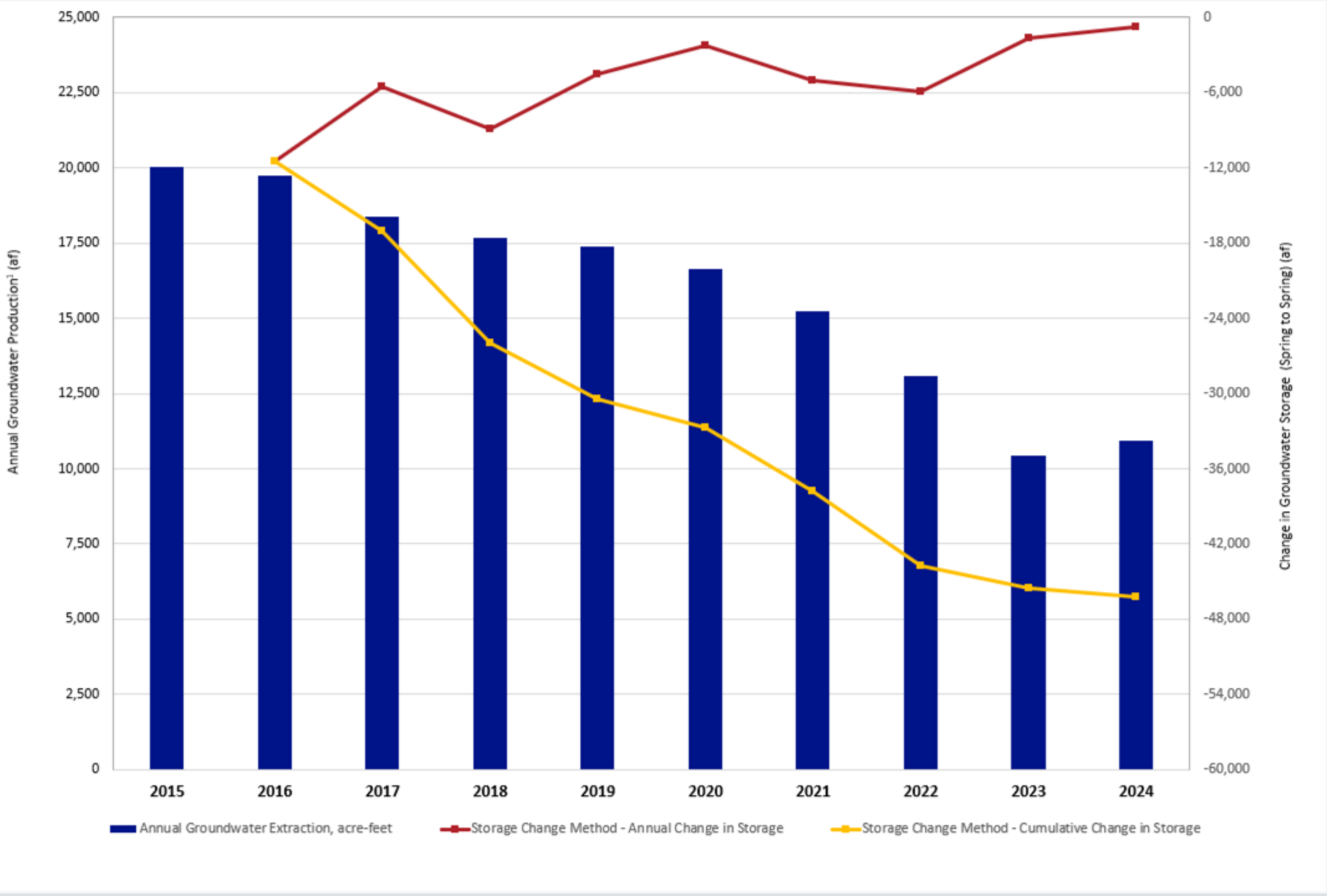
Storage Change Results
Spring 2023 to Spring 2024

- The change in groundwater storage from Spring 2023 to Spring 2024 was a ***decrease*** of approximately ***789 af***.

- Storage change calculation is made for two areas:
  - Entire Basin = **-789 af**
  - Within mask (where data are present) = **-467 af**



Change in Storage vs. Groundwater Production



Conclusions

This Year (Spring 2023 to Spring 2024):

- Storage increased in the North Management Area
- Storage declined in the Central and South Management Areas

Since 2015:

- Storage has continuously declined. Total decline of 46,300 af
- Rate of storage decline has decreased → mainly due to decreases in pumping

Board Comments

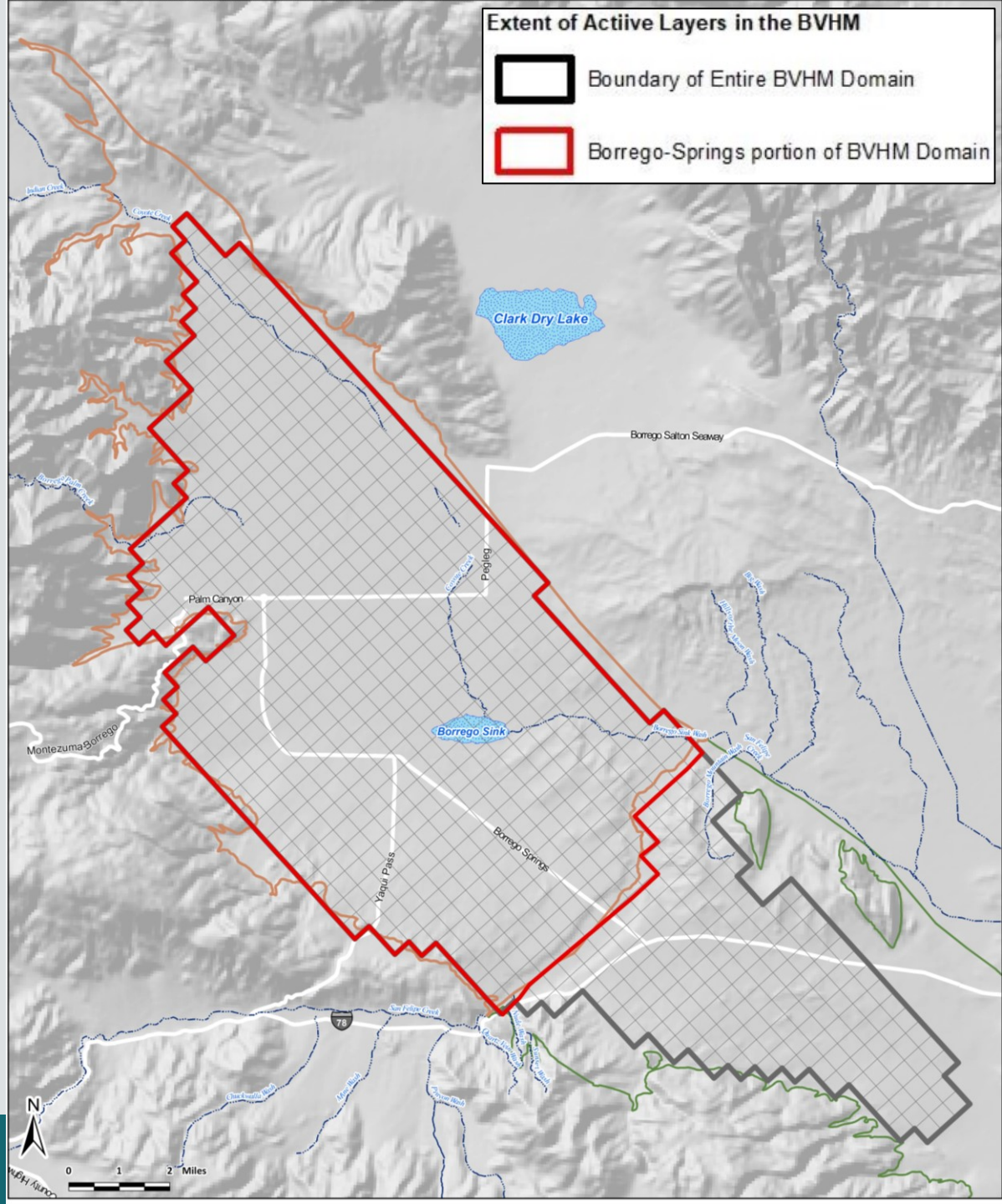
- Presented results from the Storage Change Method to the Board at the Dec. 5th meeting
- No comments on methods or results

Other Ways to Estimate Storage Change

- TAC and Board have discussed revisiting method used to estimate storage change
  - Results from *Calibrated BVHM* are now available
- When should we revisit changes to the method?
  - WY 2024 Annual Report?
  - Future Annual Report?
  - 5-year GMP update?

BVHM-Estimated Change in Storage

- BVHM estimates change in storage → part of water budget
- Calculates change in storage for each model cell (and by model layer)
- Total change in storage = sum of storage change of all model cells and layers

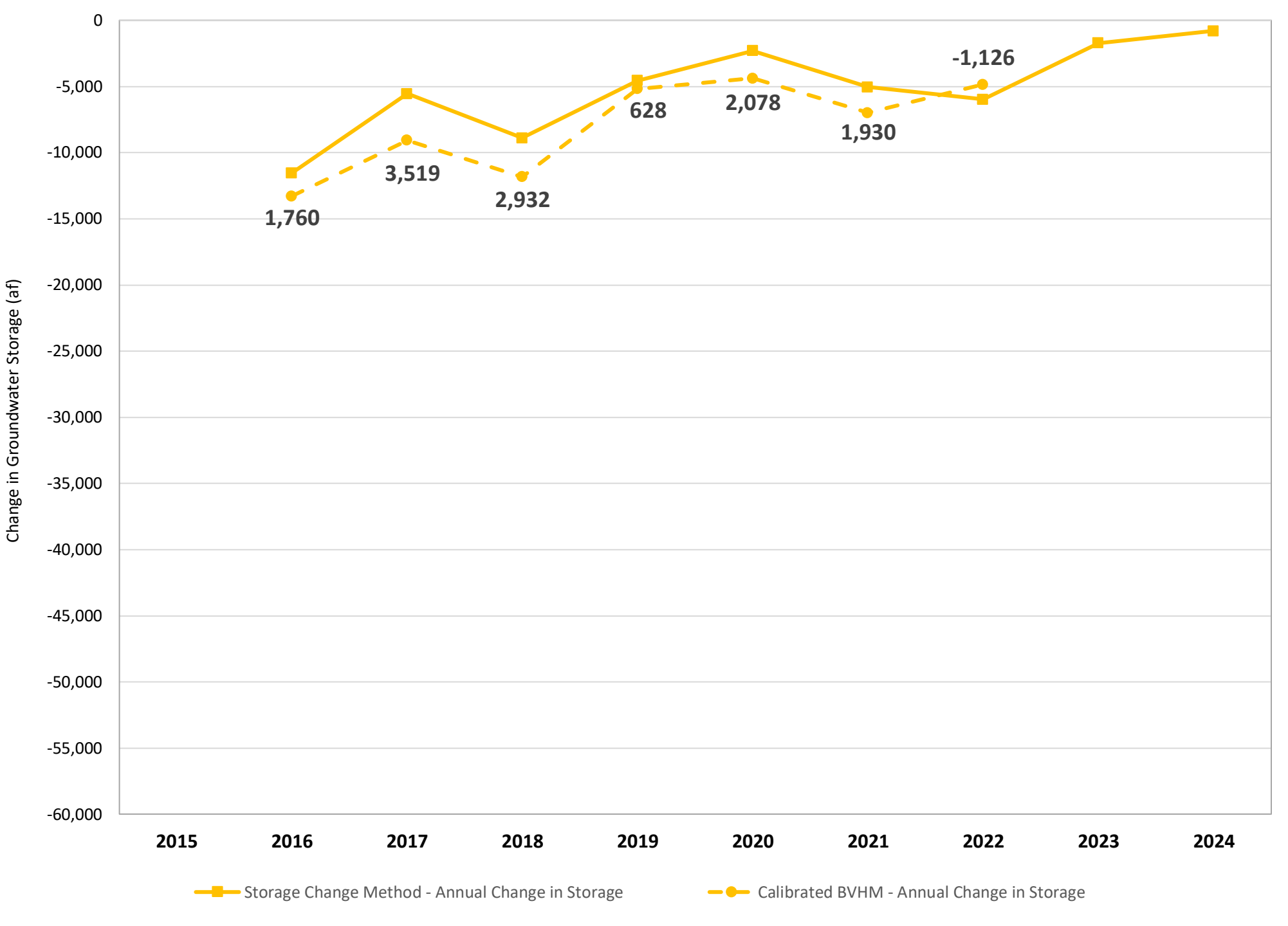


BVHM-Estimated Change in Storage

- 2016 BVHM estimated storage changes for WY 1945–2016
  - Results from projection scenarios were used to set Sustainable Management Criteria in GMP
  - Model aquifer properties used in storage change estimates
- *Calibrated BVHM* estimated storage changes for WY 1945–2022
  - No estimates for WY 2023 and 2024
  - NEW aquifer properties were produced during model calibration

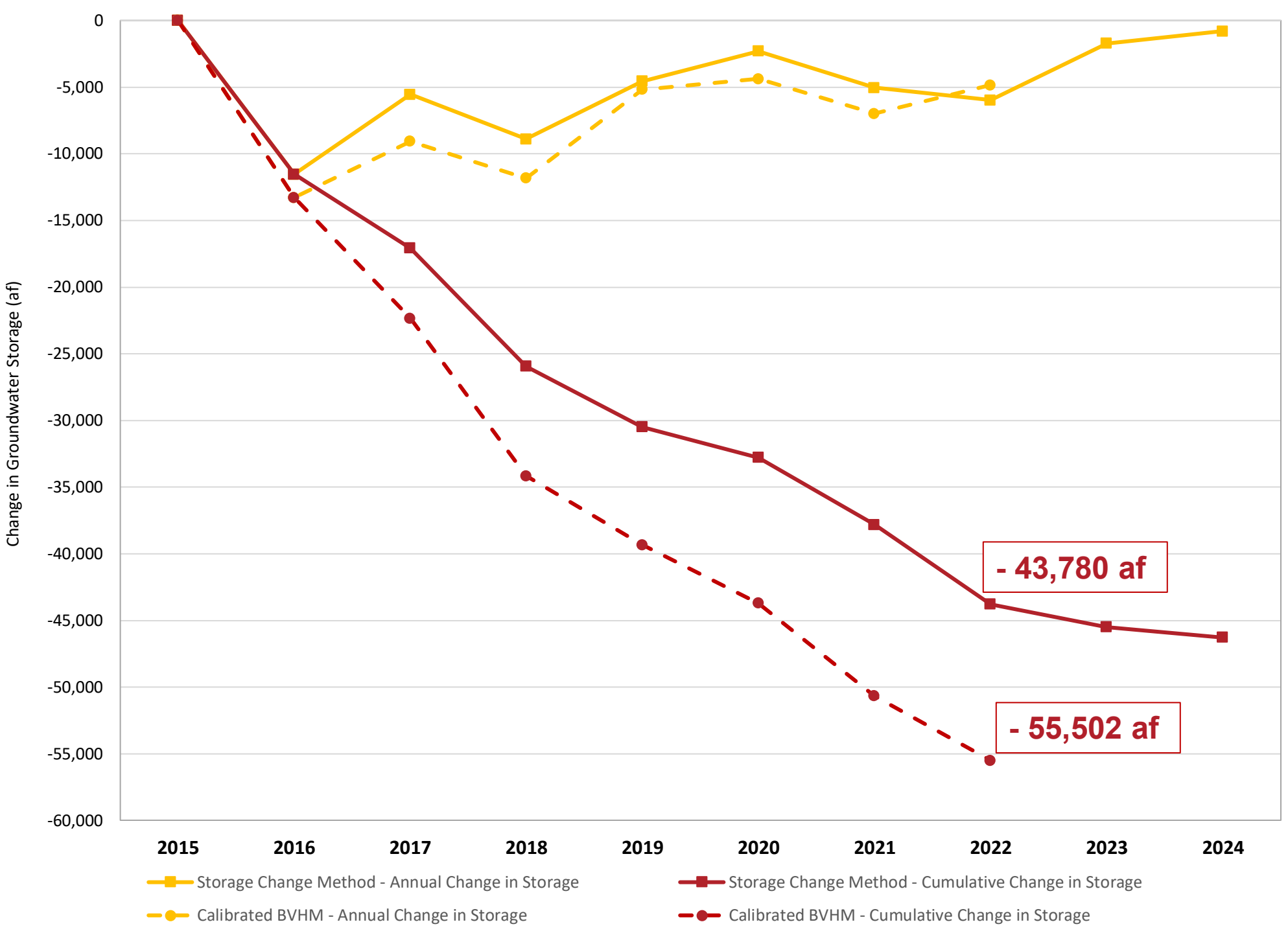
Annual Change in Storage:

Storage Change Method vs. *Calibrated BVHM*



Cumulative Change in Storage:

Storage Change Method vs. *Calibrated BVHM*



Storage Change Method vs. BVHM-Estimate

Cumulative Change in Storage (2015 to 2022):

- Storage Change Method = **-43,780 af**
- *Calibrated* BVHM = **- 55,502 af**
- 25% more total storage loss is estimated by *Calibrated BVHM* vs. Storage Change Method

- Total storage in the Basin = 5,500,000 af
  - Difference in calculation by two methods is small compared to total Basin storage (< 1%)

Reasons for Differences in Estimates

- Storage properties
  - Depth-averaged specific yield values from the 2016 BVHM (Storage Change Method)
  - New, recalibrated storage properties and layer-specific values *(Calibrated BVHM*)
- Time periods
  - Spring to spring (Storage Change Method)
  - Water year (*Calibrated BVHM*)
- Aquifer layer(s)
  - Shallow aquifer (Storage Change Method)
  - All 3 aquifer layers are used in the estimation (*Calibrated BVHM*)

Reporting Considerations

WY 2024 Annual Report

- *Purpose*: Report annual changes to the Basin to DWR
- Due to Board by January 23, 2025 (draft)
  - Due to DWR by April 1, 2024 (final)

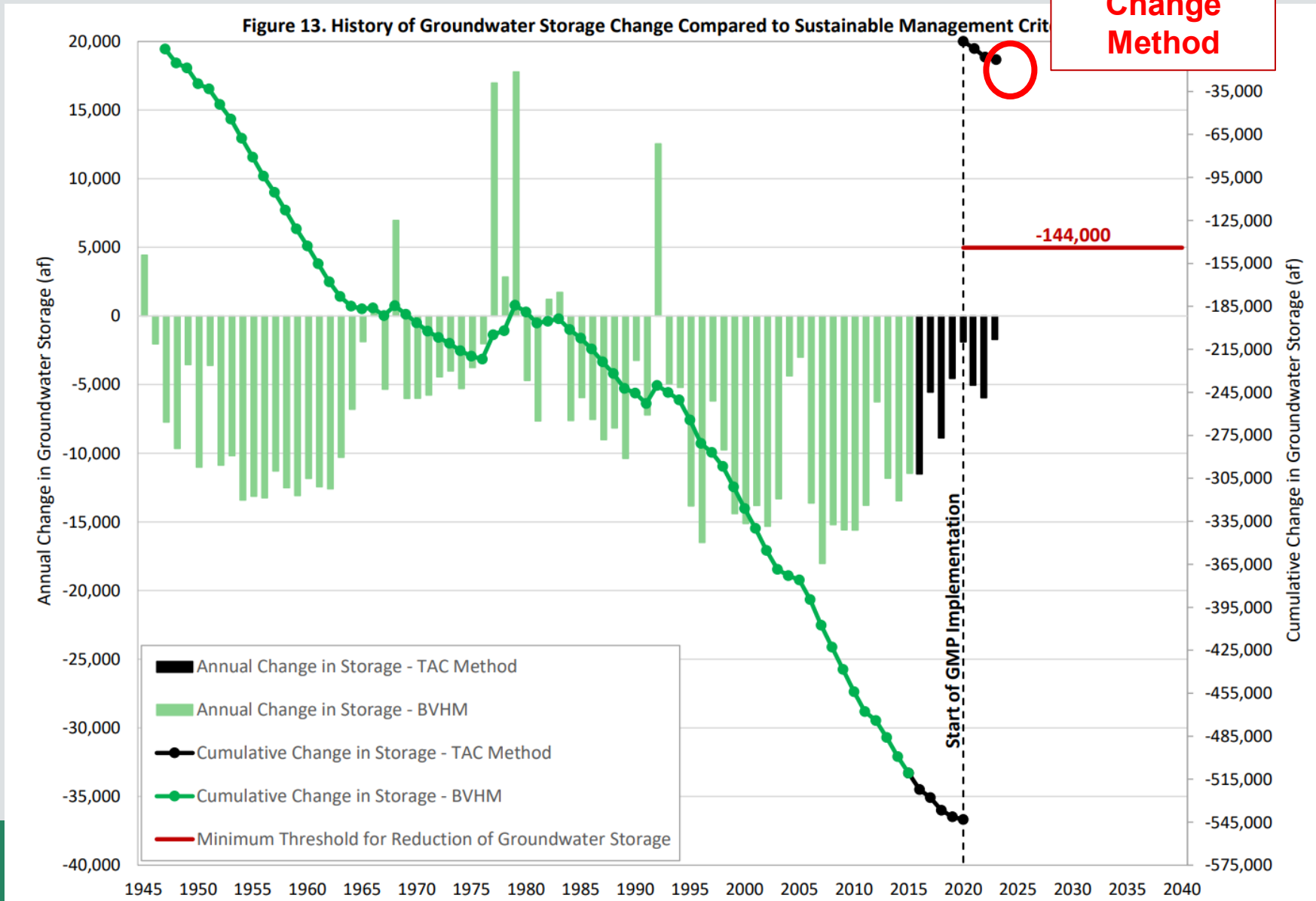
GMP

- *Purpose*: Evaluate new information and update methods used in 5-year update
- Due June 30, 2026

Recommendations: WY 2024 Annual Report

- Use Storage Change Method results
  - Change in storage = -786 af
  - Report will include a footnote that method is being re-evaluated
- No change to historical estimates

Update with results from Storage Change Method



Recommendations: GMP

- Update historical estimates using *Calibrated* BVHM (WY 1945-2022)
- Update Storage Change Method to use specific yield values from *Calibrated* BVHM
  - Use method to estimate change in storage for years that model results aren't available (WY 2023 and 2024)
- Updated estimates can be reported in future Annual Reports to DWR

Next Steps

- Incorporate TAC recommendations and feedback, if any, into the storage-change calculation
- **January 23, 2025:** Publish storage change results in draft WY 2024 Annual Report
- **End of March 2025:** Update historical estimates and methods used to estimate the change in storage for the 5-year GMP Assessment
- **April 1, 2025:** Report the storage-change calculation in the 2024 Annual Report and submit to the DWR

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Background

Conclusion #3 from the Final Technical Report to Redetermine the 2025 Sustainable Yield:

The *Calibrated BVHM* should be used to predict future groundwater conditions in the Basin under future groundwater pumping plans and climatic conditions to:

- Assess the long-term sustainability under a Rampdown to the 2025 Sustainable Yield
- Evaluate Watermaster's current Carryover rules
- Support the GMP Assessment Report

- Projection scenarios have not been simulated by the BVHM
- Current simulation period of BVHM: WY 1945 – 2022

Use the BVHM to Simulate Future Basin Conditions

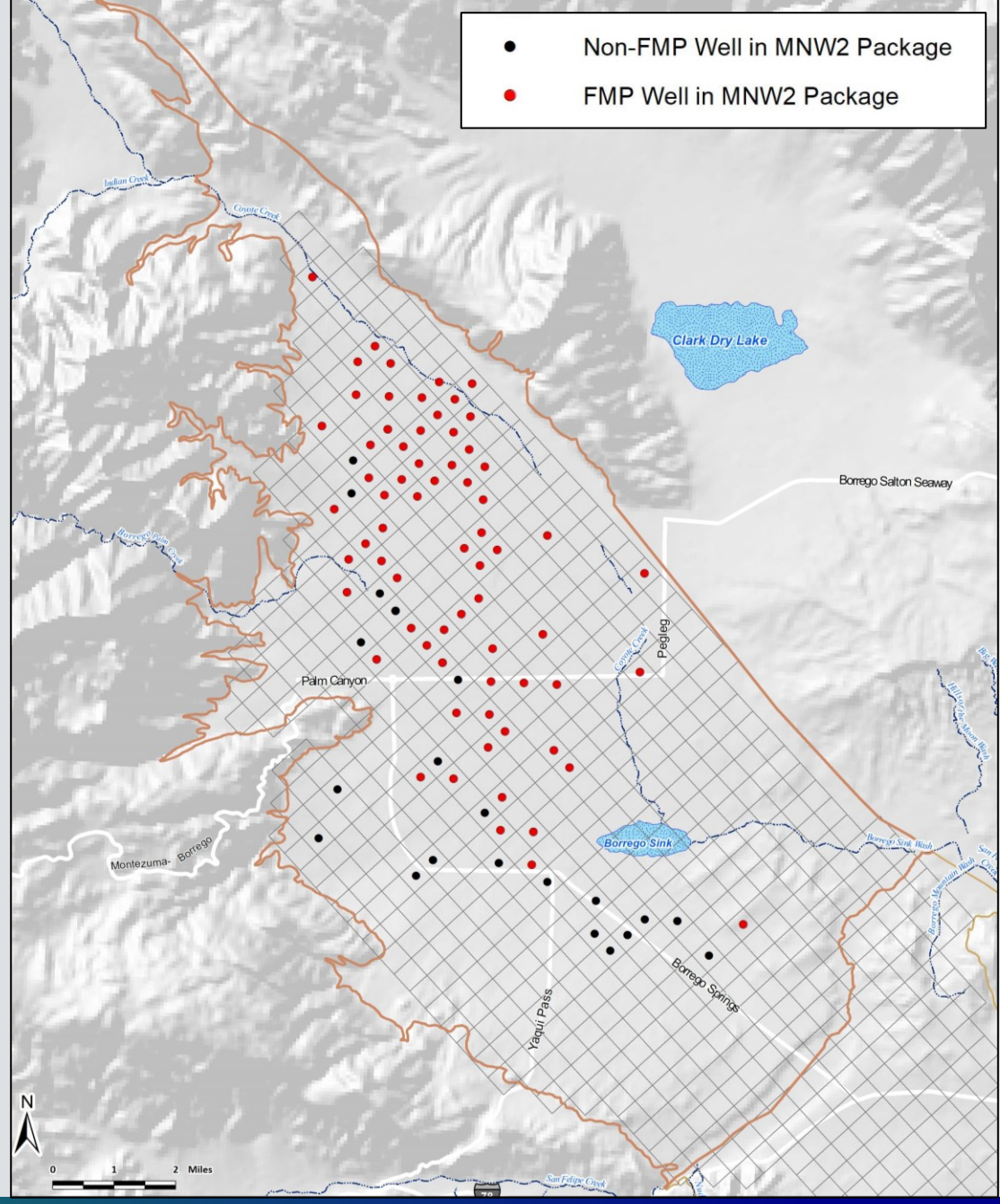
1. Extend the BVHM through WY 2070 using:
   - Metered pumping data through WY 2024
   - Pumping projections based on Party plans
   - Changes in land use based on Party plans
   - Future climatic/hydrologic conditions
2. Run the BVHM through WY 2070
3. Use model results to evaluate: ***Do the future groundwater conditions lead to Undesirable Results with respect to groundwater levels and storage?***
   - Assess the long-term sustainability under a Rampdown to the 2025 Sustainable Yield (7,952 afy)
   - Evaluate Watermaster's current Carryover rules
   - Support the 5-year GMP Assessment Report

Goals for Future Pumping/Model Configuration

1. Retain ability of the FMP to:
   - Estimate crop demands (historical + future)
   - Estimate historical groundwater pumping to meet crops demands (WY 1945 – 2022)
   - Estimate return flows and shallow ET of groundwater → important water budget components
2. Assign future pumping directly in the BVHM so that:
   - Future pumping from the aquifer is simulated and reflects plans of Parties
   - Groundwater pumped is used to satisfy crop demands

How the Model Currently Simulates Pumping

- MNW2 package simulates groundwater pumping at wells that are screened in one or more model layers.



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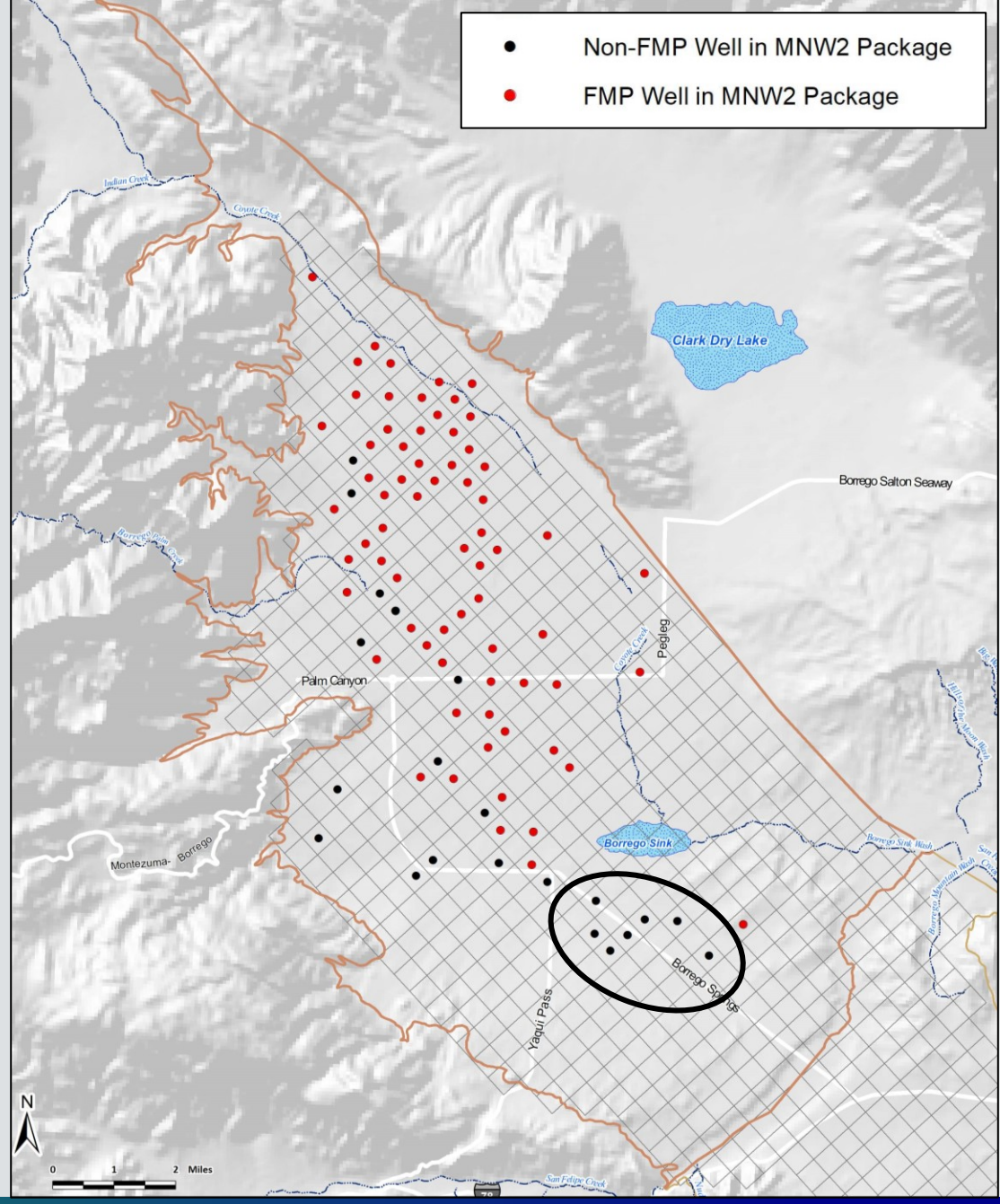
- MNW2 package simulates groundwater pumping at wells that are screened in one or more model layers.
- Two sets of wells in the MNW2 package:
  - **Non-FMP Wells.** Metered pumping is assigned directly to these fictious well locations.
    - Examples: BWD wells, Rams Hill Golf Course wells.
  - **FMP Wells.** Pumping estimated by the FMP is assigned to these fictious well locations.



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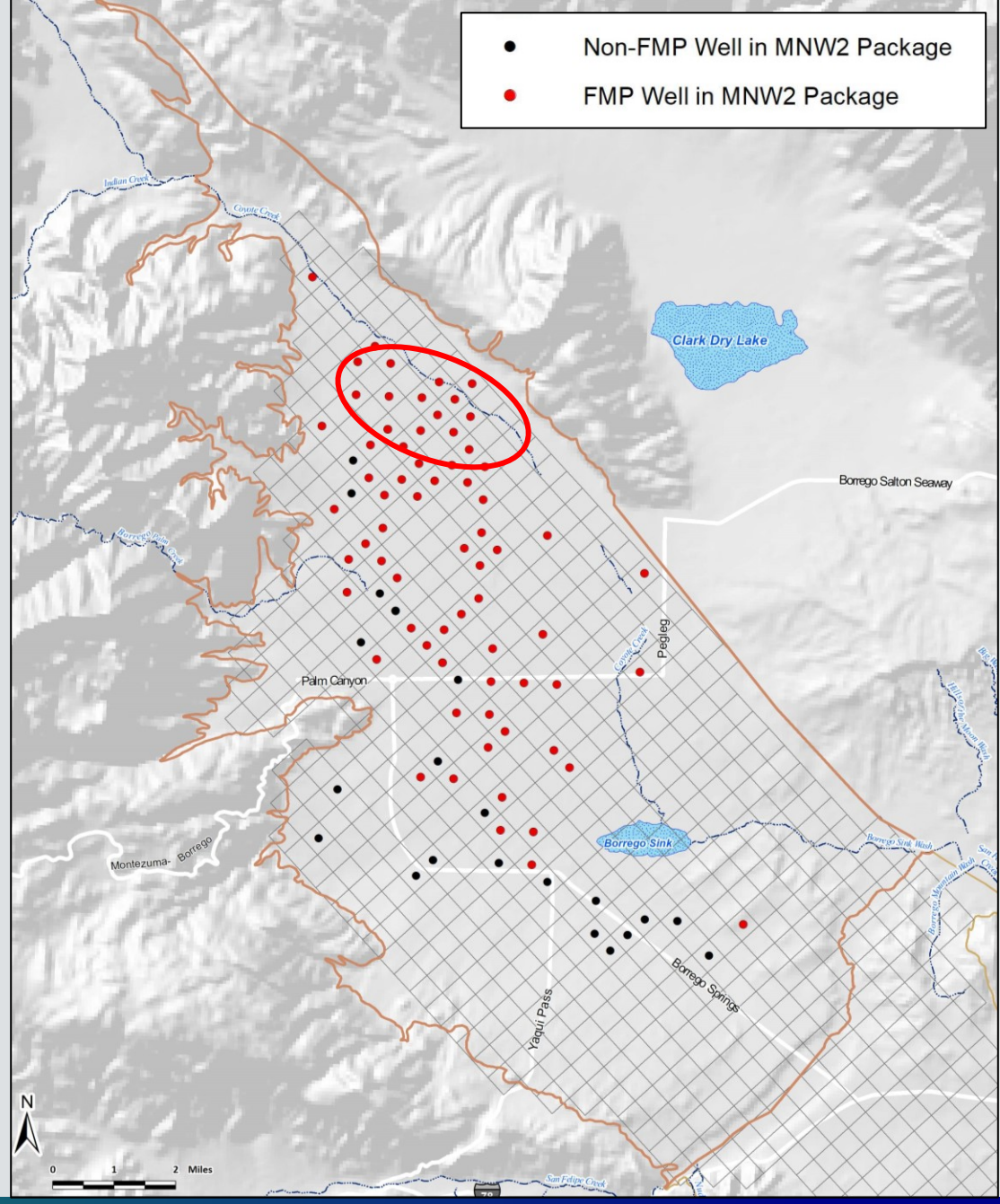


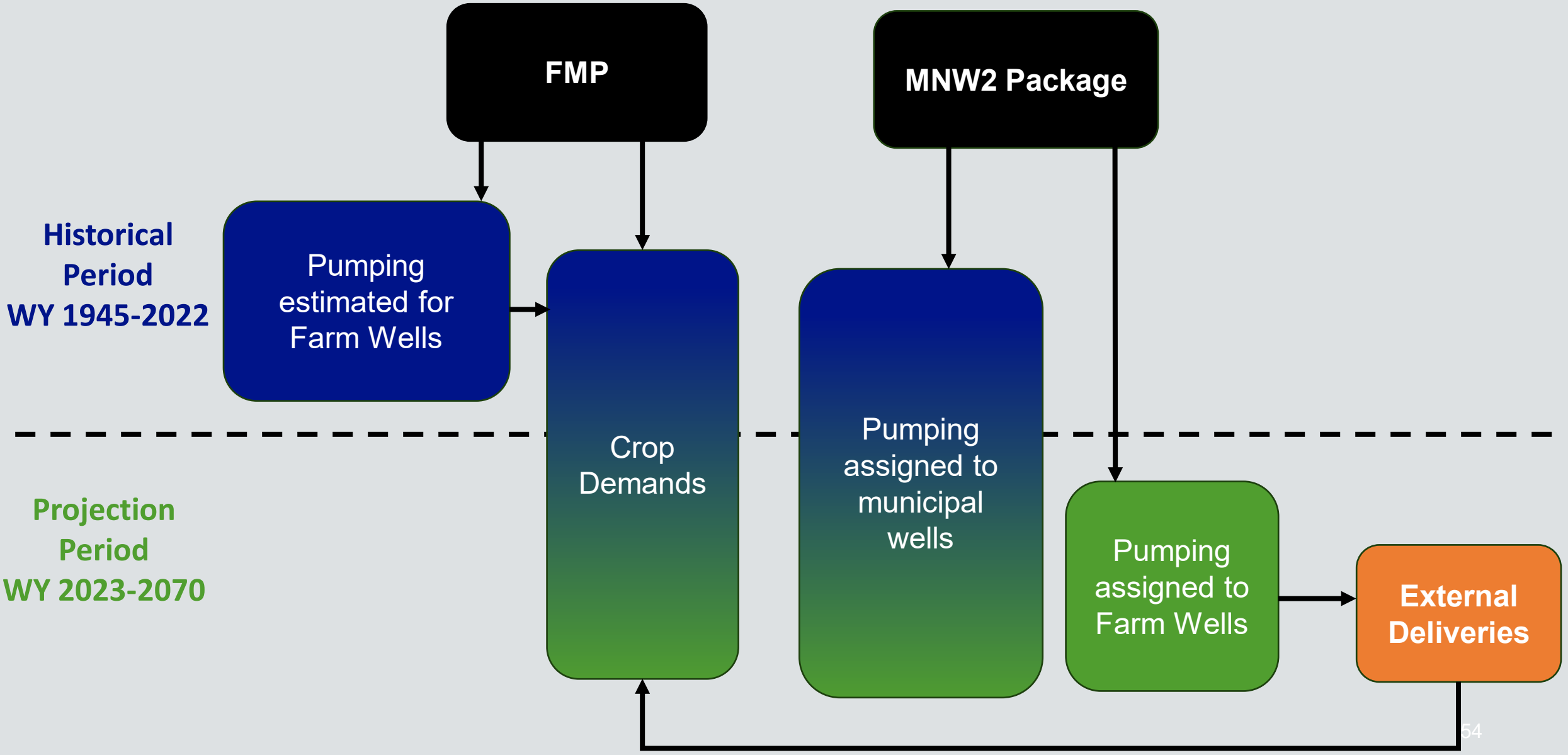
Limitations in Current Model Configuration

- FMP estimates pumping based on crop demands
  - Unable to assign pumping directly to wells in the FMP
- Farms in the FMP don't represent actual farms in the Basin
  - 52 farms in the FMP --> not delineated based on current farm ownership
  - 1 FMP farm may represent multiple farms/Parties
- Farm wells in FMP don't represent actual wells in the Basin
  - Fictious farm wells assigned to the farms in the FMP → don’t match location of actual wells in the Basin

BVHM Configuration for Future Scenarios

- **FMP** used to estimate **all** crop demands (WY 1945 – 2070)
  - ***Historical*** demands satisfied by FMP-estimated pumping (WY 1945–2022)
  - ***Future*** demands satisfied by **External Deliveries** (WY 2023-2070)
  - Adjust land use/crop types in FMP to best match expected demands for farms/Parties
- **MNW2** package used to:
  - Assign **all** pumping to municipal wells (WY 1945 – 2070)
  - Assign ***future*** pumping to farm wells (WY 2023 – 2070) → water is assigned as **External Deliveries** and delivered to the farms

BVHM Configuration for Future Scenarios



Use FMP to Estimate Demands, Return Flows, and Shallow ET of Groundwater

Goal #1: Retain ability of the FMP to estimate all crop demands, return flows, and shallow ET of groundwater, and historical groundwater pumping

- *Implementation:*
  - No changes to historical period – BVHM uses FMP to estimate demands and farm wells to extract groundwater pumping
  - Disable farm wells in projection period
- *Outcome:* FMP estimates historical pumping, return flows and shallow ET of groundwater

Use MNW2 to Assign Pumping and External Deliveries to Meet Demands

Goal #2: Assign future pumping to match Party plans/projections

- *Implementation for projection period:*
  - Disable farm wells in the FMP
  - Add new farm wells and assign pumping in MNW2 package
    - Pumping matches Pumper plans
    - Simulates groundwater pumped from the aquifer
  - Link external deliveries to FMP to meet crop demands
- *Outcomes:*
  - Pumping projections are directly assigned and simulated to more accurately simulate future aquifer impacts.
  - Ensures crop demands are satisfied by combining external deliveries and assigned pumping

Method Limitations

- Challenge to match FMP-estimated demands and assigned/delivered groundwater pumping
- **If external deliveries are less than FMP-estimated demand**
  - Results in unmet farm demands
  - *Impact to water budget:* Could result in forced reduction of demands if demands continue to be unmet
- **If external deliveries are greater than FMP-estimated demand**
  - Results in excess water delivered to farms
  - *Impact to water budget*: Could inaccurately increase return flows
- FMP output files will be reviewed to identify mismatches → adjust monthly pumping best match demand and supply

Next Steps

- Finalize pumping projections
- Set-up BVHM forward-projection and run future simulations
  - Extend model input files
  - Set up connection between FMP, MNW2, and external deliveries
  - Run BVHM through 2070
  - Simulate variable climate conditions
- Evaluate results and compare groundwater levels and storage against:
  - Sustainable Management Criteria
  - Undesirable Results
- Work will be completed by end of March 2025 (end of SGM grant period)

Today's Agenda

1. Public Comment
2. Review of Board Comments on the draft Redetermination of the 2025 Sustainable Yield
3. Scope of Work for the 2030 Redetermination of the Sustainable Yield
4. Analysis of Carryover Rules
5. Draft Results of the Storage Change Calculation for Spring 2023 to Spring 2024
6. Pumping Projections to Support the GMP Assessment Report
7. **Public Comment**

Next TAC Meeting – Early 2025

Agenda:

1. Pumping Projections to Support the GMP Assessment Report