

Development of 2020 Storage Management Plan

Workshop No. 3
November 6, 2019





Workshop agenda

Introductions

What the 2020 SMP is and what it is not

Existing SMP and the need to update it

2020 SMP development process

Technical basis for the 2020 SMP

Description of the draft SMP V2

Next Steps



What the 2020 SMP is and what it is not





What the 2020 SMP is and what it is not

- The 2020 SMP establishes the manner in which Basin storage may be utilized
 - It articulates the Judgment and the Peace Agreement requirements for use of storage – Watermaster will review all S & R program applications based on the SMP
 - It is not a plan to optimize the use of storage, it sets boundaries on storage management activities for subsequent optimization
- OBMP Update Activity B will utilize the 2020 SMP as a platform for the development of optimal S & R programs and to support Watermaster review and approval of applications



Existing SMP and the need to update it



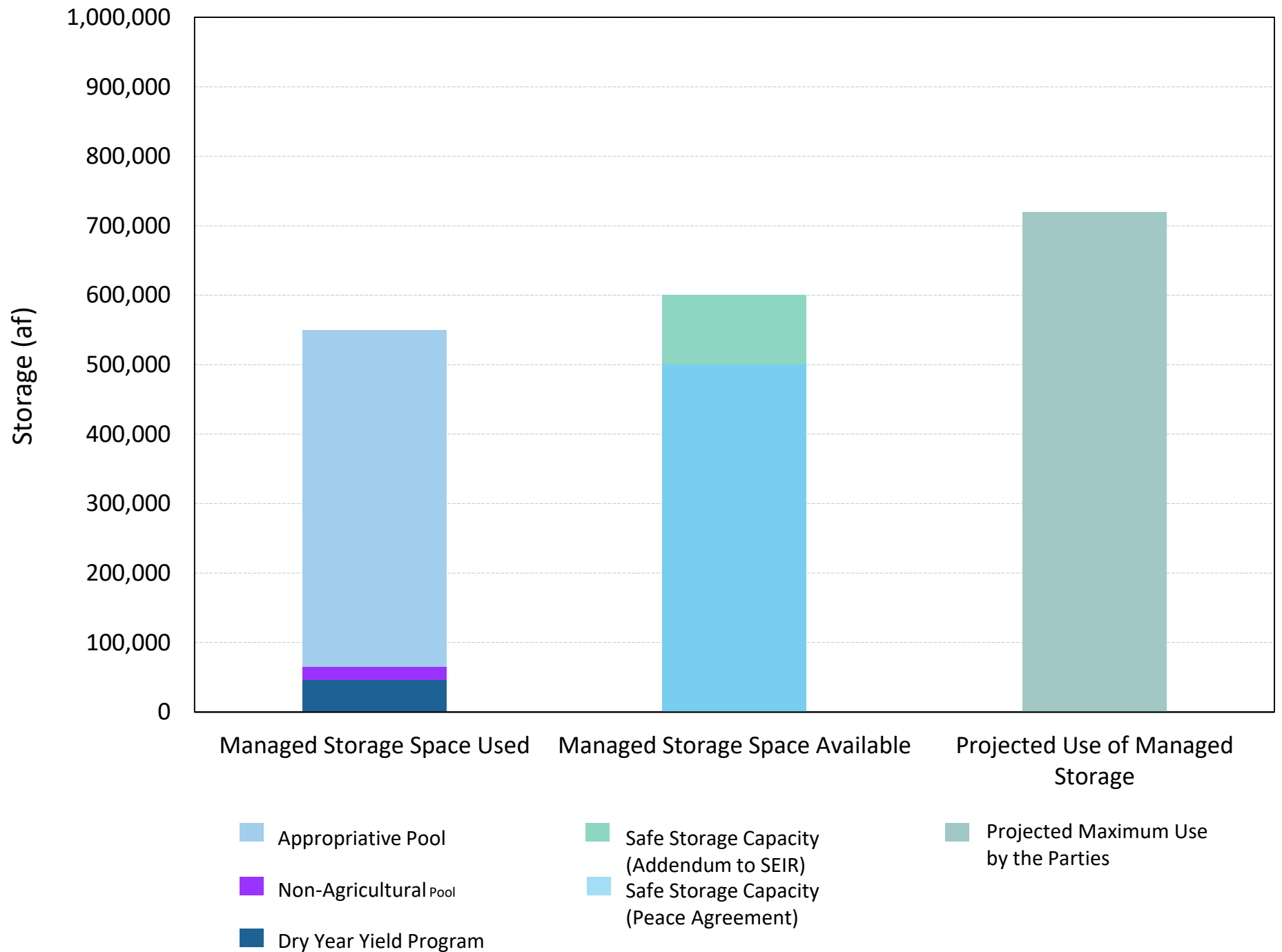


Current Storage Management Plan

- Pre – Peace Agreement
- Peace Agreement and Peace II Amendments
- Current status of Storage Agreements:
 - Non – Agricultural Pool Storage ✓
 - Appropriative Pool Storage ✓
 - Storage and Recovery ✓
- Allocation of storage among the classes of storage (carryover, excess carry-over; local supplemental; storage and recovery) and the parties pursuant to guidance documents
- Storage-related thresholds
 - 500 kaf “Safe Storage Capacity” (Temporarily increased to 600 kaf as per SEIR Addendum until 2021)
 - 100 kaf of “Safe Harbor” for Local Supplemental provided there is no MPI (expired in 2010)



Comparison of managed storage space used, managed storage space available, and projected maximum use of managed storage by the Parties





2020 SMP development process





2020 SMP development process

- Completed Storage Framework Investigation in October 2018
 - Developed in a open stakeholder process involving eight workshops over a two – year period
- Stakeholder process to develop the 2020 SMP
 - Workshops on June 7th, July 18th and November 6th
 - Completed a white paper on the 2020 Storage Management Plan on July 18th
 - Completed draft 2020 SMP versions 1 and 2 and submitted them to the Parties for review and comment on September 6th and October 24st, respectively
 - Received comments on draft 2020 SMP v1, prepared responses to comments and distributed the responses with draft 2020 SMP v2



Two workshops in June and July

- Reviewed current Storage Management Plan
- Reviewed technical requirements for 2020 Storage Management Plan and their bases
- Requested that Parties:
 - Provide updated water demand, supply plans, intended use of storage
 - Provide input on specific sections of the draft 2020 SMP



Technical basis for the 2020 SMP





Technical requirements for the 2020 SMP

- Watermaster requirements:
 - Reservation of existing spreading basin facilities to satisfy Watermaster's recharge and replenishment obligations
 - Limitation of Transfers or Leases of water rights and water held in managed storage
 - Evaluation of MPI, Safe Yield impacts and Hydraulic Control for S & R program applications

- Parties' input required:
 - Use of storage space by the Parties and S & R programs
 - Addressing reduced net recharge and Safe Yield
 - Addressing Hydraulic Control impacts due to a S & R programs
 - Periodic updates of the Storage Management Plan



How was the 700 kaf projection of storage use by the parties estimated?

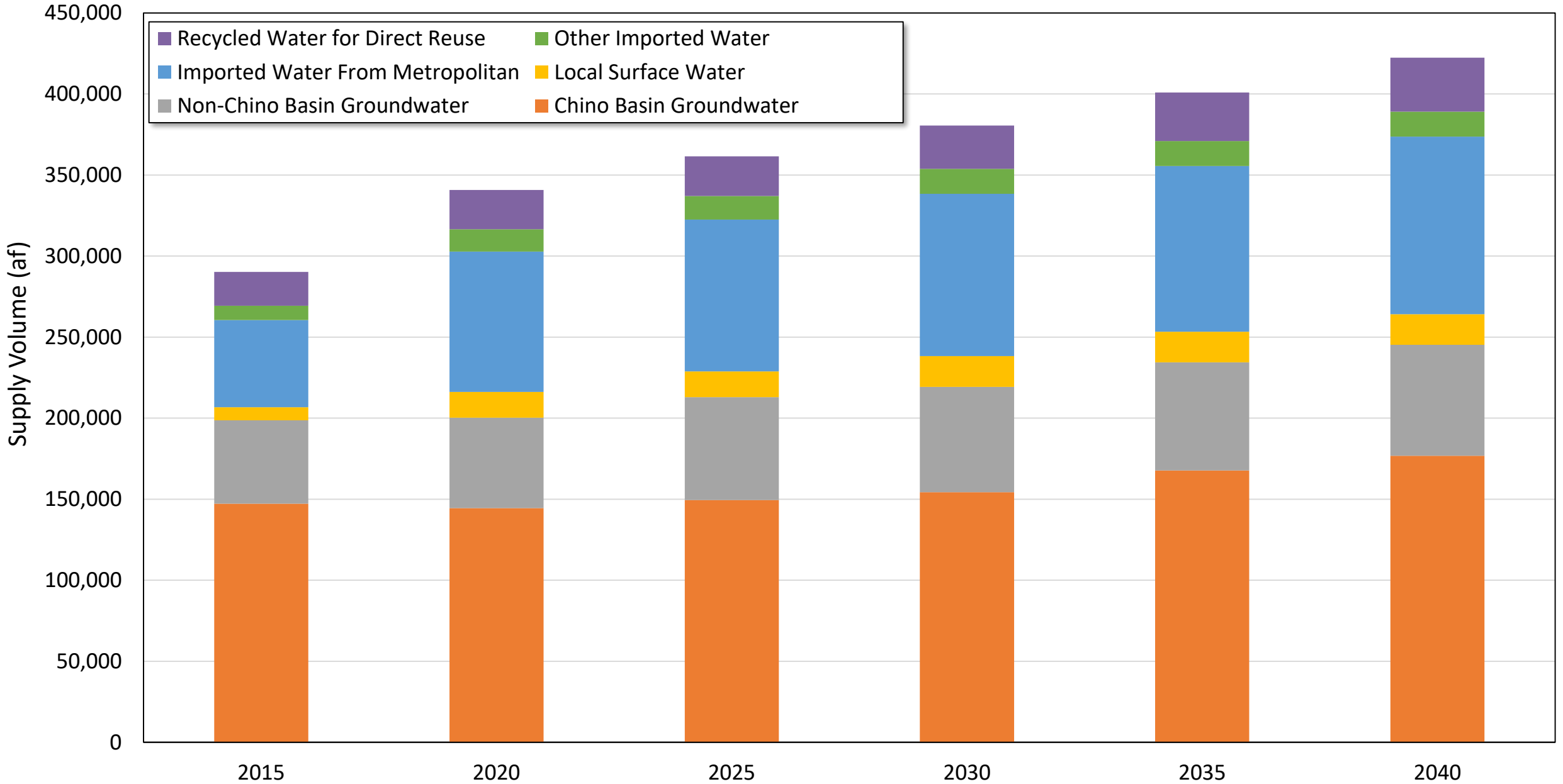




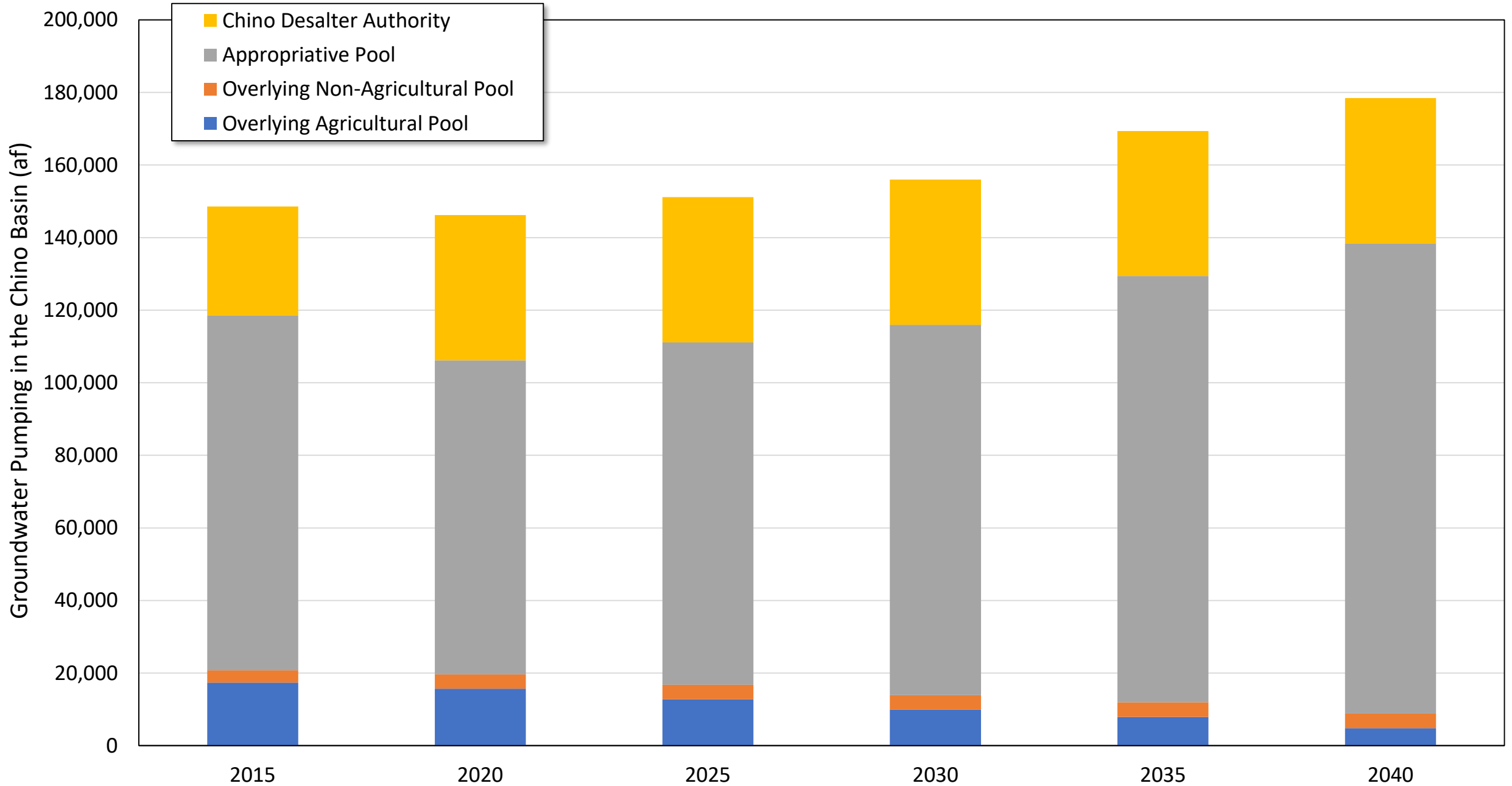
2018 SFI estimate of managed storage used by the Parties

- Developed then-current best estimate of projected water demands and supply plans, use of stored water and cultural conditions
- Modeled the basin response to projected recharge and pumping and estimated: MPI, net recharge and Safe Yield, and the state of hydraulic control
- Projected managed storage

From Figure 2-5 of the 2018 SFI, Aggregate Water Supply Plan for Chino Basin Agencies,
Scenario 1A



Projected Chino Basin Groundwater Pumping by Pool and Desalters, Scenario 1A





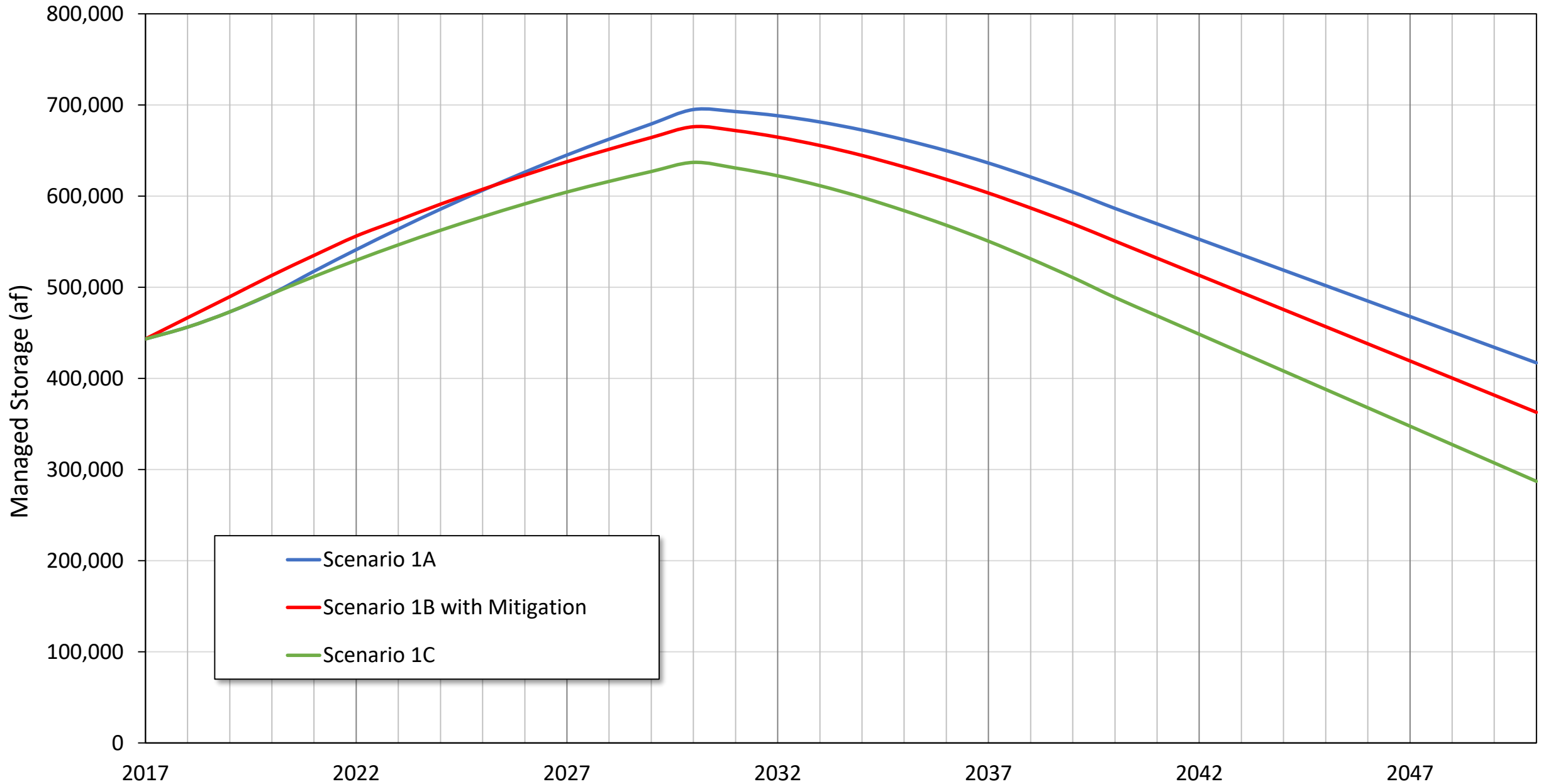
2018 SFI baseline scenarios

Scenario 1A: Parties' best estimates of how they will use available water supplies to meet their demands

Scenario 1B: Parties will pump all their annual pumping rights before meeting demands from other sources plus incorporating water conservation observed during the recent drought

Scenario 1C: Pumping same as Scenario 1A, plus incorporating water conservation observed during the recent drought

From Figure 5-1 of the 2018 SFI, Model-Projected End-of-Year Volume in Managed Storage by the Parties



Projected Groundwater Production, Production Rights, Replenishment and End of Year Managed Storage – Scenario 1A

(af)

Fiscal Year	Projected Groundwater Production per 2017 Survey for Normal Year	Production Rights							Aggregate Replenishment Obligation ²	Replenishment from Storage	Wet Water Replenishment	End of Year Managed Storage
		Safe Yield ¹	Controlled Overdraft Pursuant to Judgment	Reoperation Water Offset to Desalter Production	6,500 afy Supplemental Water Recharge in MZ1 per Peace II	Recycled Water Recharge	Debit Against 6,500 afy Obligation from Recycled Water Recharged in MZ1	Total				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9) = (3)+(4)+(5)+(6)+(7)+(8)	(10) = (2)-(9)	(11)	(12)	(13) _t = [(2) _t -(9) _t + (12) _t + (13) _{t-1}
2018	145,981	135,000	0	5,000	6,500	16,000	-3,490	159,010	-13,029	0	0	456,273
2019	147,718	135,000	0	10,000	6,500	16,420	-3,490	164,430	-16,712	0	0	472,985
2020	144,528	135,000	0	10,000	6,500	16,420	-3,490	164,430	-19,902	0	0	492,887
2021	145,488	140,717	0	10,000	6,500	16,420	-3,490	170,147	-24,659	0	0	517,546
2022	146,492	140,717	0	10,000	6,500	16,420	-3,490	170,147	-23,654	0	0	541,201
2023	147,437	140,717	0	10,000	6,500	16,420	-3,490	170,147	-22,710	0	0	563,910
2024	148,368	140,717	0	10,000	6,500	16,420	-3,490	170,147	-21,778	0	0	585,689
2025	149,468	140,717	0	10,000	6,500	16,420	-3,490	170,147	-20,679	0	0	606,367
2026	150,231	140,717	0	10,000	6,500	16,420	-3,490	170,147	-19,916	0	0	626,284
2027	151,348	140,717	0	10,000	6,500	16,420	-3,490	170,147	-18,799	0	0	645,083
2028	152,701	140,717	0	10,000	6,500	16,420	-3,490	170,147	-17,446	0	0	662,528
2029	153,490	140,717	0	10,000	6,500	16,420	-3,490	170,147	-16,657	0	0	679,185
2030	154,302	140,717	0	10,000	6,500	16,420	-3,490	170,147	-15,845	0	0	695,030
2031	157,135	137,943	0	0	0	16,420	0	154,363	2,772	2,217	554	692,813
2032	160,063	137,943	0	0	0	16,420	0	154,363	5,699	4,559	1,140	688,253
2033	162,928	137,943	0	0	0	16,420	0	154,363	8,565	6,852	1,713	681,401
2034	165,381	137,943	0	0	0	16,420	0	154,363	11,017	8,814	2,203	672,588
2035	167,723	137,943	0	0	0	16,420	0	154,363	13,360	10,688	2,672	661,900
2036	169,366	137,943	0	0	0	16,420	0	154,363	15,003	12,002	3,001	649,898
2037	171,285	137,943	0	0	0	16,420	0	154,363	16,921	13,537	3,384	636,361
2038	173,514	137,943	0	0	0	16,420	0	154,363	19,151	15,321	3,830	621,040
2039	175,943	137,943	0	0	0	16,420	0	154,363	20,678	16,542	4,136	604,497



Conclusions from the review of baseline scenarios through 2050

Feature	Scenario 1A	Scenario 1B with mitigation	Scenario 1C
Maximum storage space used	700 kaf	680 kaf	640 kaf
Pumping sustainability	Pumping sustainability challenges are projected to occur in the CDA and JCSD well fields and at some FWC wells. Scenario 1A has the least challenges and Scenario 1B with mitigation has the greatest challenges.		
New Land Subsidence	No new land subsidence projected through 2050		
Net Recharge	Net recharge increases in 2021 with implementation of the 2013 RMPU facilities. In Scenarios 1A and 1C, net recharge declines with increasing managed storage through 2030 and increases in 2040 and thereafter with decreasing managed storage and increasing pumping. In Scenario 1B with mitigation, net recharge increases generally through 2050.		
Hydraulic Control	Maintained through 2050 for all baseline scenarios		



What does the 700 kaf mean?

- It is Watermaster staff's estimate of the maximum aggregate storage required by the Parties during the planning period to implement their water management plans.
- It represents an aggregate physical requirement based on planning projections provided by each individual Party in 2017 and expected to be updated periodically.
- A higher number, provided that is supported by planning projections, can be analyzed for basin impacts and MPI.



How was the 300 kaf basin impacts from storage use by S & R programs evaluated?





Operating bands, scenarios, storage, and put and take capacities

Operating Bands	Scenarios	Range of Managed Storage Used (af)	Cumulative Put Capacity (afy)	Cumulative Take Capacity (afy)
1	1A	0 to 700,000	na	na
1 and 2	2C	0 to 800,000	25,000	33,333
1, 2 and 3	3A and 3B	0 to 900,000	50,000	66,667
1, 2, 3 and 4	4A and 4B	0 to 1,000,000	75,000	100,000

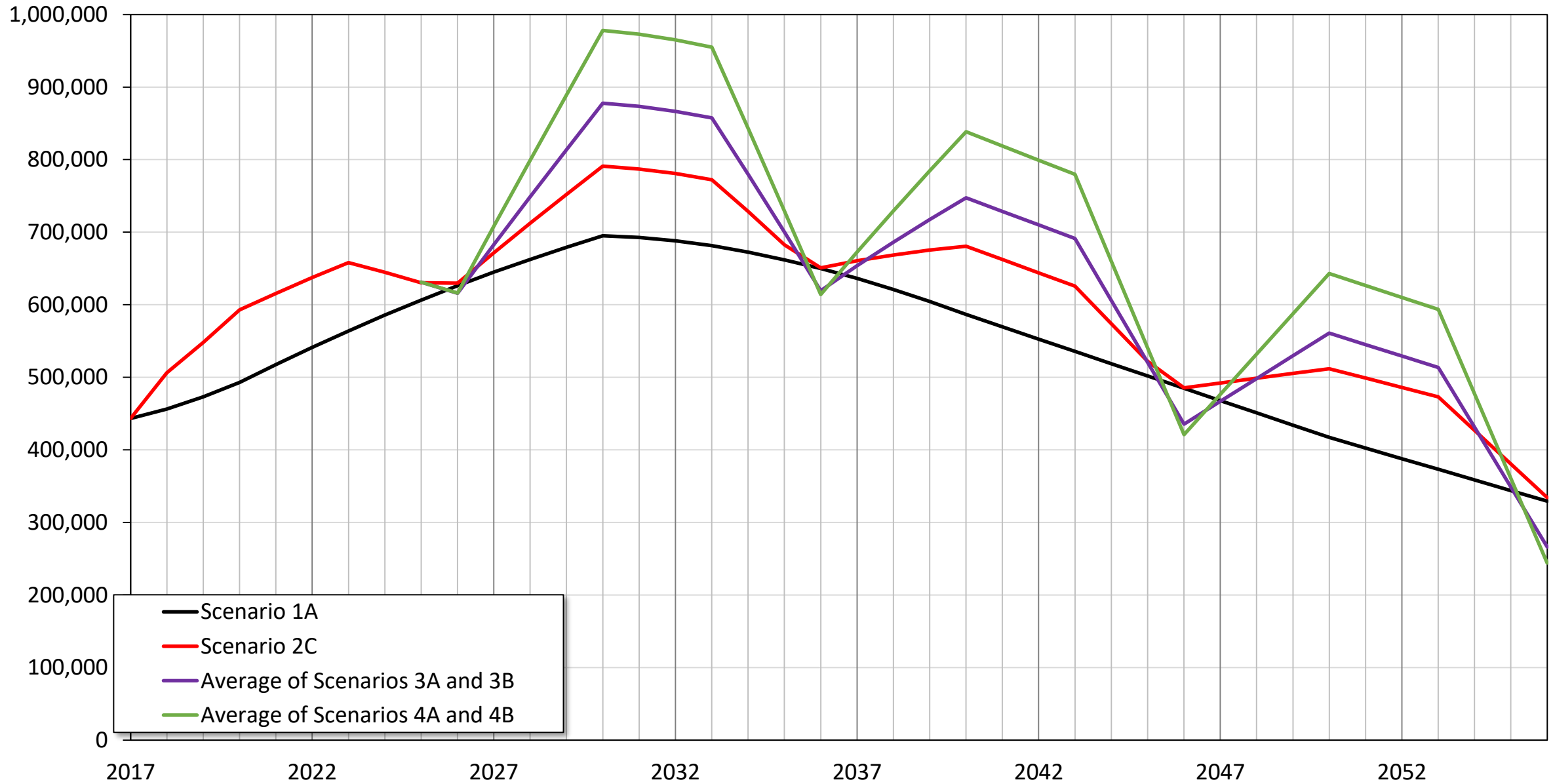


Description of operating bands 2, 3 and 4 “take” features (afy)

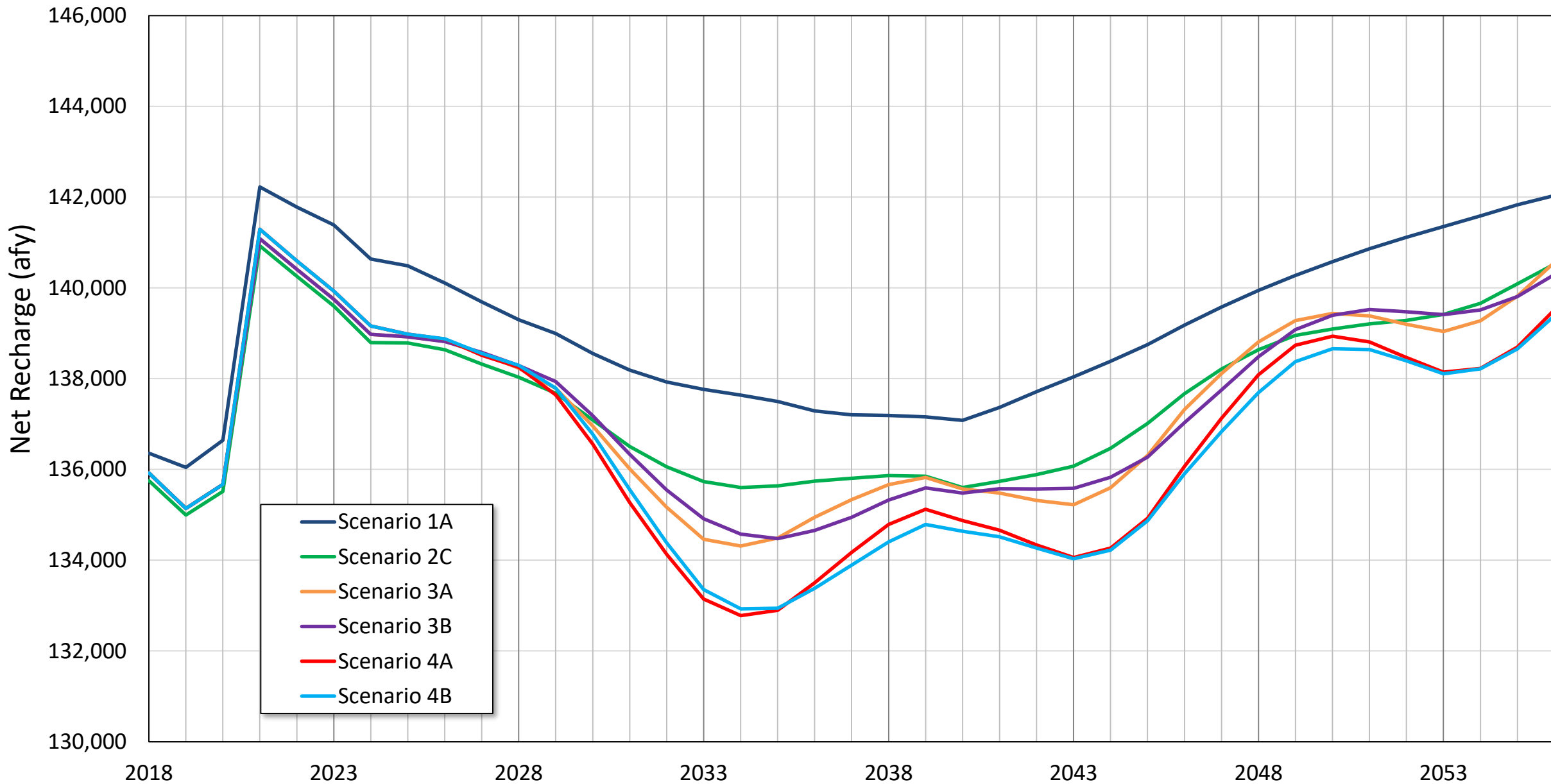
Feature	Operating Bands				
	2C	3 (800 to 900 kaf)		4 (900 to 1,000 kaf)	
Scenario	2C	3A	3B	4A	4B
Total Cumulative Take	33,333	66,667	66,667	100,000	100,000
Ex Well Capacity	33,333	50,000	33,333	50,000	50,000
New ASR Well Capacity	0	11,667	33,333	27,000	50,000
New Conventional Well Capacity	0	5,000	0	23,000	0



From Figure 6-3 of the 2018 SFI, Model-Projected End-of-Year Volume in Managed Storage for Scenarios 1A and 2C and Average End-of-Year Volume for Scenarios 3A and 3B and 4A and 4B



From Figure 6-8 of the 2018 SFI, Projected Net Recharge for Baseline and Storage and Recovery Program Scenarios





Summary of conclusions for operating bands 2, 3 and 4 through 2050

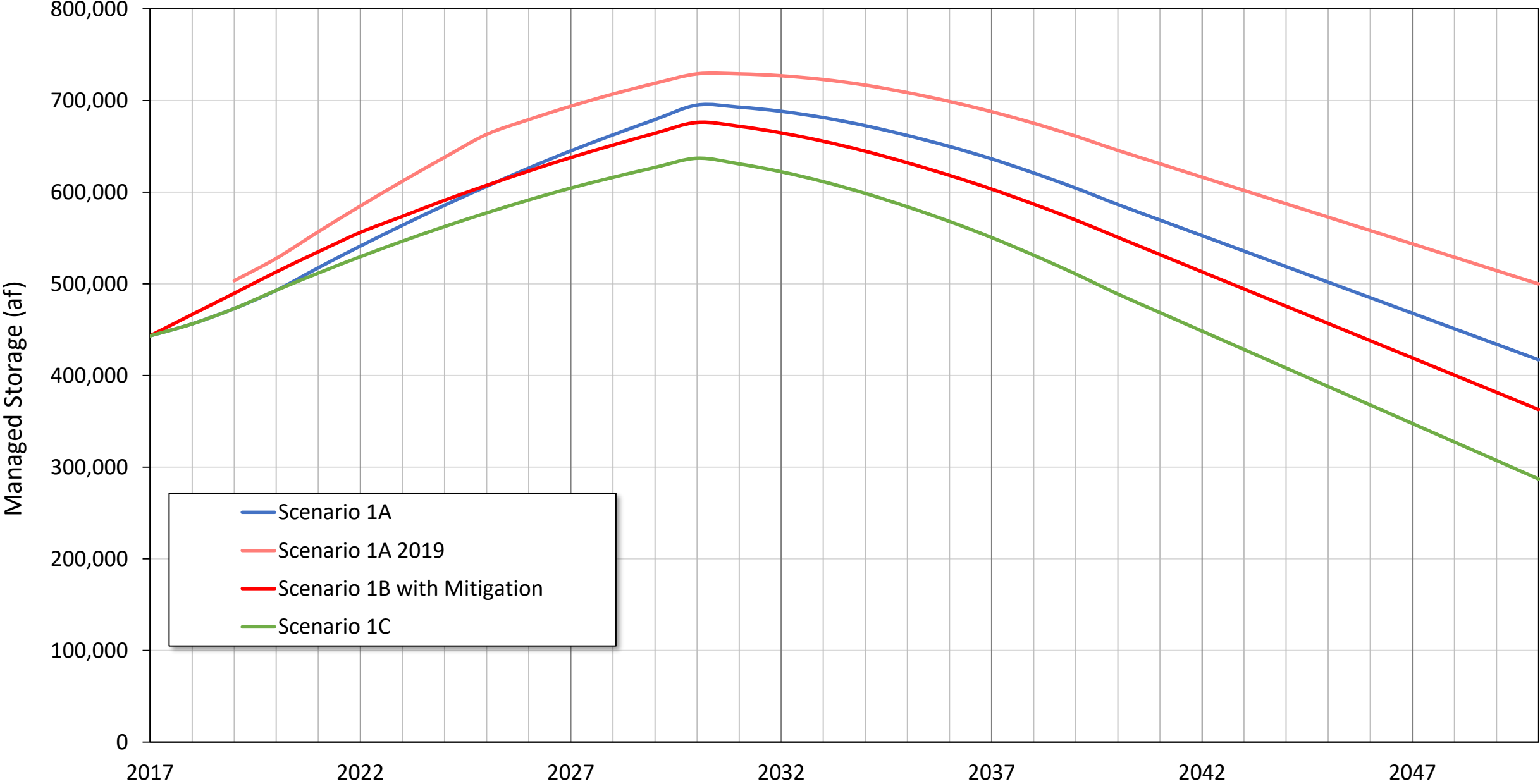
Feature	Operating Band				
	2 (700 to 800 kaf)	3 (800 to 900 kaf)		4 (900 to 1,000 kaf)	
Scenario	2C	3A	3B	4A	4B
Pumping sustainability	No MPI	No MPI through 2050. Potential MPI afterwards. Can be mitigated by optimizing recovery well field			
New land subsidence	No MPI				
Reduction in annual net recharge as a percentage of annual storage space used	2.41%	1.50%			
Hydraulic Control	Maintained	Increased groundwater discharge through the CCWF, approaching the de minimis standard. Can be mitigated by optimizing recovery well field.			
Effects on solvent plumes	Affects the speed and direction of the GE Flat Iron and GE Test Cell plumes				



At the July 18 workshop, Watermaster staff requested that the Parties provide updated demand projections, water supply plans, and expected use of stored water



Modified From Figure 5-1 of the 2018 SFI, Model-Projected End-of-Year Volume in Managed Storage by the Parties plus 2019 Updated Scenario 1A Managed Storage Projection





Ten-minute break



Draft 2020 SMP v2



Draft 2020 SMP v2

1. Introduction

2. Storage Management Plan Description

App A 2020 Storage Management Plan White Paper

App B Comments and Responses on the draft 2020 SMP v1

App C 2019 Update of Managed Storage Projection through 2050



Section 2 Storage Management Plan Description

2.1 Use of storage space by Parties and Storage and Recovery Programs

2.2 Reservation of Existing Spreading Basin Facilities to Satisfy Watermaster Recharge and Replenishment Obligations

2.3 Storage Management Activities of the Parties

2.4 Storage and Recovery Programs

2.5 Storage Agreement Application Process

2.6 Storage Management Plan Update



Use of storage space by Parties and Storage and Recovery Programs (§ 2.1)

An aggregate amount of 800,000 af is reserved for the Parties' conjunctive-use operations (includes Carryover, Excess Carryover, and Supplemental Accounts) and Metropolitan's DYYP. This amount is referred to as the "First Managed Storage Band" (FMSB).



Use of storage space by Parties and Storage and Recovery Programs (§ 2.1)

The managed storage space between 800,000 and 1,000,000 af is reserved for Storage and Recovery Programs. Storage and Recovery Programs that utilize the managed storage space above 800,000 af will be required to mitigate potential MPI as if the 800,000 af were fully used. Renewal or extension of the DYYP agreement will require the DYYP to use storage space above 800,000 af.

The use of storage space greater than 1,000,000 af is possible.



Reservation of Existing Spreading Basin Facilities to Satisfy Watermaster Recharge and Replenishment Obligations (§ 2.2)

Watermaster will include provisions in storage agreements to prioritize the use of spreading basins to satisfy Watermaster's recharge and replenishment obligations over the use of spreading basins for other uses.



Storage Management Activities of the Parties – Limitation of Transfers or Leases of Water Rights and Water Held in Managed Storage (§ 2.3.1)

Early in the OBMP implementation period, Watermaster determined that transfers or leases of water rights and water held in managed storage (hereafter transfers) from Parties that are situated such that they pump groundwater outside of MZ1 to Parties that pump in MZ1 for the purpose of replenishment have the potential to cause MPI.

This limitation on transfers should be reconsidered if the land subsidence management plan for MZ1 includes consideration for such transfers, the land subsidence plan is implemented, and subsequent monitoring demonstrates the sufficiency of the land subsidence management plan.



Storage Management Activities of the Parties – Mitigation of Reduced Net Recharge and Safe Yield (§ 2.3.2)

The 2018 SFI demonstrated that storing water has the effect of reducing net recharge and Safe Yield. The reduction in net recharge caused by storage is an adverse impact. The Safe Yield, a prospective calculation, is based on projected estimates of net recharge that include the effects of managed storage on net recharge. The reduction in Safe Yield due to projected storage management by the Parties is thus incorporated into the Safe Yield estimate. Watermaster considers this adverse impact to be mitigated by the prospective calculation of the Safe Yield.



S & R Programs – Prioritization of Put and Take Operations in MZ2 and MZ3 (§ 2.4.1)

Puts and takes should be prioritized to occur in MZ2 and MZ3 to avoid new land subsidence and interfering with land subsidence management in MZ1, to minimize pumping sustainability challenges, to minimize the impact of storage and recovery operations on solvent plumes, to preserve the state of Hydraulic Control, and to take advantage of the larger and more useful groundwater storage space in MZ2 and MZ3.



S & R Programs – Prioritization of Put and Take Operations in MZ2 and MZ3 (§ 2.4.1)

This spatial prioritization on puts and takes should be reconsidered if the land subsidence management plan for MZ1 includes consideration for Storage and Recovery programs, the land subsidence management plan is implemented, and subsequent monitoring demonstrates the sufficiency of the land subsidence management plan.



S & R Programs – Evaluation of Storage and Recovery Program Impacts, MPI, and Mitigation (§ 2.4.2)

The intent of this provision is to reaffirm the requirements of Paragraph 12 of the Judgment and the Peace Agreement, as to the review of Storage and Recovery Program applications, and to require Storage and Recovery Program agreements to provide provisions that require Storage and Recovery Program participants to cease or modify their operations if Watermaster determines, subsequent to Watermaster and Court approval of a Storage and Recovery Program storage agreement, that the participant's storage and recovery operations are causing or threaten to cause potential MPI. The potential MPIs to be addressed include but are not limited to land subsidence, pumping sustainability, reduction in Safe Yield, water quality impacts, shallow groundwater, and liquefaction.



S & R Programs – Evaluation of Storage and Recovery Program Impacts, MPI, and Mitigation (§ 2.4.2)

The 2018 SFI concluded that the net recharge and Safe Yield of the basin would be reduced annually by about 2.0 percent of the volume of water stored in a Storage and Recovery Program. Watermaster will estimate the reduction in net recharge and Safe Yield for each Storage and Recovery Program and deduct it from water stored in each Storage and Recovery Program storage account to compensate for its impact on net recharge and Safe Yield. The annual net recharge loss rate attributable to each Storage and Recovery Program will be estimated by Watermaster during the development of each Storage and Recovery Program Agreement and it may be adjusted from time-to-time based on revised estimates of the loss rate.



S & R Programs – Evaluation of Storage and Recovery Program Impacts, MPI, and Mitigation (§ 2.4.2)

Watermaster will review each Storage and Recovery Program application, estimate the surface and groundwater system response, prepare a report that describes the response and potential MPI, and develop mitigation requirements to mitigate MPI caused by the proposed Storage and Recovery Program. The Storage and Recovery Program applicant will develop mitigation measures pursuant to these requirements and incorporate them into their Storage and Recovery Program application. Upon approval by Watermaster, these mitigation measures will be incorporated into the Storage and Recovery Program storage agreement.



S & R Programs – Evaluation of Storage and Recovery Program Impacts, MPI, and Mitigation (§ 2.4.2)

Watermaster will periodically review current and projected basin conditions, compare this information to the projected basin conditions prepared in the evaluation of the Storage and Recovery Program application process, compare the projected Storage and Recovery Program operations to actual Storage and Recovery Program operations, and make findings regarding the efficacy of related MPI mitigation requirements and measures in the Storage and Recovery Program storage agreements. And, based on its review and findings, Watermaster may require changes in the Storage and Recovery Program agreements to mitigate MPI.



S & R Programs – Hydraulic Control Impacts Due to a Storage and Recovery Program Must Be Mitigated (§ 2.4.3)

Watermaster will, as part of the Storage and Recovery Program application review process, make a projection of the program's expected impact on the state of Hydraulic Control. Watermaster will review these impacts and develop Hydraulic Control mitigation requirements for the proposed Storage and Recovery Program. The Storage and Recovery Program applicant will develop mitigation measures pursuant to these requirements and incorporate them into their Storage and Recovery Program application. Upon approval by Watermaster, these mitigation measures will be incorporated into the Storage and Recovery Program storage agreement.



S & R Programs – Hydraulic Control Impacts Due to a Storage and Recovery Program Must Be Mitigated (§ 2.4.3)

Watermaster will periodically review the current and projected state of Hydraulic Control, compare this information to the projected Hydraulic Control assessment prepared in the evaluation of the Storage and Recovery Program application process, compare the projected Storage and Recovery Program operations to actual Storage and Recovery Program operations, and make findings regarding the efficacy of the related mitigation measures and requirements in the Storage and Recovery Program storage agreement. And, based on its review and findings, Watermaster may require changes in the Storage and Recovery Program agreements to mitigate impacts on the state of Hydraulic Control.



Storage Agreement Application Process (§ 2.5)

As part of the development of an updated Storage Management Plan, environmental review will be conducted as to the impacts of a planned quantity of storage space reserved for the Parties' conjunctive-use operations and Metropolitan's DYYP. As a means of streamlining the process through which Parties apply for, receive approval of, and enter into storage agreements with Watermaster, the existing Form 8 Local Storage Agreements will be modified to be consistent with an "evergreen agreement" paradigm.



Storage Agreement Application Process (§ 2.5)

Within an “evergreen agreement” paradigm, the forms of the agreements, as revised, will allow for the quantities stored pursuant to the agreements to increase, during the term of the agreements, to cover the amount of water that each party to an agreement places into storage, as shown in each Watermaster-approved annual Assessment Package.



Storage Agreement Application Process (§ 2.5)

The evergreen agreements will be valid for the duration of the Peace Agreement and will be automatically adjusted upon Watermaster's approval of each subsequent Assessment Package so long as the cumulative amount of water in storage is less than the quantity reserved for the Parties' conjunctive-use operations and Metropolitan's DYYP (cumulatively, the First Managed Storage Band or FMSB) and Watermaster has made no finding that MPI is threatened to occur as a result of the increase in the quantity of water in storage.



Storage Management Plan Update (§ 2.6)

Watermaster will periodically review and update the SMP based on monitoring information obtained since the previous SMP was adopted, technology changes, and the “needs and requirements of the lands overlying the Chino Basin and the owners of the rights in the Safe Yield or Operating Safe Yield of the Basin.” The periodic review and update of the SMP will require the use of updated planning and hydrologic data and models, and it should be completed: at no less than a five-year frequency, when the Safe Yield is recalculated, or when Watermaster determines a review and update is warranted based new information and/or the needs of the Parties or the Basin.



Storage Management Plan Update (§ 2.6)

Notwithstanding the SMP update frequency stated above, Watermaster should update the SMP at least five years before the aggregate amount of managed storage by the Parties is projected to fall below 340,000 af.



Takeaways

- Parties expressed the need of storage for local use and for S & R Programs
- Based on the parties' planning projections and use of storage, the maximum accumulation of water in storage is estimated at 720 kaf for local use (ECO, Supplemental, Recycled, etc.)
- The 2018 SFI analyzed effects of storing water at different levels on top of the 700 kaf projection for S & R Programs
- The 2018 SFI concluded that for S & R Programs beyond 800 kaf, new facilities will be required



Takeaways

- The 2020 SMP establishes the manner in which Basin storage may be utilized
 - It articulates the Judgment and the Peace Agreement requirements for use of storage – Watermaster will review all S & R program applications based on the SMP
 - It is not a plan to optimize the use of storage, it is a set of boundaries on storage management activities for subsequent optimization
- OBMP Update Activity B will utilize the 2020 SMP as a platform for the development of optimal S & R programs and to support Watermaster review and approval of applications



Next Steps

- Review the draft 2020 SMP v2 and
 - Come prepared to discuss your questions and comments at the November 13 workshop
 - Provide written comments to Watermaster by November 20th
- Watermaster will prepare draft 2020 SMP v3 by December 11th based on comments received at the November 13th workshop and comments received by November 20th



Schedule

- November 13th – SMP workshop 4
- November 20th – Comments due to Watermaster on draft 2020 SMP v2
- December 11th – OBMP Update Listening Session 8 integrates 2020 SMP into the OBMP Update
- December 11th – Watermaster staff distributes draft SMP v3
- December 19th – SMP workshop 5 (if needed)
- January 10th – Watermaster staff submits final 2020 SMP to stakeholders

Questions

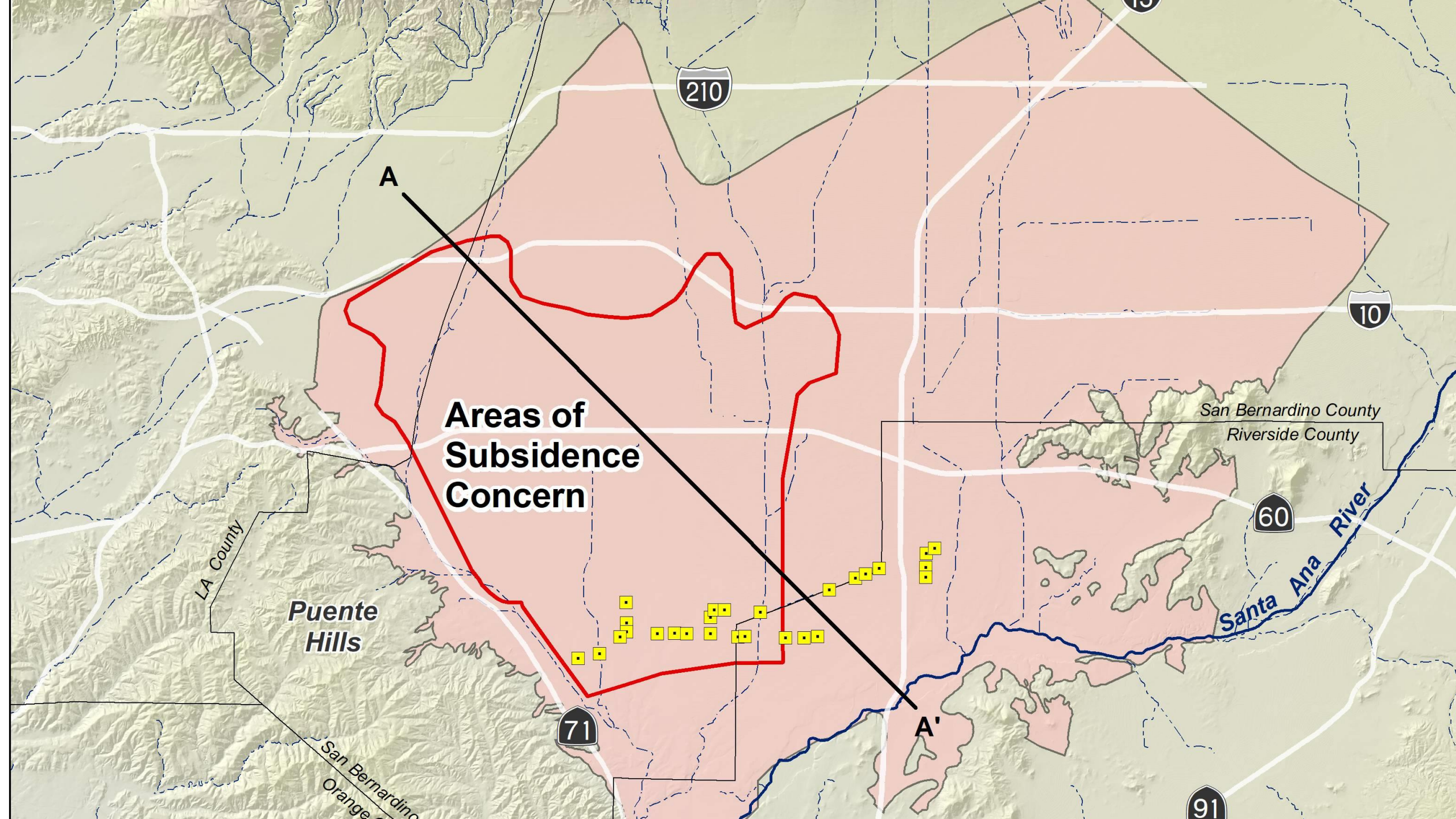
Presentation can be viewed and
downloaded from:

<http://cbwm.org/FTP/Storage/>





End



Areas of Subsidence Concern

Puente Hills

San Bernardino County
Riverside County

Santa Ana River

LA County

San Bernardino
Orange

210

10

60

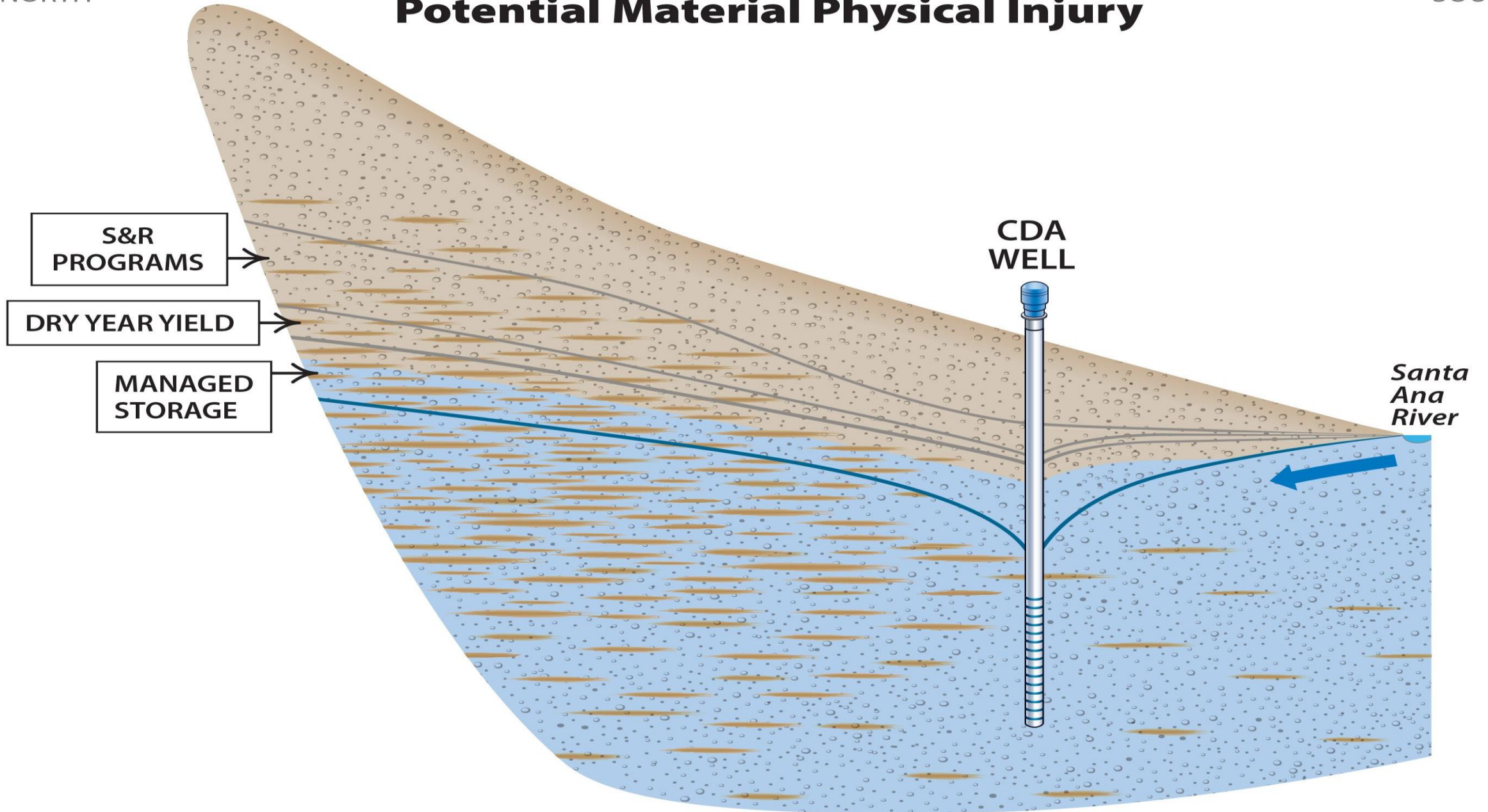
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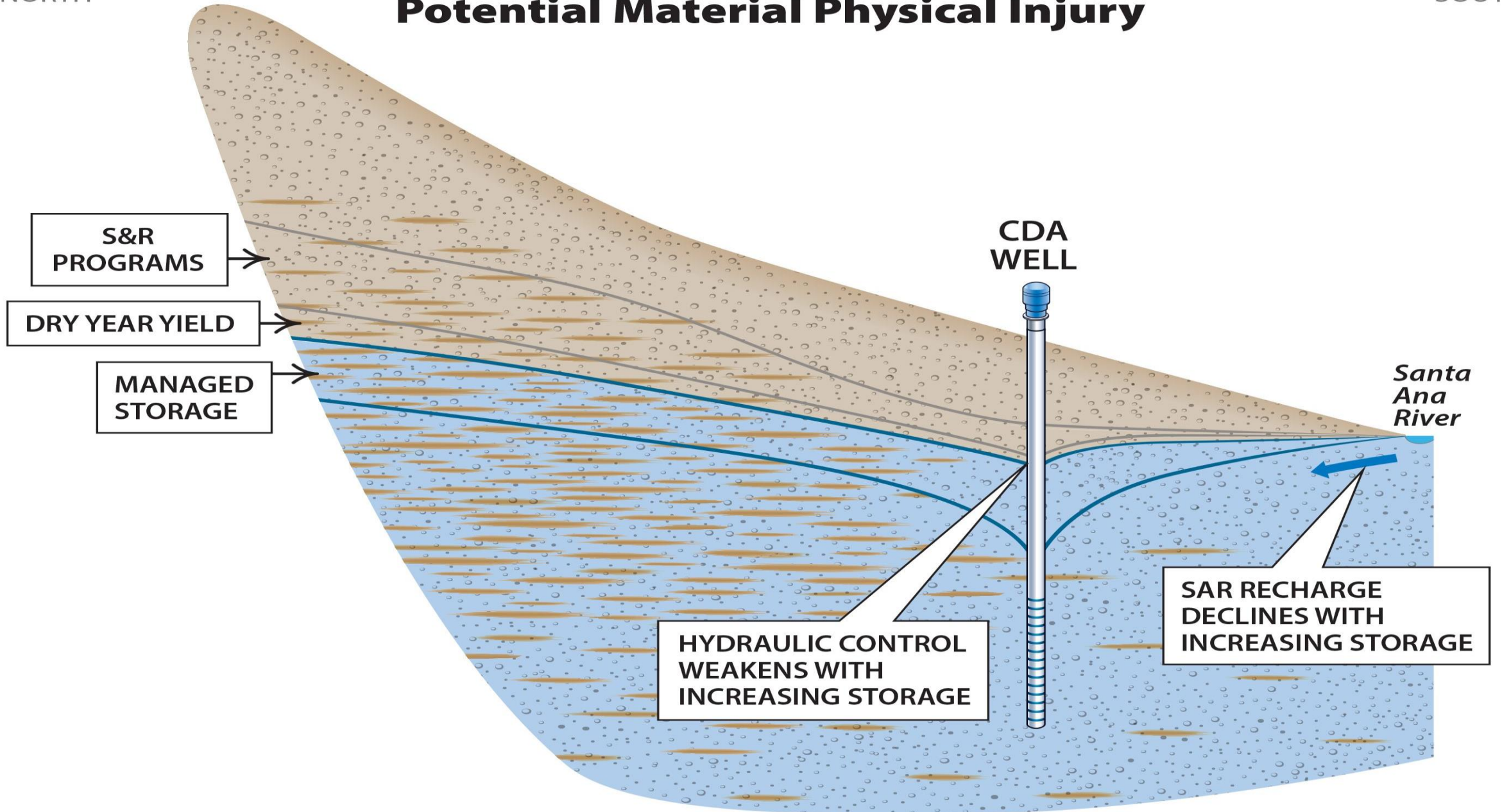
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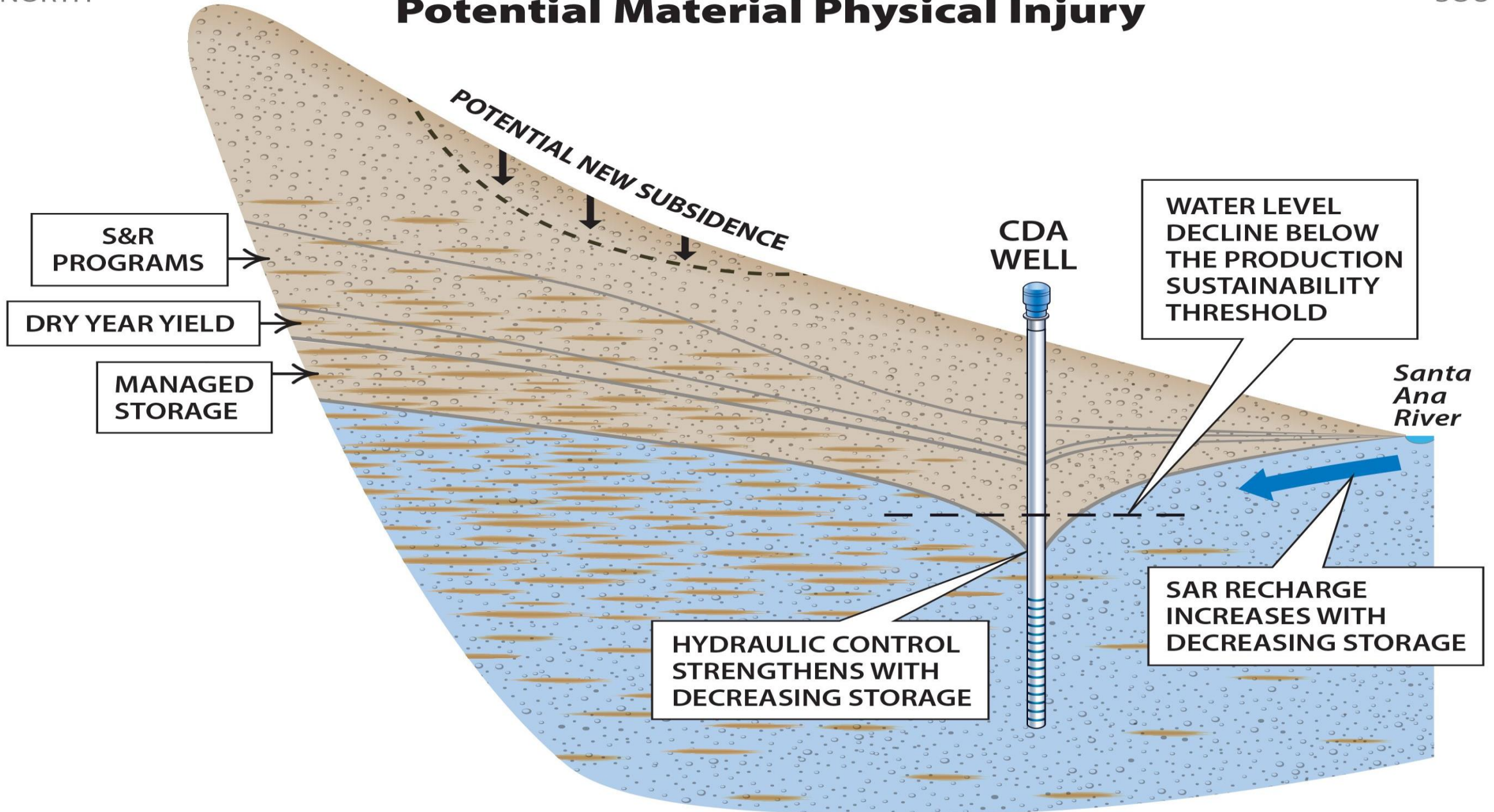
Storage Framework and Potential Material Physical Injury



Storage Framework and Potential Material Physical Injury



Storage Framework and Potential Material Physical Injury



Storage Framework and Potential Material Physical Injury

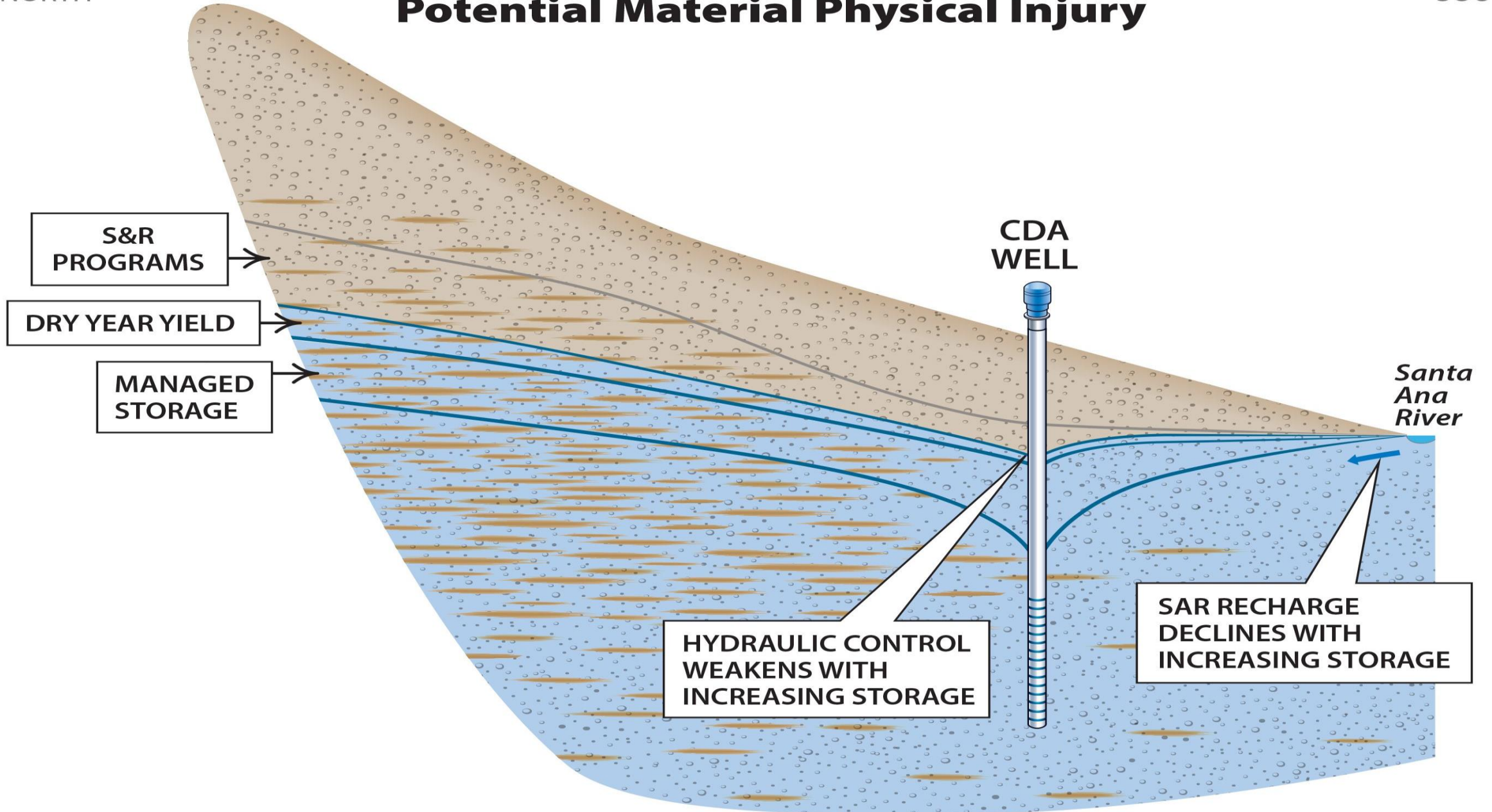
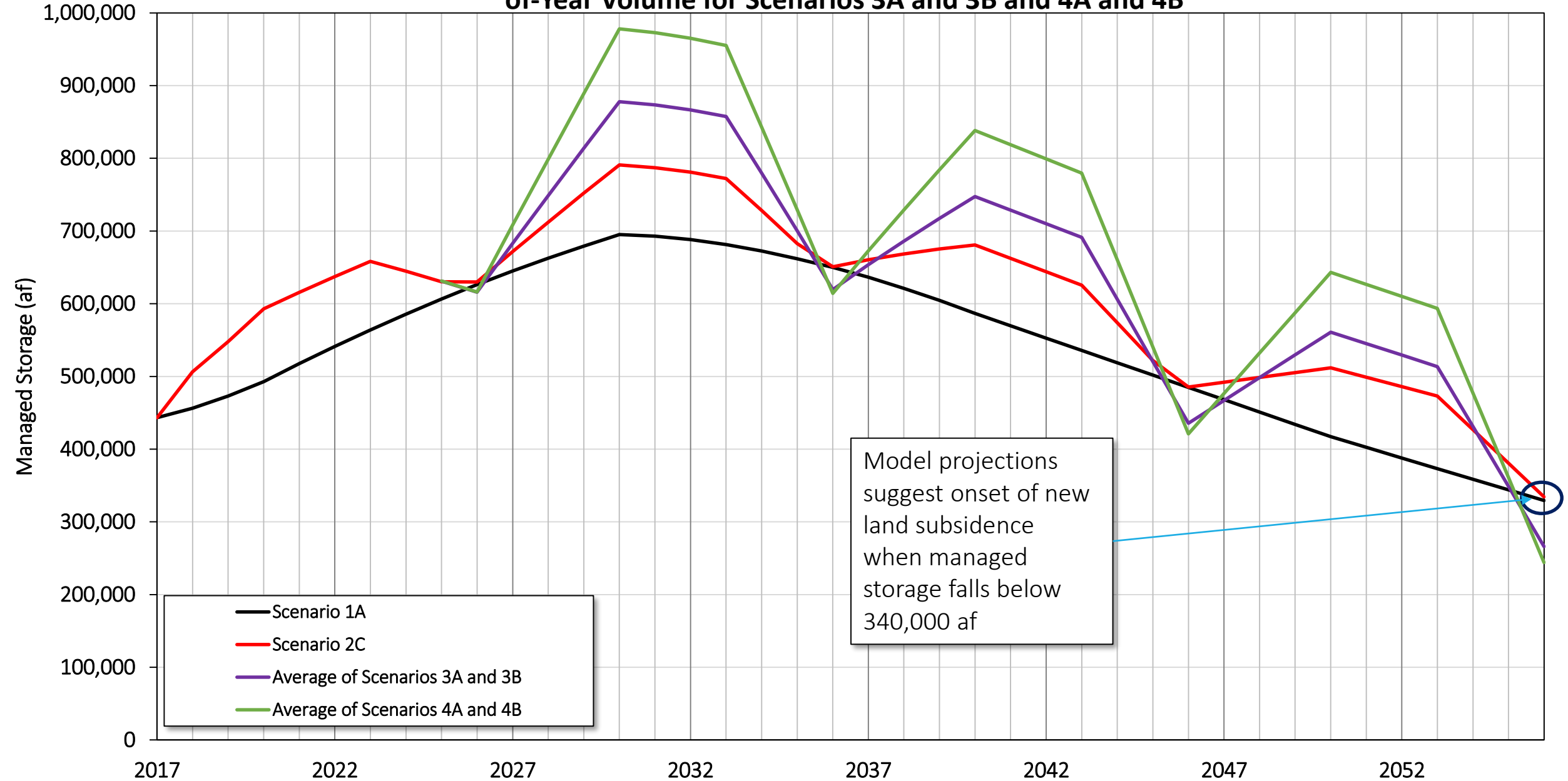


Figure 6-3 from the Storage Framework Investigation
Model-Projected End-of-Year Volume in Managed Storage for Scenarios 1A and 2C and Average End-of-Year Volume for Scenarios 3A and 3B and 4A and 4B





Other assumptions included in baseline scenarios

Replenishment obligations are met:

- 100 percent from transfers/storage when total pumping is less than total pumping rights
- Up to 80 percent from transfers/storage when total pumping exceeds total pumping rights



Overproduction and Replenishment in the Chino Basin, 2011-2017

