

GOLDSIM UPDATE

ITEM NO.
7

Najwa Pitois
Board Meeting
November 7, 2023



OUTLINE

Background

Uses of Reliability Model

Methodology

Scenarios

- **Benefits of Article 56 Carryover Storage**
- **Benefits of new banking program**

Summary & Next Steps

BACKGROUND



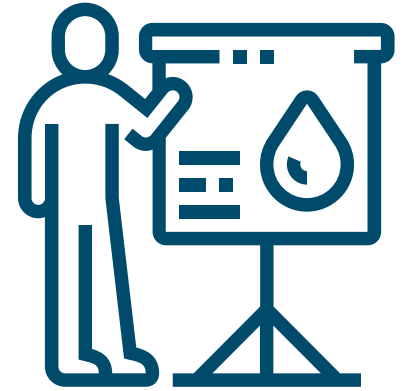
BACKGROUND

Board authorized update to the prior Reliability (MBK) Model in Spring of 2021.

- **Improve functionality.**
- **Build expertise in-house.**
- **New platform that is easier to update and maintain.**

In February 2023, presented on model construction and the value of monthly time steps.

Status: we have a functional version of the model that meets our needs to begin running scenarios.



USES OF THE RELIABILITY MODEL

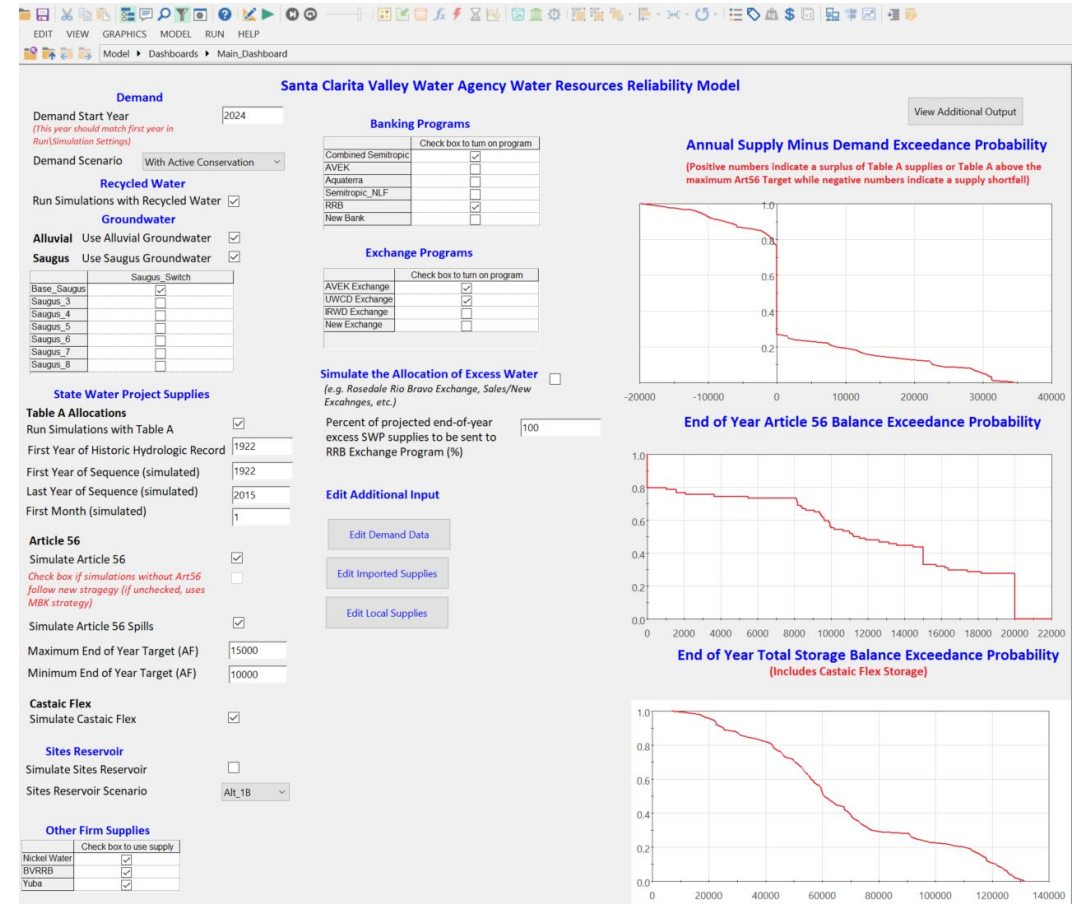
USES OF RELIABILITY MODEL

Assess the adequacy of the existing water resource portfolio.

Quantitatively assess and compare the value of new investments.

Consider the investments in conjunction with new operating strategies.

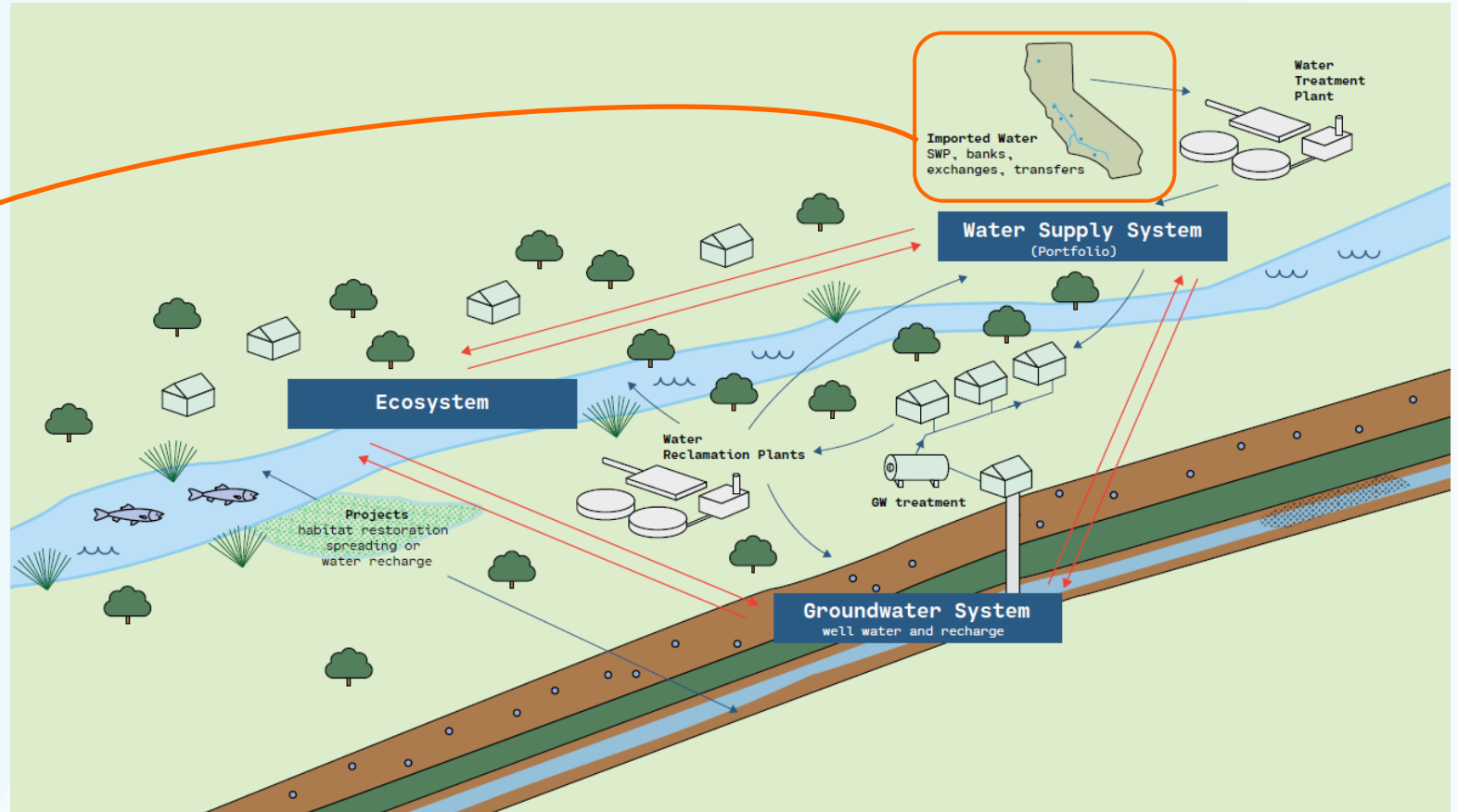
Assess the risks of interruptions to one or more supplies.



SCV Water Imported Water Supplies (Existing and Potential)



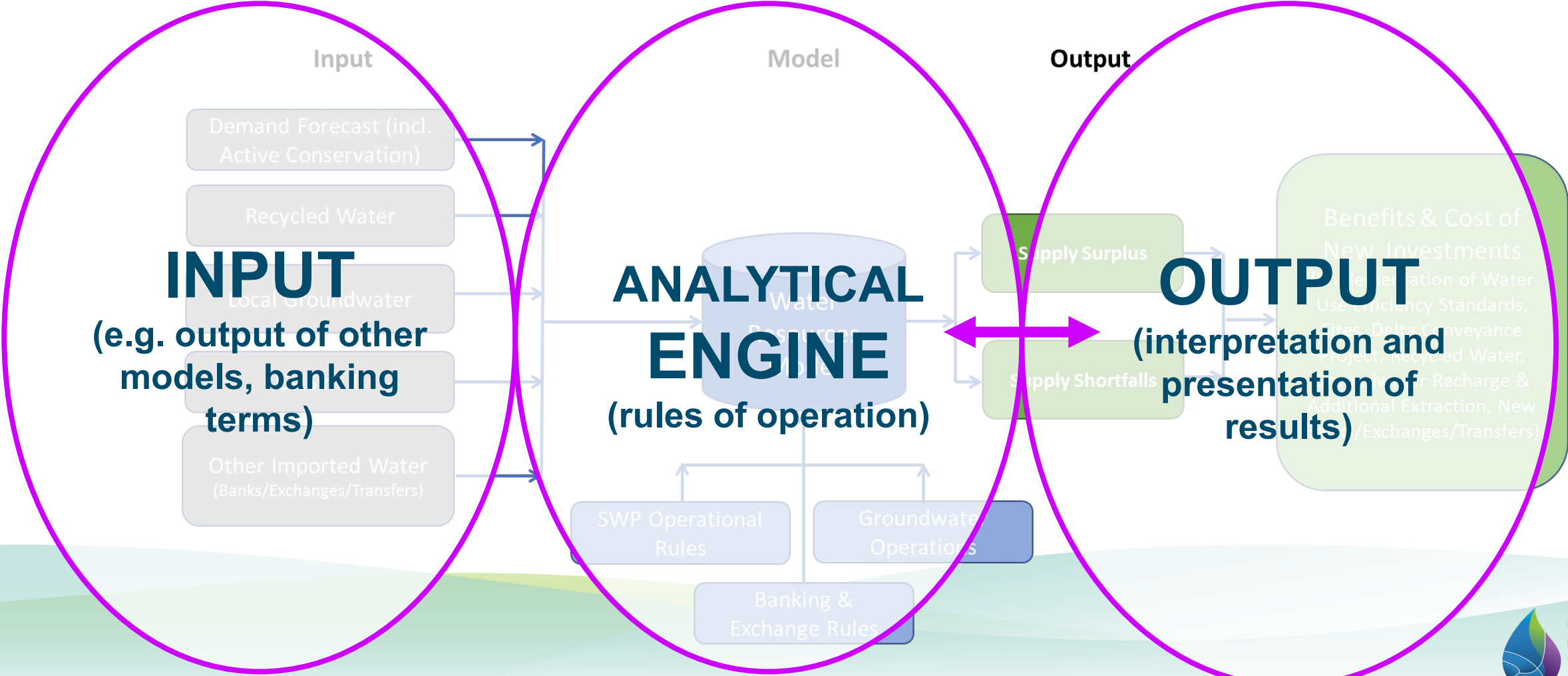
SCV WATER SYSTEM PORTFOLIO



METHODOLOGY

METHODOLOGY

CONCEPTUAL FRAMEWORK OF RELIABILITY MODELING



METHODOLOGY

Multi-year sequences of wet and dry years.

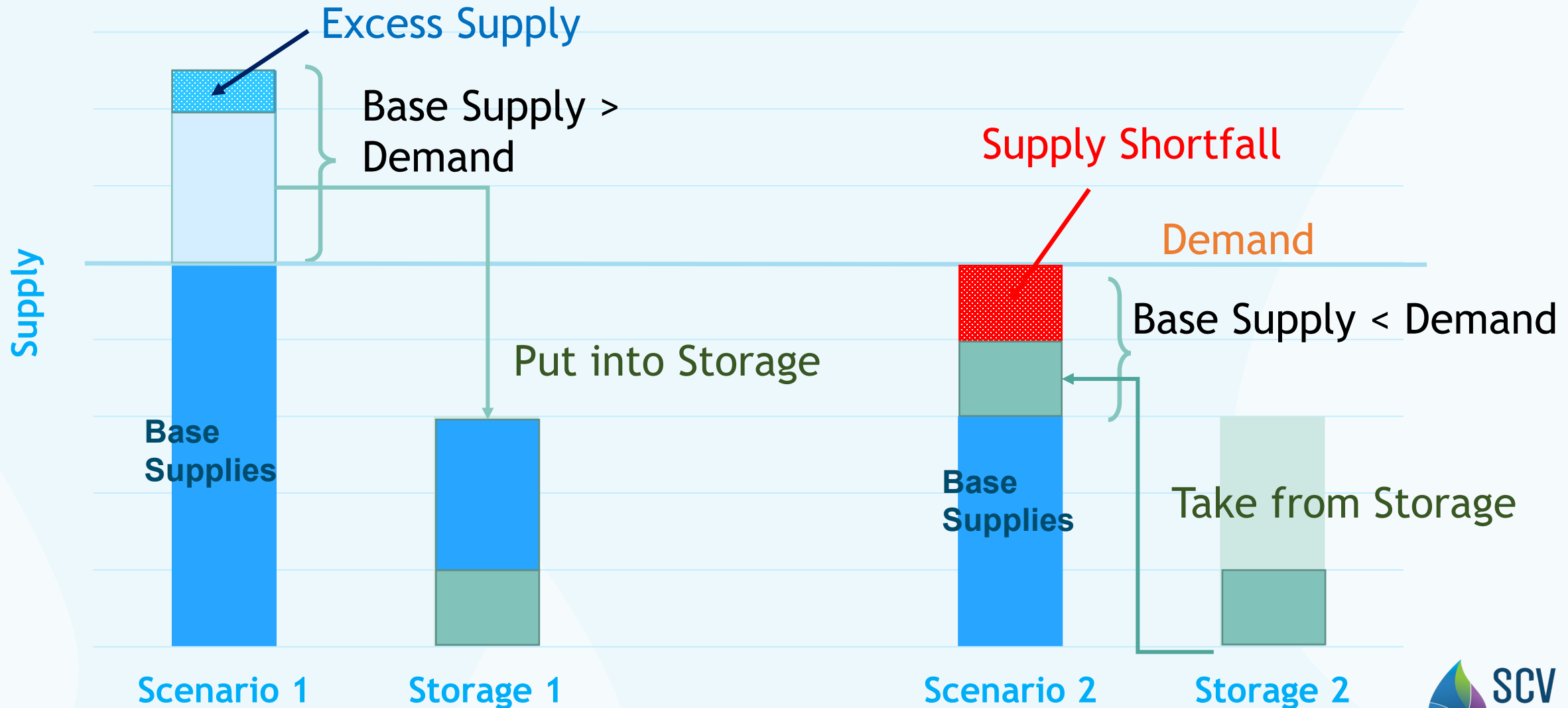
State-of-the-practice assumptions for climate change, regulations, and future development of the SWP.

Variability of local groundwater during wet and dry periods.

30-year planning horizons.

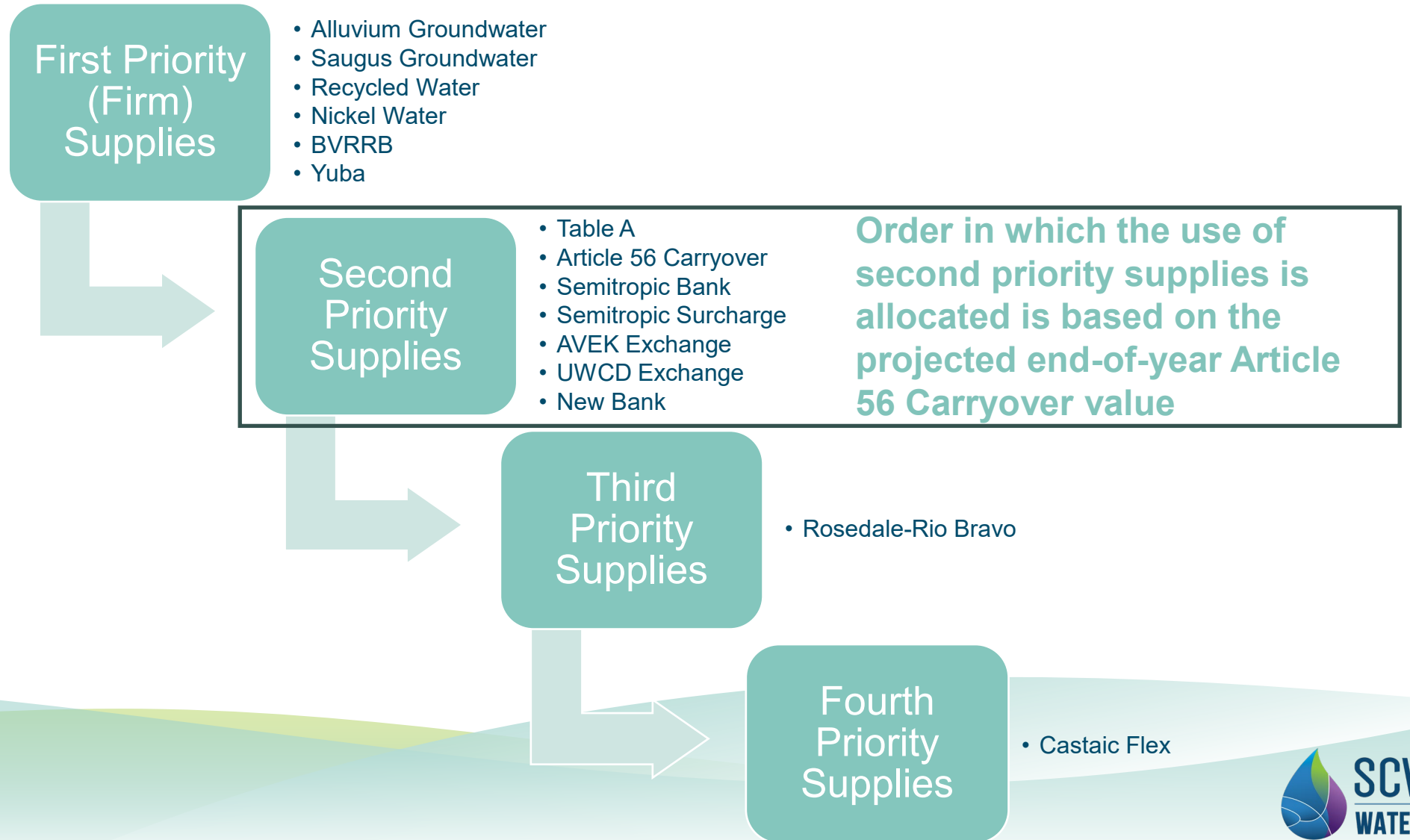
Methodology

Water Operations in a Single Time Step



METHODOLOGY

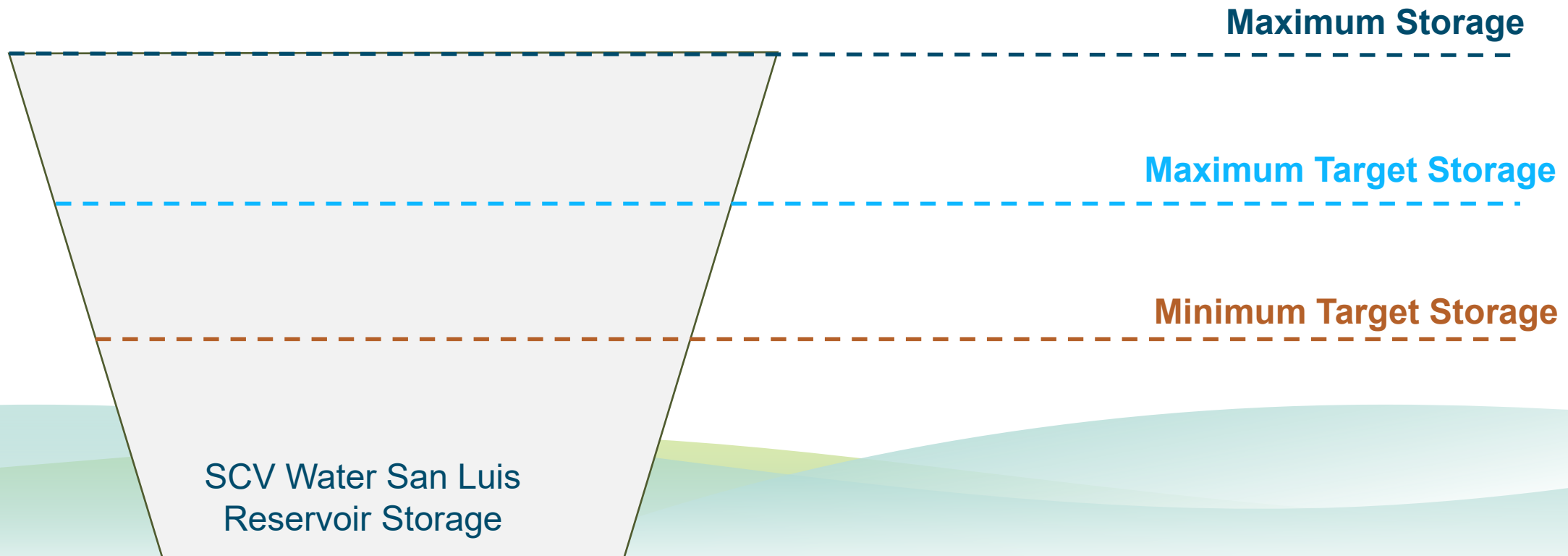
Allocation of Supplies to Meet Demand



METHODOLOGY

Allocation of **Second Priority** Supplies for Demand

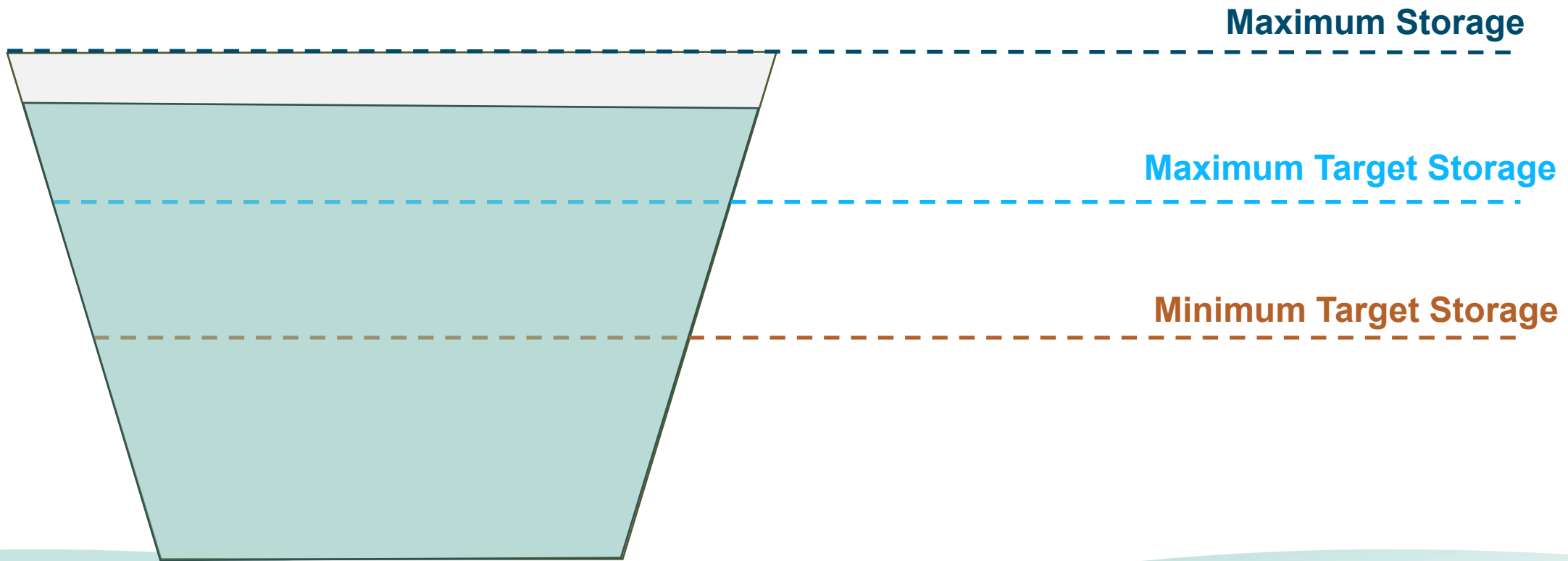
- Management of Article 56 Carryover in San Luis Reservoir provides the agency with additional storage but comes with the risk of spill.



METHODOLOGY

Allocation of **Second Priority** Supplies for Demand

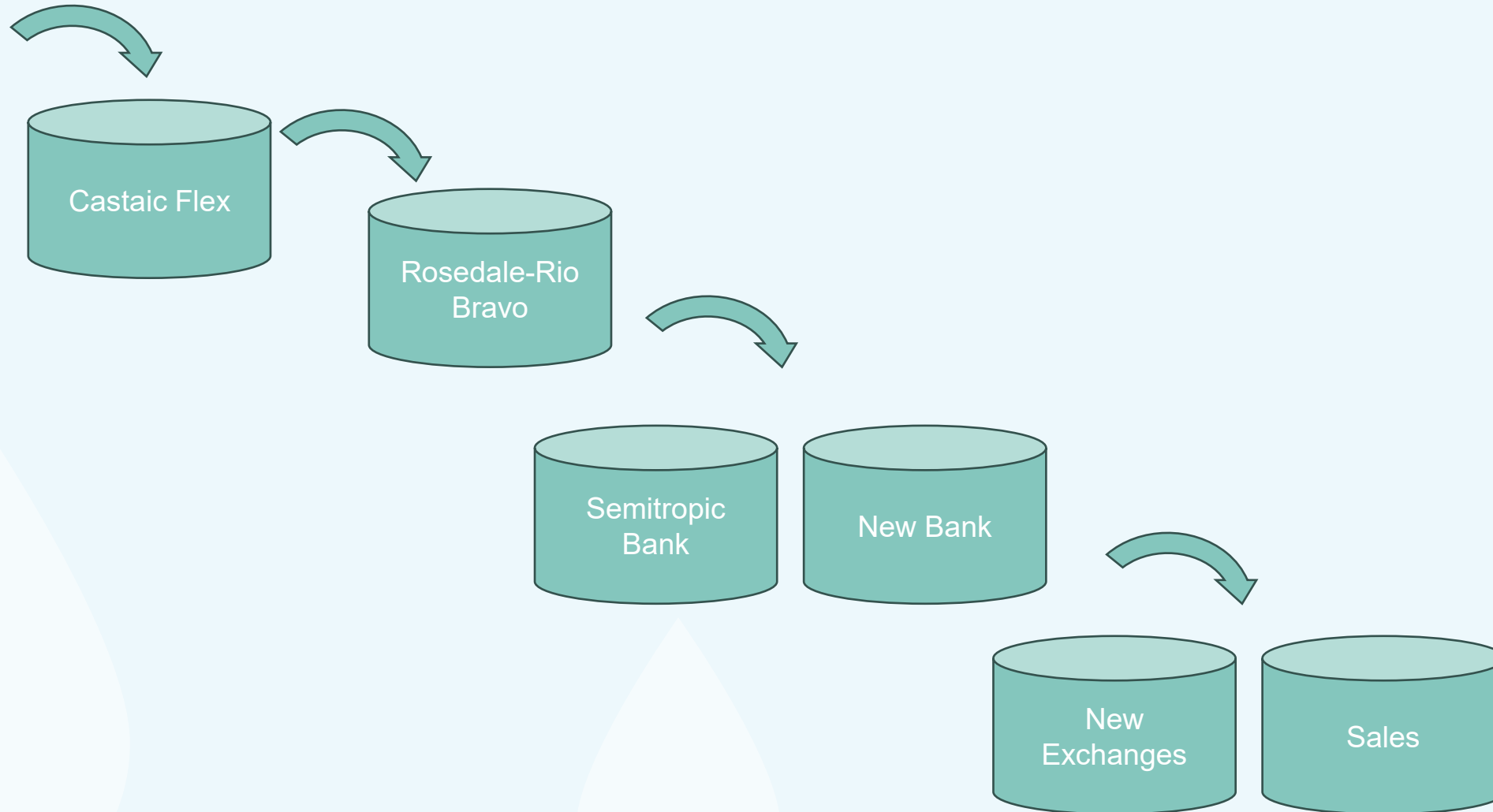
Case 1: EOY Article 56 Carryover Balance > Maximum Target Storage



- Prioritize using SWP supplies to meet demand.
- Send surplus water to flex, then to banking and exchange programs.

METHODOLOGY

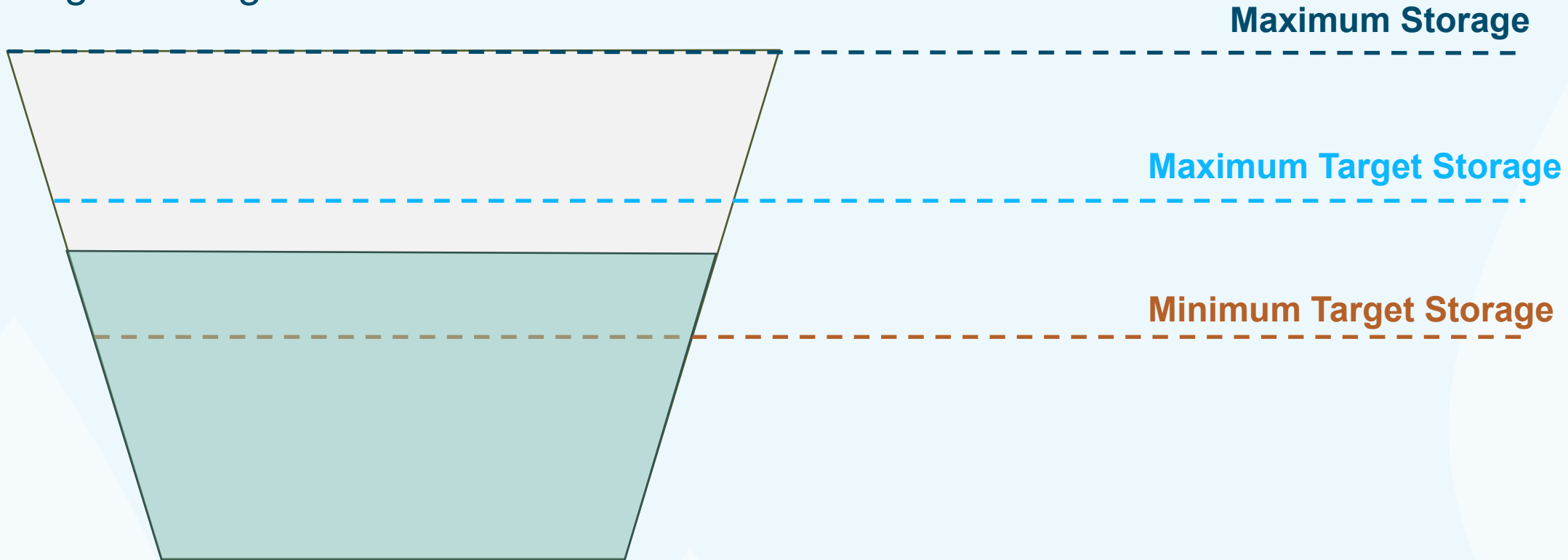
Allocation of Surplus Supplies to Storage in **Case 1.**



METHODOLOGY

Allocation of **Second Priority** Supplies for Demand

Case 2: Minimum Target Storage < EOY Article 56 Carryover Balance < Maximum Target Storage

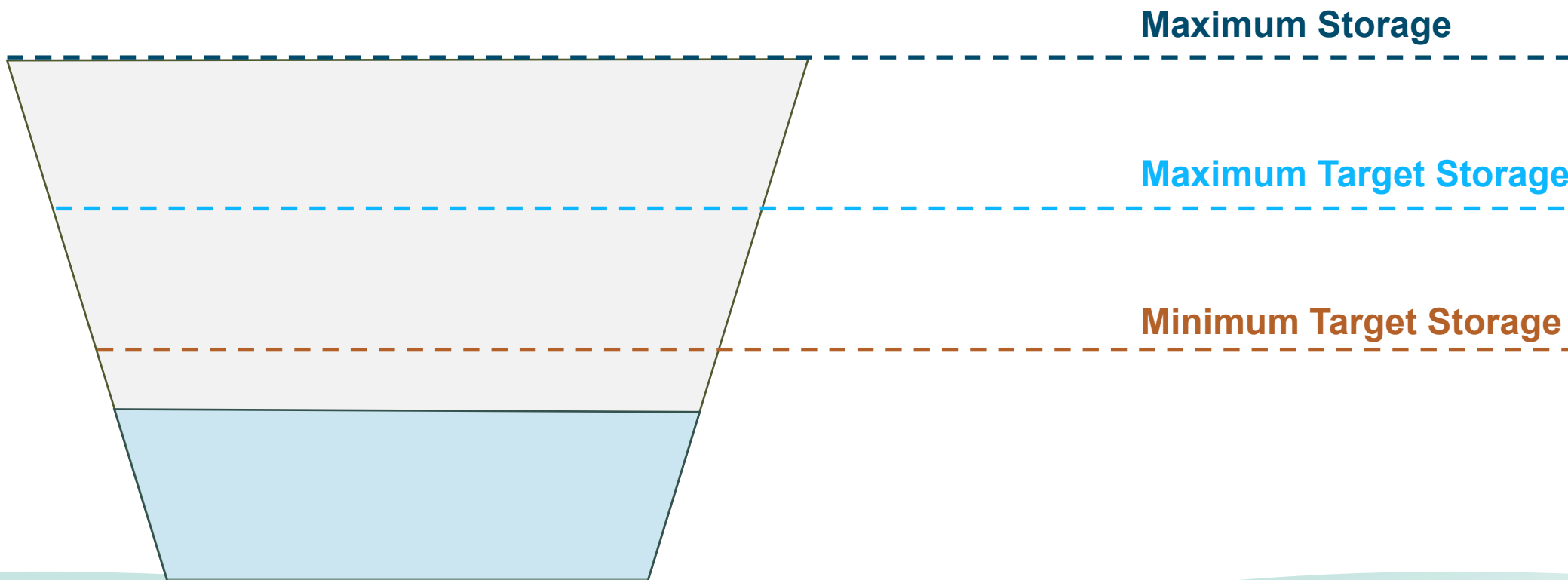


- Prioritize using SWP supplies to meet demand.
- Return to flex.
- No puts into or takes from banking and exchange programs.

METHODOLOGY

Allocation of **Second Priority** Supplies for Demand

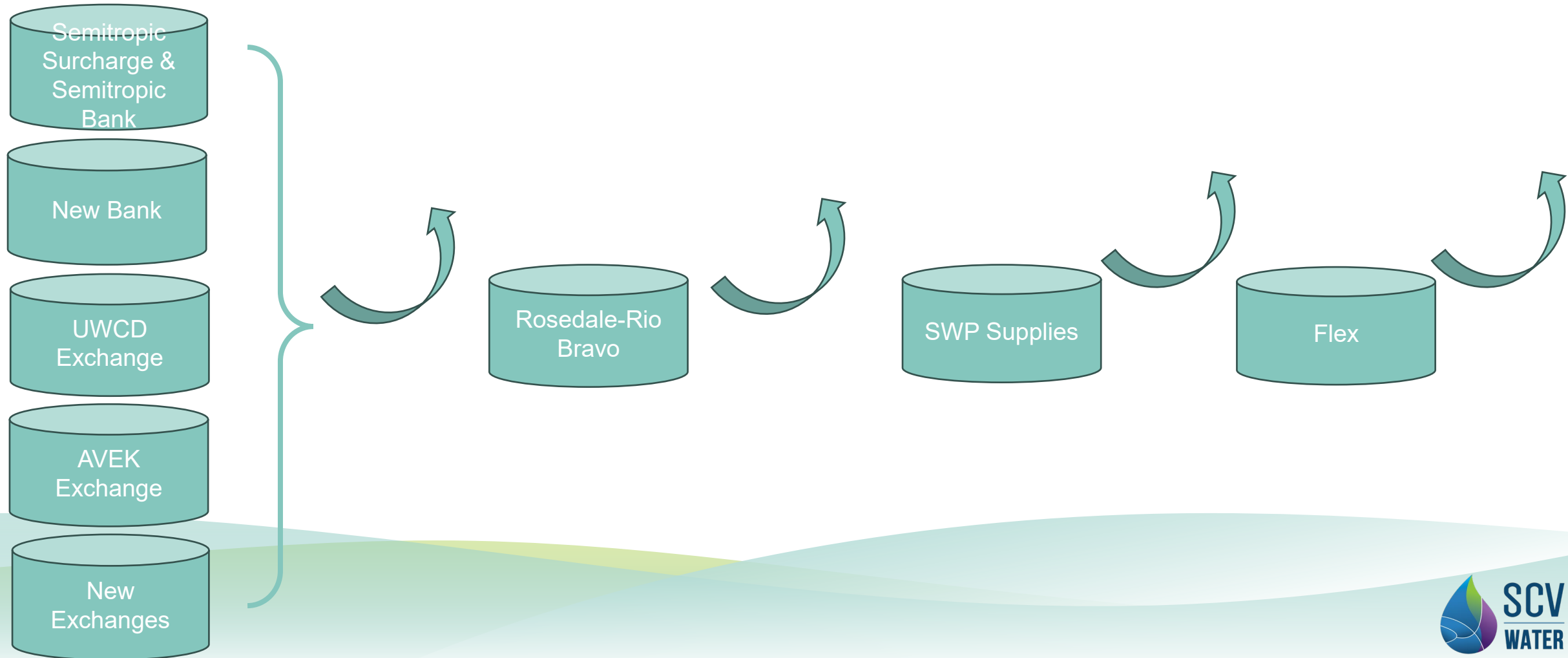
Case 3: EOY Article 56 Carryover Balance < Minimum Target Storage



- Prioritize using banked and exchange water to meet demand, then return to flex.
- After meeting demand, back up stored water into San Luis Reservoir.

METHODOLOGY

Allocation of Supplies for Demand in **Case 3.**



SCENARIOS

SCENARIOS

| | | Prelim (without Article 56) | Base Scenario (with Article 56) | Scenario 1 (with Art56 & AVEK) |
|----------------------------------|-------------|-----------------------------|---------------------------------|--------------------------------|
| Demand with Active Conservation | | X | X | X |
| Alluvium (2020 GSP) | | X | X | X |
| Saugus (2020 GSP) | | X | X | X |
| Dry Year Saugus (3-8) | | | | |
| Recycled Water | | X | X | X |
| Table A (with climate change) | | DCR 2021 | DCR 2021 | DCR 2021 |
| Article 56 Carryover | Max Target | | 15 TAF | 15 TAF |
| | Min Target | | 5 TAF | 5 TAF |
| SWP/Castaic flexible storage | | X | X | X |
| BVERRB | | X | X | X |
| Nickel Water | | X | X | X |
| Yuba | | X | X | X |
| Semitropic | | X | X | X |
| Semitropic NLF | | | | |
| Rosedale Rio Bravo (RRB) | | X | X | X |
| RRB Expanded Withdrawal Capacity | | | | |
| RRB Exchange | | | | |
| AVEK Exchange | | X | X | X |
| UWCD Exchange | | X | X | X |
| High Desert AVEK Bank | Puts | | | 20 TAFY |
| | Takes | | | 20 TAFY |
| | Max Storage | | | 80 TAF |

SCENARIOS - ASSUMPTIONS & INITIAL CONDITIONS

Existing Programs

| | 2024 Initial Balance (AF) | Max Storage (AF) |
|-------------------------|---------------------------|------------------|
| Semitropic Surcharge | 20,970 | - |
| Semitropic Bank | 13,800 | 15,000 |
| Rosedale Rio Bravo Bank | 75,966 | 80,000 |
| AVEK Exchange | 2,250 | - |
| UWCD Exchange | 500 | - |
| Article 56 | 10,000 | 20,000 |

Potential New Program

| AVEK Program | Scenario 1 |
|--------------------|------------|
| Maximum Storage | 80,000 AF |
| Annual Puts | 20,000 AF |
| Annual Takes | 20,000 AF |
| Losses | 10% |
| Program Start Year | 2030 |
| Program Last Year | 2065 |
| Initial Balance | 0 |



ARTICLE 56 CARRYOVER STORAGE SIMULATIONS

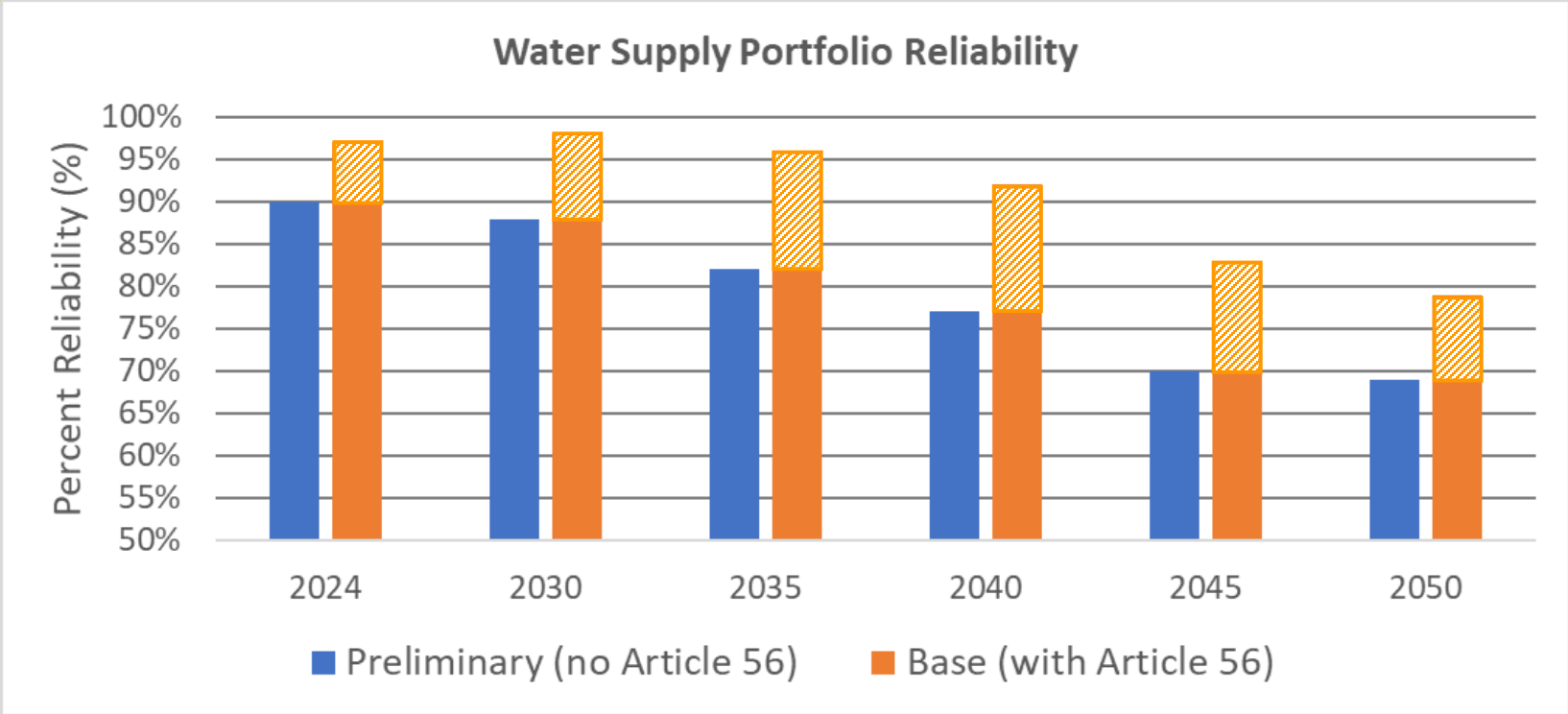


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| BVERRB | | X | X | X |
| Nickel Water | | X | X | X |
| Yuba | | X | X | X |
| Semitropic | | X | X | X |
| Semitropic NLF | | | | |
| Rosedale Rio Bravo (RRB) | | X | X | X |
| RRB Expanded Withdrawal Capacity | | | | |
| RRB Exchange | | | | |
| AVEK Exchange | | X | X | X |
| UWCD Exchange | | X | X | X |
| High Desert AVEK Bank | Puts | | | 20 TAFY |
| | Takes | | | 20 TAFY |
| | Max Storage | | | 80 TAF |

BENEFITS OF ACCESS TO ARTICLE 56 CARRYOVER STORAGE

The management of Article 56 Carryover in San Luis serves as a buffer and increases the reliability of SCV Water's base supplies.



AVEK SIMULATIONS

AVEK



SCENARIOS

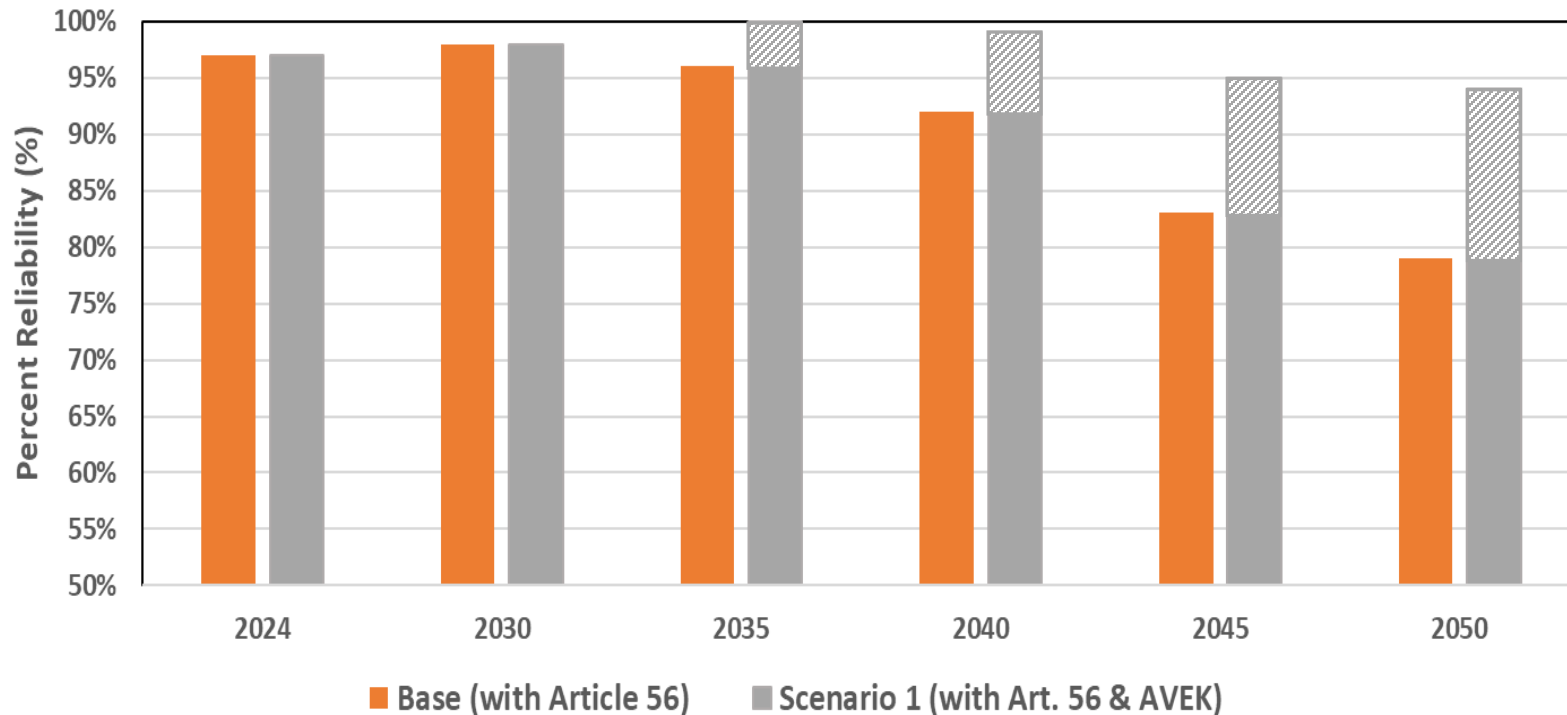
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| BVRRB | | X | X | X |
| Nickel Water | | X | X | X |
| Yuba | | X | X | X |
| Semitropic | | X | X | X |
| Semitropic NLF | | | | |
| Rosedale Rio Bravo (RRB) | | X | X | X |
| RRB Expanded Withdrawal Capacity | | | | |
| RRB Exchange | | | | |
| AVEK Exchange | | X | X | X |
| UWCD Exchange | | X | X | X |
| High Desert AVEK Bank | Puts | | | 20 TAFY |
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| | Max Storage | | | 80 TAF |

AVEK SIMULATIONS

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| Program Last Year | 2065 |
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COMPARISON BETWEEN BASE SCENARIO AND AVEK SCENARIO 1

Water Supply Portfolio Reliability



Additional storage increases reliability, especially during extended periods of drought

SUMMARY & NEXT STEPS



SUMMARY & NEXT STEPS



SCV Water now has a running water supply reliability model with several improvements:

Monthly timestep

Complex rules on the management of Article 56 Carryover.

Rules on banking program fills and takes.

Access to and management of Article 56 Carryover storage serves as a buffer between dry and wet years and improves reliability by at least 10%.

Preliminary AVEK evaluations demonstrate the value of additional storage for improving reliability.

AVEK improves reliability by more than 15% by 2050.

AVEK reduces the magnitude of supply shortfalls by more than 25% by 2050.

One of the main constraining factors for filling AVEK (and other potential storage programs) is the availability of surplus water upon realization of increased demands in service area.

SUMMARY & NEXT STEPS

We can begin to assess the need and value of other projects inside and outside the service area.

Investment in DCP.

Investment in Sites Reservoir.

Investments in Saugus dry year wells.

Development of local groundwater recharge and recovery.

New conservation measures.

Investments in new banking programs.

Together with other tools, we can evaluate consequences of alternate local groundwater management and recycled water management scenarios in a much more comprehensive way.

Storage.

Refined operating strategies.

Interaction with environmental flows.

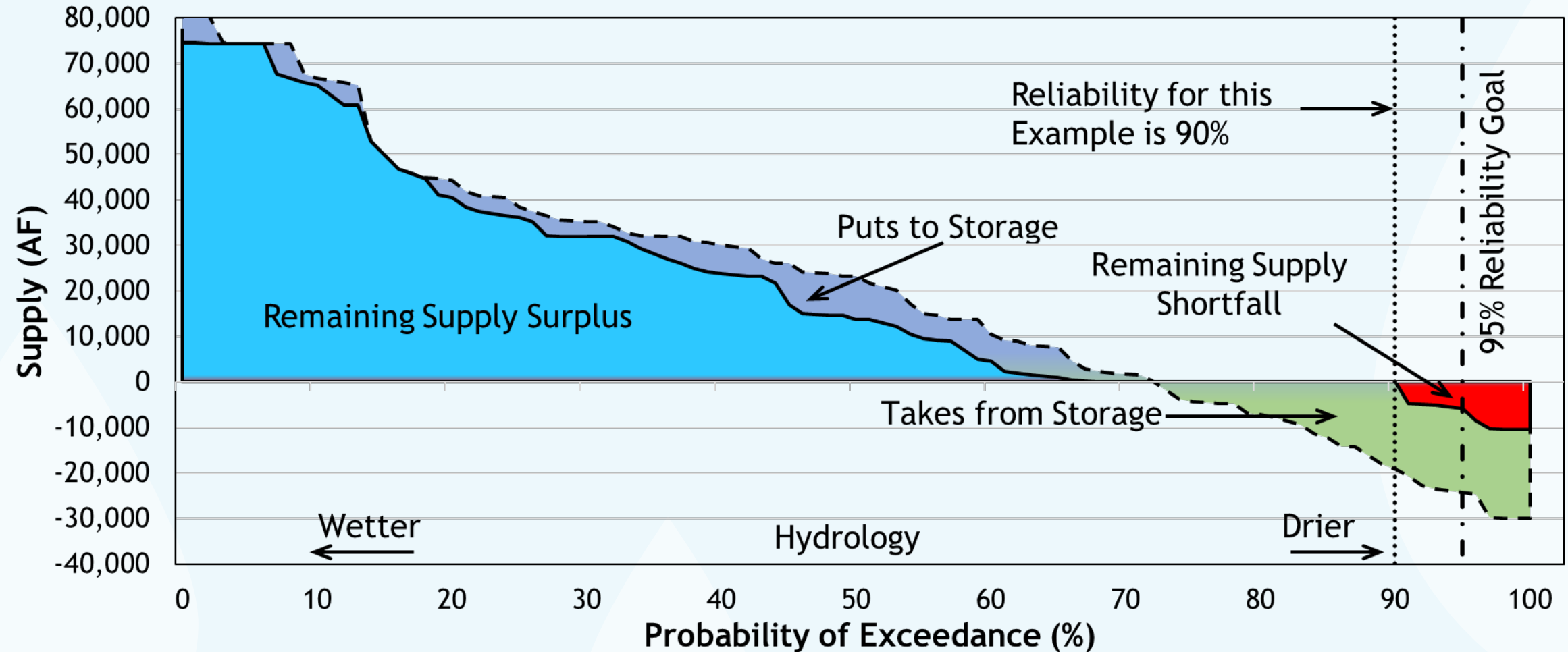


EXTRA SLIDES



Methodology

Sample Statistical Summary over Multiple Plausible Hydrologic Traces



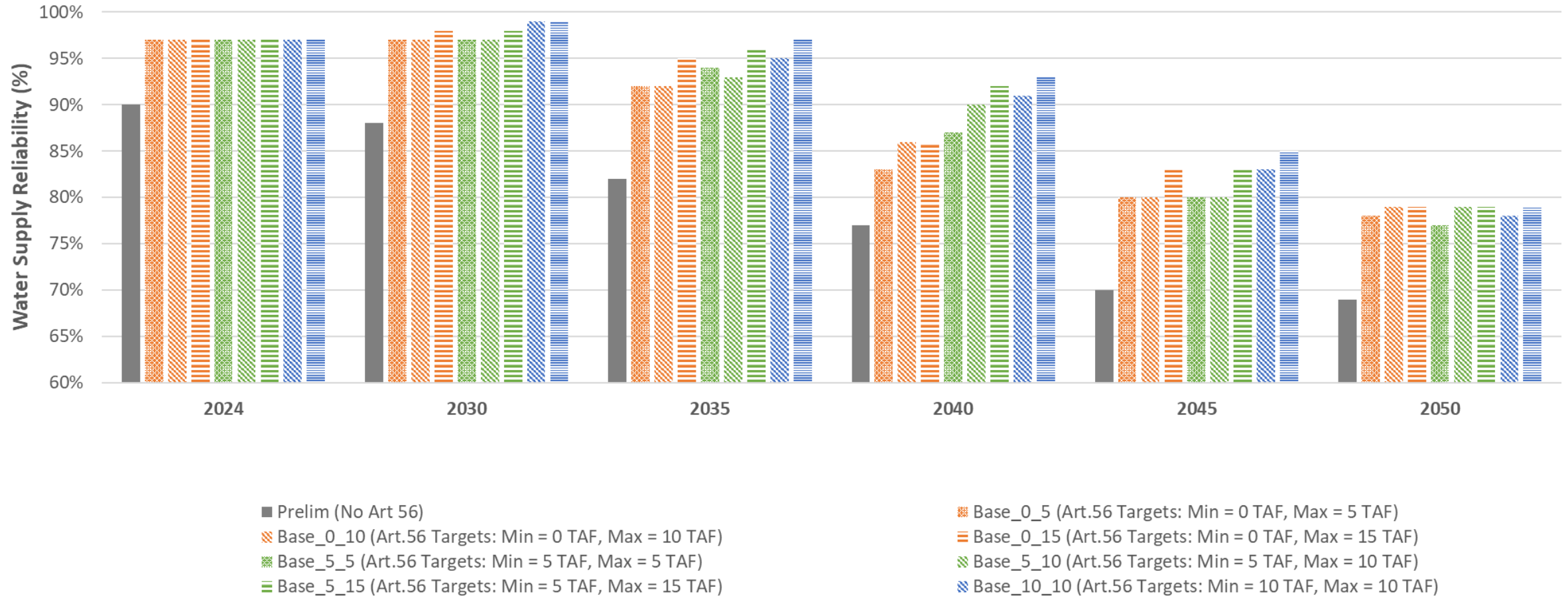
Scenarios

| | | Prelim (without Article 56) | Base Scenario (with Article 56) | Scenario 1 (with Art56 & AVEK) | Scenario 2 (with Art56 & AVEK) |
|-------------------------------|-------------|-----------------------------|---------------------------------|--------------------------------|--------------------------------|
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| Saugus (2020 GSP) | | X | X | X | X |
| Dry Year Saugus (3-8) | | | | | |
| Recycled Water | | X | X | X | X |
| Table A (with climate change) | | DCR 2021 | DCR 2021 | DCR 2021 | DCR 2021 |
| Article 56 | Max Target | | 15 TAF | 15 TAF | 15 TAF |
| | Min Target | | 5 TAF | 5 TAF | 5 TAF |
| SWP/Castaic flexible storage | | X | X | X | X |
| BVRRB | | X | X | X | Extra |
| Nickel Water | | X | X | X | |
| Yuba | | X | X | X | |
| Semitropic | | X | X | X | |
| Semitropic NLF | | | | | |
| Rosedale Rio Bravo | | X | X | X | X |
| Rosedale Rio Bravo Exchange | | | | | |
| AVEK Exchange | | X | X | X | X |
| UWCD Exchange | | X | X | X | X |
| High Desert AVEK Bank | Puts | | | 20 TAFY | 30 TAFY |
| | Takes | | | 20 TAFY | 30 TAFY |
| | Max Storage | | | 80 TAF | 100 TAF |

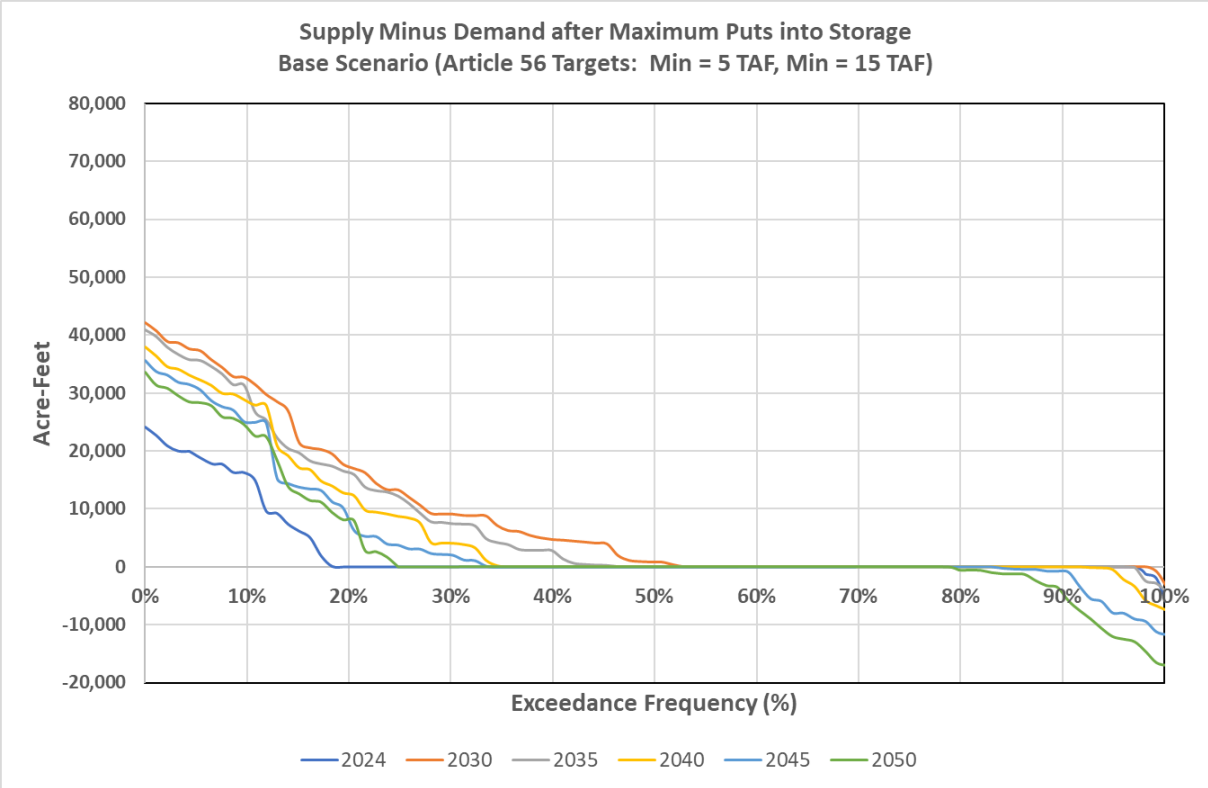
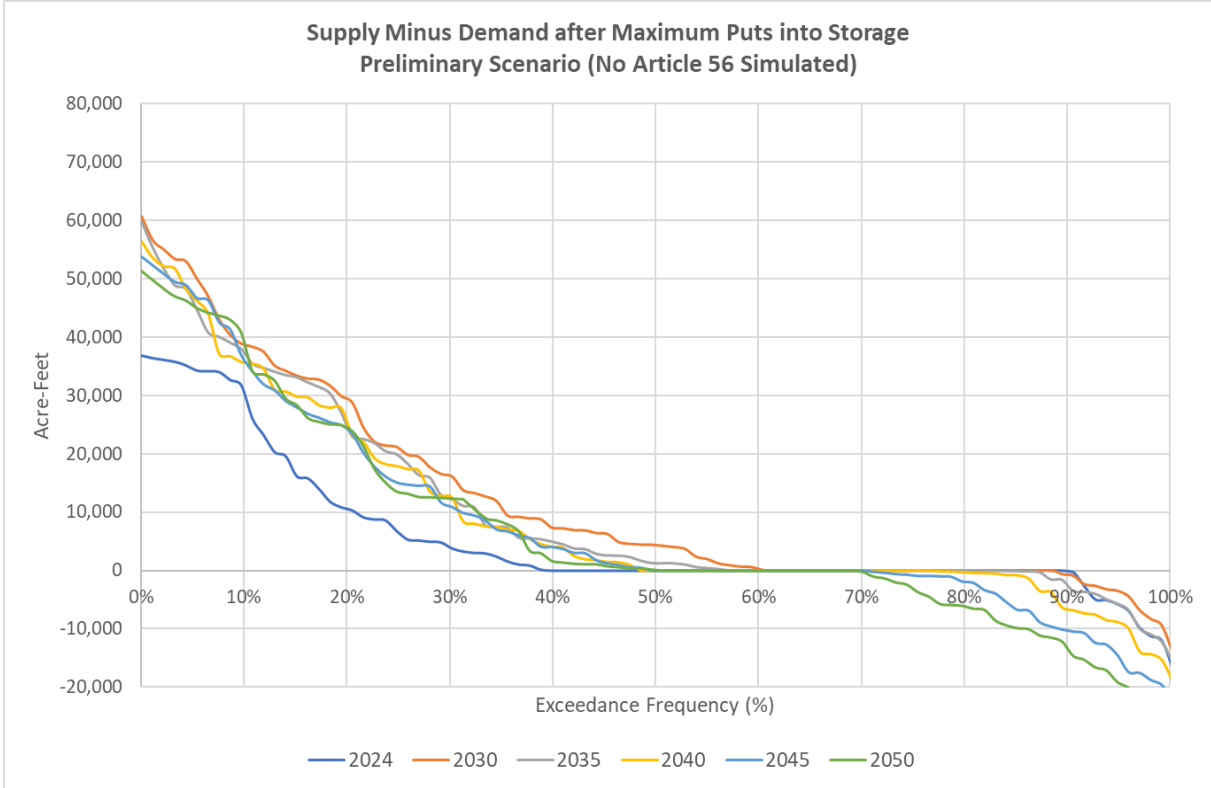


SENSITIVITY ANALYSIS TO THE ARTICLE 56 TARGETS

Sensitivity Analysis of Base Scenario to Article 56 Targets



BENEFITS OF ACCESS TO ARTICLE 56 CARRYOVER STORAGE

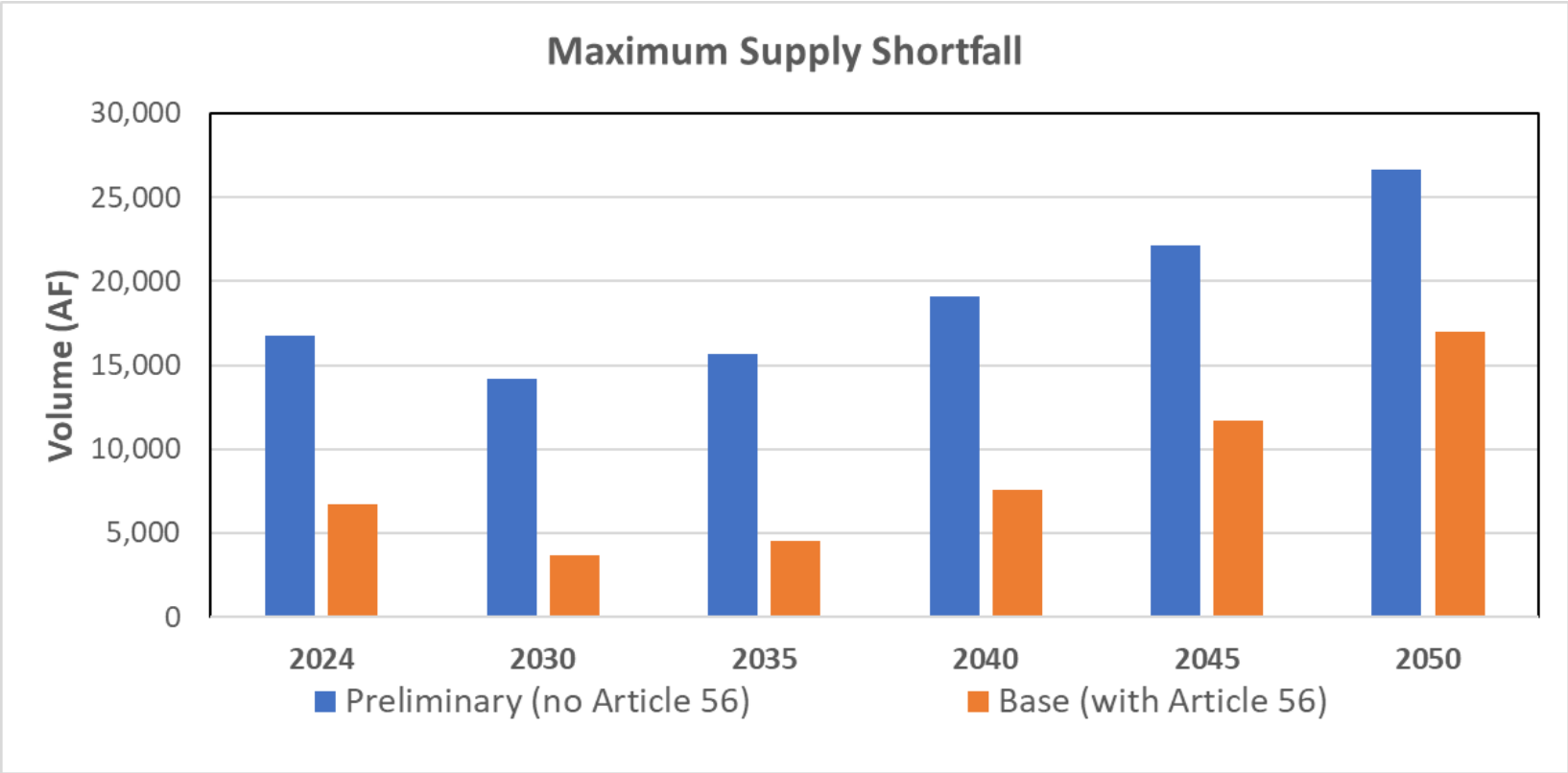


- The management of Article 56 in San Luis increases reliability of SCV Water’s base supplies.



BENEFITS OF ACCESS TO ARTICLE 56 CARRYOVER STORAGE

The management of Article 56 Carryover in San Luis decreases the magnitude of maximum supply shortfalls.

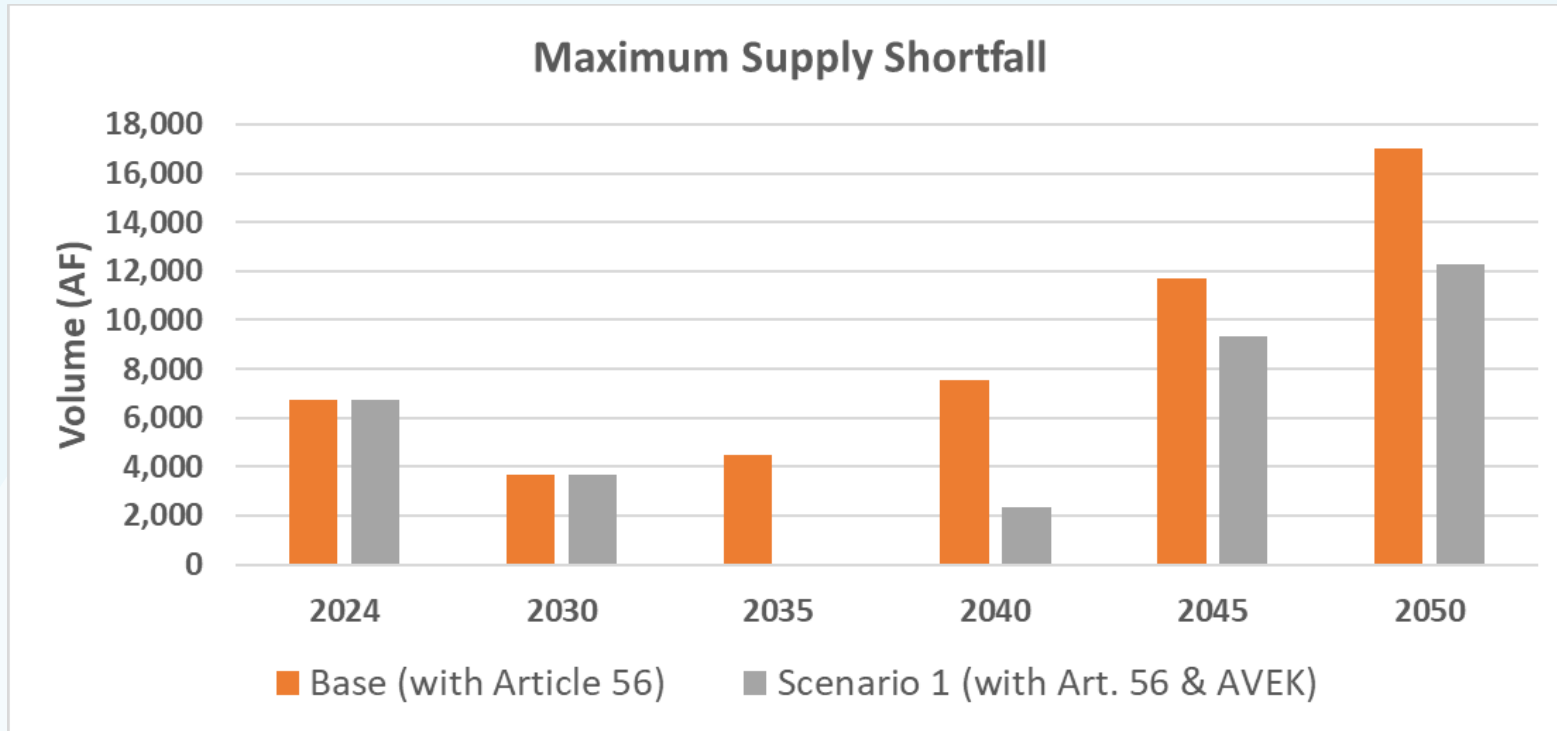


AVEK SIMULATIONS

| AVEK Program | Scenario 1 | Scenario 2 |
|--------------------|------------|------------|
| Maximum Storage | 80,000 AF | 100,000 AF |
| Annual Puts | 20,000 AF | 30,000 AF |
| Annual Takes | 20,000 AF | 30,000 AF |
| Losses | 10% | 10% |
| Program Start Year | 2030 | 2030 |
| Program Last Year | 2065 | 2065 |
| Initial Balance | 0 | 0 |

Extra

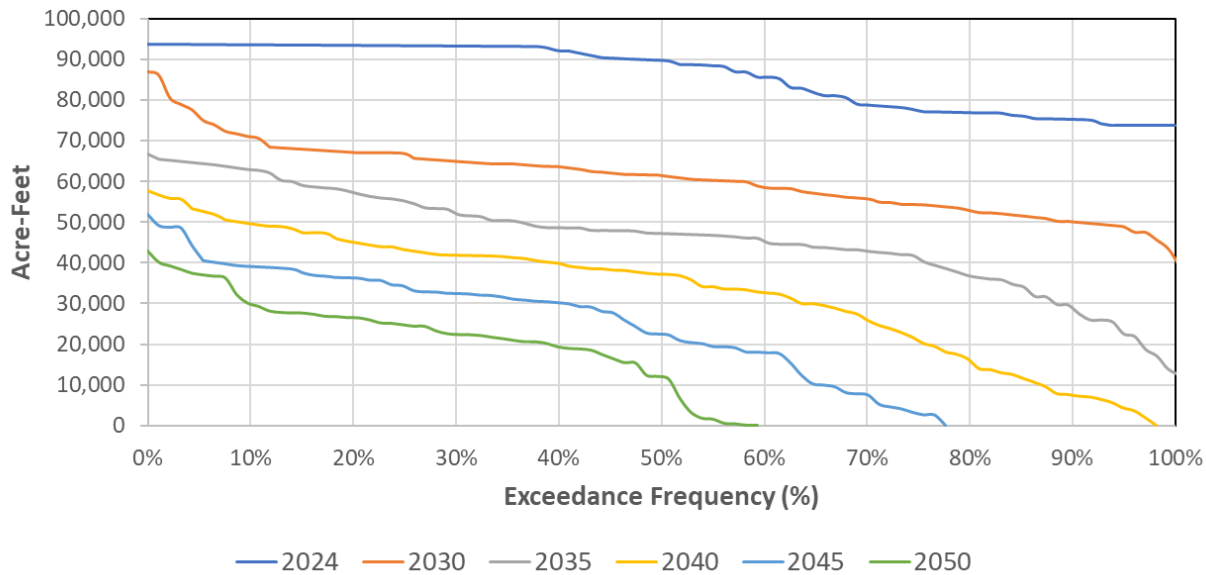
COMPARISON BETWEEN BASE SCENARIO AND AVEK SCENARIO 1



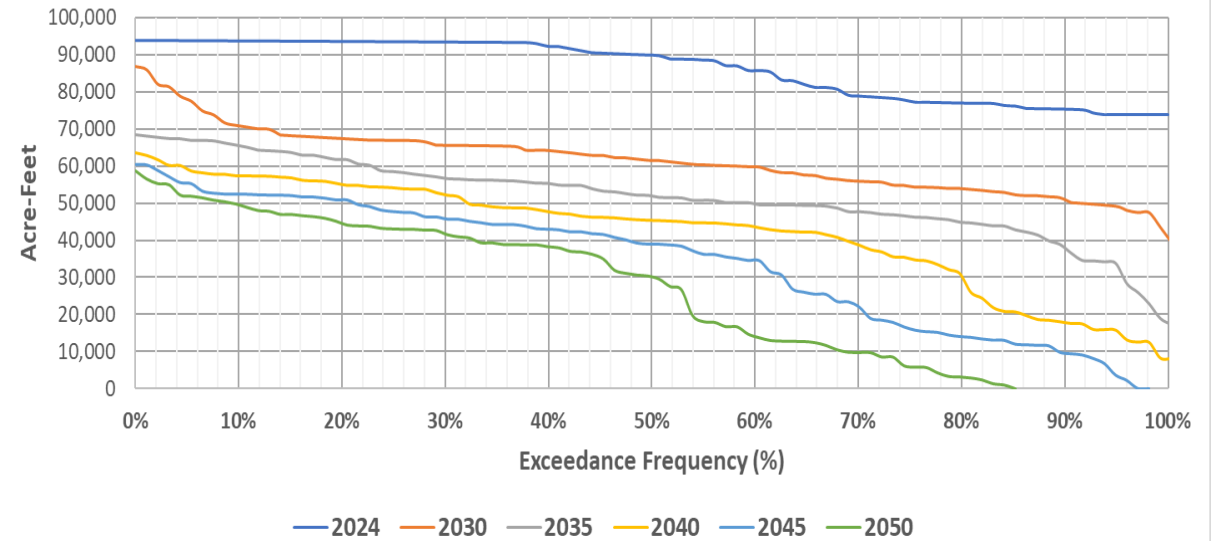
Additional storage decreases the magnitude in supply shortfalls.

COMPARISON BETWEEN BASE SCENARIO AND AVEK SCENARIO 1

RRB Remaining Puts
Base Scenario



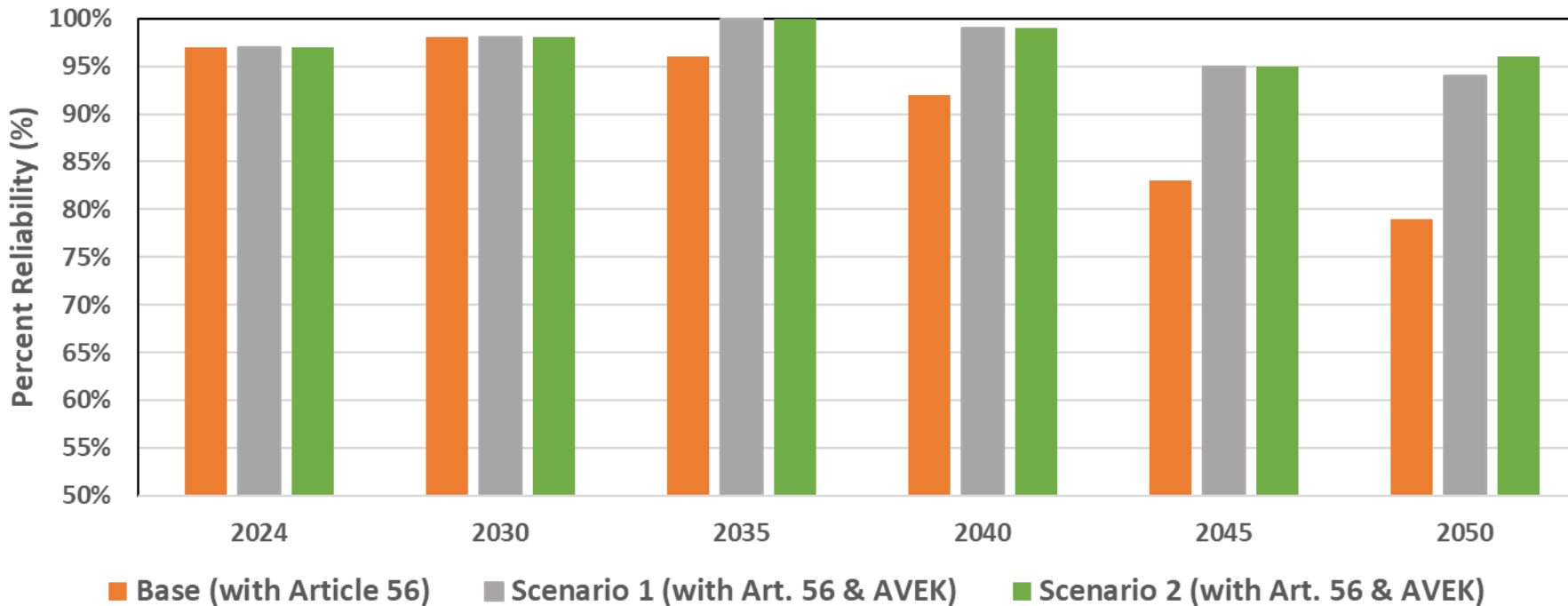
RRB Remaining Puts
Scenario 1 (with AVEK)



- AVEK further extends the life of RRB

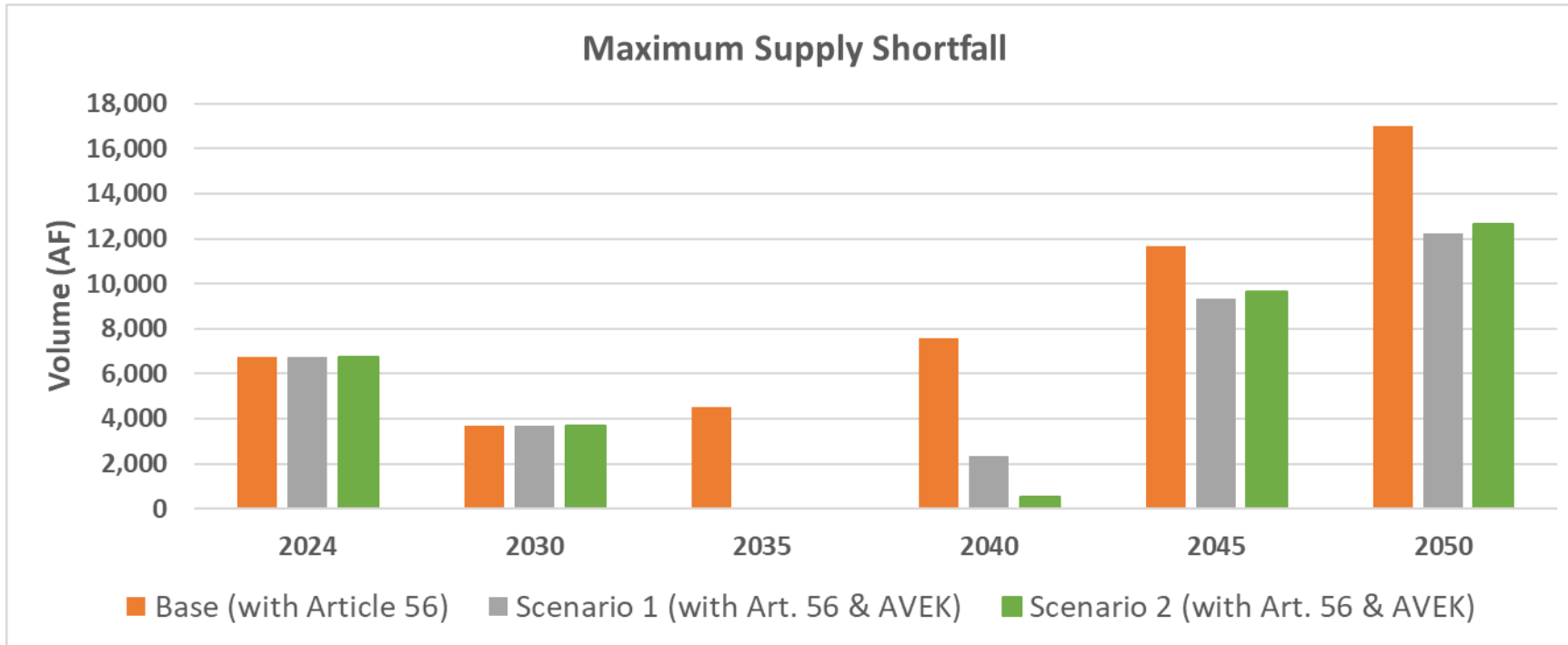
COMPARISON BETWEEN BASE SCENARIO AND AVEK SCENARIOS 1 & 2

Water Supply Portfolio Reliability



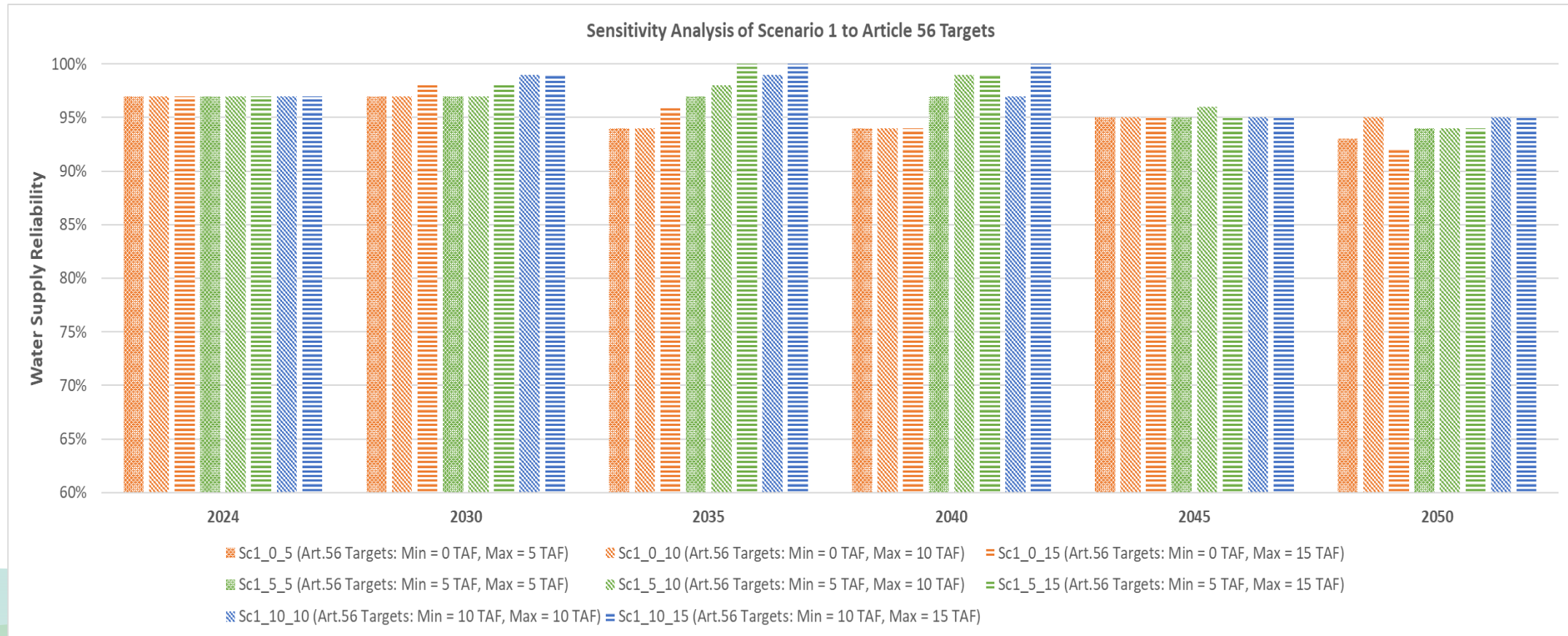
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COMPARISON BETWEEN BASE SCENARIO AND AVEK SCENARIOS 1 & 2

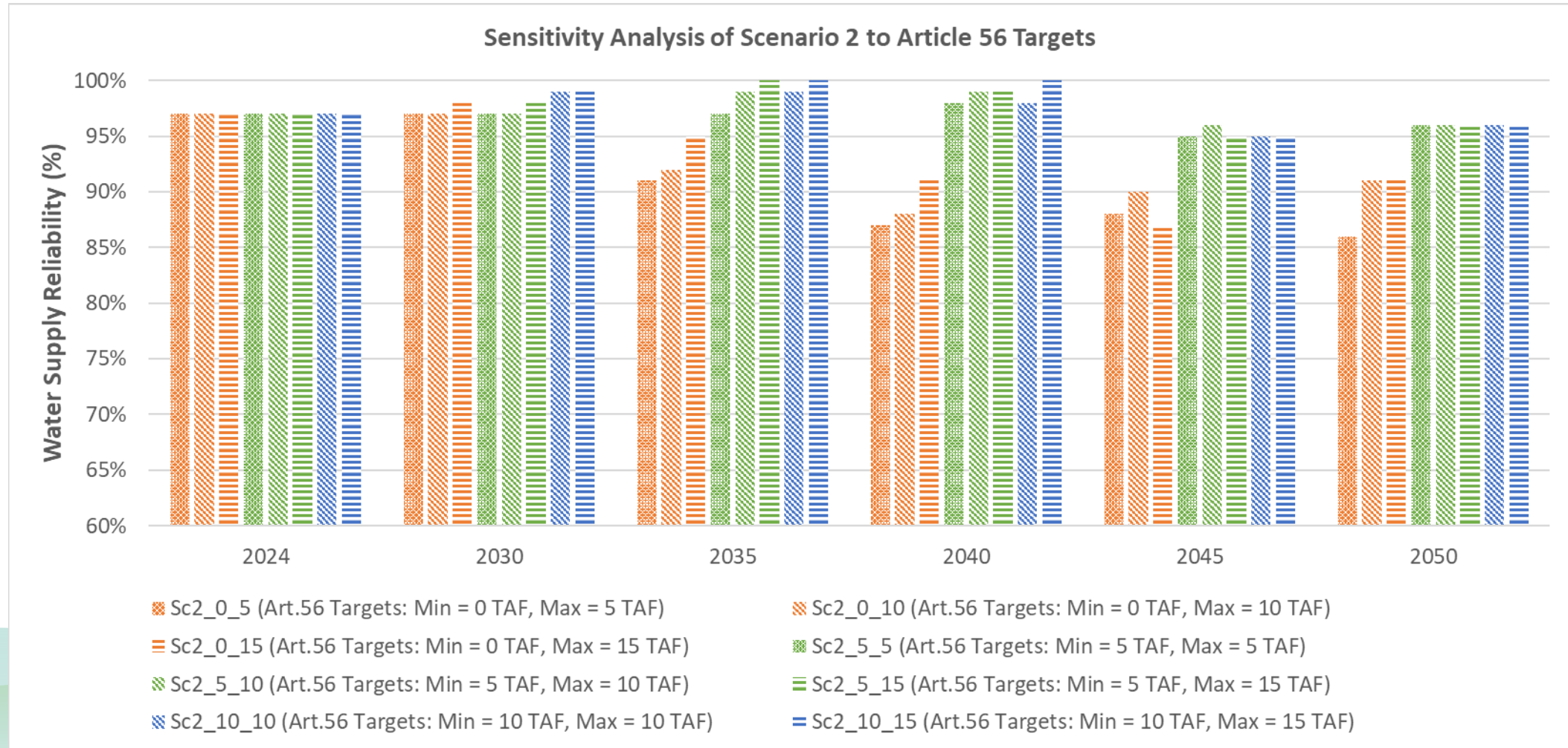


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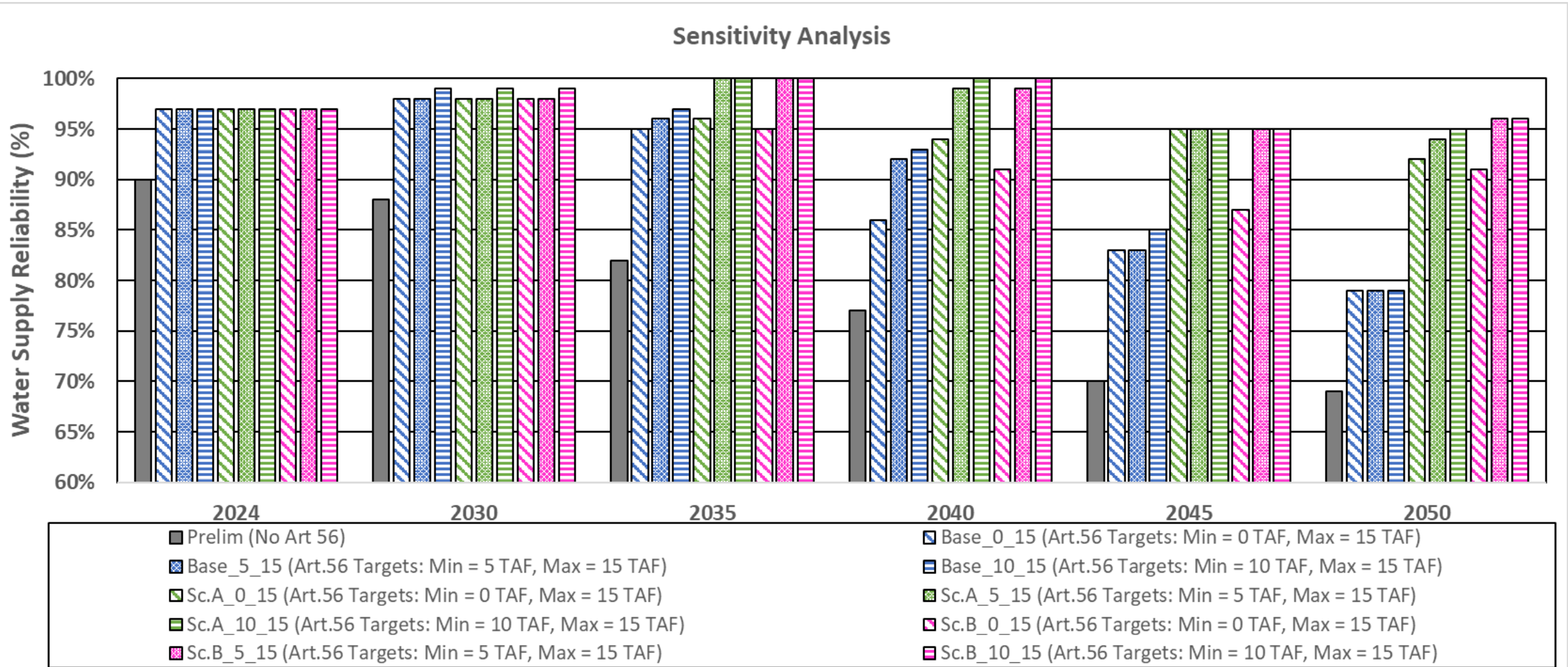
SENSITIVITY ANALYSIS OF SCENARIO 1 TO ARTICLE 56 TARGETS (AVEK PUTS & TAKES = 20 TAFY, MAX STORAGE = 80 TAF)



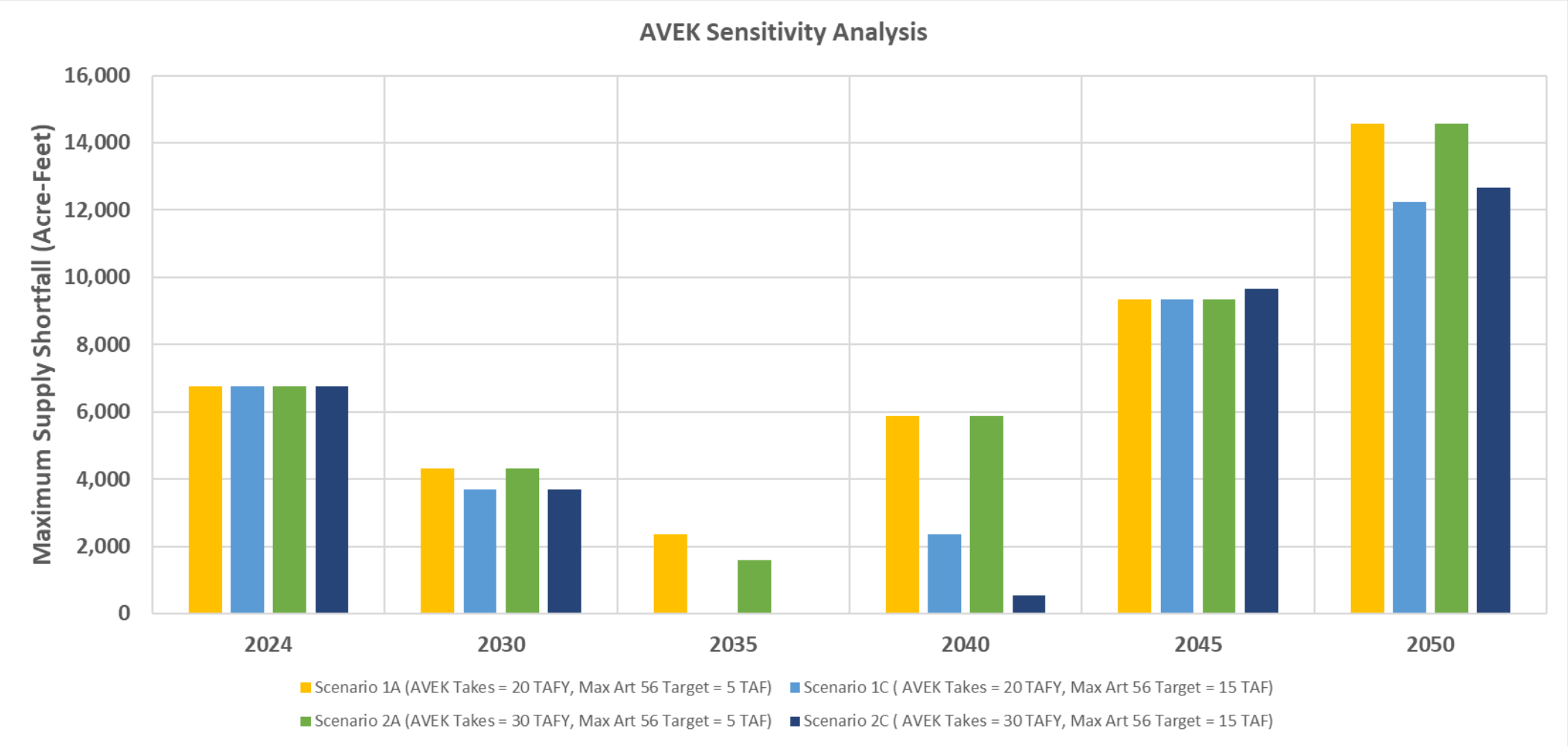
SENSITIVITY ANALYSIS OF SCENARIO 2 TO ARTICLE 56 TARGETS (AVEK PUTS & TAKES = 30 TAFY, MAX STORAGE = 100 TAF)



AVEK SIMULATIONS SENSITIVITY ANALYSIS



SENSITIVITY ANALYSIS WITH THE AVEK BANKING PROGRAM



AVEK BANKING PROGRAM

Set AVEK parameters so they are non-constraining:

Puts & Takes = 65,000 AFY

Maximum Storage = 175,000 AF

Still can't achieve 100 % reliability because of:

Availability of supplies

Limits on aqueduct capacity (secondary)

Questions on what level of reliability we want to achieve