Discussion of IRP Portfolios and Adaptive Management Implementation Considerations

Integrated Resources Plan Special Committee
Item 6a
September 28, 2021

Outline

- Interpreting Graphics
- Scenario Update
- Portfolio Discussion
- Next Steps

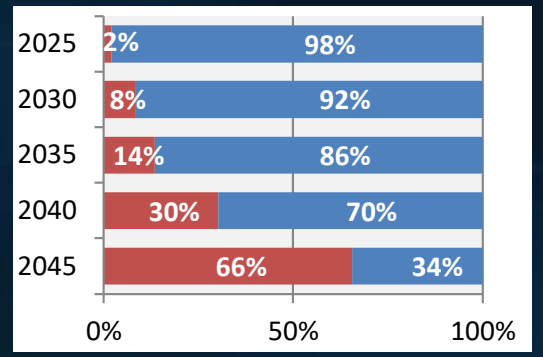
Interpreting Graphics

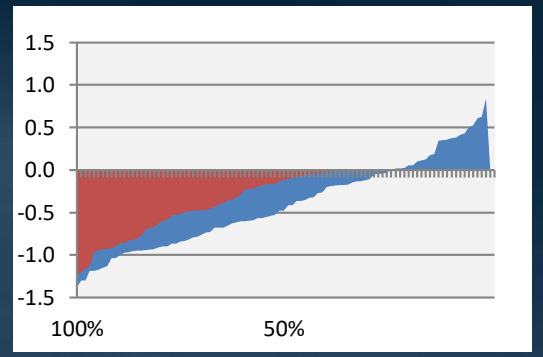
Analyzing the Scenarios with IRPSIM

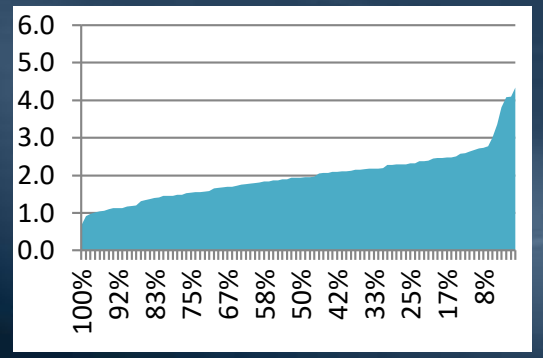
- Water Supply/Demand mass balance simulation model
- Programmed with:
  - Water Demand (Retail, Ag, Replenishment)
  - Water Supply (Local Supply, SWP, CRA)
  - Storage and Transfers (by Program Characteristics)
- Provides simulated supply/demand balances over the 25-year planning horizon under a range of weather outcomes

Interpreting Graphics

- "Football Field" Graphs
  - Frequency and timing of shortages and surplus
- Shortage/Surplus Curves
  - Exceedance curves provide magnitude and probability of shortage and surplus
- Storage Graphs
  - End of year probability of storage levels





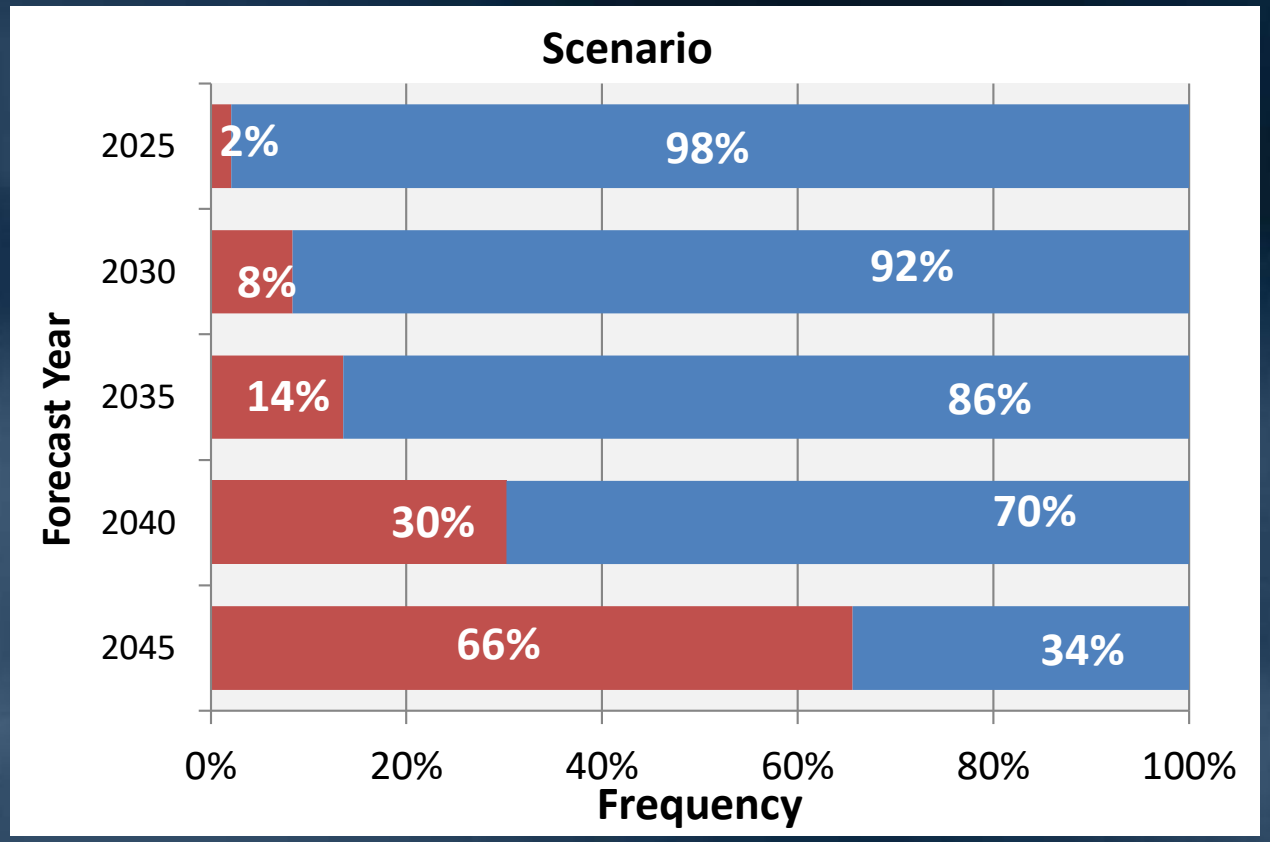


“Football Field” Graph

Frequency and Timing of Shortages

Red bars indicate the frequency of shortage conditions

Shortage means: Running out of accessible supply somewhere in MWD’s service area



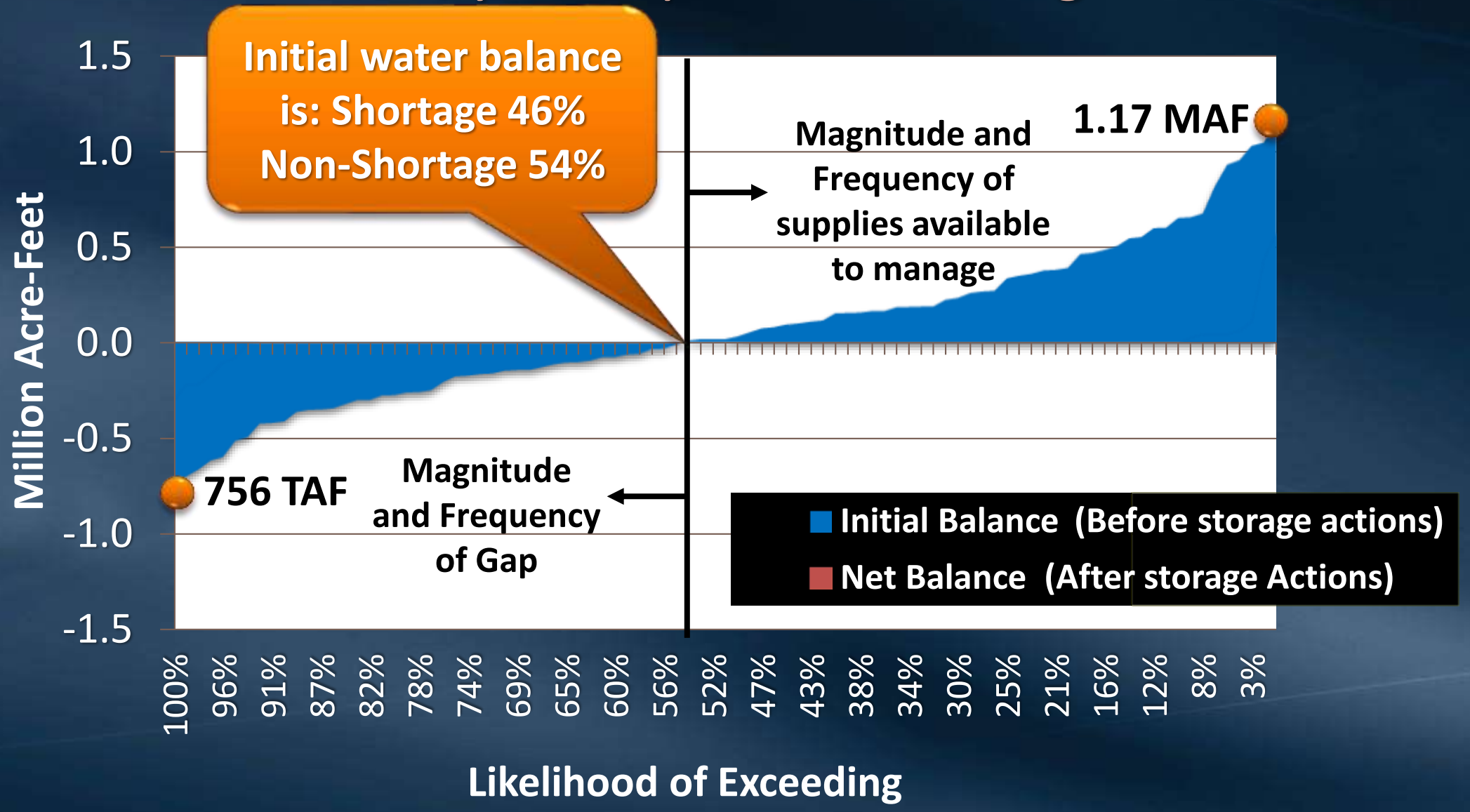
Blue bars indicate the frequency of non-shortage conditions

Non-Shortage means one or a combination of:

- Balanced condition
- Demands are met through storage
- Surplus supply to manage

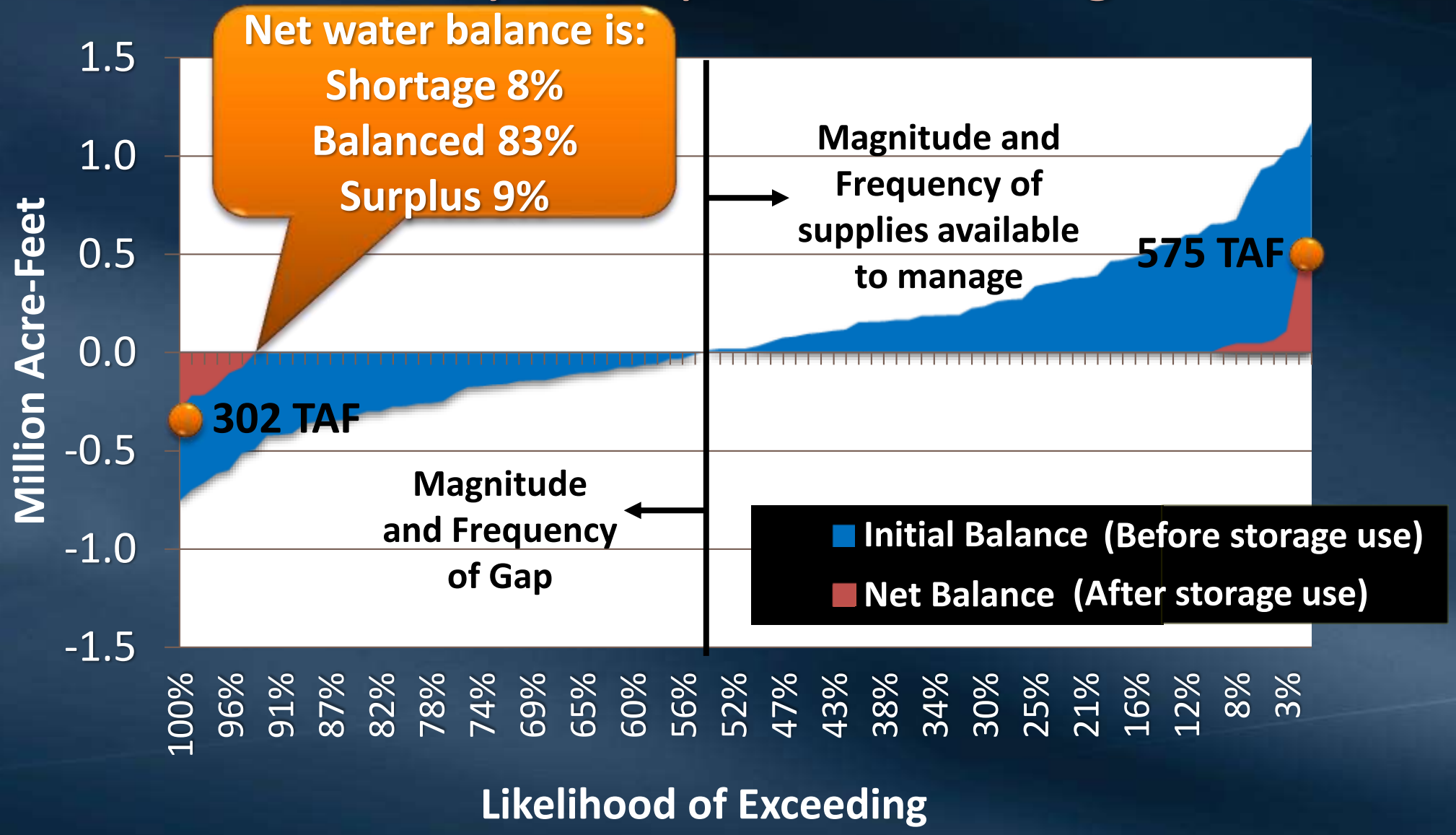
Shortage/Surplus Curve

Magnitude and Probability of Surplus and Shortage



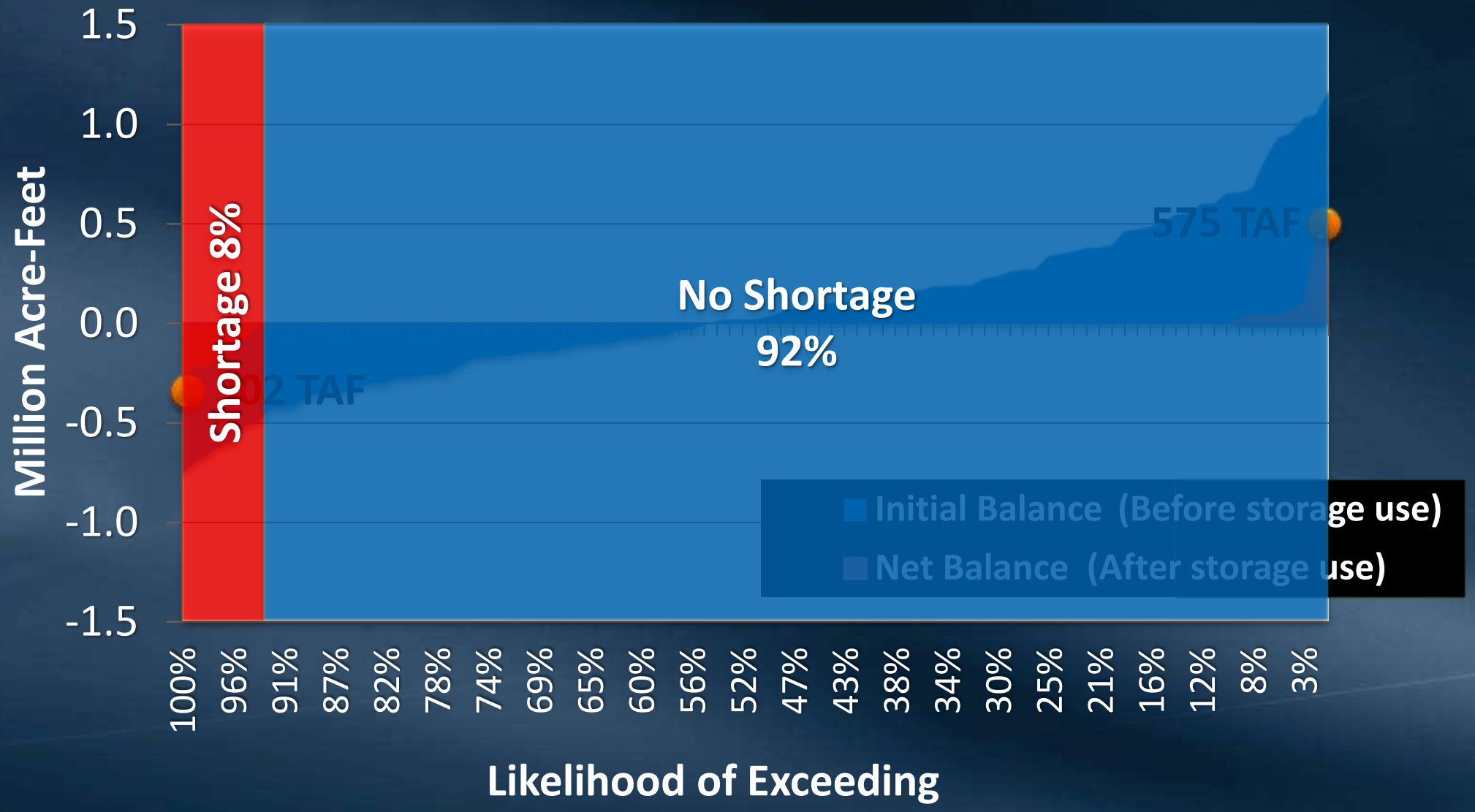
Shortage/Surplus Curve

Magnitude and Probability of Surplus and Shortage



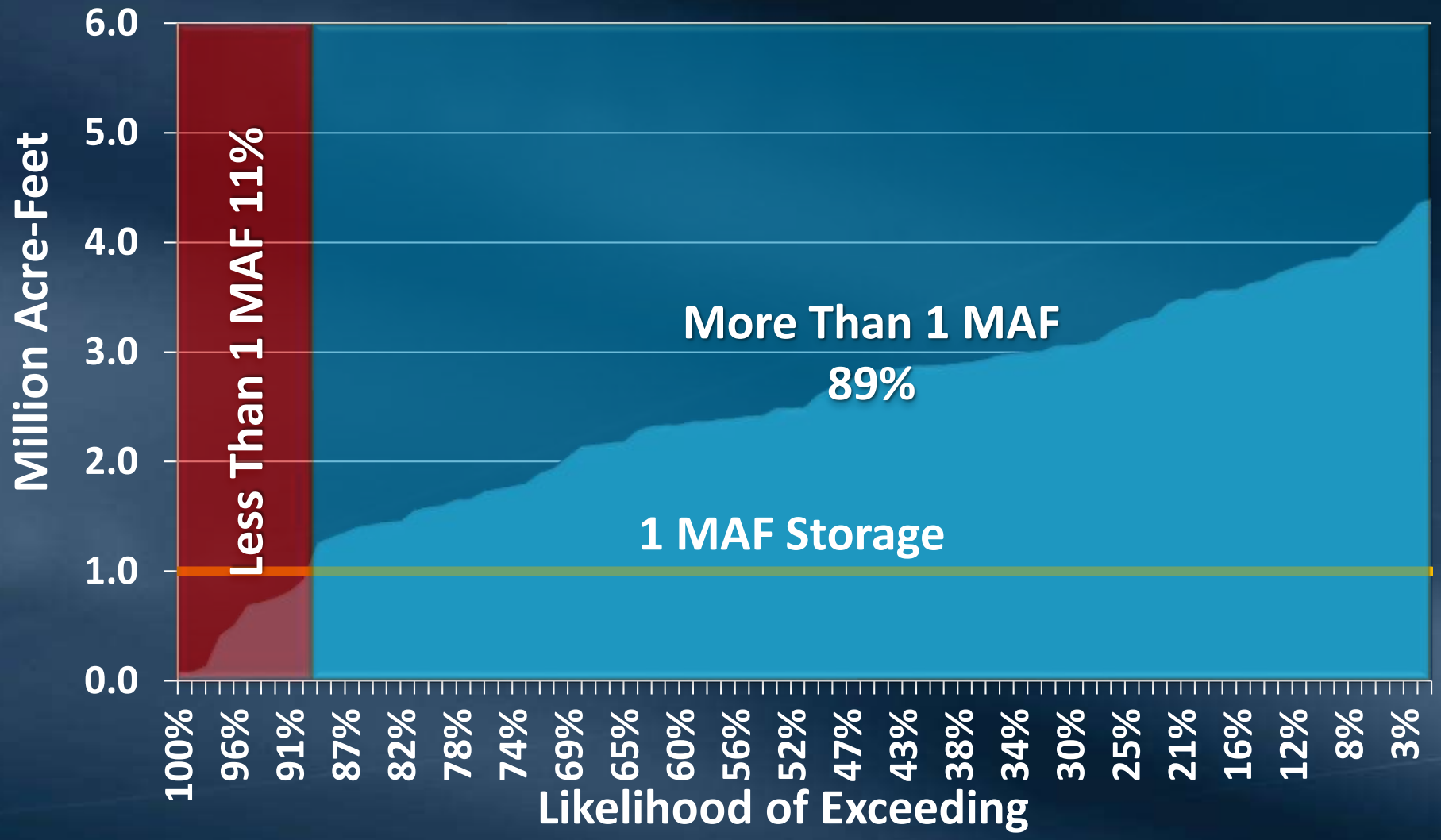
Shortage/Surplus Curve

Magnitude and Probability of Surplus and Shortage



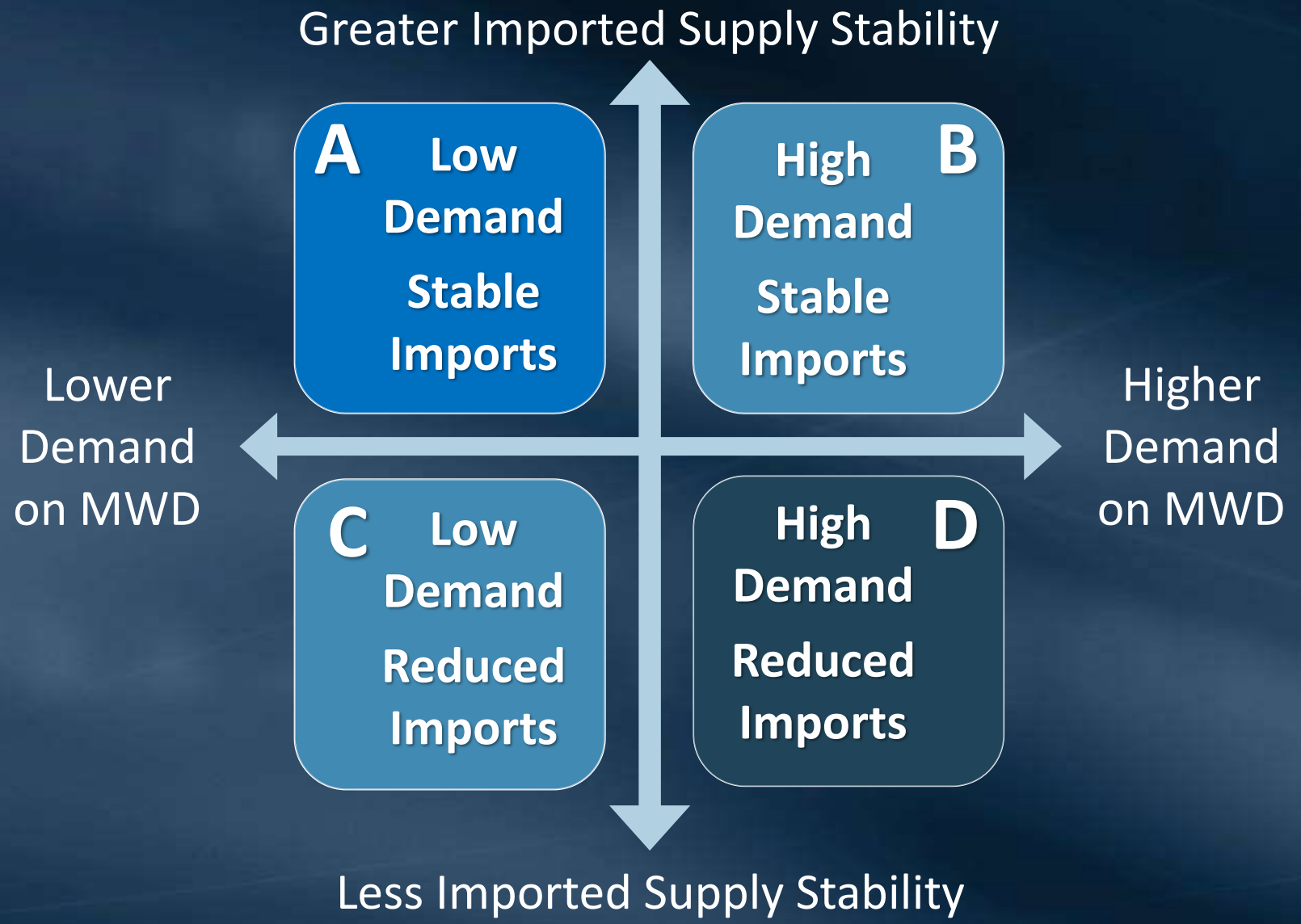
Storage Graph

End of Year Probability of Storage Levels



Scenario Update

IRP Scenario Recap



Refined Gap Analysis Improvements

- Updated MWD service connection groupings
  - Now more accurately reflects operational flexibility to meet demands in SWP-Only, CRA-Only and blended areas
- Model coding updates
  - Refined assumptions from continued staff and expert panel input and corrected model coding issues
- Local supply refinements/corrections
  - Eliminated double-counting of some local supplies and added previously missing local supply production information

Refined Gap Analysis Improvements

- Updated MWD service connection groupings
  - Now more accurately reflects operational flexibility to meet demands in areas
- Model codin
  - Refined assu expert panel input and co
- Local supply
  - Eliminated double-counting of some local supplies and added previously missing local supply production information

- **Increases in shortage frequency and magnitude in Scenario D -2045**
- **No changes to Portfolio Category Analysis Outcomes**

Portfolio Discussion

Portfolio Planning Category

- Core Supply/Demand Reduction
  - *A supply that is generally available and used every year to meet demands under normal conditions and may include savings from efficiency gains through structural conservation*

  High reliability and value if used often. Expensive otherwise.

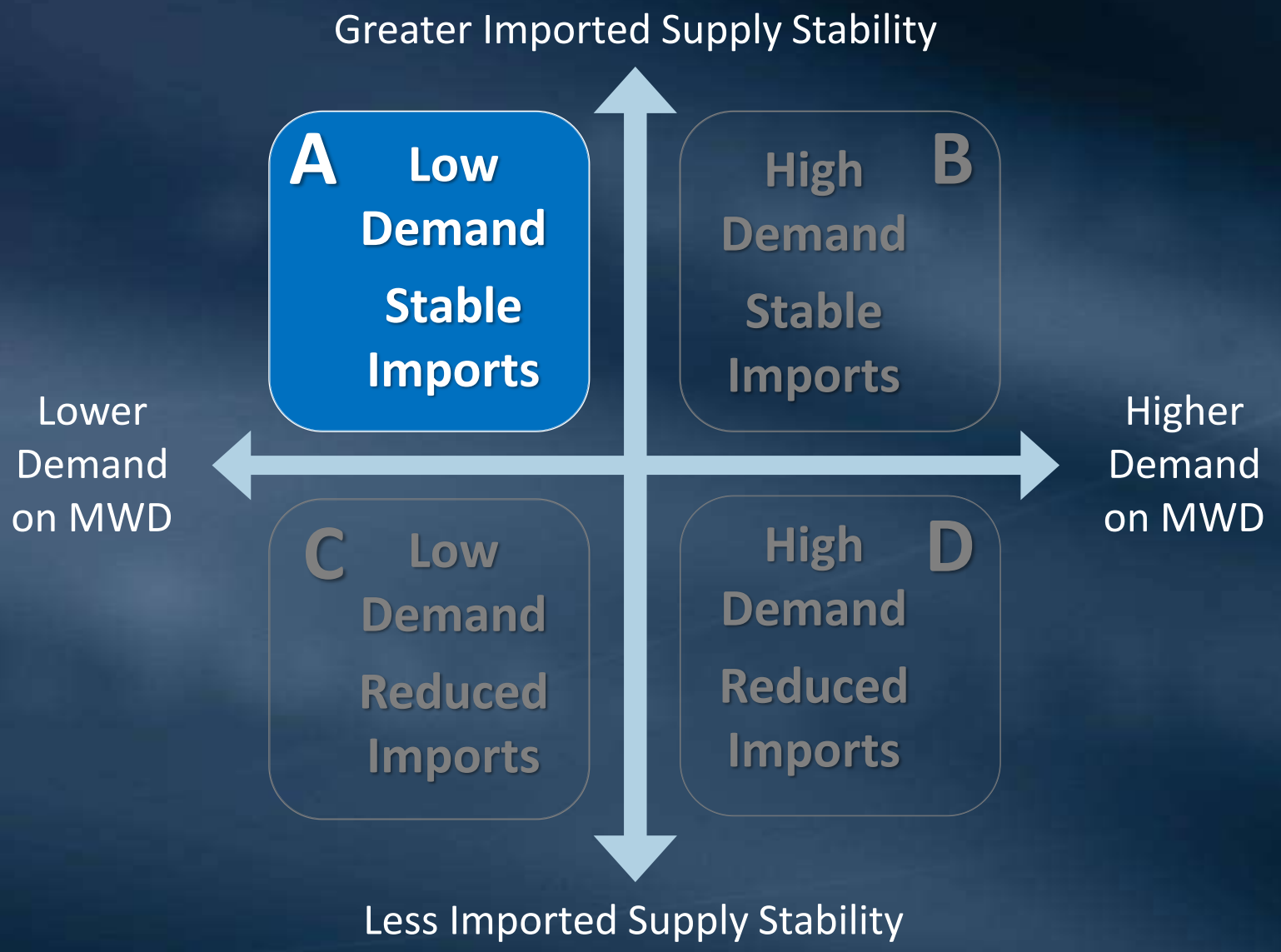
- Flexible Supply/Demand Response
  - *A supply that is implemented on an as-needed basis and may or may not be available for use each year and may include savings from focused, deliberate efforts to change water use behavior*

  Expensive if used too much or too often. Better value if used occasionally.

- Storage
  - *The capability to save water supply to meet demands at a later time*

  Converts Core Supply into Flexible Supply. Evens out variability in supply and demand.

Scenario A

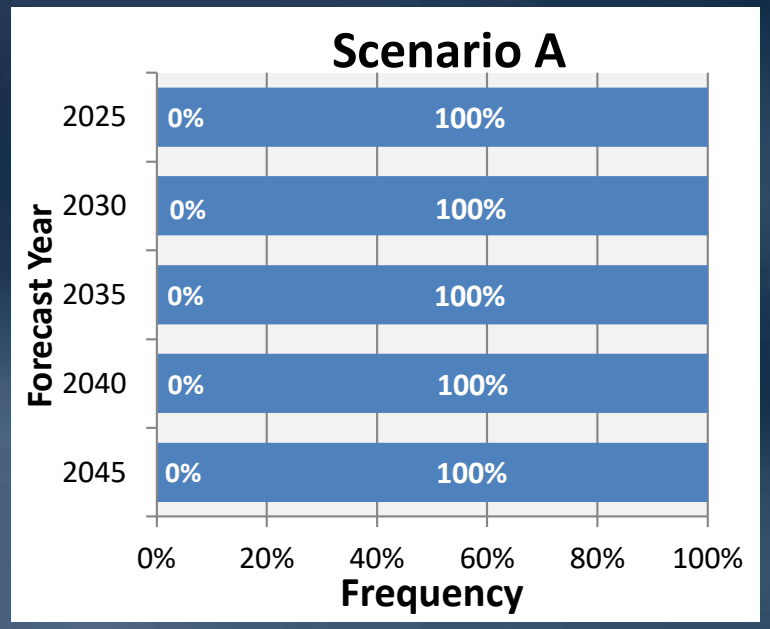


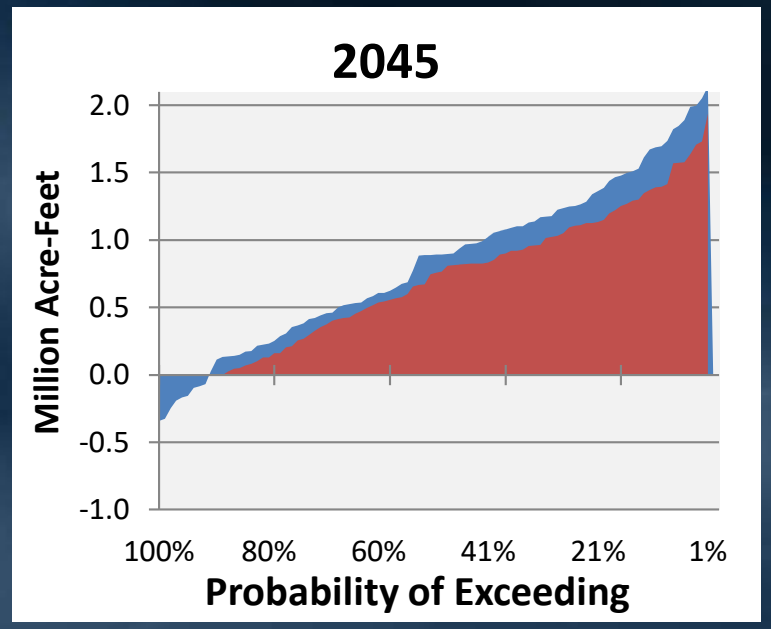
Scenario A

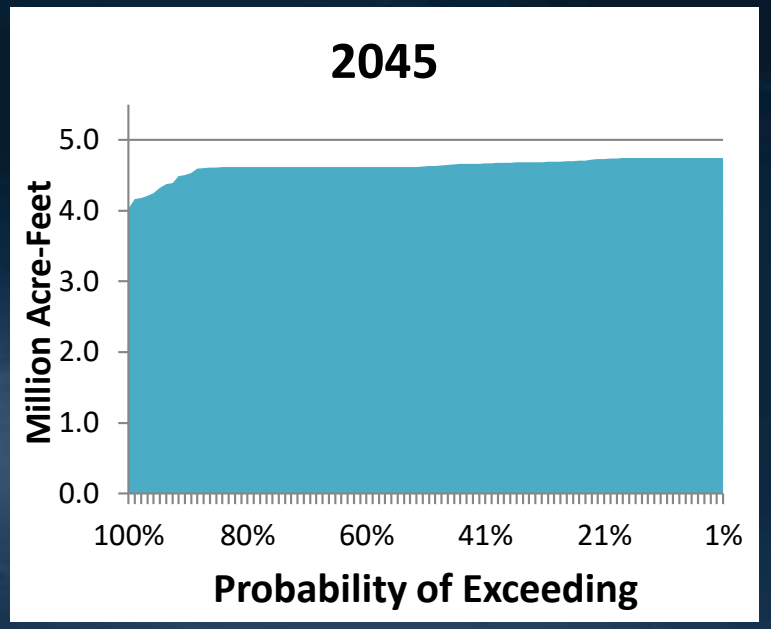
This scenario is driven by a combination of **plentiful regional and local supplies**, a **struggling economy**, **low population growth**, and a **continuing water use ethic** across the region.

Least challenging overall reliability outlook of the four IRP scenarios

Scenario A – Gap Analysis Findings







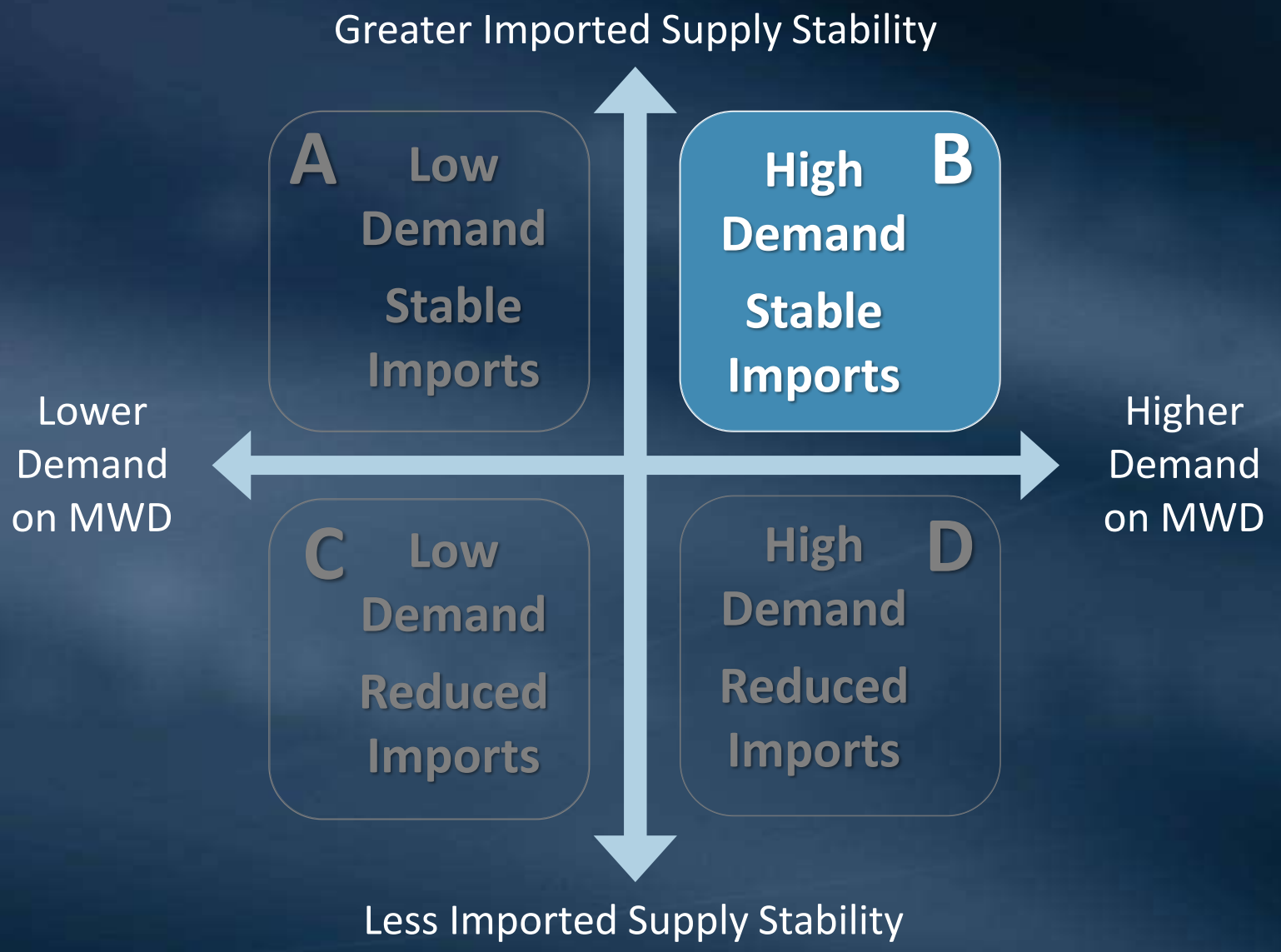
- Shortages are addressed with existing resources and storage programs/supplies
- Unable to manage up to 770 TAF of surplus supply 50% of the time
- End of year storage is above 4.5 MAF 89% of the time by 2045

Scenario A - Portfolio Category Analysis

Takeaways

- No new investments in Core, Flexible or Storage are necessary provided the assumed demand and supply levels are maintained
- Combination of lower demand and stable supplies are end-user initiated without additional intervention from Metropolitan

Scenario B

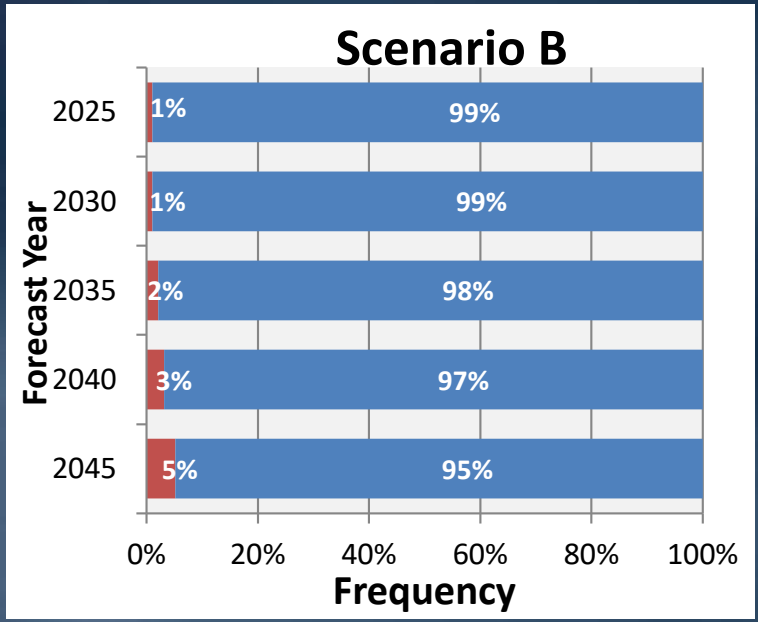


Scenario B

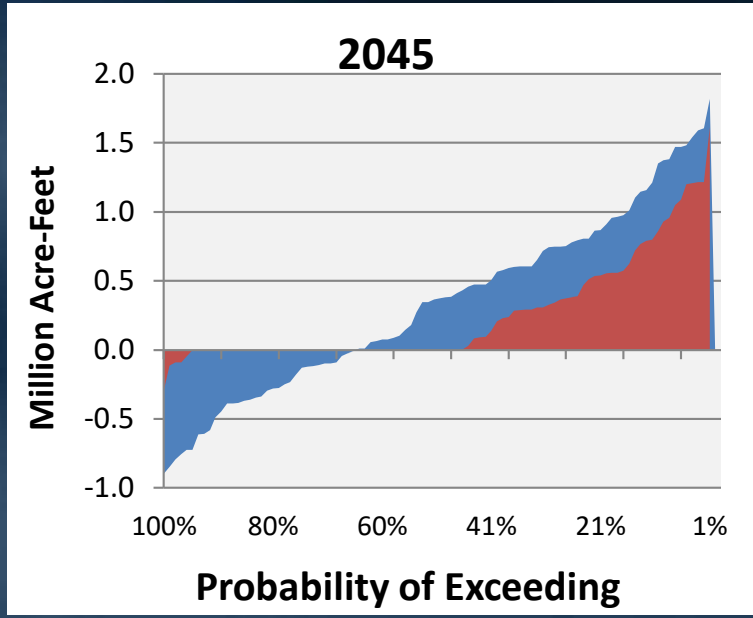
This scenario reflects **increasing retail demands** across the region resulting from **relatively high population growth** and a **strong economy**. Fortunately, **climate change impacts are manageable** and **imported supplies remain stable**.

Scenario B – Gap Analysis Findings

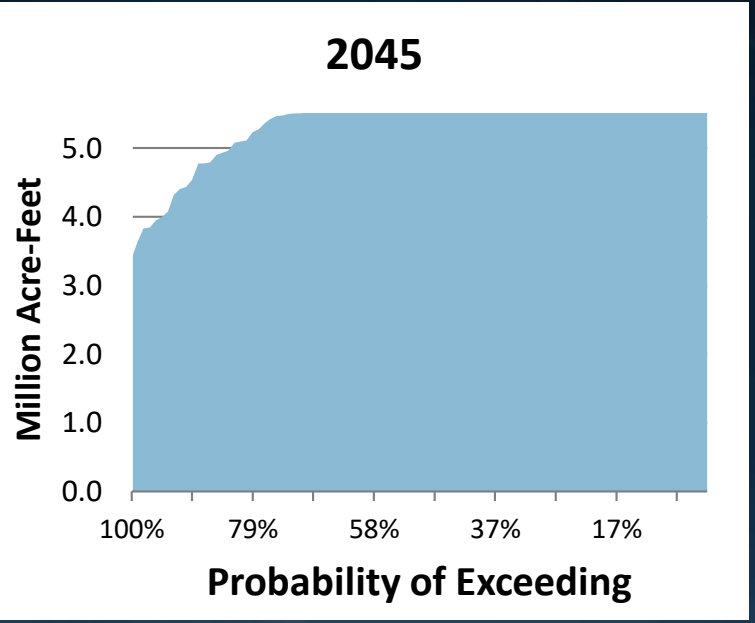
Football Field



Shortage/Surplus



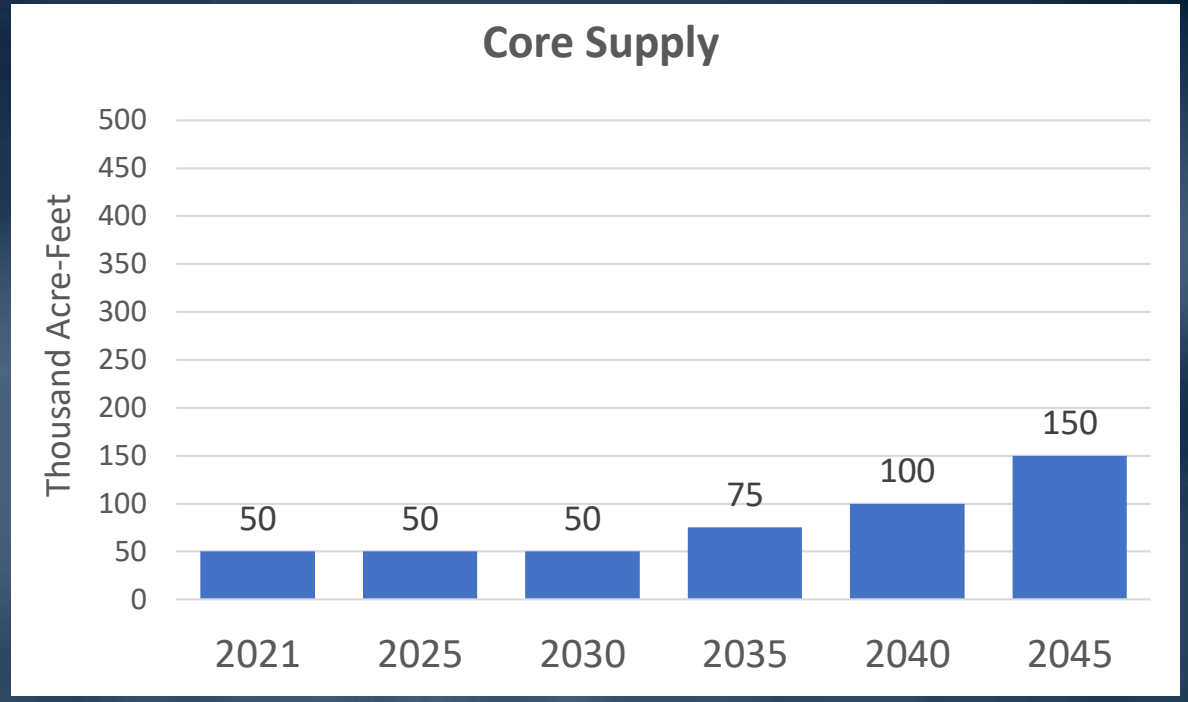
Storage

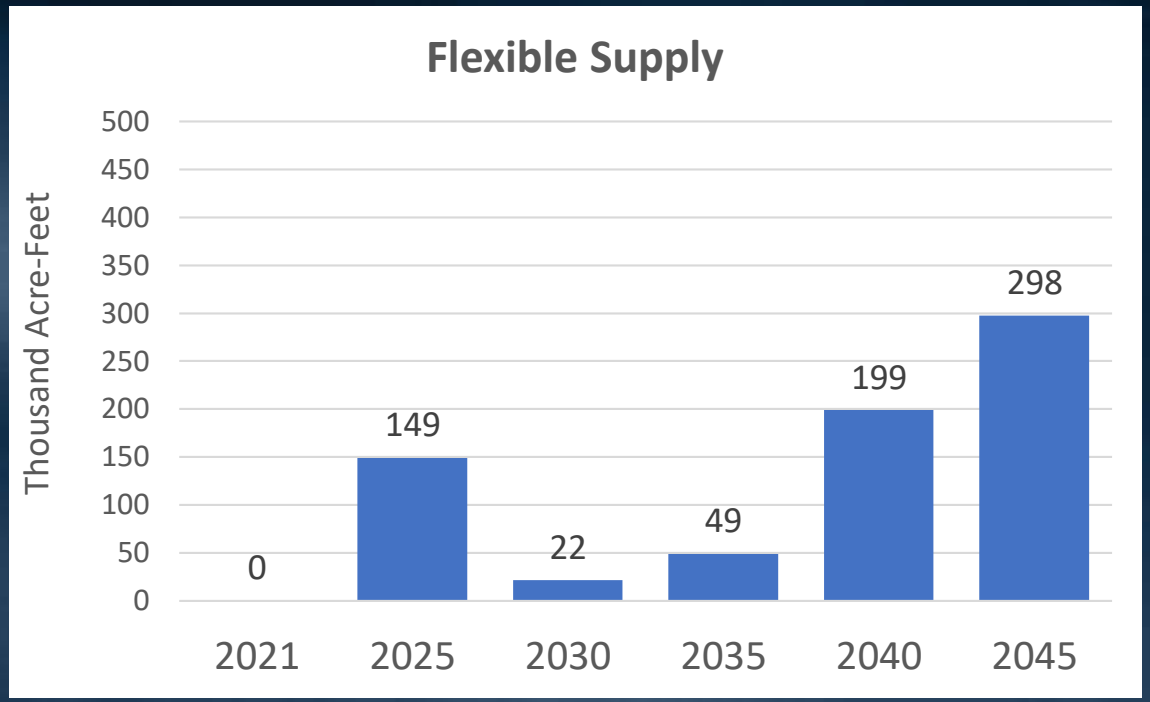


- Shortages occur between 1-5% of the time through planning horizon
- Up to 300 TAF of shortage in 2045
- End of year storage is above 4.5 MAF 90% of the time by 2045

Scenario B – Portfolio Category Analysis

Development Needed of Each Portfolio Category Alone to Achieve Reliability





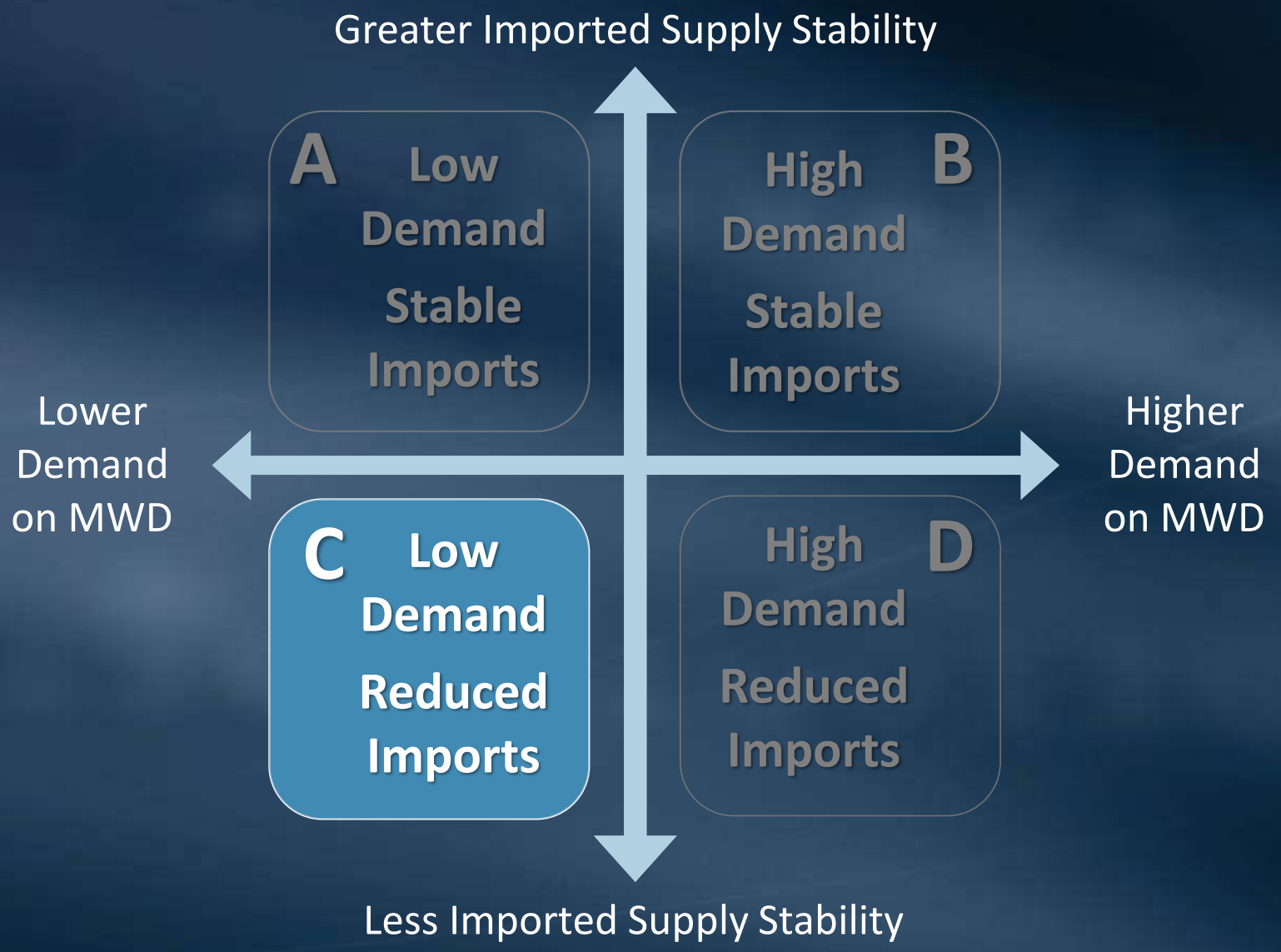
- Storage: 500,000 AF of new storage capacity with a 250,000 AFY put/take capacity will eliminate shortage (except for 1% in 2045), *if that storage can reach the "SWP-Only" areas*

Scenario B - Portfolio Category Analysis

Takeaways

- Challenges are due mostly to increasing demands
- A combination of Core, Flexible and Storage will optimize how we eliminate shortages
- 150 TAF of Core supply need is feasible, however time to develop near-term supply must be considered
- Up to 300 TAF of Flexible supply need is identified that would require both new supply and demand response actions
- All shortages experienced in “SWP-Only” areas, adding CRA storage will not reduce frequency or magnitude of shortage

Scenario C

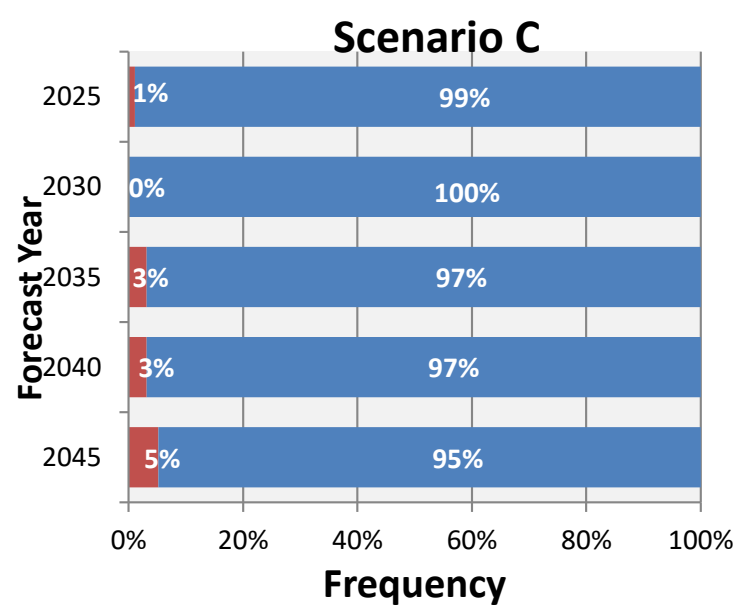


Scenario C

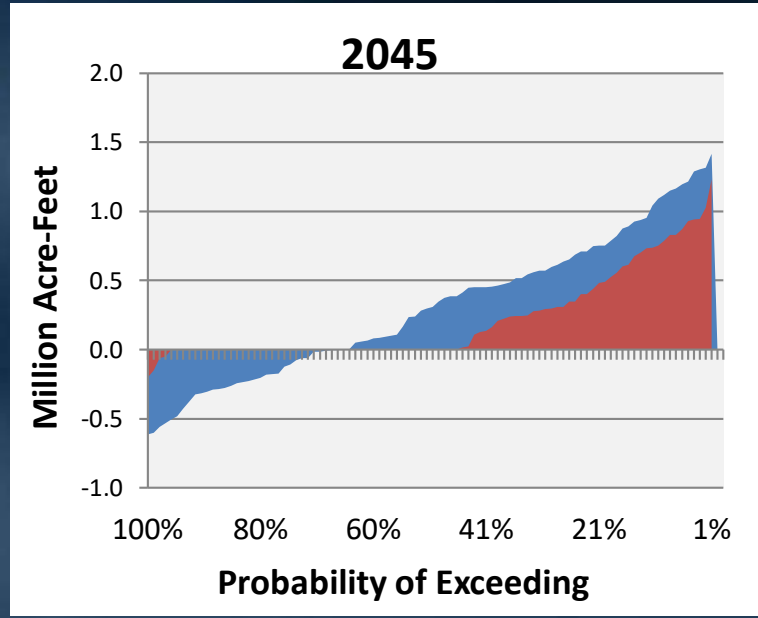
This scenario combines **modest population and economic growth** with successful efforts among local agencies to **manage water use behavior**. Rapid onset of **climate change effects and regulatory constraints** impact imported supplies and local supplies.

Scenario C – Gap Analysis Findings

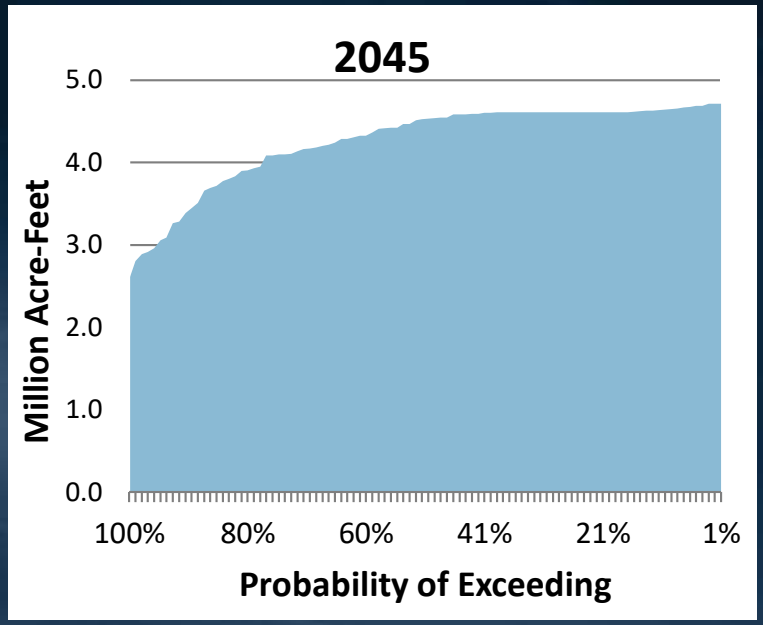
Football Field



Shortage/Surplus



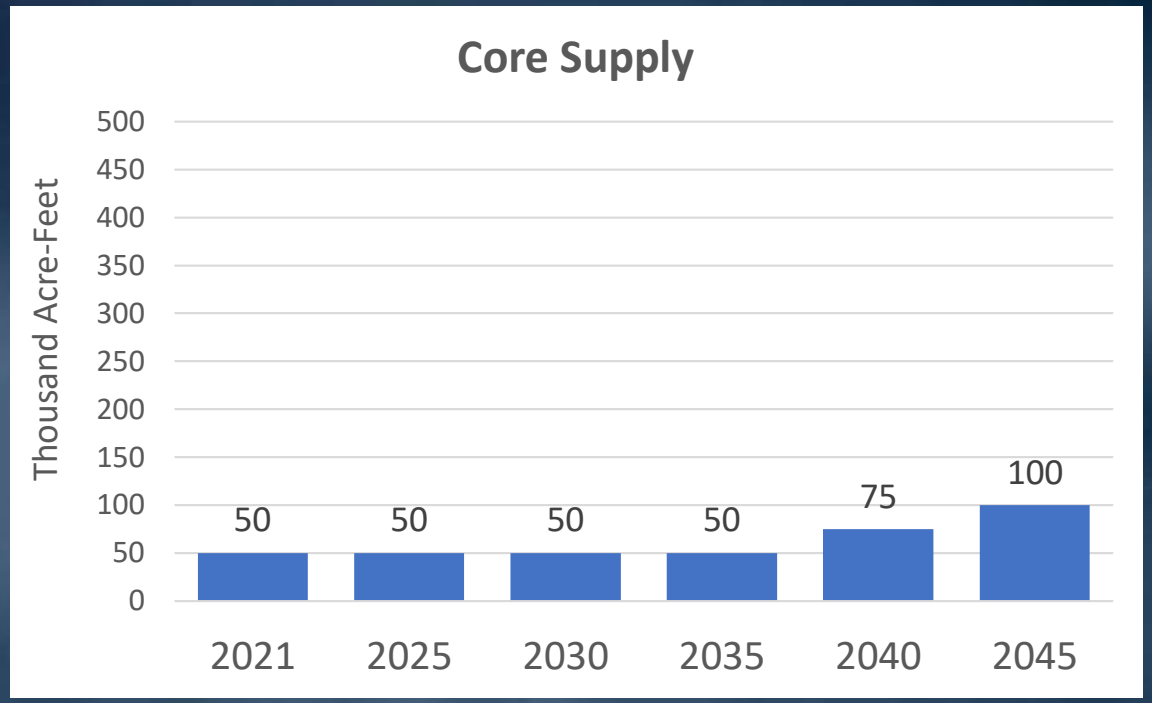
Storage

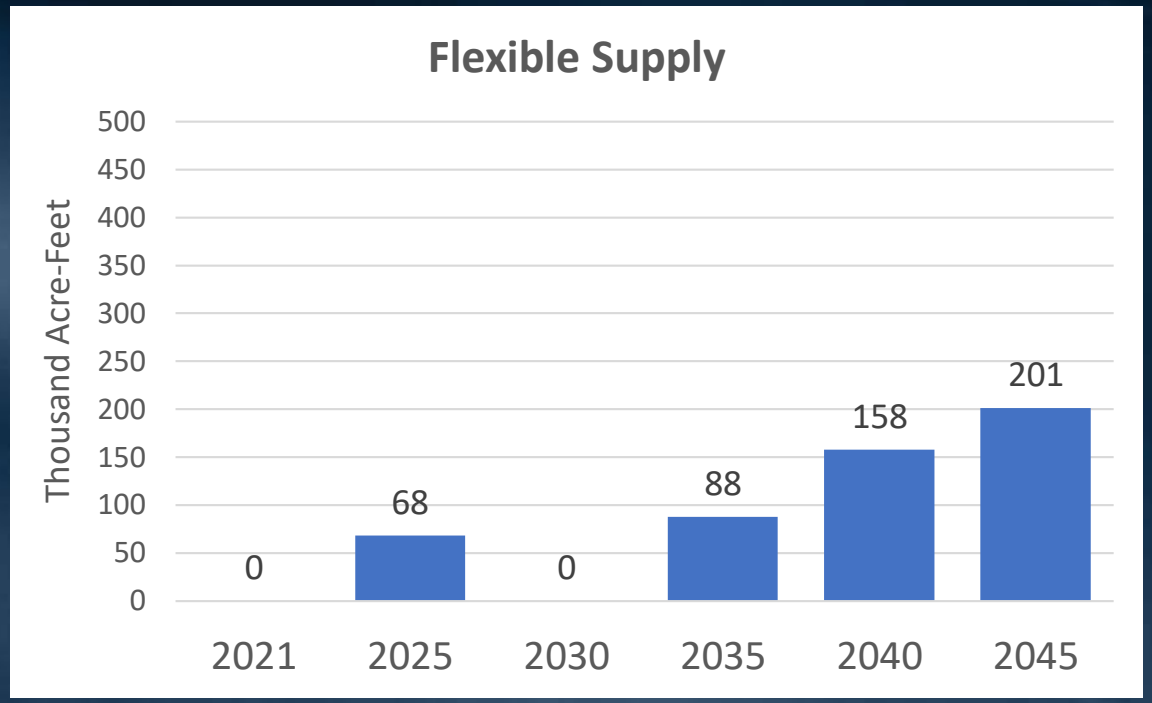


- Shortages occur between 1-5% of the time through planning horizon
- Up to 200 TAF of shortage in 2045
- End of year storage is above 4.5 MAF 52% of the time by 2045

Scenario C – Portfolio Category Analysis

Development Needed of Each Portfolio Category Alone to Achieve Reliability





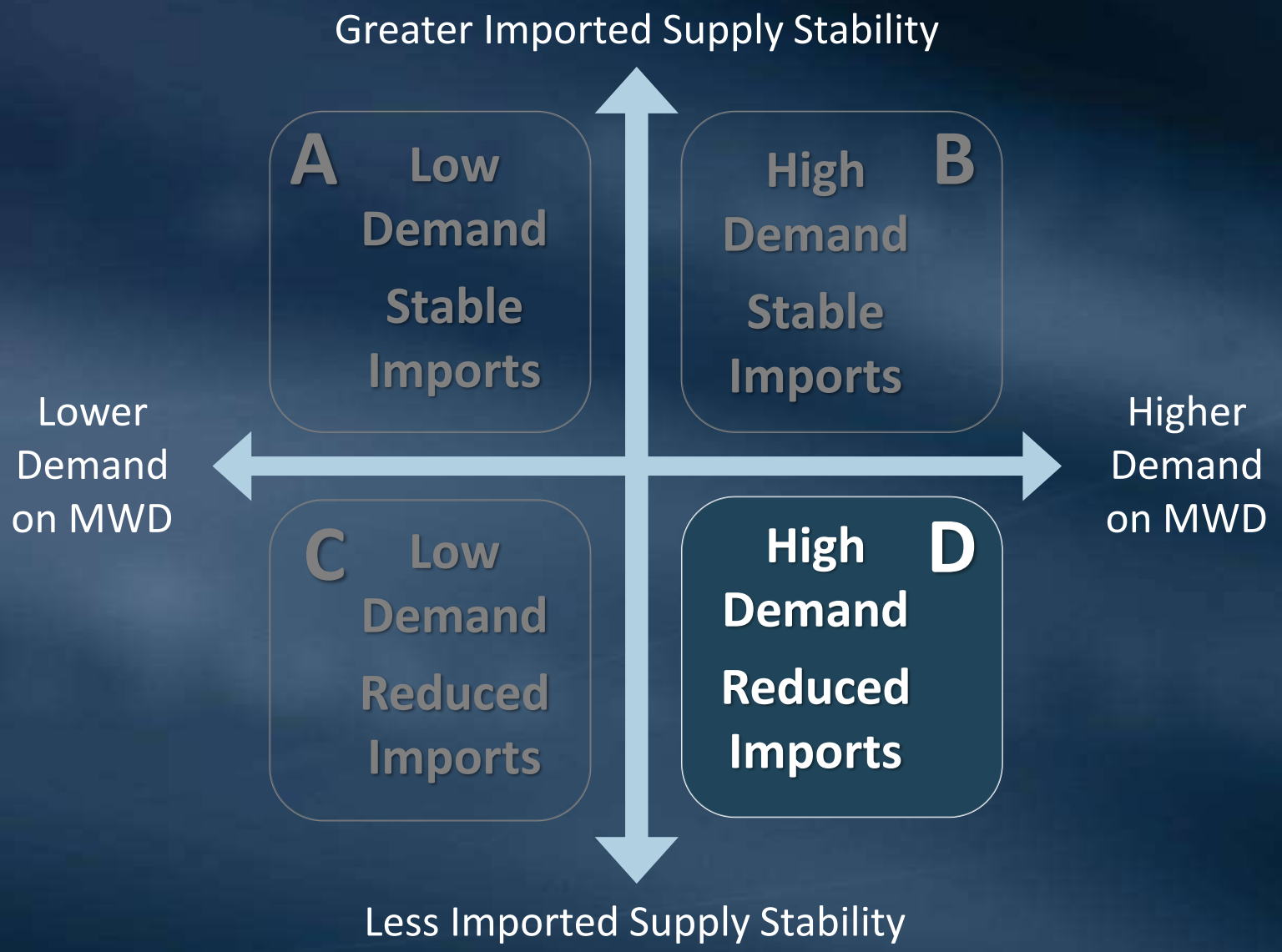
- Storage: An additional SWP 500,000 AF of storage capacity with a 250,000 AFY put/take capacity will eliminate shortage

Scenario C - Portfolio Category Analysis

Takeaways

- Challenges are mostly due to decreasing local and imported supplies
- A combination of Core, Flexible and Storage will optimize how we eliminate shortages
- 100 TAF of Core supply need is reasonable, however the lead time to develop near-term Core supply must be considered
- Up to 200 TAF of Flexible supply need is identified that would require both new supply and demand response actions
- All shortages experienced in “SWP-Only” areas, adding CRA Storage will not reduce frequency or magnitude of shortage

Scenario D



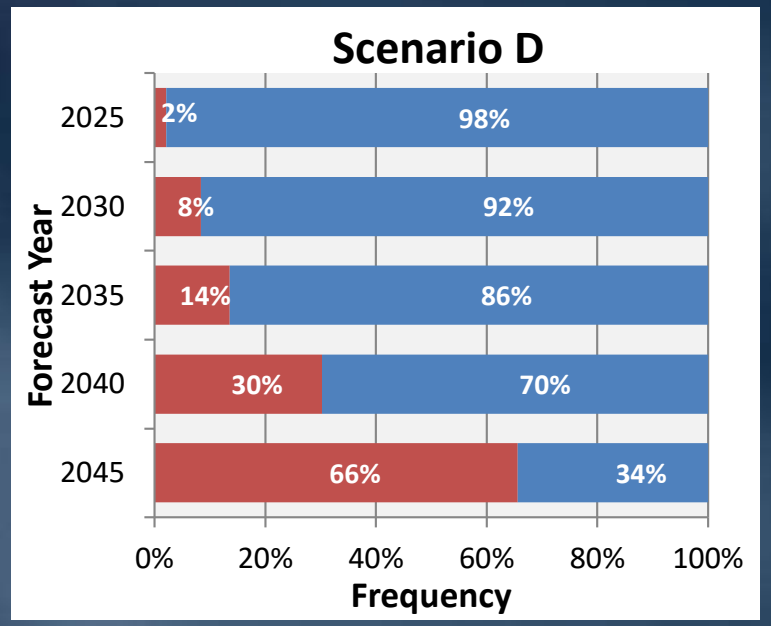
Scenario D

This **highly-challenging scenario** is beset by higher demands, unstable imported and diminishing local supplies. **Drivers of change on both demand and supply-side conspire to present serious threats to water reliability.** High retail demands reflect strong economic and demographic growth and a rebound of water-using behaviors. Severe climate change and regulatory constraints impact both imported and local supplies.

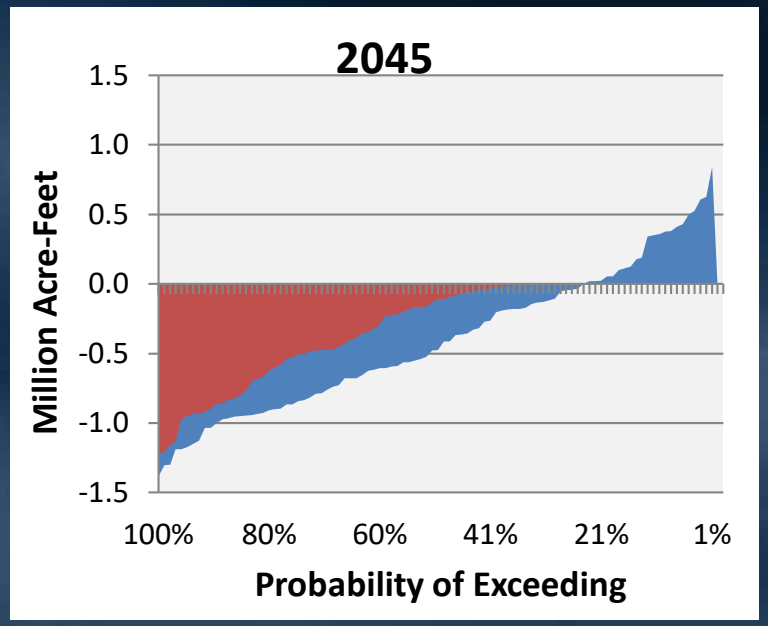
Most challenging overall reliability outlook of the four IRP scenarios

Scenario D – Gap Analysis Findings

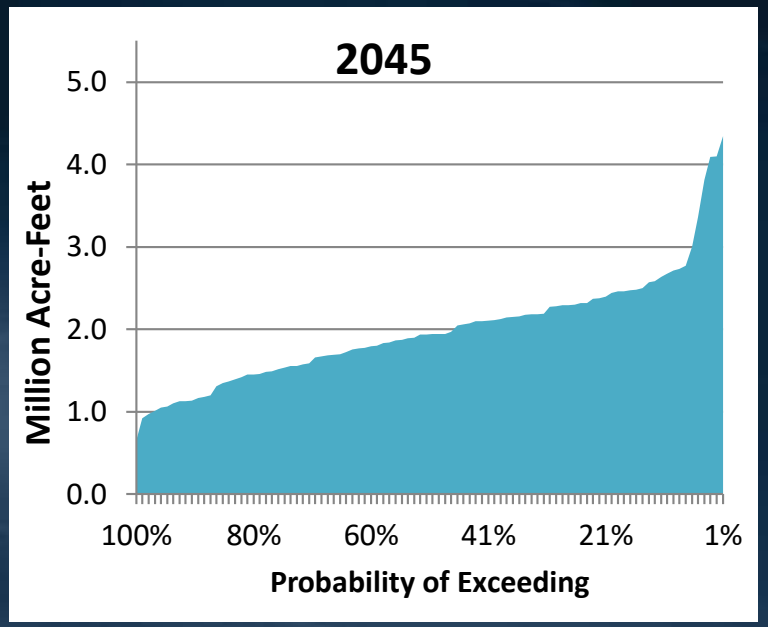
Football Field



Shortage/Surplus



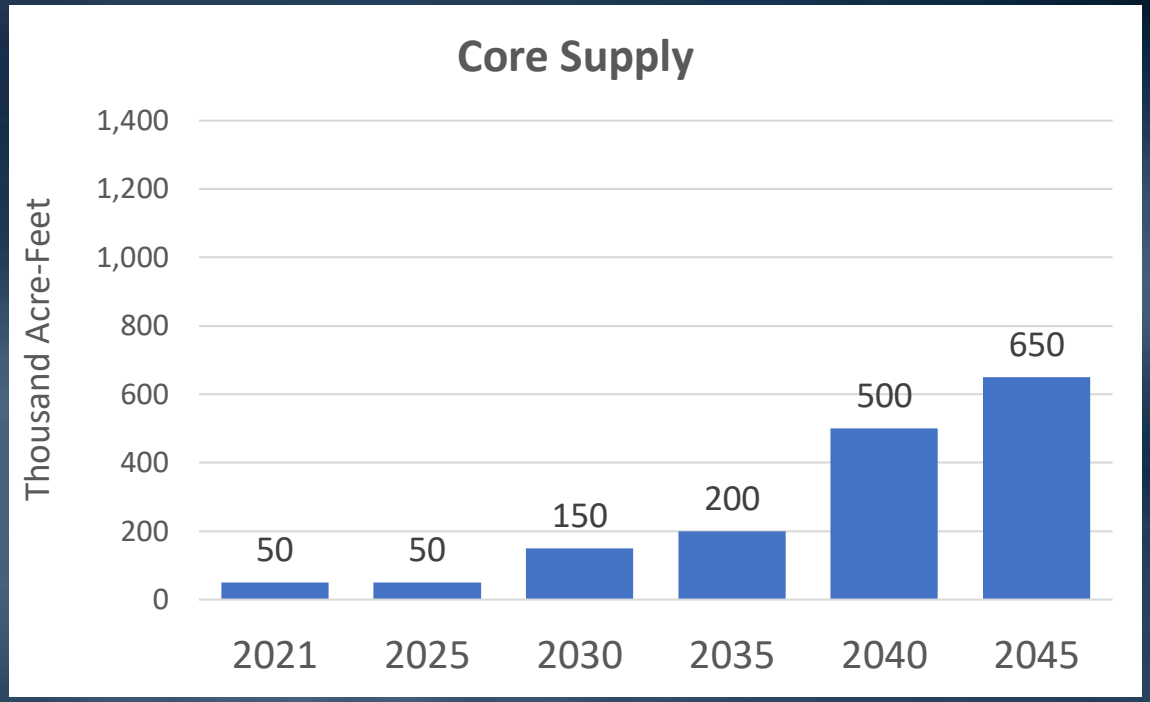
Storage

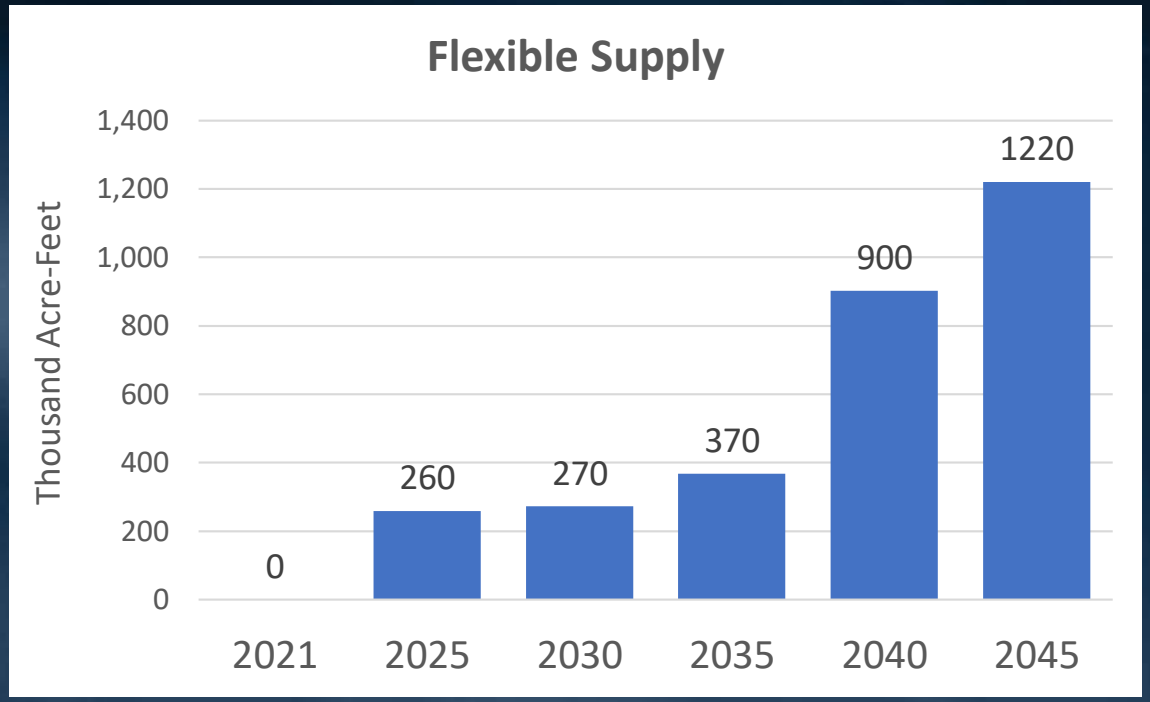


- Risk of shortage increasing substantially through the planning horizon (2-66%)
- Up to 1.22 MAF of shortage in 2045
- End of year storage is never full in this scenario

Scenario D – Portfolio Category Analysis

Development Needed of Each Portfolio Category Alone to Achieve Reliability



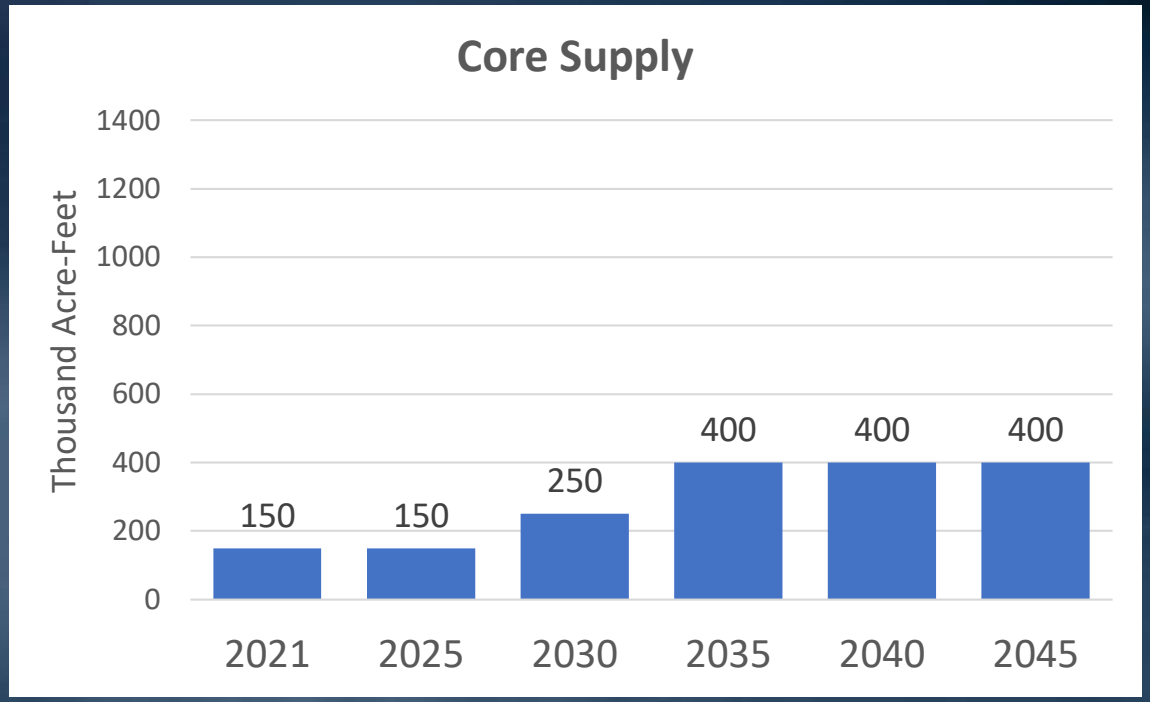


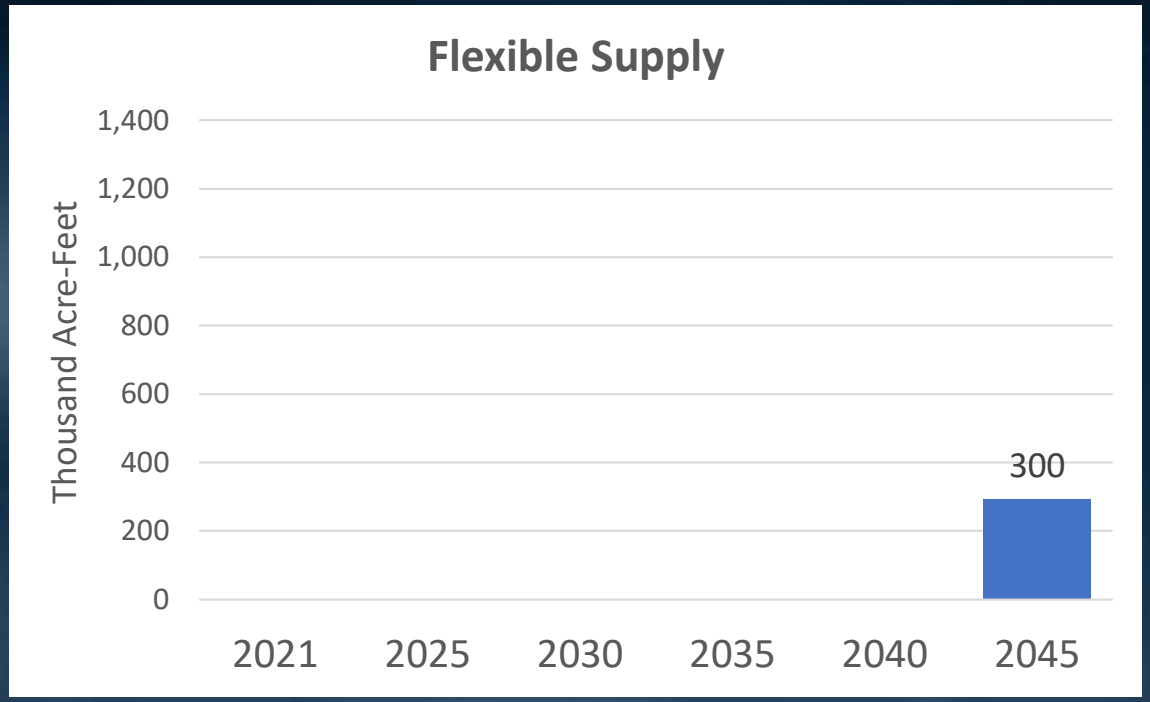
- Storage: No amount of additional storage capacity will eliminate shortage on its own

Note: Different scale used than Scenarios B and C

Scenario D – Portfolio Category Analysis

Combining Portfolio Categories Optimizes Outcomes





- Storage: Addition of 1 MAF of SWP storage with 500,000 AFY put/take capacity reduces the need for 100-250 TAF of Core Supply in years 2036-2045

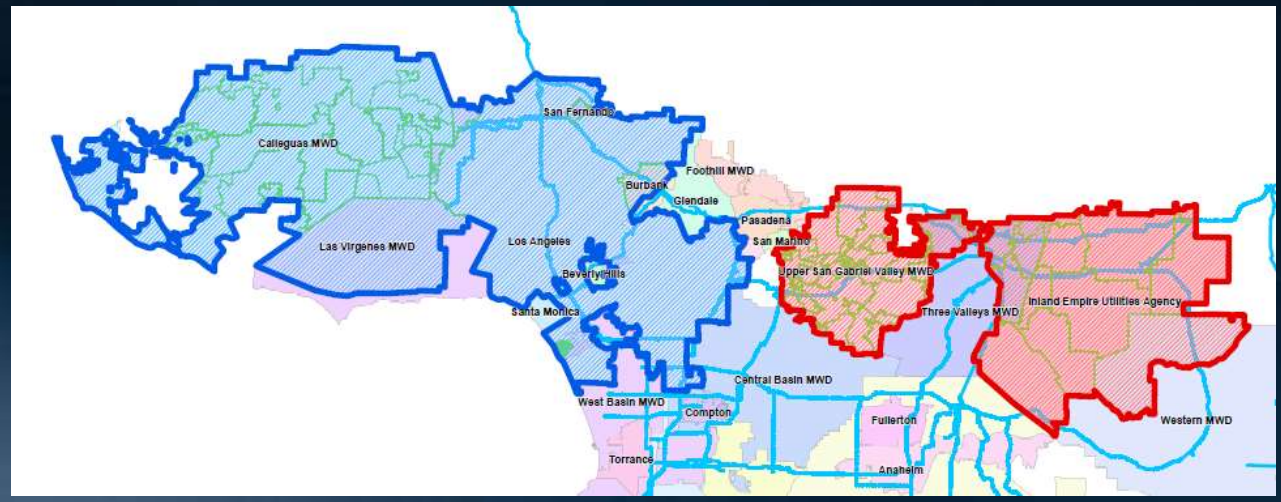
Note: Different scale used than Scenarios B and C

Scenario D - Portfolio Category Analysis

Takeaways

- Challenges are due to both increasing demands and decreasing local and imported supplies
- Investments in a combination of Core, Flexible and Storage are necessary to address shortages
- Additions to Core Supply and Storage work together in tandem
  - More storage reduces how much core supply is needed
  - More core supplies are needed to stockpile in storage over time
- Shortages affect Metropolitan's "blended" areas in the out-years, not just attributed to the "SWP-Only" areas

Key Observations



Reliability Needs

- Focus needed on managing and meeting "SWP-Only" demands in order to achieve regional reliability goal
  - Potential shortages in "SWP-Only" demands are critical vulnerabilities in any scenario
- Maintaining existing levels and/or developing new core supplies is imperative to achieving the reliability goal
  - Maintaining and developing local supplies is key to core supply
  - Potential loss of imported supplies have significant impacts

Key Observations Cont'd

Storage Needs

- Storage is critical for balancing supply/demands across all scenarios and optimizes core supply development
- New storage capacity is most effective if that supply can reach the "SWP-Only" areas
- Existing storage programs begin to expire during the IRP planning horizon
  - Need policy direction on whether to renegotiate existing storage programs

Key Observations Cont'd

Efficiency/Demands

- Water use efficiency and behavior have a large impact on the size of the supply/demand gap for all scenarios
- Scenarios in which demands are lower lead to greater reliability
- Taking steps to control growth in demands for Metropolitan deliveries can be a robust strategy to ensure reliability
- Lower demands are easier to manage but also put stress on financial sustainability

Key Observations

System Improvements

- Investments in system improvements may help move additional water currently available to Metropolitan to the “SWP-Only” areas
- Partnerships with agencies to provide access to additional supply to the “SWP-Only” areas may assist in achieving the reliability goal

Implementation

- Each scenario warrants different sets of actions to ultimately achieve the reliability goal
- Looking across all scenarios with combined portfolio categories will result in robust actions

Next Steps

Next Steps

- Obtain feedback on key observations
- Incorporate the IRP observations from scenarios into key takeaways and high-level recommendations
- Transition to a collaborative process with member agencies and stakeholders focused on implementation and adaptive management
  - Develop a decision support strategy for thinking through timing and basis for adaptive management actions, using available information and evaluation criteria


THE METROPOLITAN WATER DISTRICT OF
SOUTHERN CALIFORNIA
1928