



Preliminary Gap Analysis of the 2020 Integrated Resources Plan

Integrated Resources Plan Special Committee

Item 6b

December 15, 2020

Overview

- Recent Activity
- Data Organization and Delivery
- Preliminary Assumptions and Gap Analysis
- Demand and Climate Change Experts
- Next Steps

Data Organization – General Categories

Retail Demand – By Agency

- Municipal & Industrial
- Agriculture
- Seawater Barrier
- Groundwater Replenishment

Local Supply – By Agency

- Surface Water
- Groundwater
- Groundwater Recovery
- Total Recycled Water
- Seawater Desalination
- Los Angeles Aqueduct

Conservation – By Agency

- Active and Code Based

Demographics – By Agency

- Population
- Households
- Employment

Imported Supply

- State Water Project
- Colorado River

Climate – By Agency

- Weather Effect Factors
- Precipitation

Demands on MWD

- Consumptive Use
- Seawater Barrier
- Replenishment

- **Historical**
- **Projections for each Scenario**

Data Organization – General Categories

Retail Demand – By Agency

- **Municipal & Industrial**
- Agriculture
- Seawater Barrier
- Groundwater Replenishment

Trial	Hydrology	2020	2021	2022	2023	2024
1	1922	353,526	364,019	366,149	364,320	359,154
2	1923	363,784	365,913	364,086	359,154	359,154
3	1924	365,678	363,852	358,923	356,441	361,788
4	1925	363,617	358,692	356,212	367,735	361,788
5	1926	358,461	355,983	367,498	367,658	364,019
6	1927	355,754	367,262	367,421	363,953	369,154
7	1928	367,025	367,185	363,719	368,871	361,788
8	1929	366,948	363,485	368,633	361,788	361,788
9	1930	363,251	368,396	361,556	362,952	368,159
10	1931	368,159	361,323	362,718	368,414	359,154
11	1932	361,090	362,485	368,178	359,422	368,159
12	1933	362,252	367,941	359,190	368,576	359,154
13	1934	367,704	358,959	368,338	359,016	358,728
14	1935	358,728	368,101	358,785	358,266	364,019
15	1936	367,864	358,554	358,035	364,146	361,788
16	1937	358,323	357,805	363,912	367,131	346,452
17	1938	357,574	363,678	366,895	346,452	361,788
18	1939	363,444	366,659	346,229	366,912	361,788
19	1940	366,423	346,006	366,676	365,072	359,154
20	1941	345,783	366,440	364,838	355,146	361,788



25
(Forecast
years)

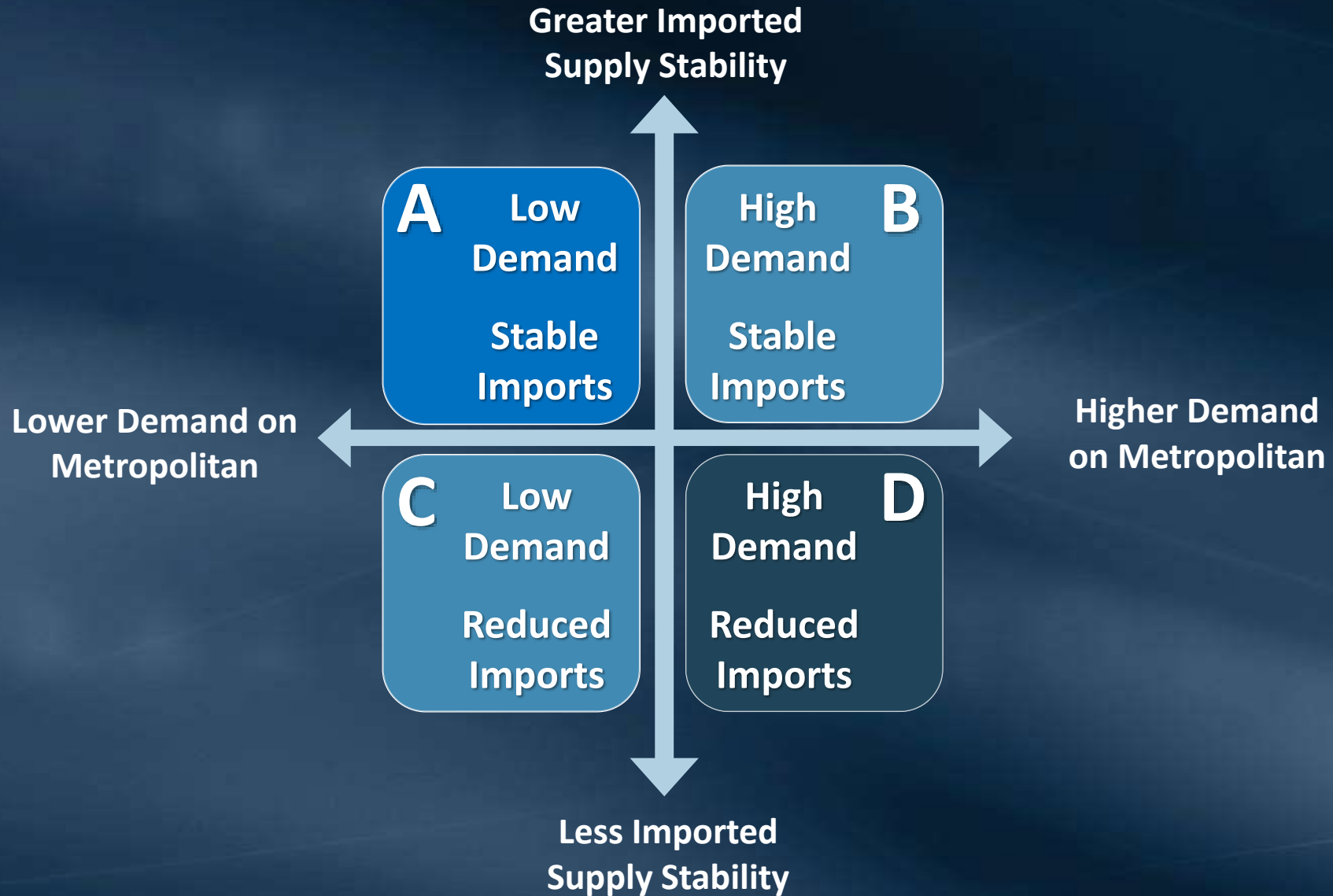


96 (Hydrologic years)

Recent Activities

- Oct 16 – Member Agency Managers Meeting
 - Assumptions and Initial results for Scenarios A and D
- Oct 27 – IRP Special Committee Meeting
 - Assumptions and Initial results for Scenarios A and D
- Nov 13 – Member Agency Managers Meeting
 - Assumptions and Initial results for Scenarios B and C
- Nov 24 – Member Agency Technical Workgroup
 - Preliminary Gap Analysis for all Scenarios

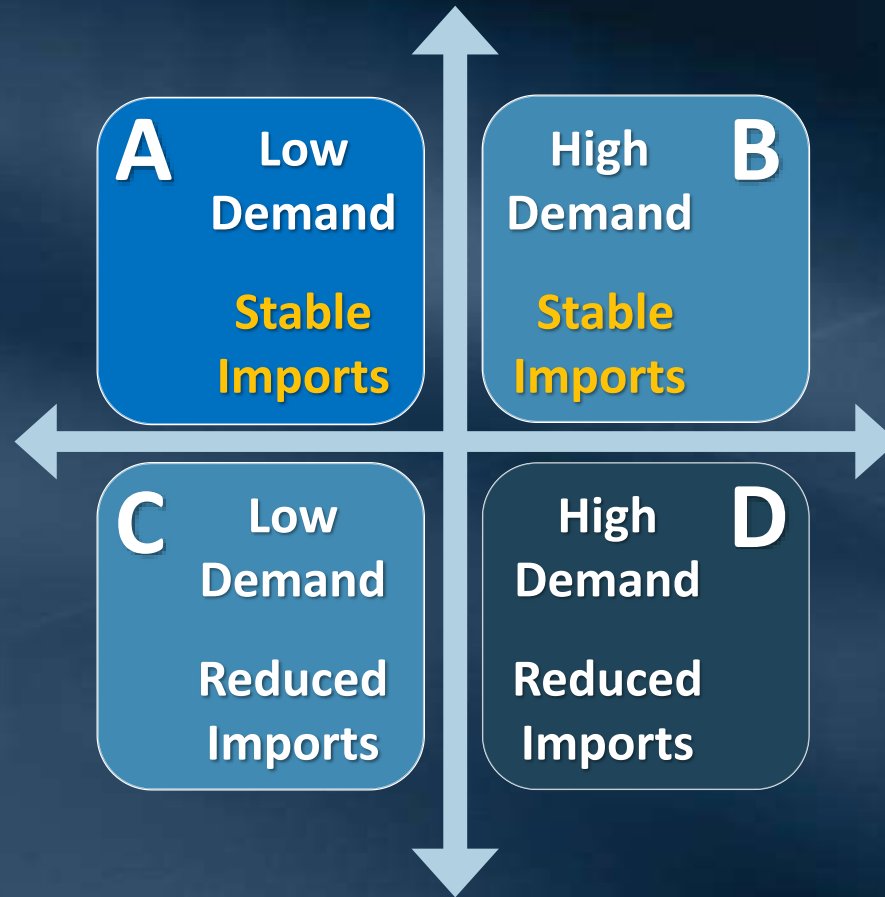
Framing the Scenarios



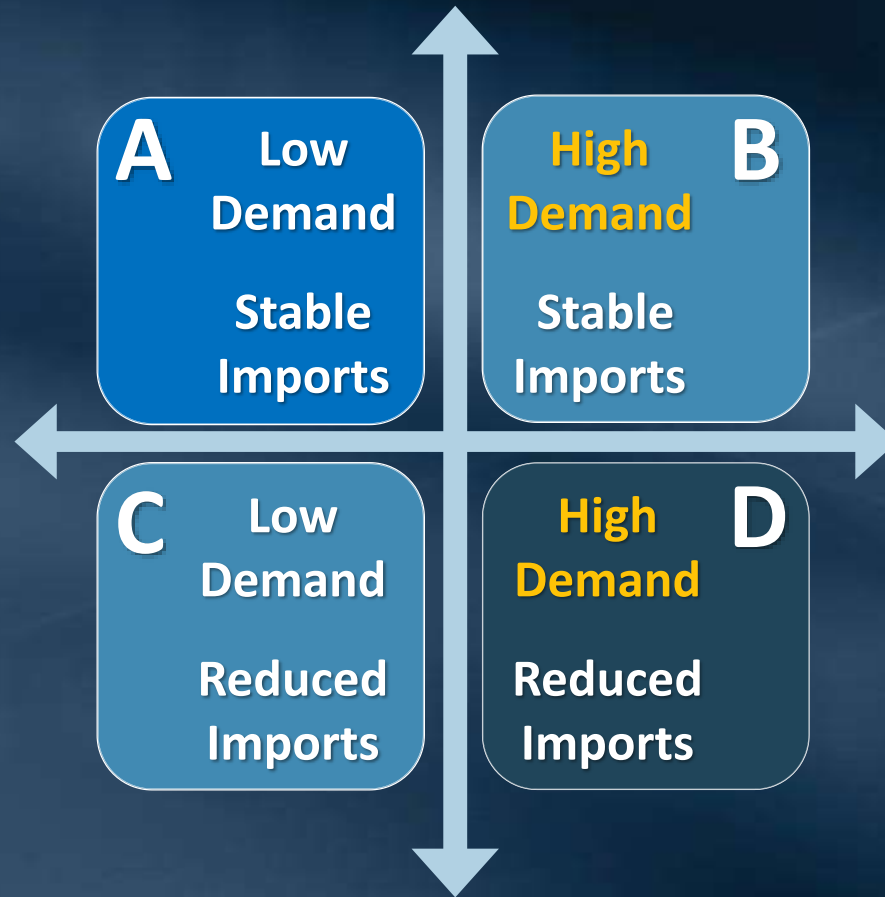
Driving the Scenarios

A - B

Gradual Climate
Impacts & Low
Regulatory Impacts



Driving the Scenarios



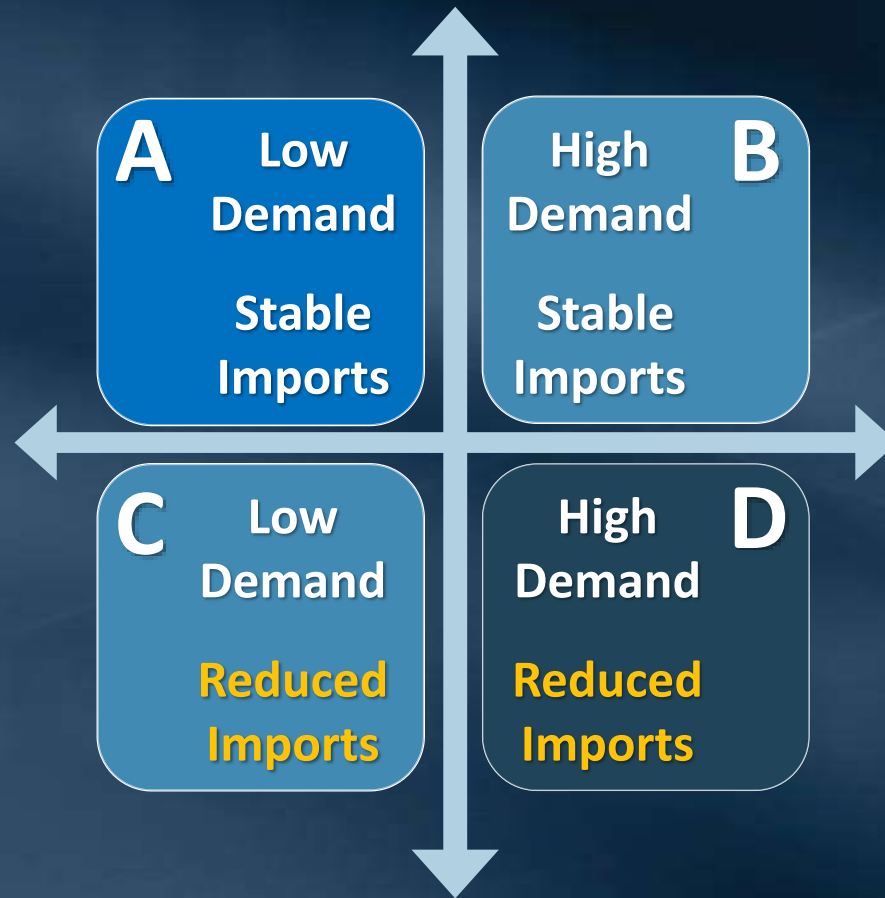
A - B

Gradual Climate
Impacts & Low
Regulatory Impacts

B - D

High Economic
Growth

Driving the Scenarios



A - B

Gradual Climate Impacts & Low Regulatory Impacts

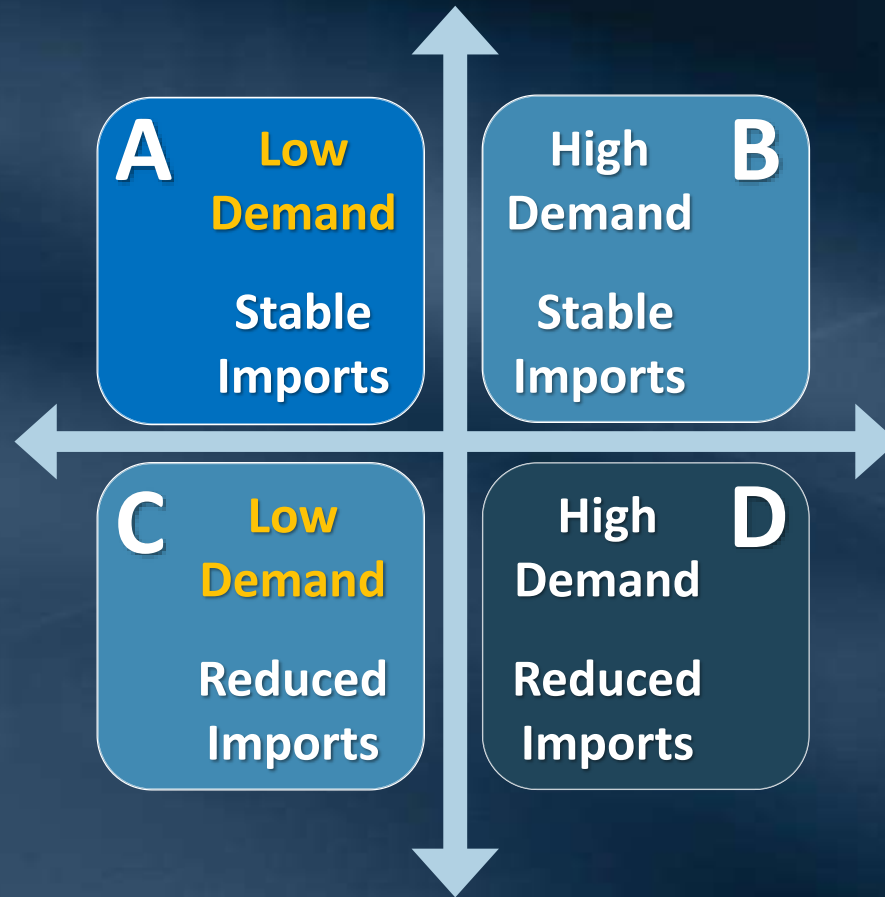
B - D

High Economic Growth

C - D

Severe Climate Impacts and high Regulatory Impacts

Driving the Scenarios



A - B

Gradual Climate Impacts & Low Regulatory Impacts

B - D

High Economic Growth

C - D

Severe Climate Impacts & High Regulatory Impacts

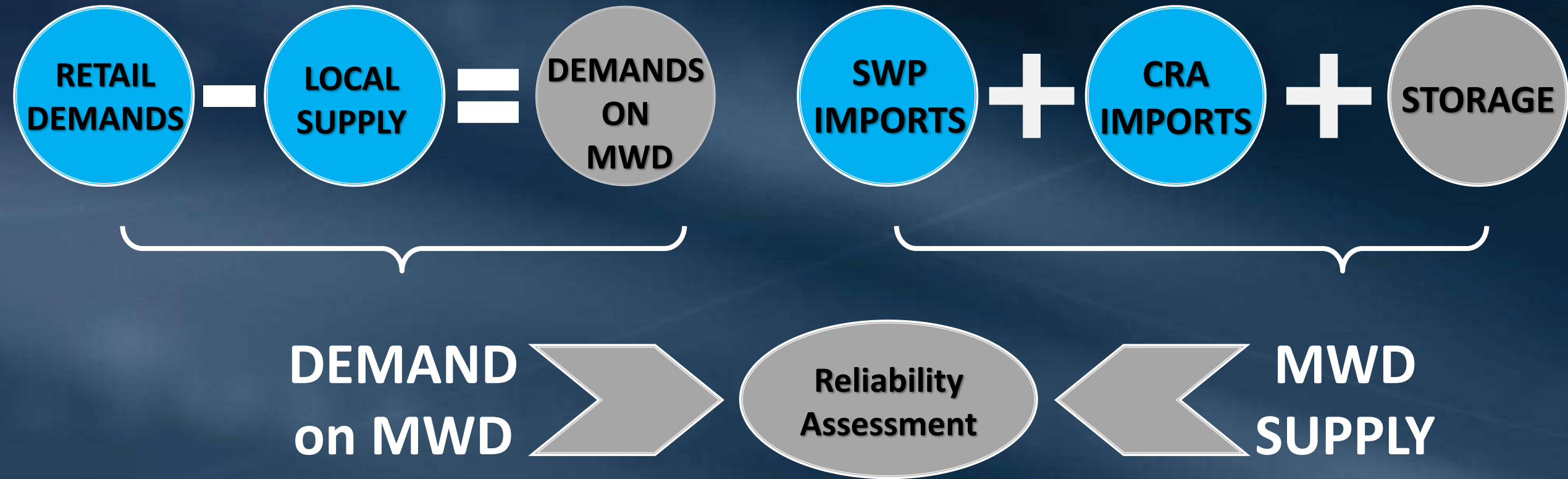
A - C

Slow Economic Growth

Preliminary Analysis

Piecing Together the Reliability Assessment

“Gap Analysis”

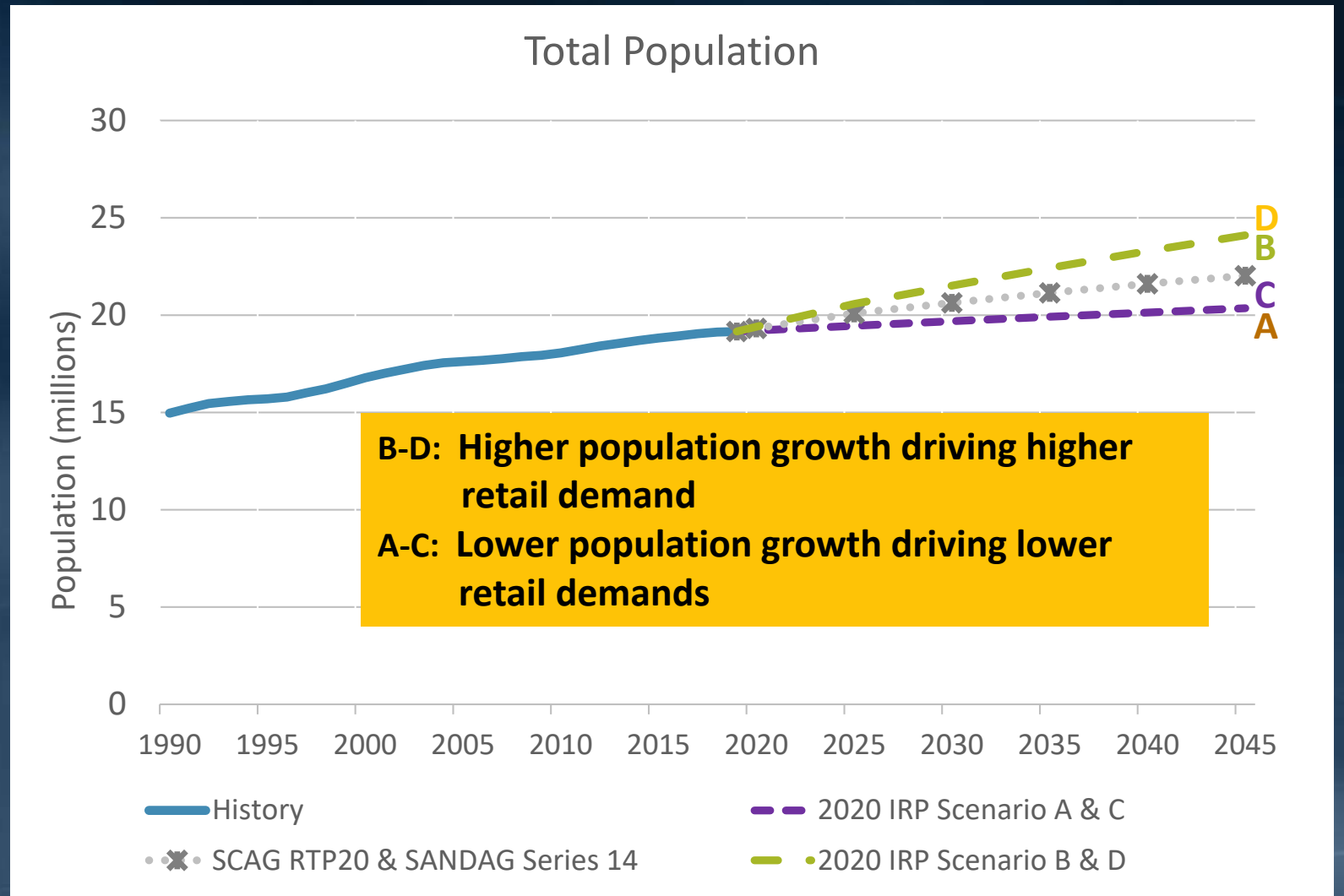
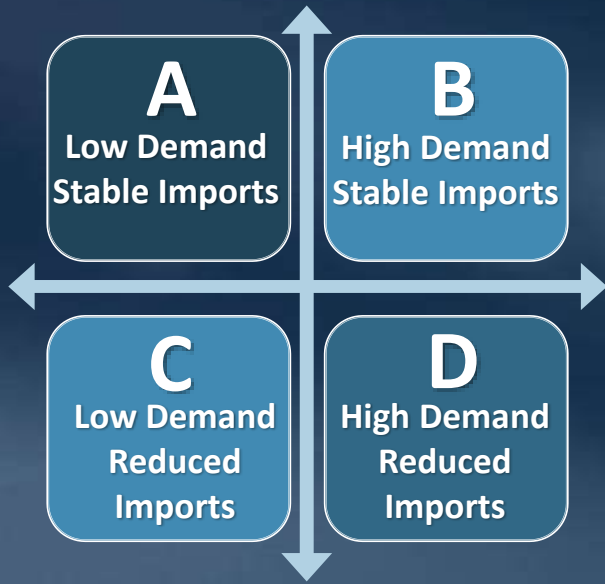


Assumption driven

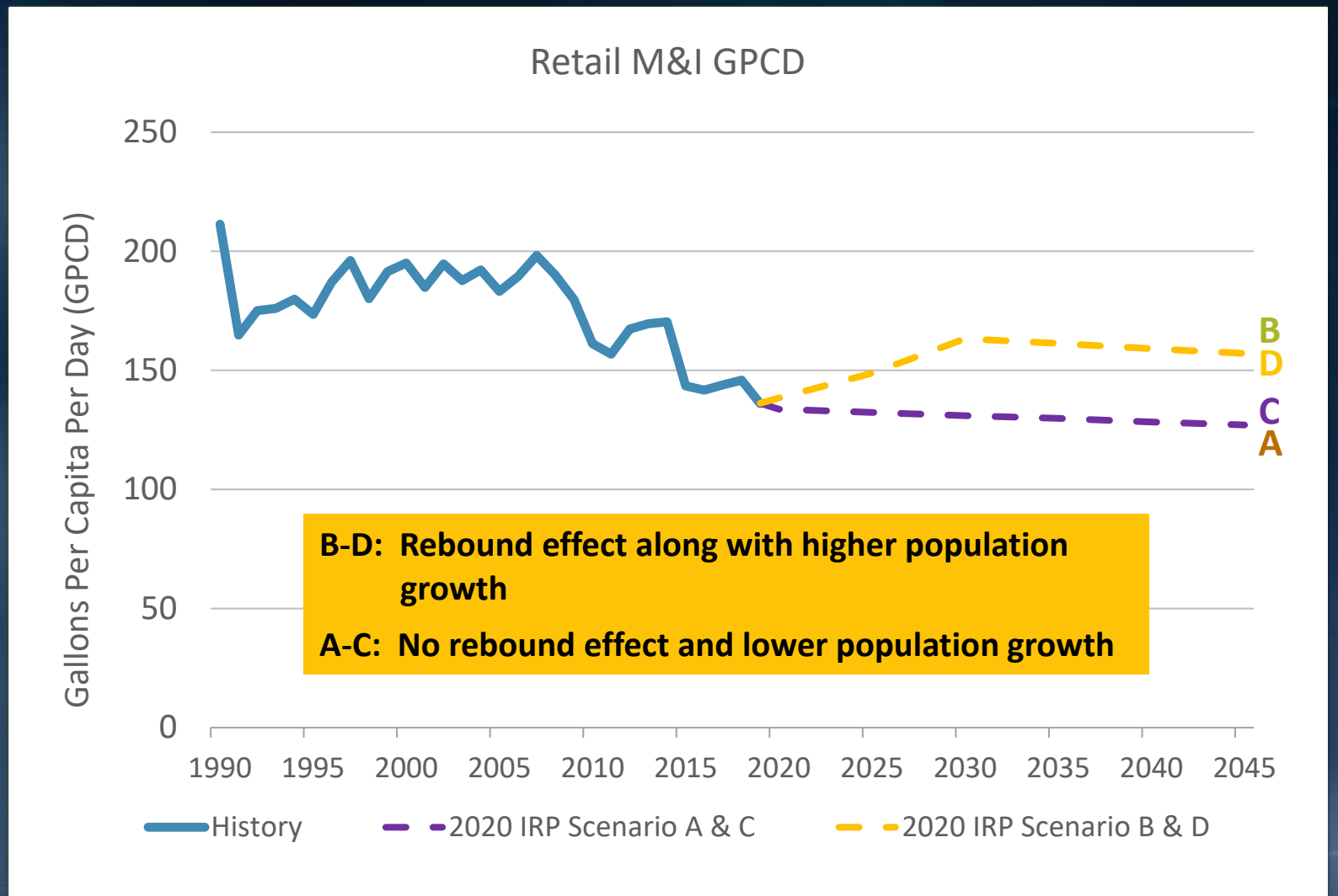
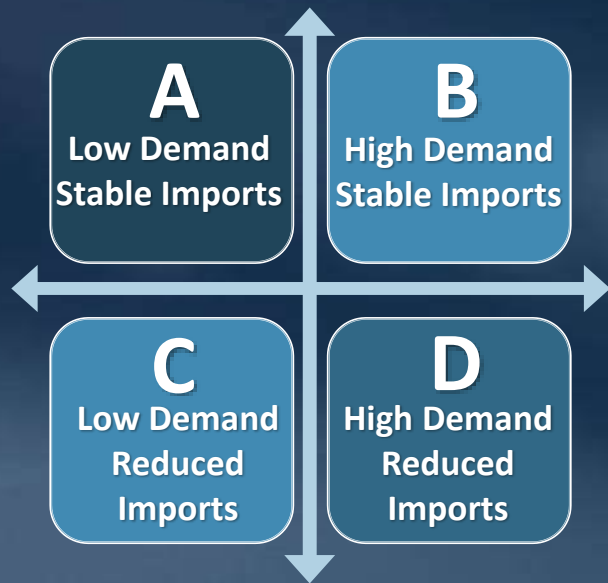


Calculated or modeled based on assumptions

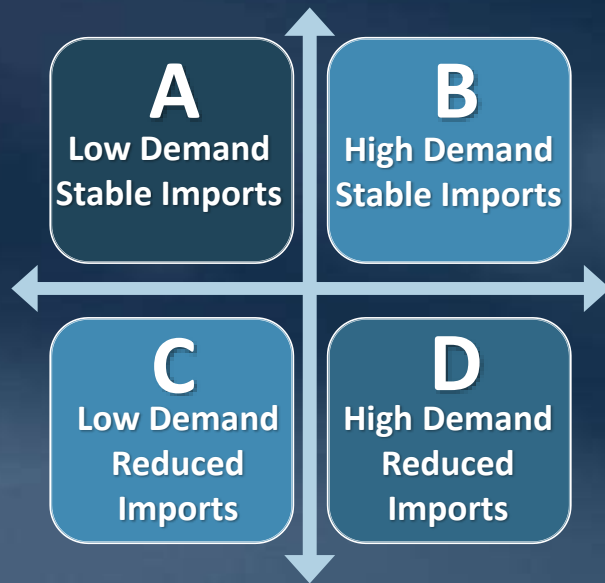
Preliminary Total Population



Preliminary M&I GPCD

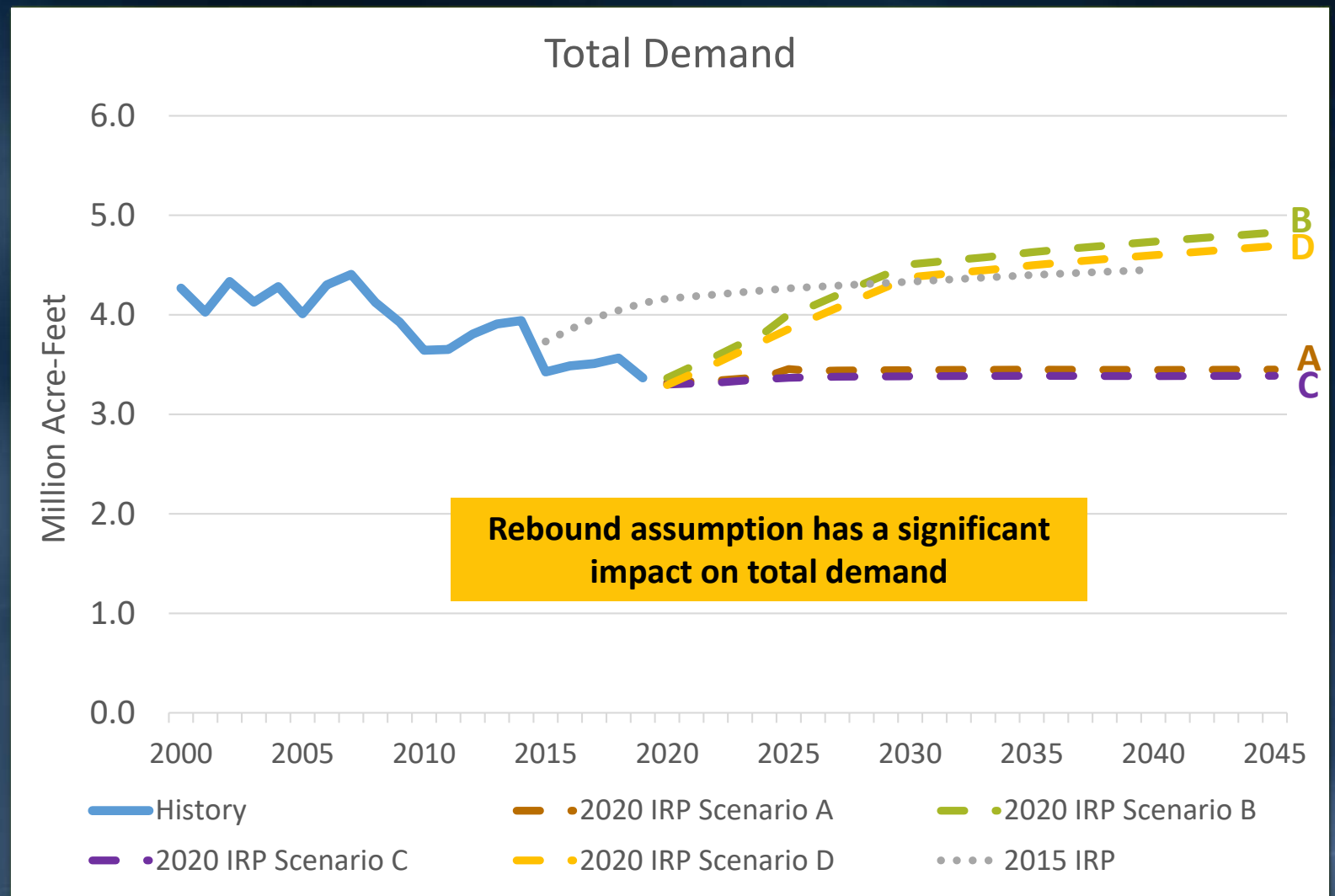


Preliminary Total Demands

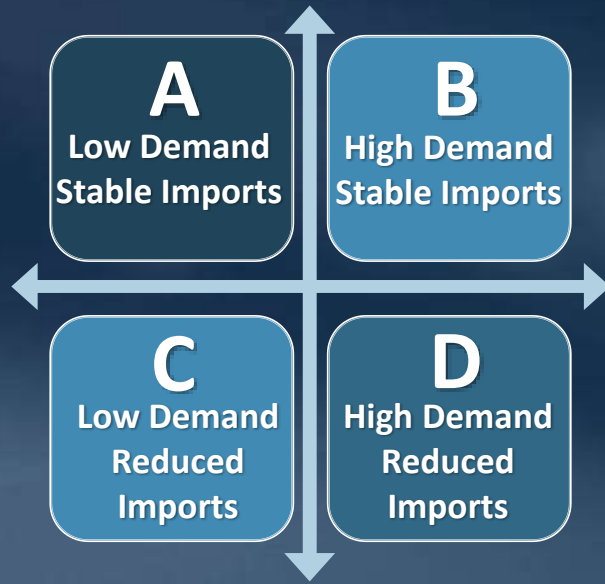


Total Demand

- Retail M&I Demand
- Agricultural Demand
- Seawater Barrier Demand
- GW Replenishment Demand

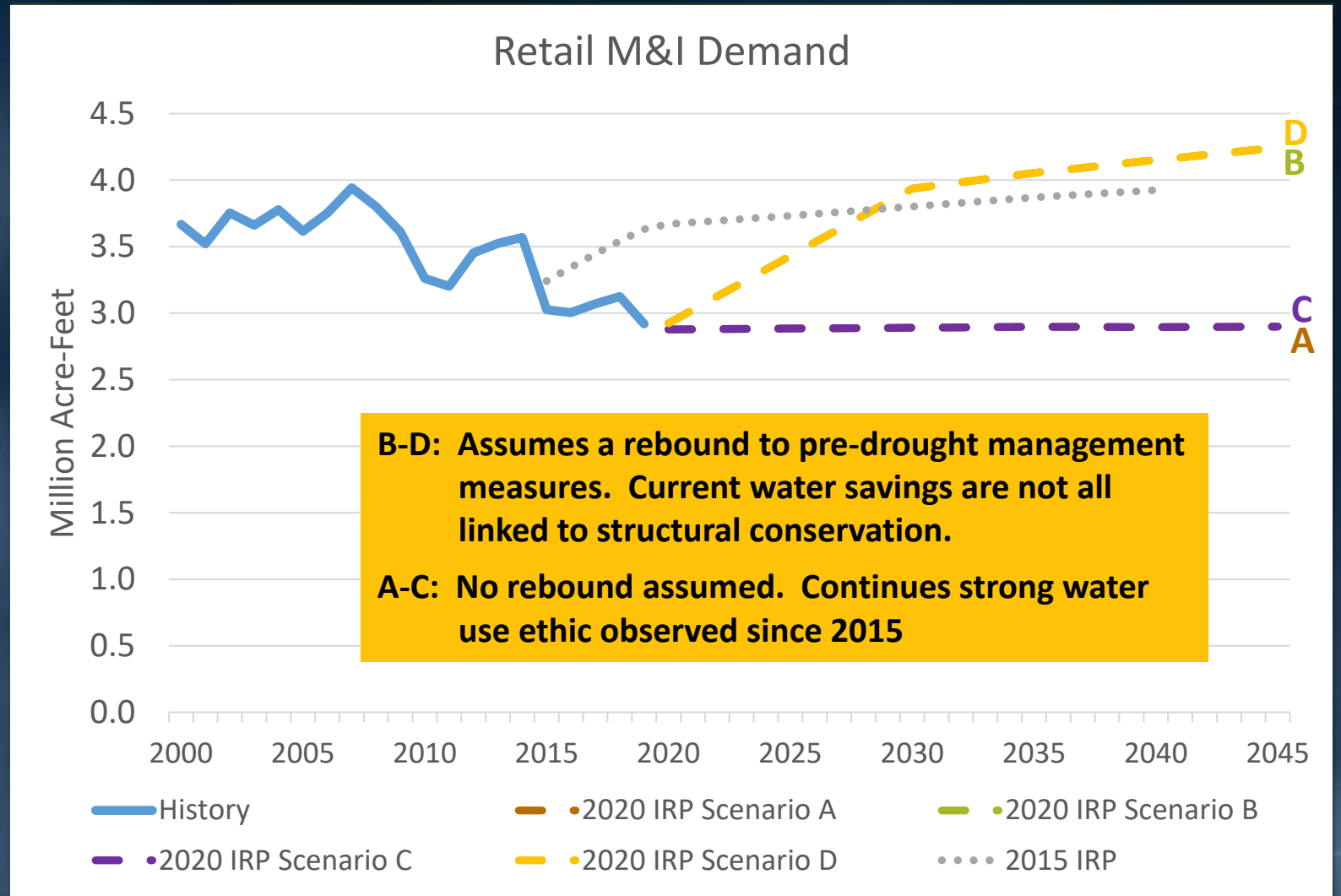


Preliminary Retail M&I Demand

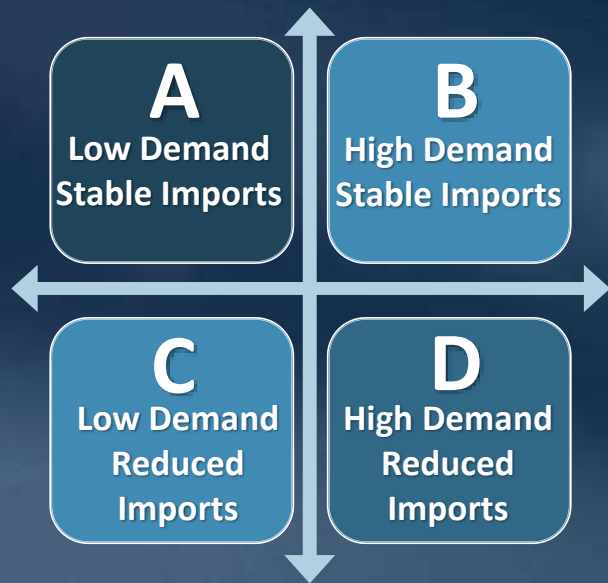


Total Demand

- **Retail M&I Demand**
- Agricultural Demand
- Seawater Barrier Demand
- GW Replenishment Demand

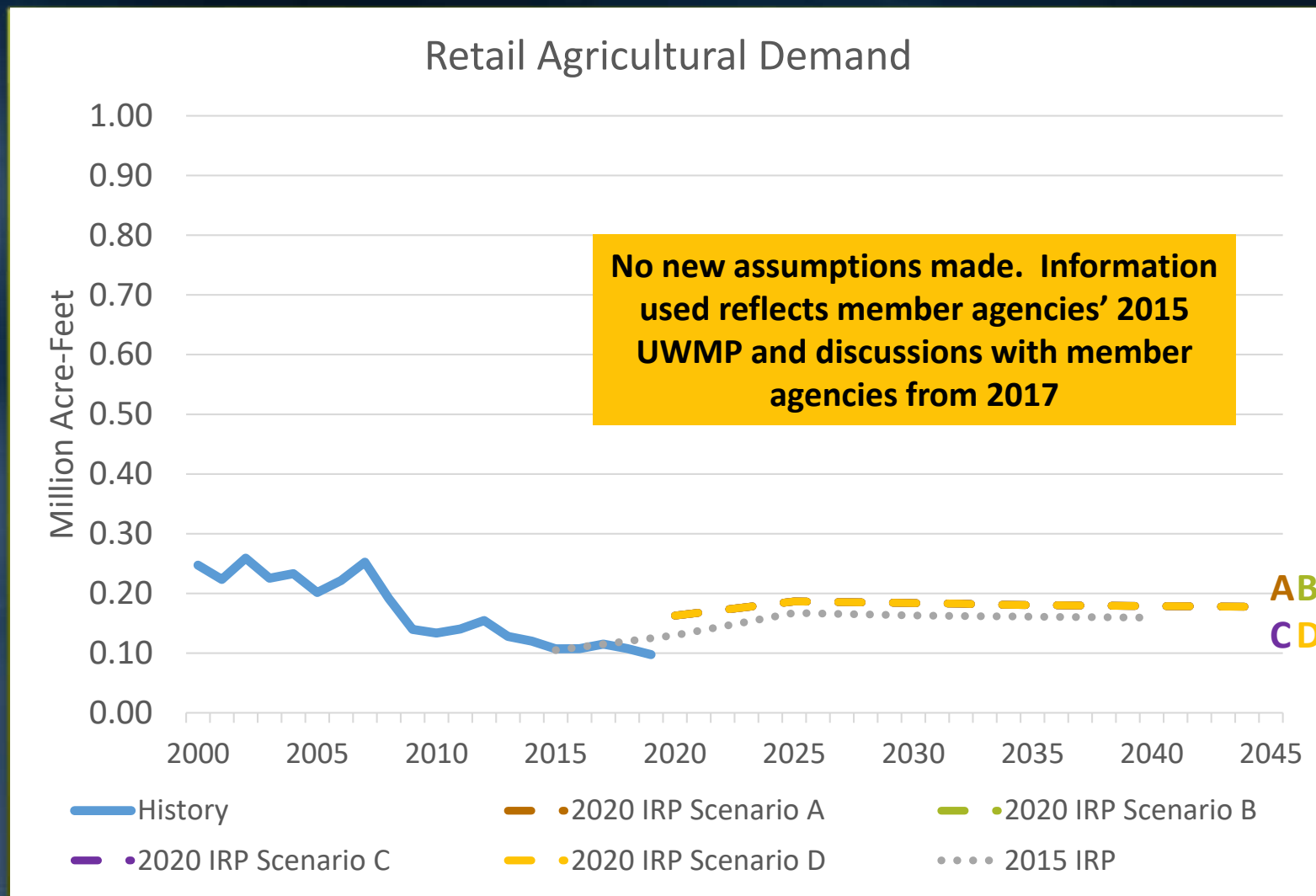


Preliminary Agricultural Demand

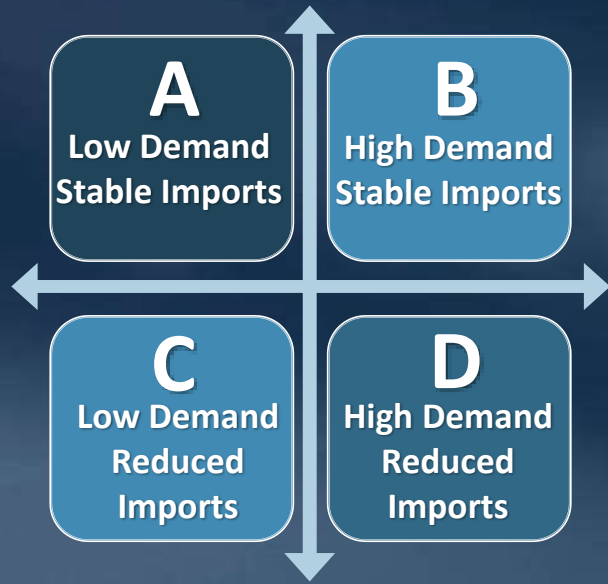


Total Demand

- Retail M&I Demand
- **Agricultural Demand**
- Seawater Barrier Demand
- GW Replenishment Demand

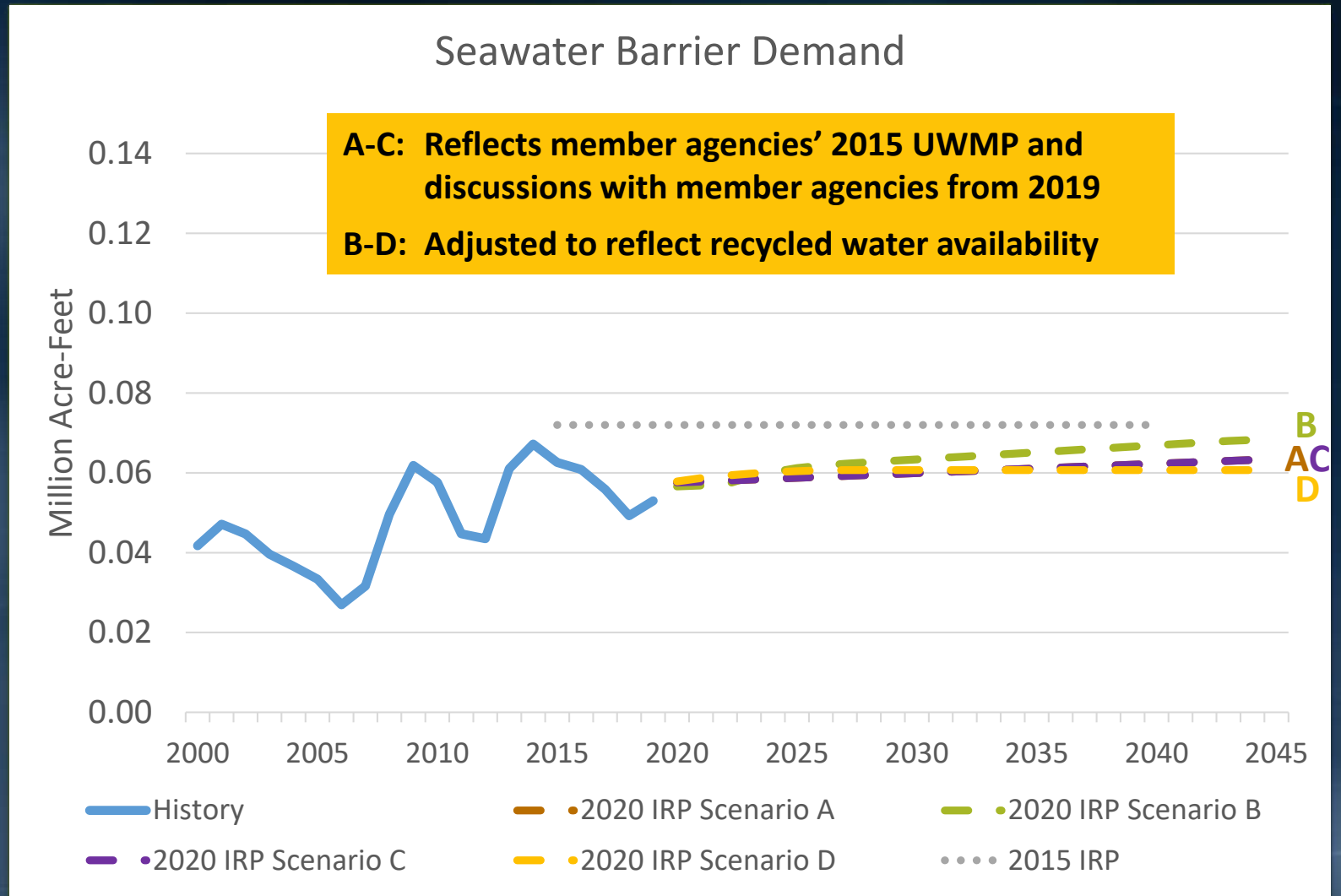


Preliminary Seawater Barrier Demand

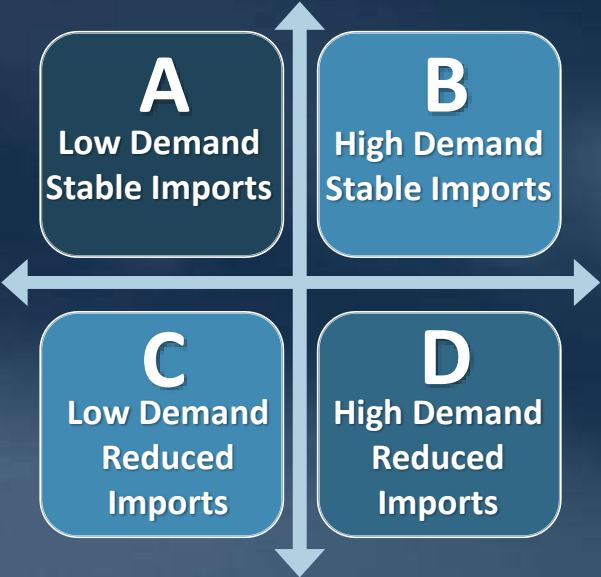


Total Demand

- Retail M&I Demand
- Agricultural Demand
- **Seawater Barrier Demand**
- GW Replenishment Demand

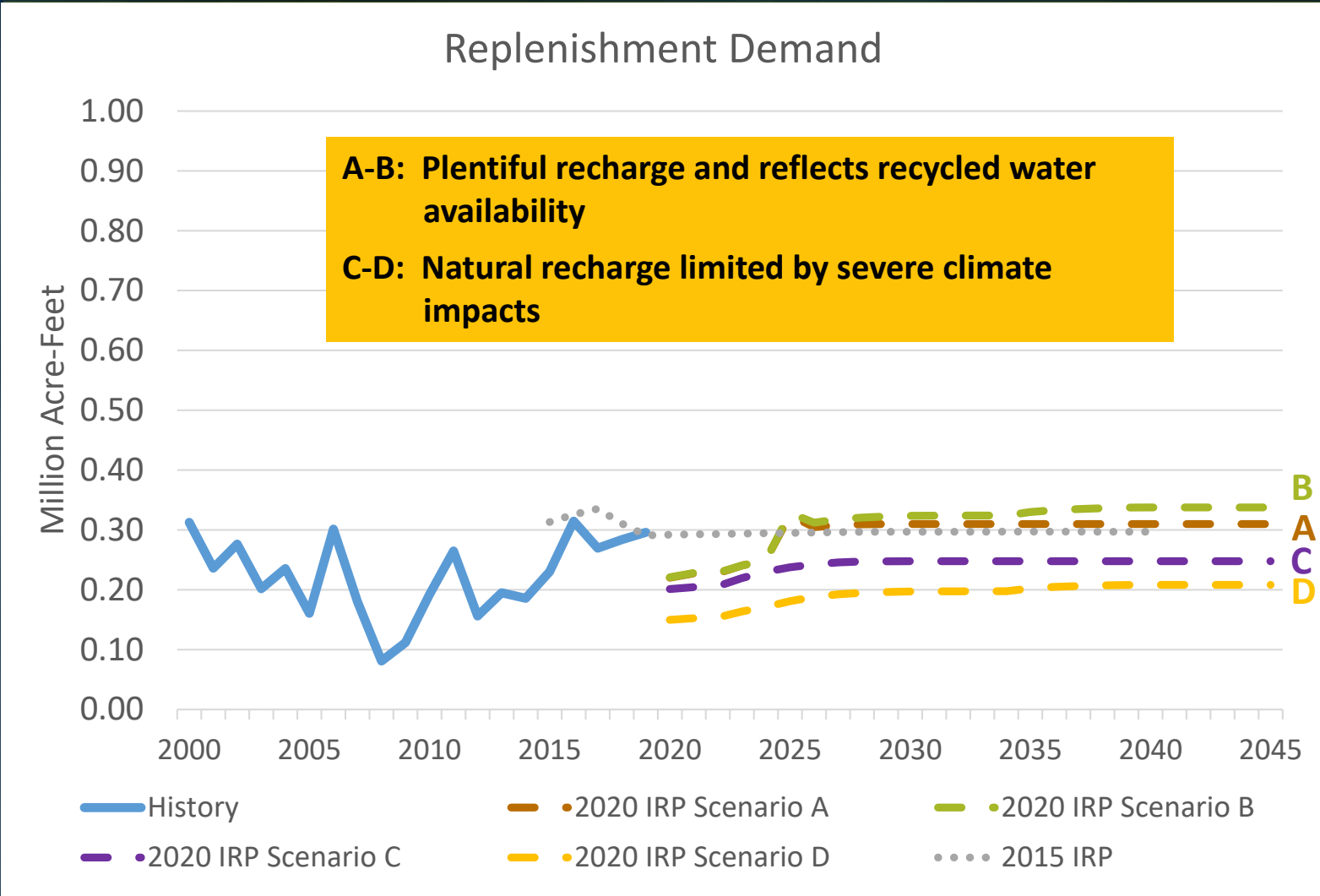


Preliminary Groundwater Replenishment Demand



Total Demand

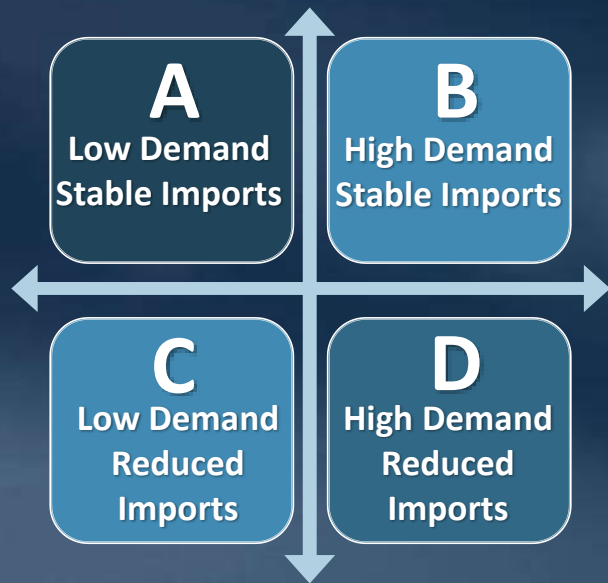
- Retail M&I Demand
- Agricultural Demand
- Seawater Barrier Demand
- **GW Replenishment Demand**



Feedback and Further Examination Underway

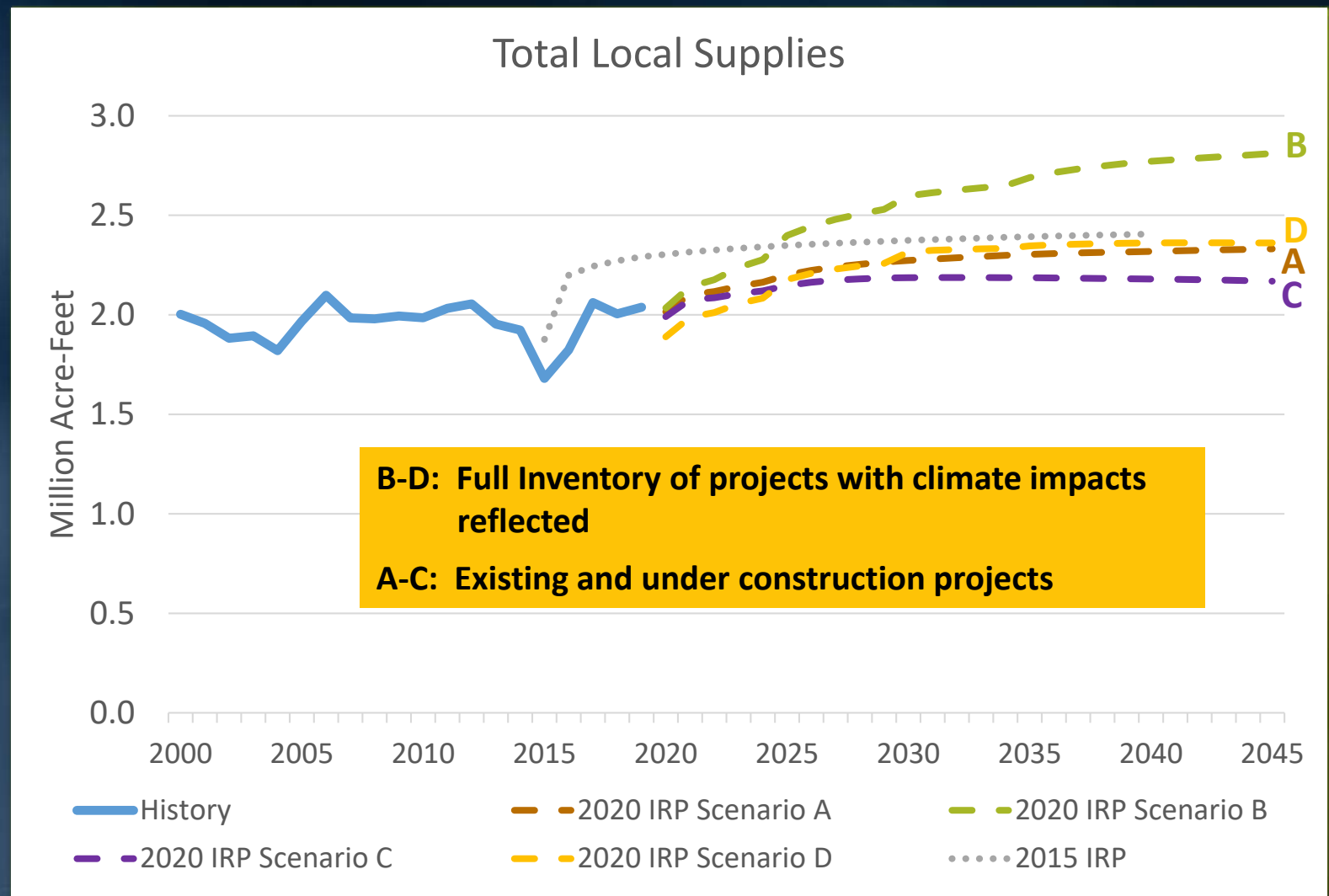
- Investigate drivers for continued low demands in order to inform demand rebound assumptions
- Plausible higher/lower population, demographic and economic growth
- Agricultural demand patterns
- Update seawater barrier demands and operating assumptions

Preliminary Total Local Supply Production

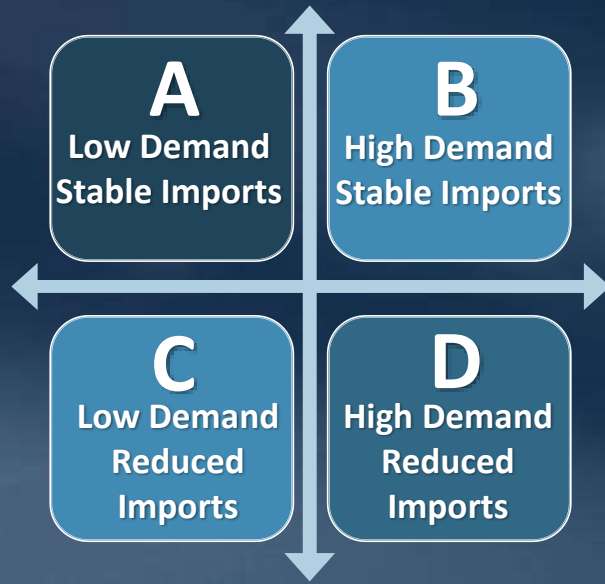


Total Local Supply Production

- Groundwater
- Groundwater Recovery
- Total Recycled Water
- Seawater Desalination
- Surface Water
- Los Angeles Aqueduct

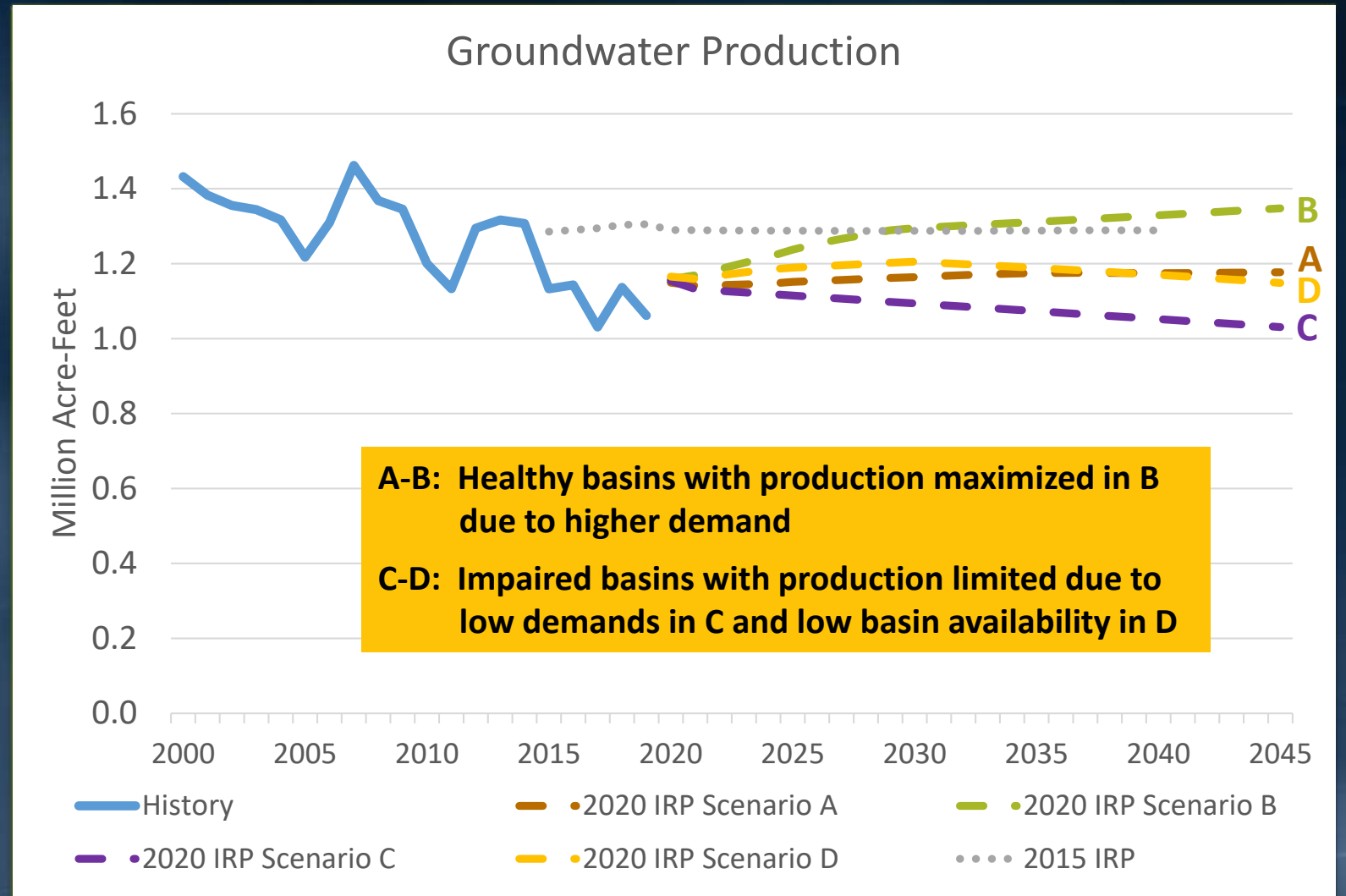


Preliminary Groundwater

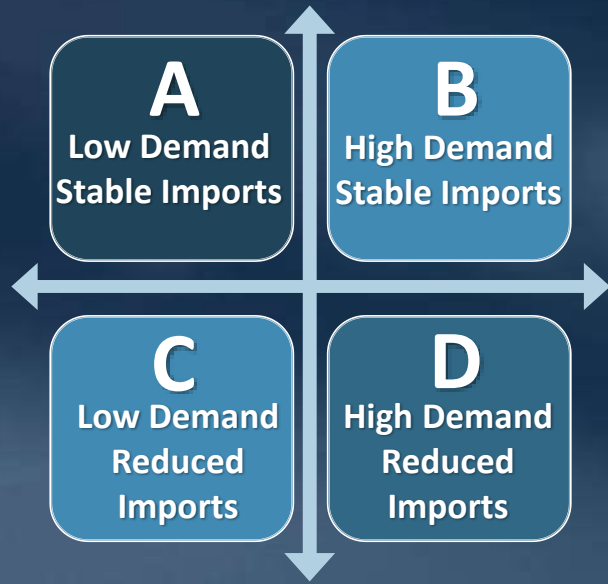


Total Local Supply Production

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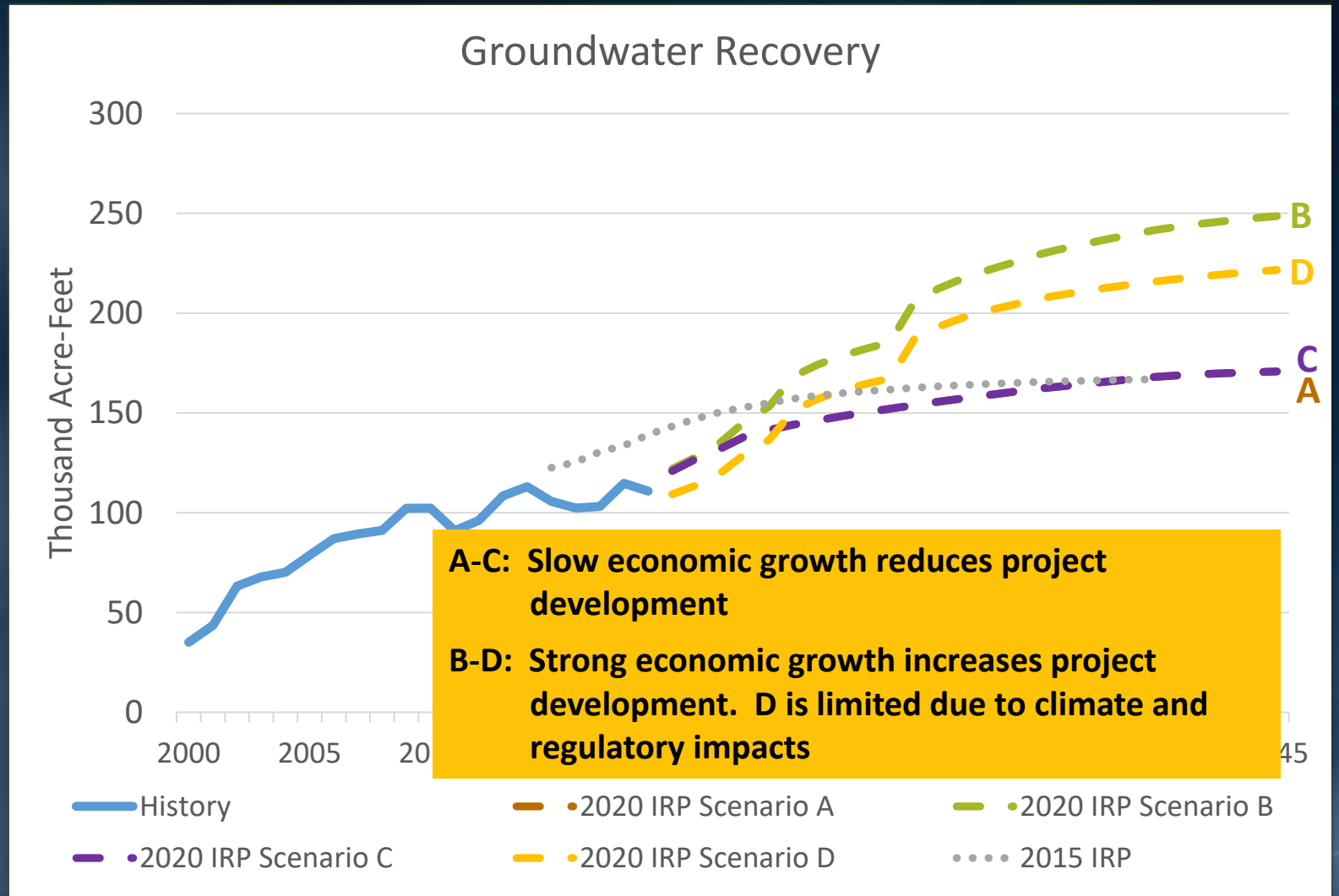


Preliminary Groundwater Recovery

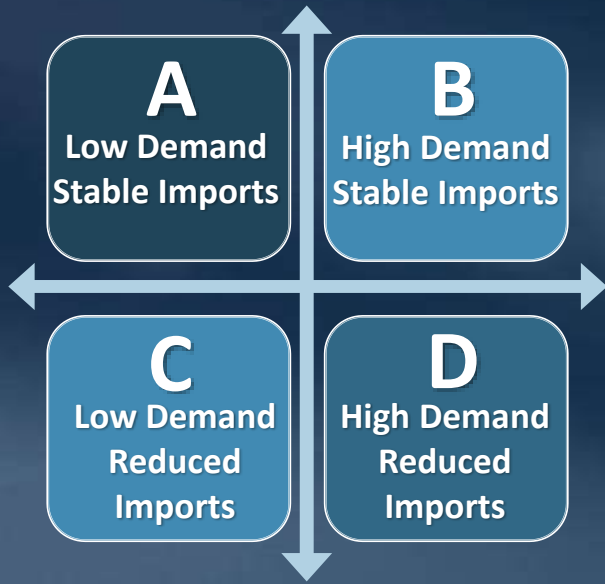


Total Local Supply Production

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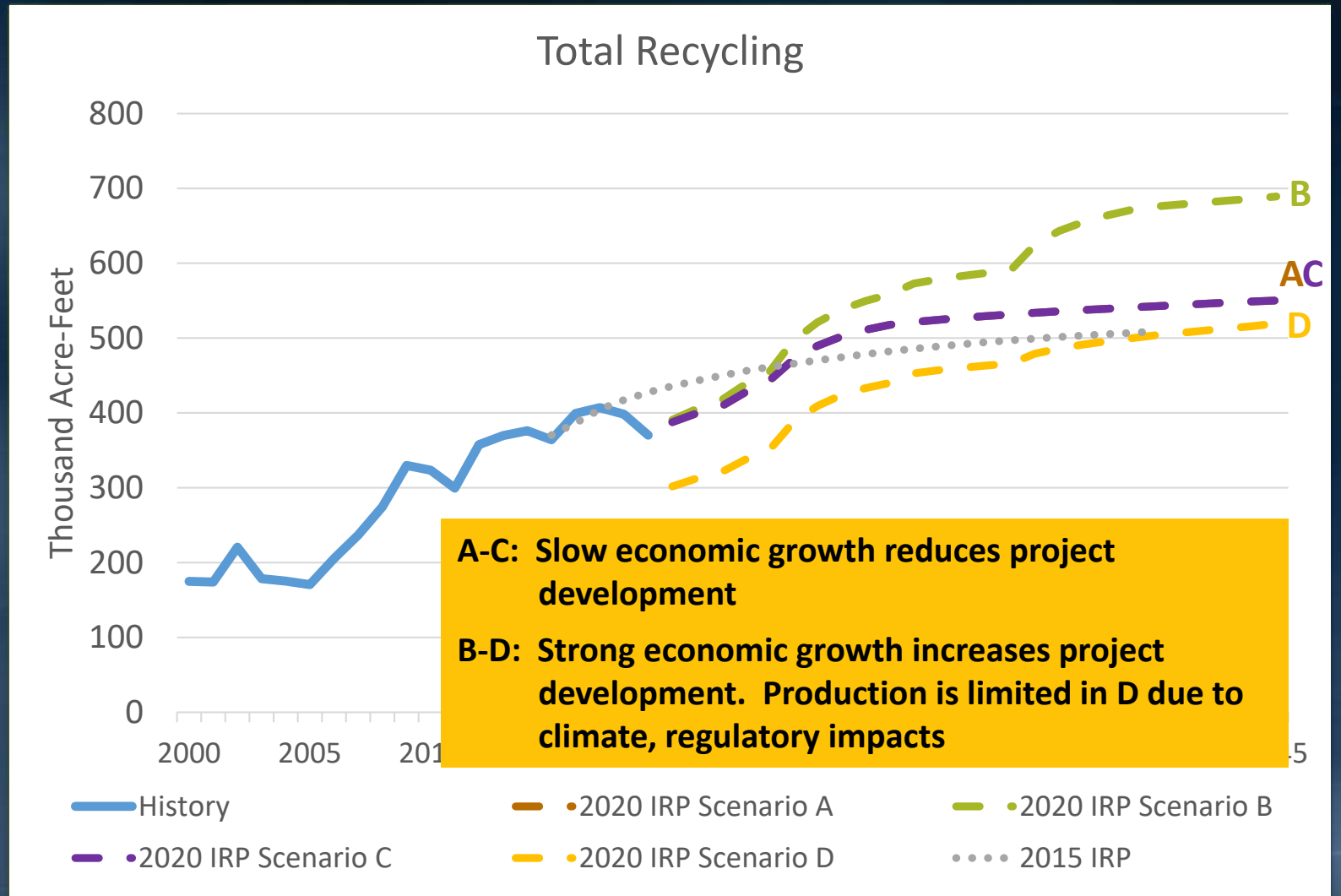


Preliminary Recycled Water

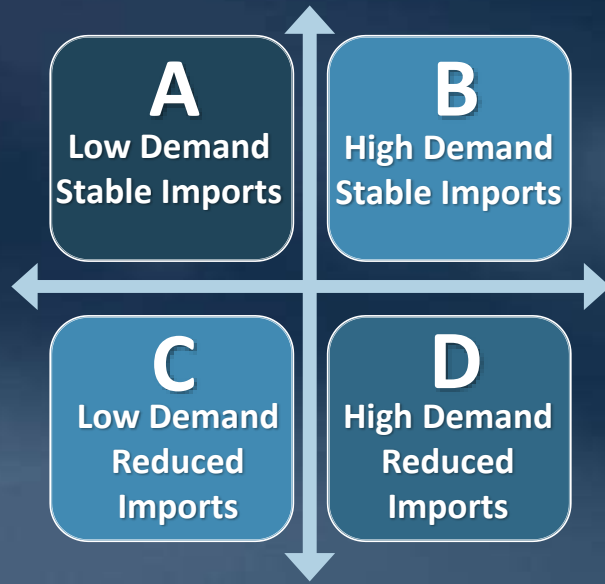


Total Local Supply Production

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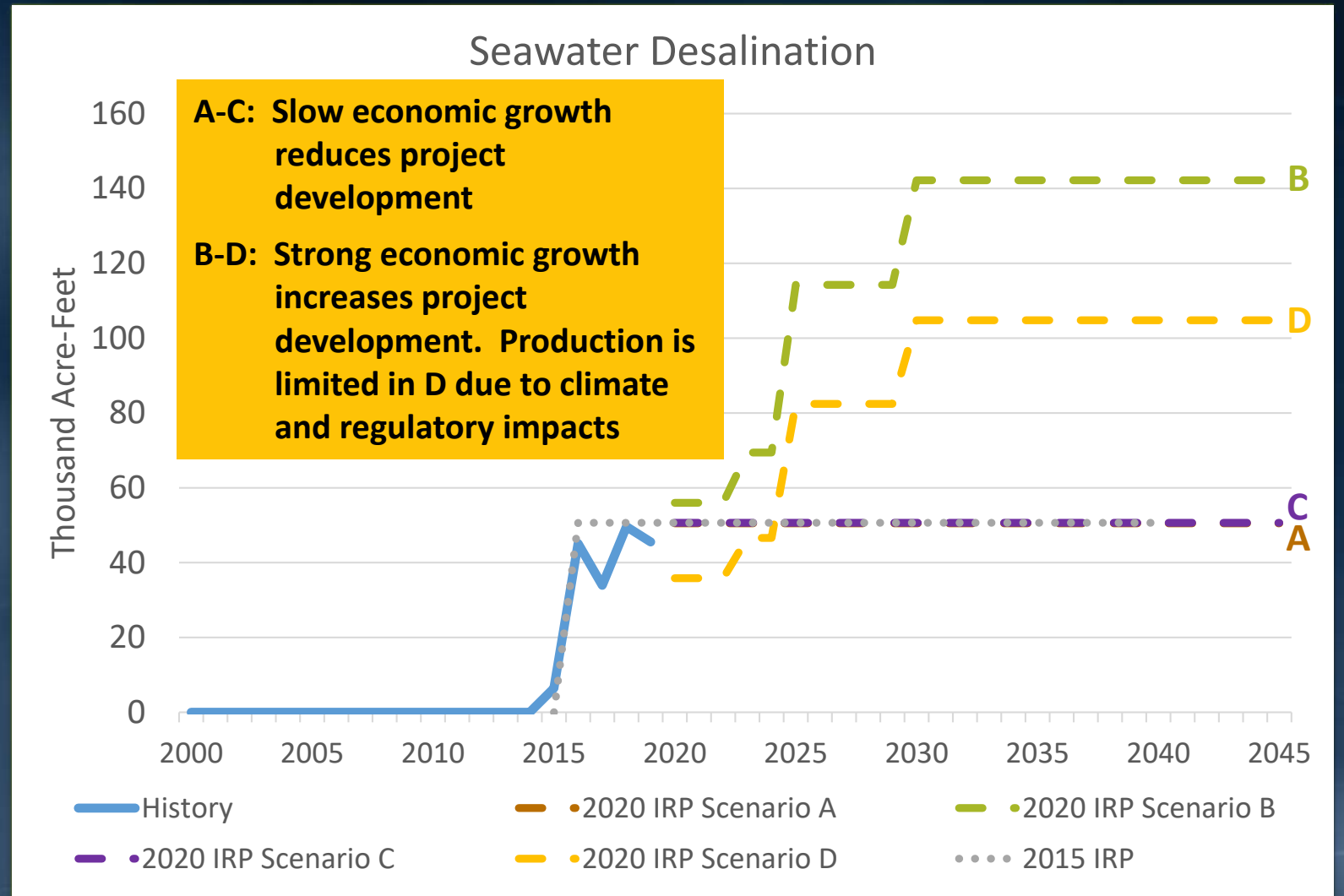


Preliminary Seawater Desalination

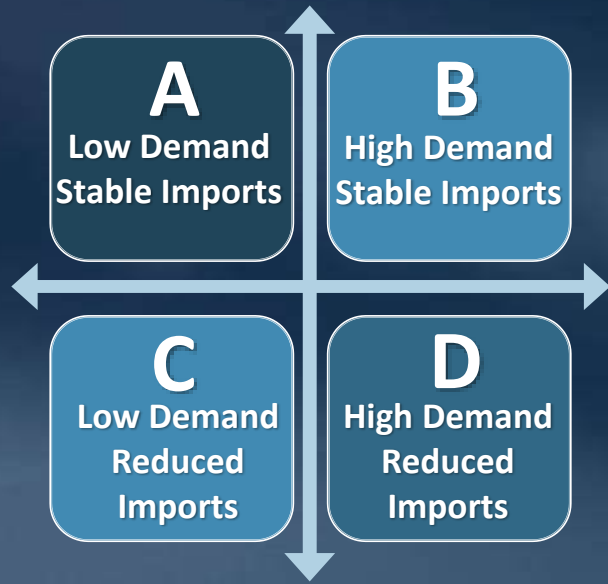


Total Local Supply Production

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- **Seawater Desalination**
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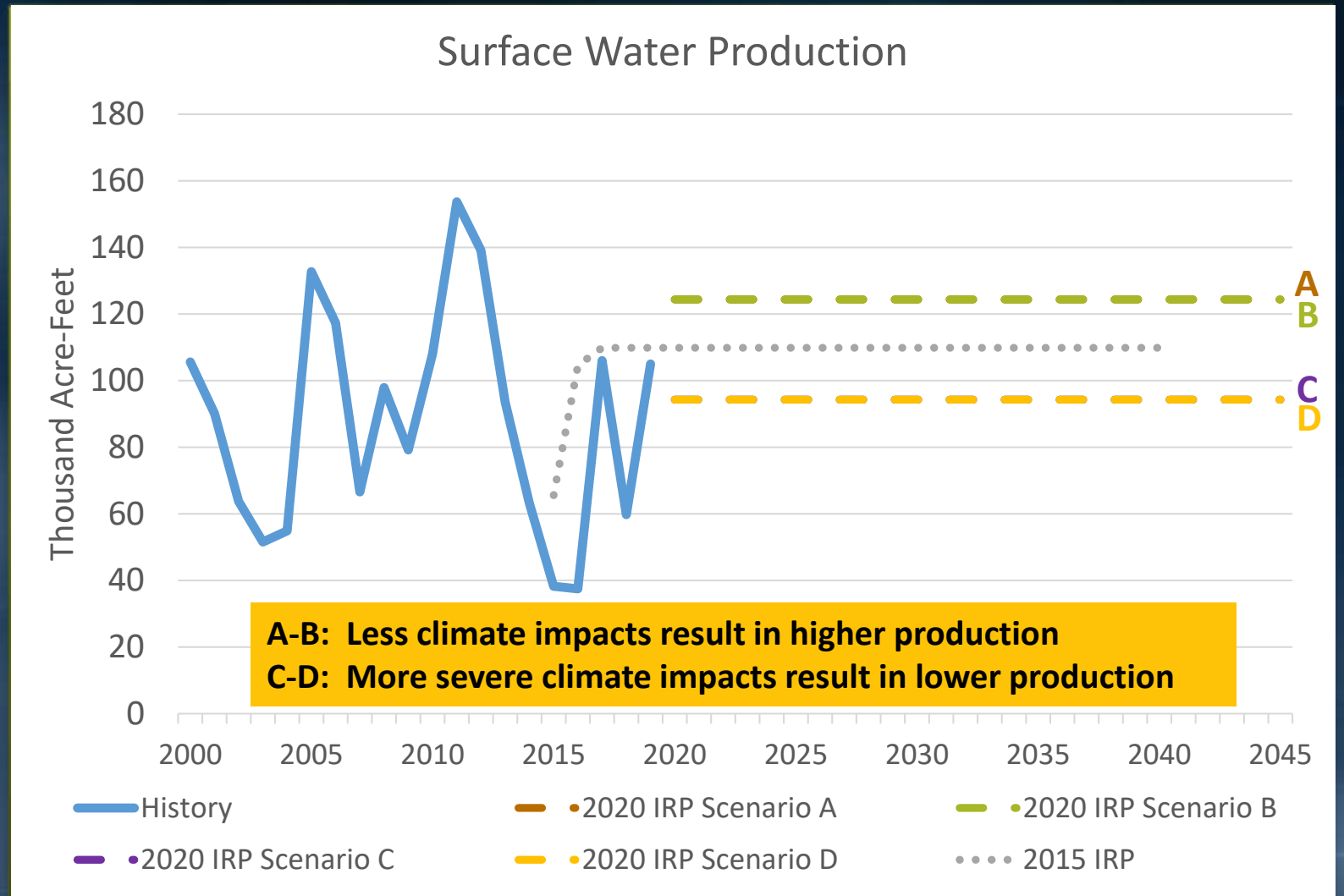


Preliminary Surface Water

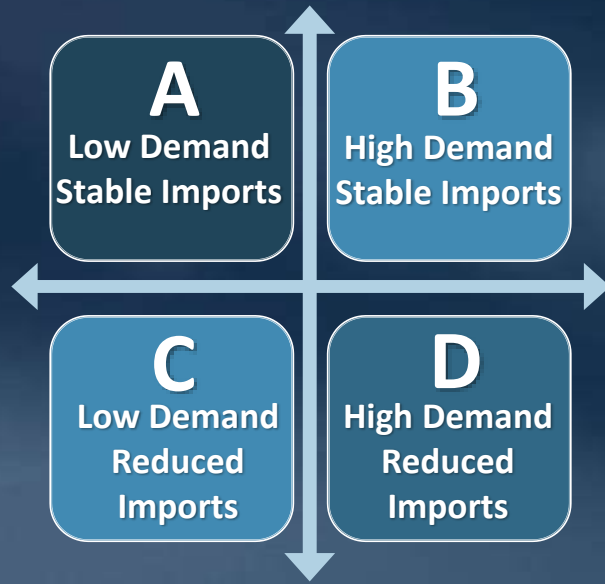


Total Local Supply Production

- Groundwater
- Groundwater Recovery
- Total Recycled Water
- Seawater Desalination
- **Surface Water**
- Los Angeles Aqueduct

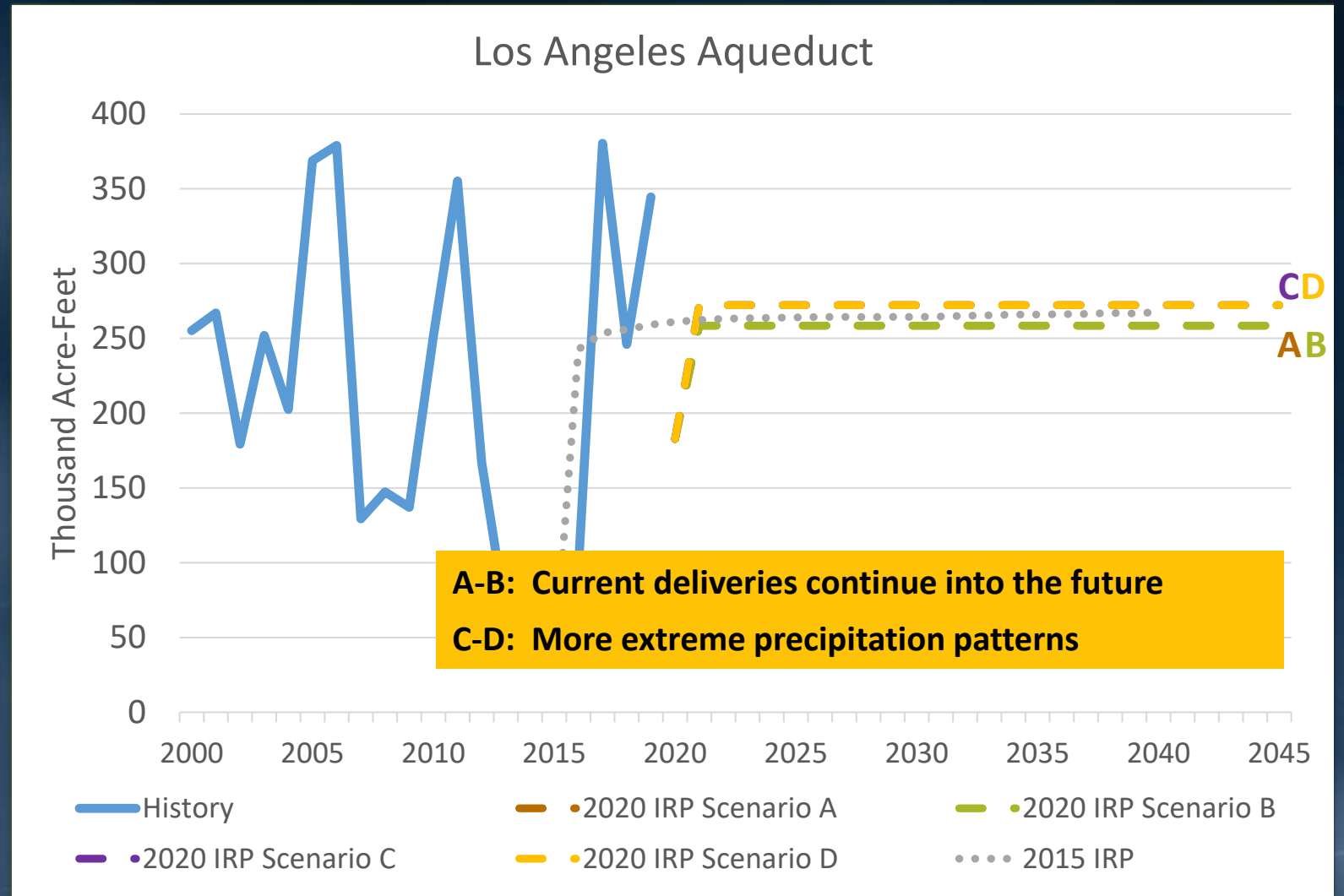


Preliminary Los Angeles Aqueduct

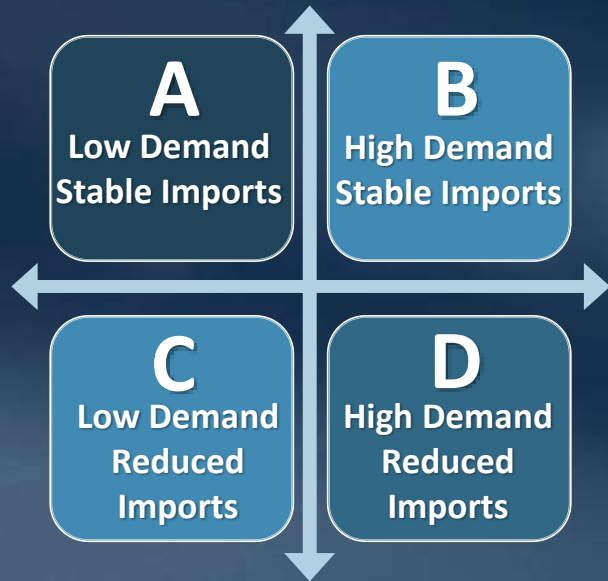


Total Local Supply Production

- Groundwater
- Groundwater Recovery
- Total Recycled Water
- Seawater Desalination
- Surface Water
- **Los Angeles Aqueduct**

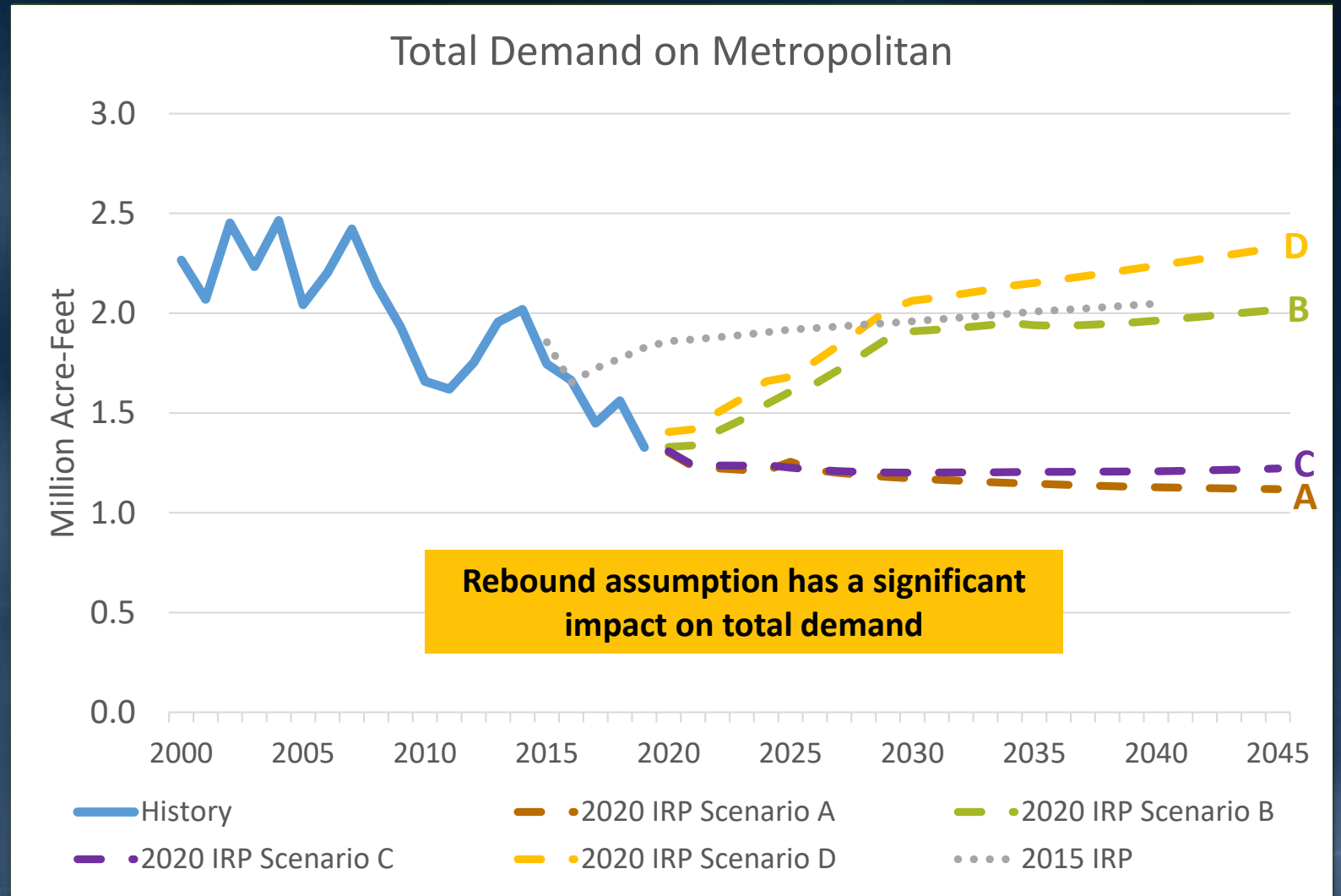


Preliminary Demands on Metropolitan



Total Demands on Metropolitan:

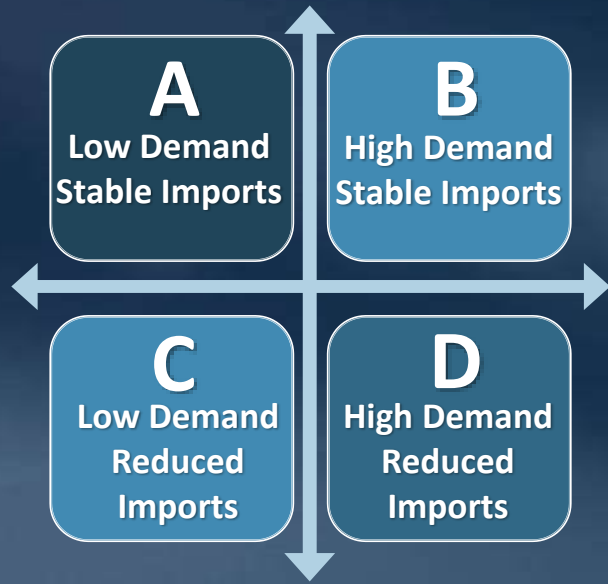
- Retail Demand - Local Supply



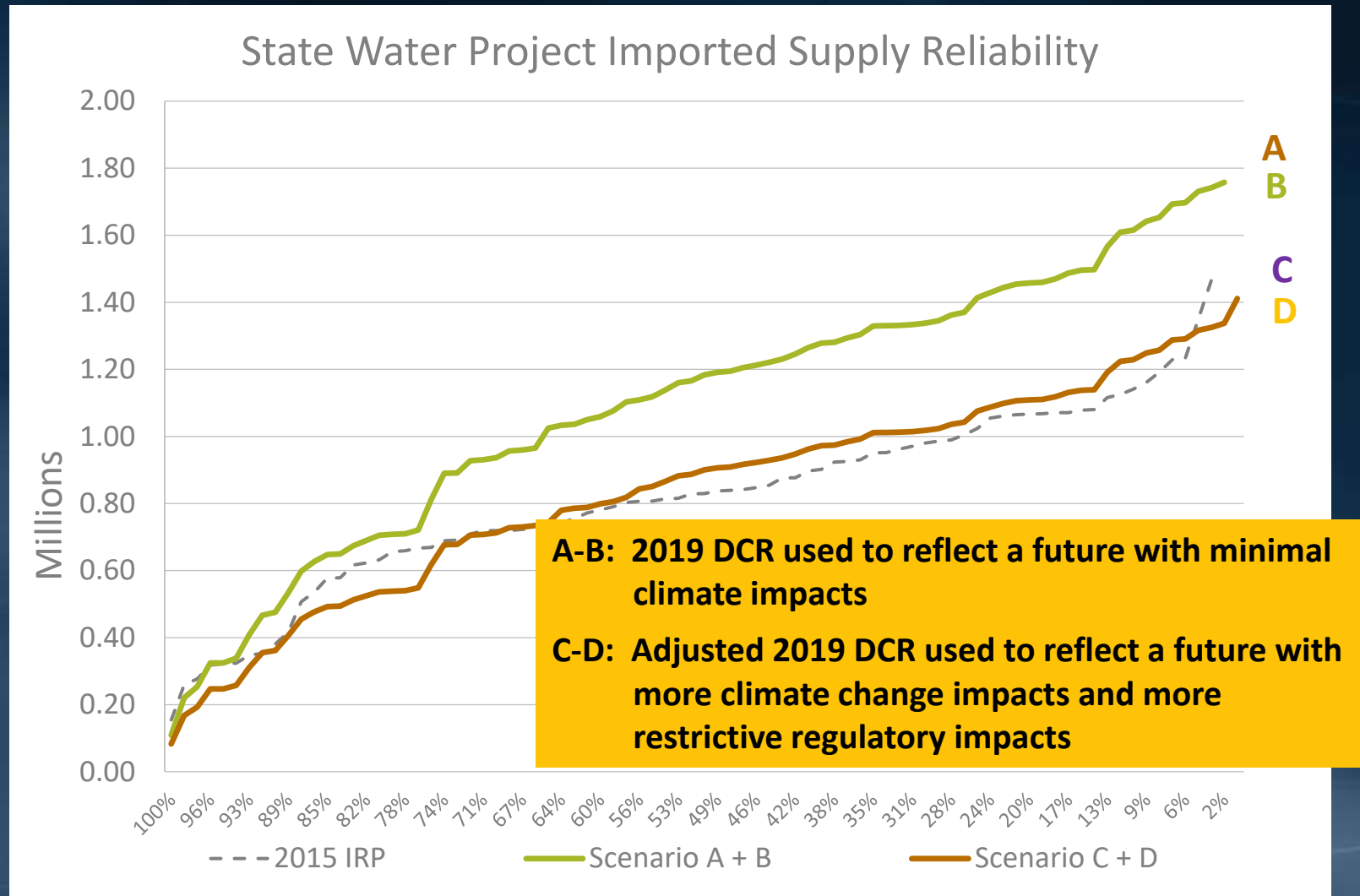
Feedback and Further Examination Underway

- Factors influencing local supply production development
- Climate change and regulatory impacts on local production
- Determine plausible level of groundwater production within each scenario

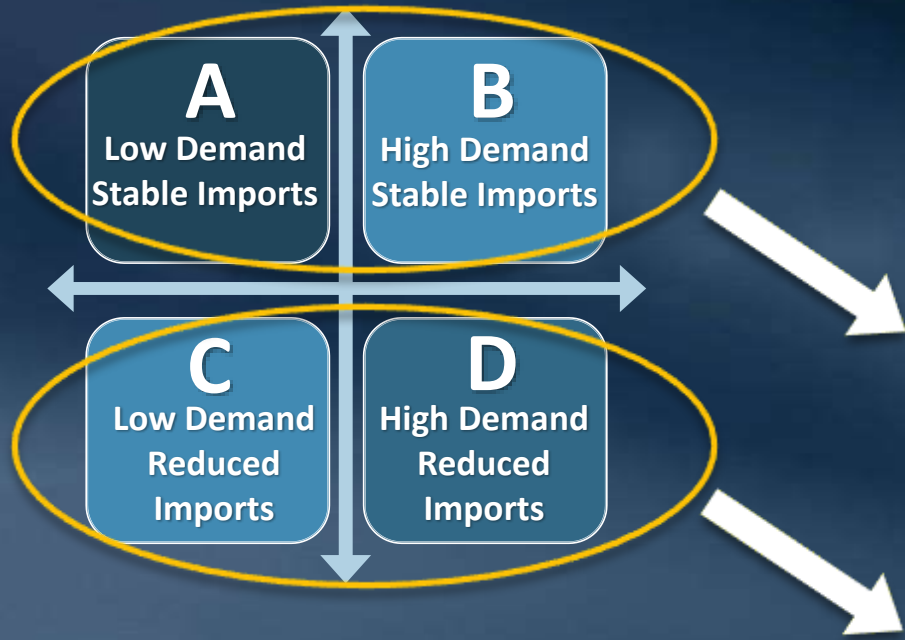
Preliminary SWP Imported Supply



	2015 IRP	A B	C D
Average SWP Allocation	43%	58%	44%



Preliminary CRA Imported Supply



Shortage Condition ¹	2021	2022	2023	2024	2025
August 2020 CRSS (Full Hydrology)	0%	23%	44%	49%	53%

Shortage Condition ¹	2021	2022	2023	2024	2025
August 2020 CRSS (Stress Test Hydrology)	0%	32%	55%	65%	77%

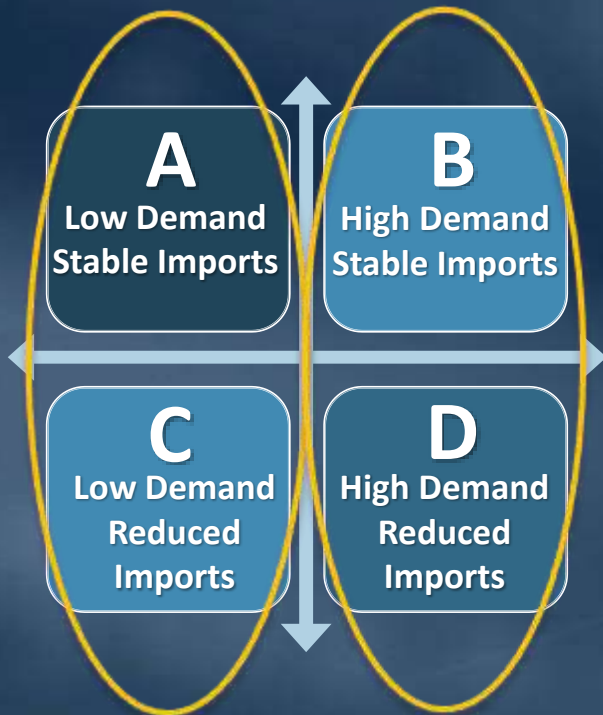
¹ Shortage Condition: Mead \leq 1,075 ft.

Feedback and Further Examination Underway

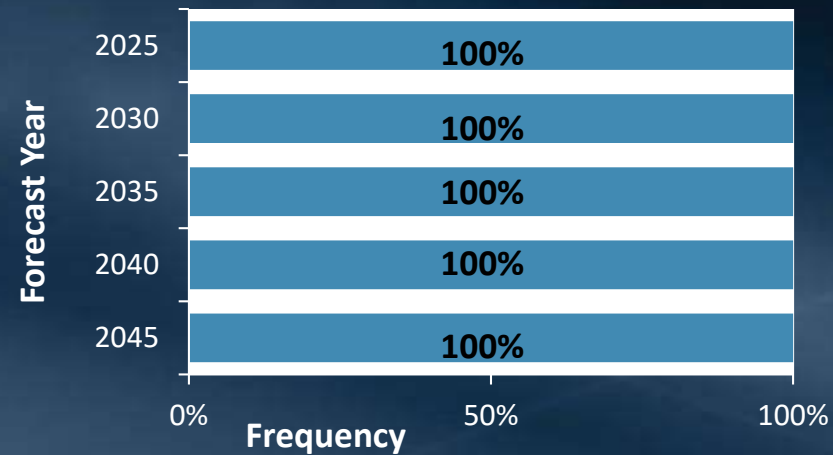
- Appropriate application of climate change impacts for both imported watersheds
- Assumptions on long-term institutional arrangements
- Regulatory impacts on both imported water supply sources

Preliminary "Gap" Analysis

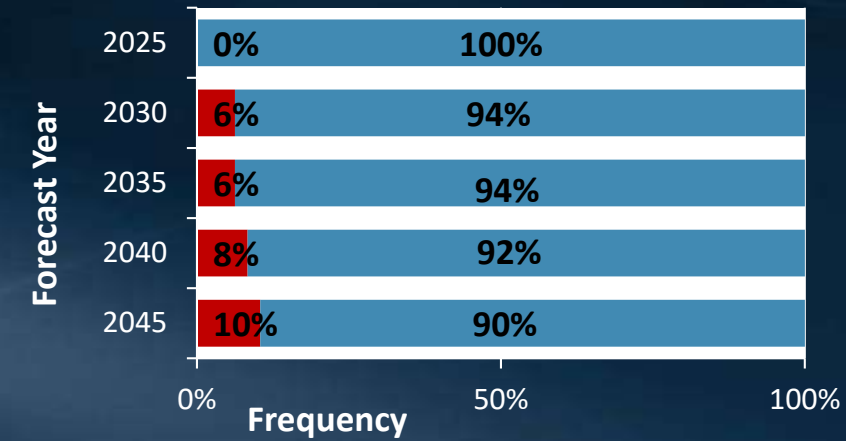
When to expect a gap and how often it occurs



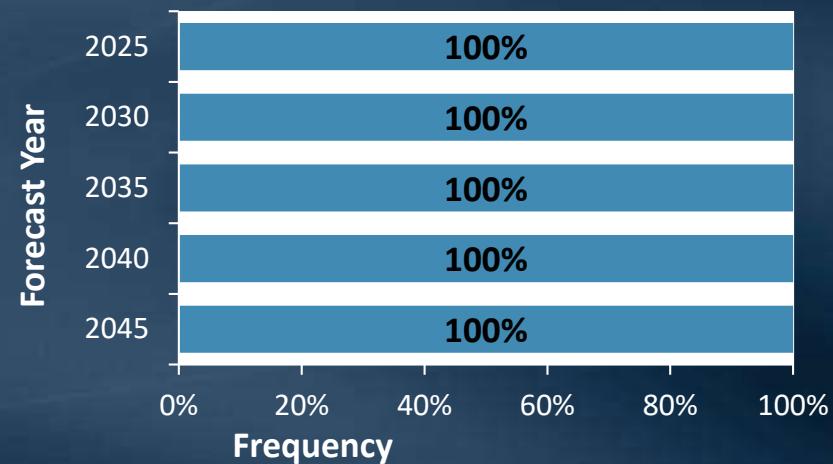
SCENARIO A



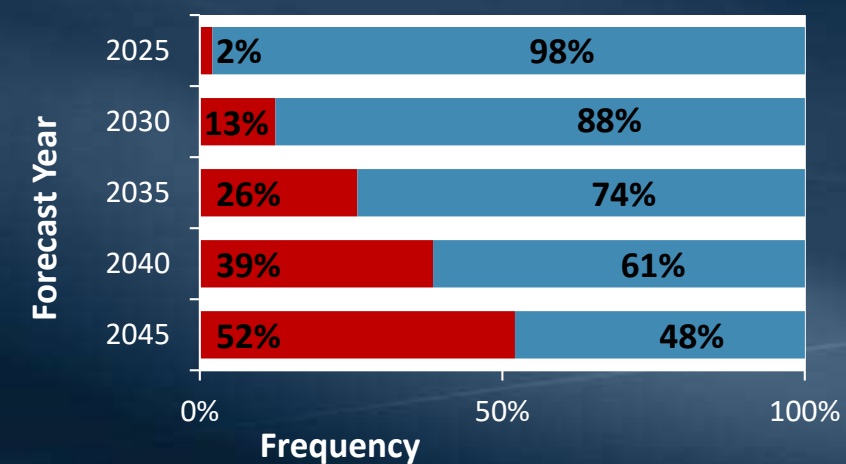
SCENARIO B



SCENARIO C

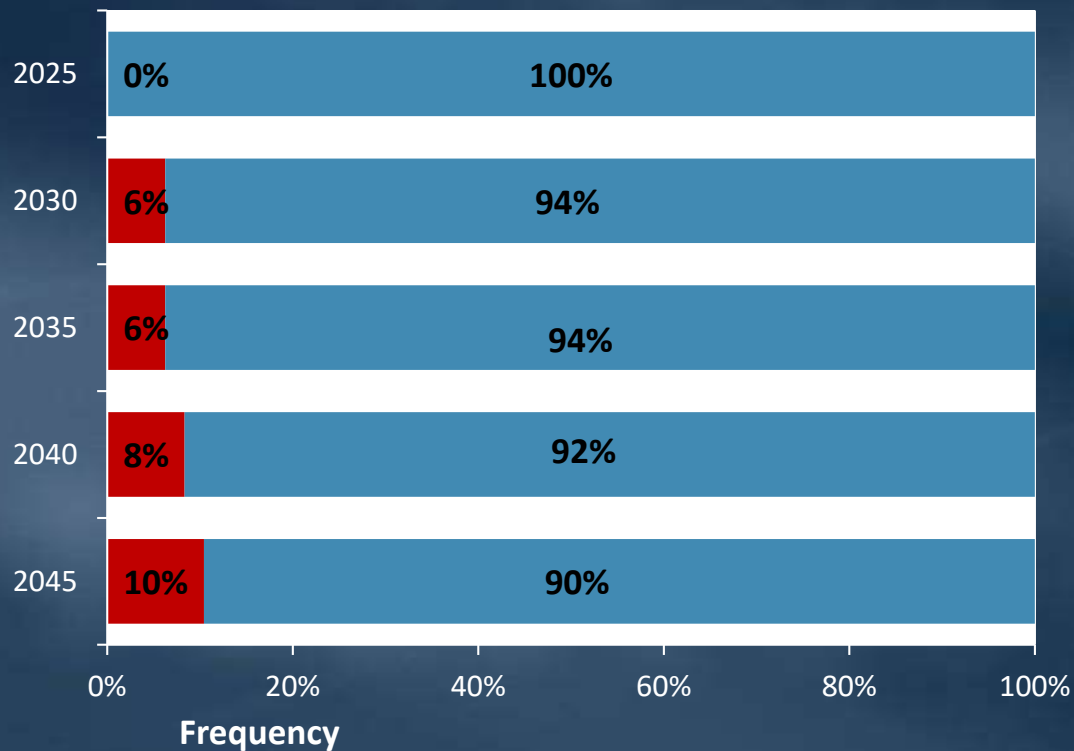


SCENARIO D

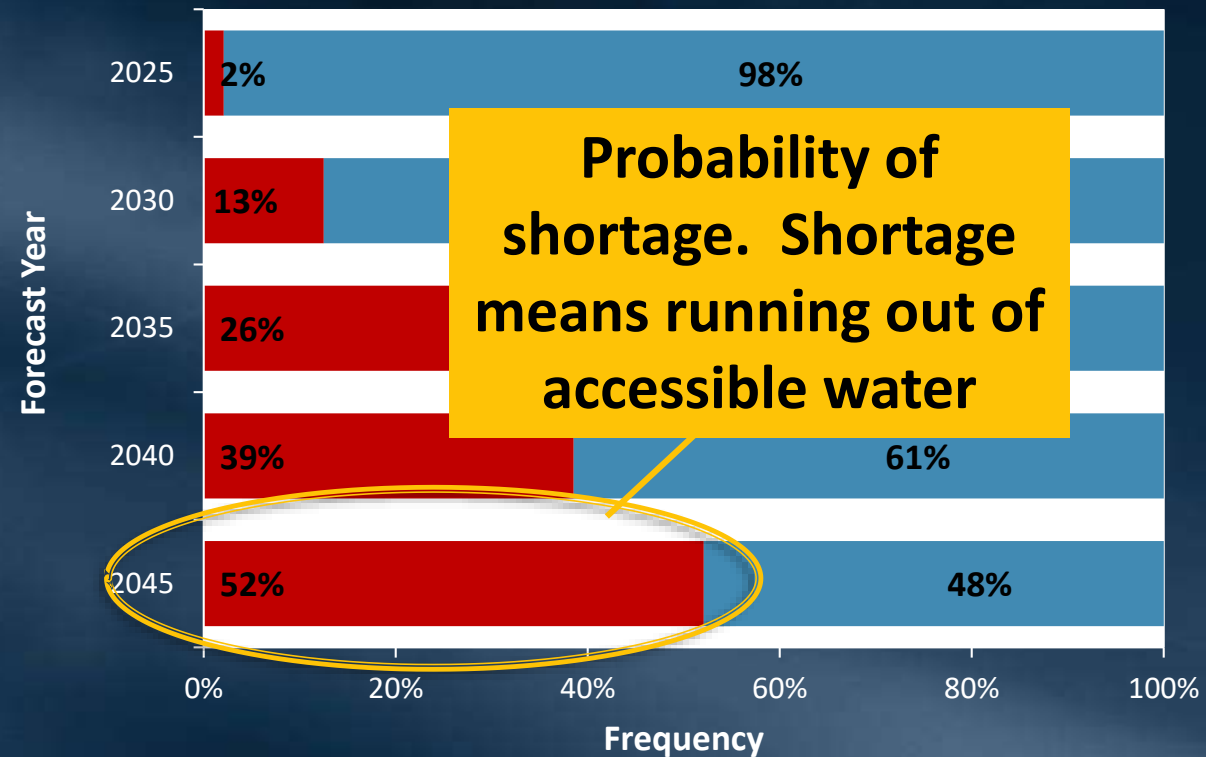


Preliminary "Gap" Analysis

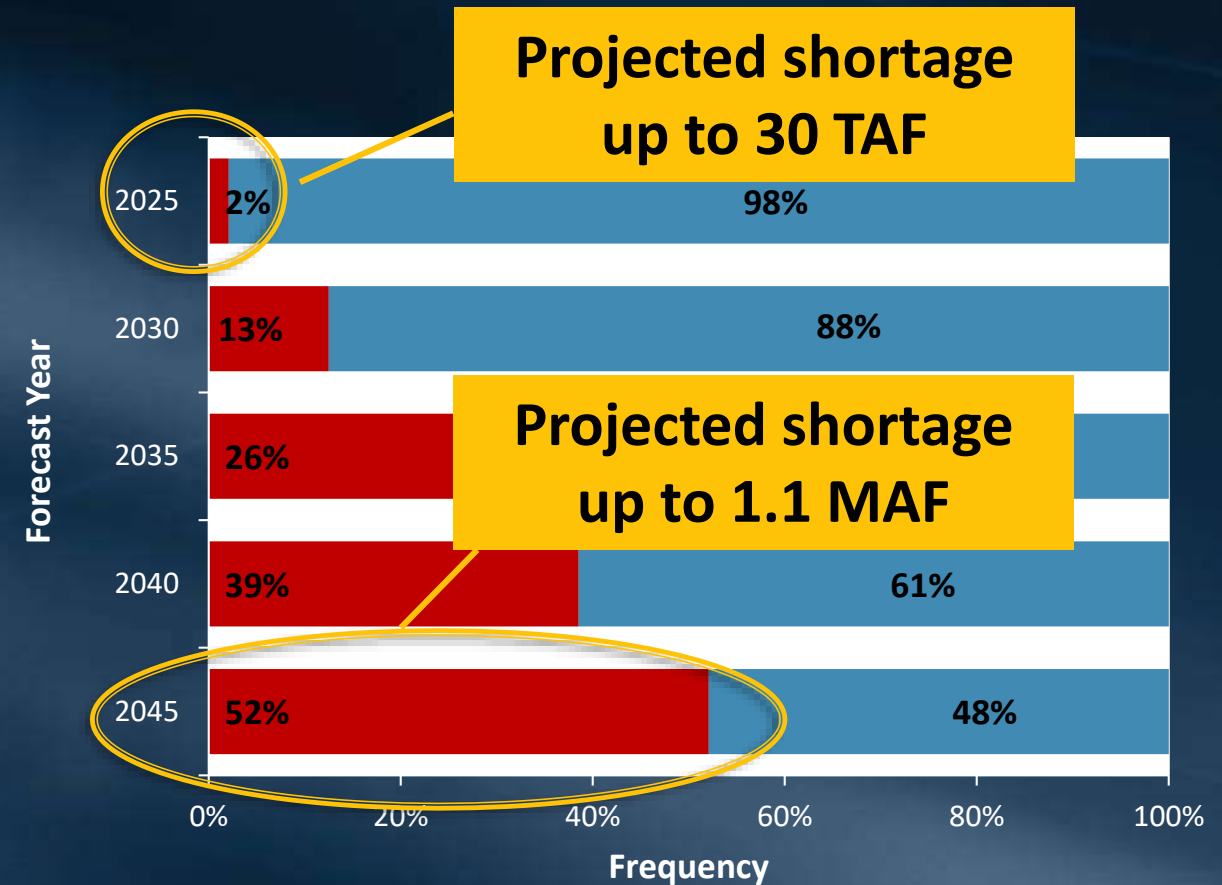
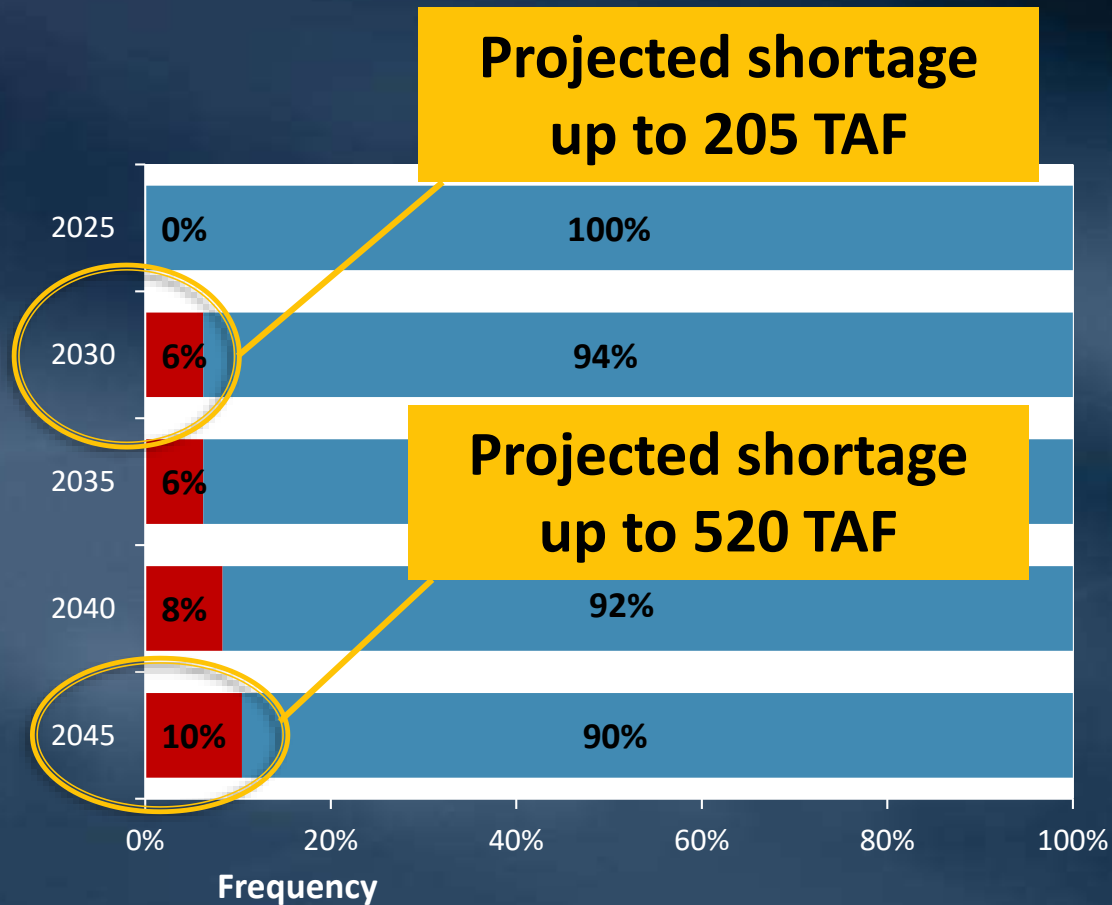
SCENARIO B



SCENARIO D



Preliminary "Gap" Analysis



Experts

Demand Experts

- Kurt Schwabe Ph.D.

Assoc. Dean/Chair & Prof of Environmental Economics & Policy, UC Riverside
Adjunct Fellow, Water Policy Center, Public Policy Institute of California (PPIC)

- Dr. Schwabe's research focuses on economic issues associated with water use, agricultural production, urban water conservation, ecosystem services, and environmental regulation. His papers have appeared in wide range of peer-reviewed publications, including *Nature Sustainability*, *Proceedings of the National Academy of Sciences*, *Journal of Risk and Uncertainty*, *Land Economics*, and the *American Journal of Agricultural Economics*, and is co-editor of two recent books on water titled, Drought in Arid and Semi-Arid Regions: A Multi-Disciplinary and Cross-Country Perspective, and The Handbook of Water Economics.

Demand Experts

- Lisa Maddaus P.E.

CFO, Senior Engineer - Maddaus Water Management Inc.

- Senior water resources engineer with experience preparing water resources planning studies for water suppliers across the country. Her passion is integrated water resources planning, and her specialty is in conservation, drought and climate change planning

- Dan Rodrigo

Vice President - CDM Smith

- Specializes in integrated water resources planning and decision science, and has utilized specialized computer tools and management techniques to help garner stakeholder consensus and develop water plans with adaptive management strategies

Demand Experts

- Tom Chesnutt Ph.D., Pstat, CAP

CEO, A&N Technical Services, Inc.

- Pioneered innovative water rate reform, probability management, stochastic simulation and forecasting in the fields of water policy and economic modeling

- Stephen Levy

Director and Senior Economist - Center for Continuing Study of the California Economy

- Specializes in regional job projections for California regional planning agencies, including understanding of national, state and regional job trends and projections and assessments of regional competitiveness conditions and the implications for public policy. He has prepared growth forecasts for regional agencies including ABAG, SACOG, SCAG, AMBAG and SBCAG and for the City of San Jose

Climate Change Experts

- Heather Cooley

Director of Research – Pacific Institute

- Conducts and oversees research on an array of water issues, such as sustainable water use and management, the connections between water and energy, and the impacts of climate change on water resources

- Julie Vano

Director of Research – National Center for Atmospheric Research

- Research interests include hydrology, water resource management, science policy, climate change impacts, and system dynamics. Her current work aims to better connect climate science and the applications community and use these connections to develop innovative ways to address climate impacts on local water resources

Climate Change Experts

- Brad Udall

Senior Water & Climate Research Scientist, Colorado Water Institute - Colorado State University

- Specializes in the impacts of climate change on water resources in the American West

- Alex Hall

Professor in the Department of Atmospheric and Oceanic Sciences and Institute of the Environment and Sustainability and Director of the Center for Climate Science - UCLA

- Specializes in the development of *downscaling* techniques to understand climate change at the scales most relevant to people and ecosystems and use these techniques to create neighborhood-scale projections of future climate

Next Steps

Next Steps – Refine Preliminary Analysis

- Continue staff investigations and consult with Experts and Member Agencies
 - Refine assumptions for local supply, demand, and imported supply
 - Continue quantification
- Develop “Gap Analysis” under refined assumptions
- Draft Action Portfolios
- Policy Discussion

