IRP Member Agency Technical Workgroup

Draft Results Part 2
September 15, 2015

IRP Member Agency Technical Workgroup Process

- April 2015
  - IRP/RUWMP Kick-off 4/8
  - Water Use Efficiency Meeting 4/16
  - Uncertainty 4/22
- May 2015
  - Imported Supplies 5/18
  - Water Use Efficiency Meeting 5/20
  - Groundwater (1 of 2) 5/27
- June
  - Groundwater (2 of 2) 6/11
  - Water Use Efficiency Meeting 6/18
  - Local Resources (1 of 2) 6/24

IRP Member Agency Technical Workgroup Process

- July 2015
  - Local Resources (2 of 2) 7/8
  - Water Use Efficiency Meeting 7/16
  - Retail Demands and Conservation 7/22
- August 2015
  - Draft Results (1 of 2) 8/3
- September 2015
  - Draft Results (2 of 2) 9/15

Presentation Overview

- Near-term Retail Demand adjustments
- Review of the “Do Nothing” water balance
- 2010 IRP Approach water balance
- 2015 IRP Approach refinements
- Next steps


Near-Term Retail
Demand Adjustment

Residential Household Use

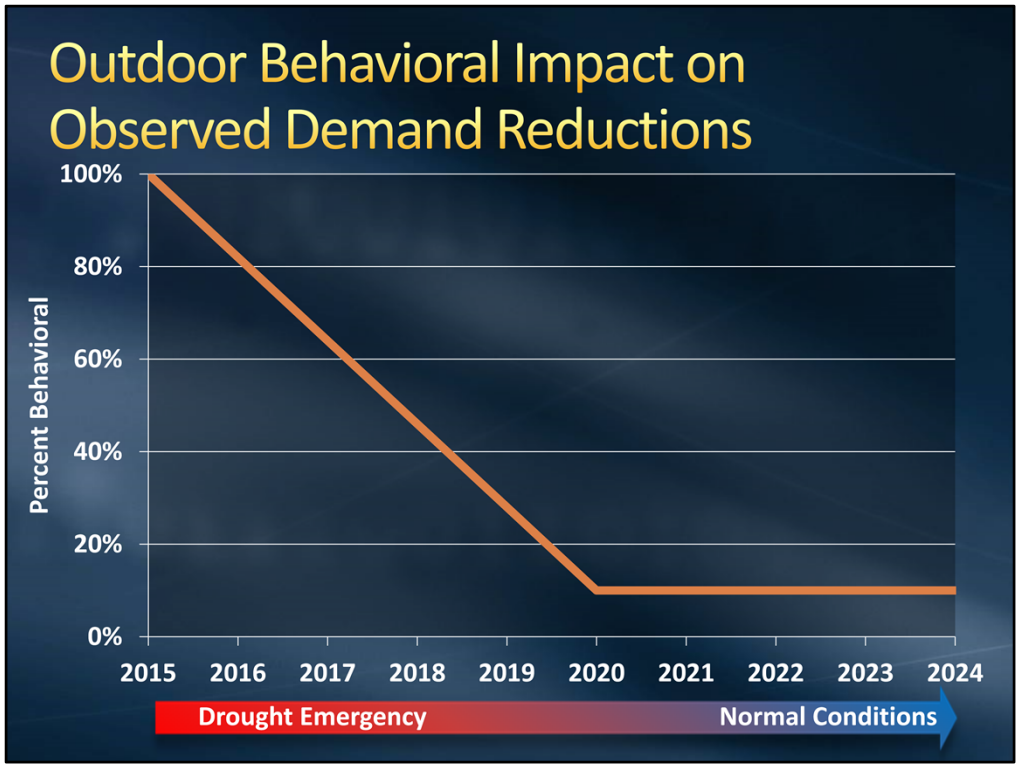
- Uses of water
  - Indoor: Toilets, showers, washing machines…
  - Outdoor: Watering, general washing, car washing…
- Behavior
  - Indoor: Flushes per day, shower minutes, loads per day…
  - Outdoor: Watering days per week, minutes per day…

What is the Effect of Governor's Call for Reduced Water Use?

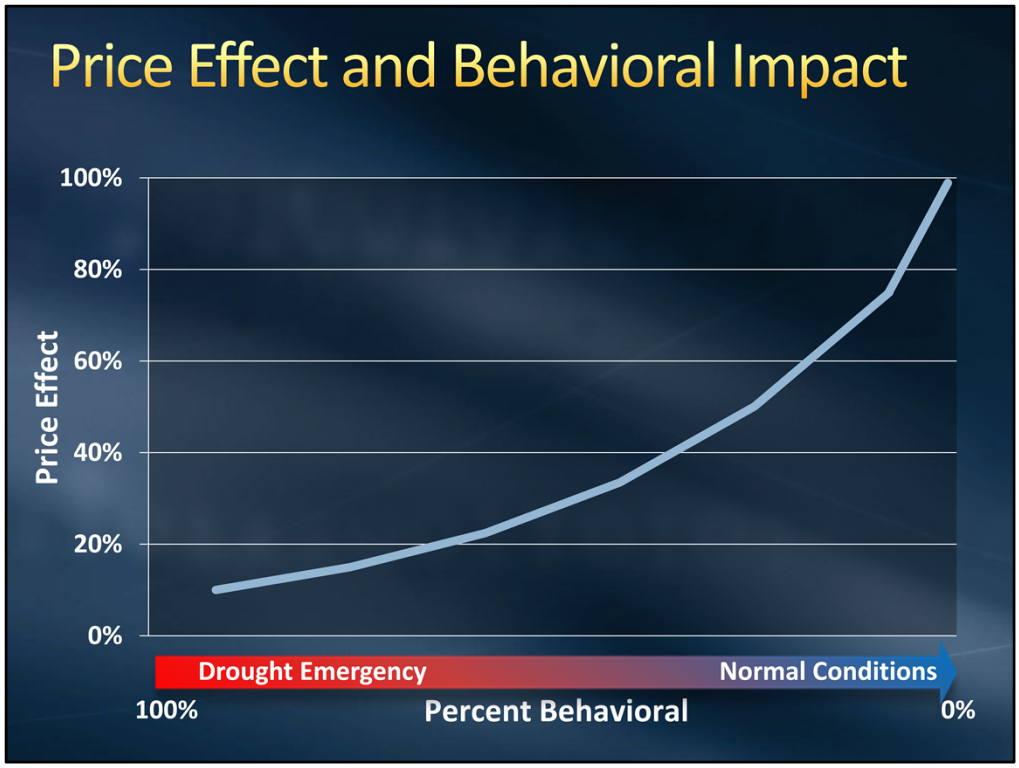
- Device-based Changes
  - Indoor: Efficient Toilets, showerheads, efficient washing machines…
  - Outdoor: Irrigation methods (Drip), Et Controllers, turf removal
- Behavior
  - Indoor: Reduce flushes per day, shower minutes, loads per day…
  - Outdoor: Reduce watering days per week, minutes per day…

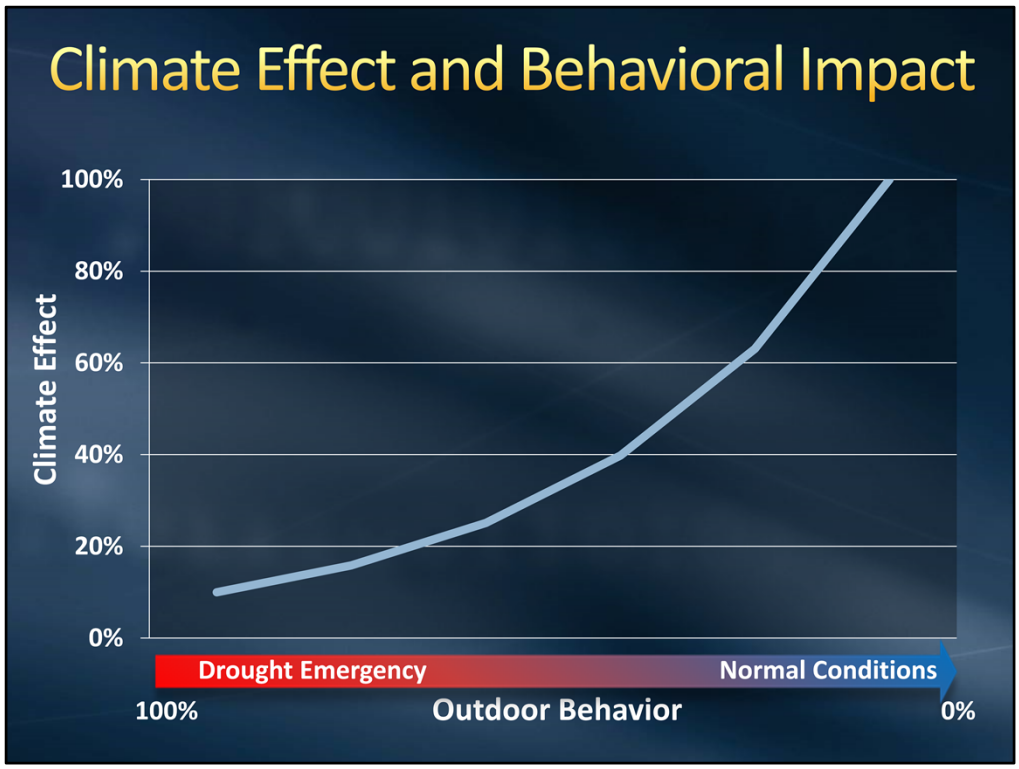
When people have changed their outdoor water use behavior

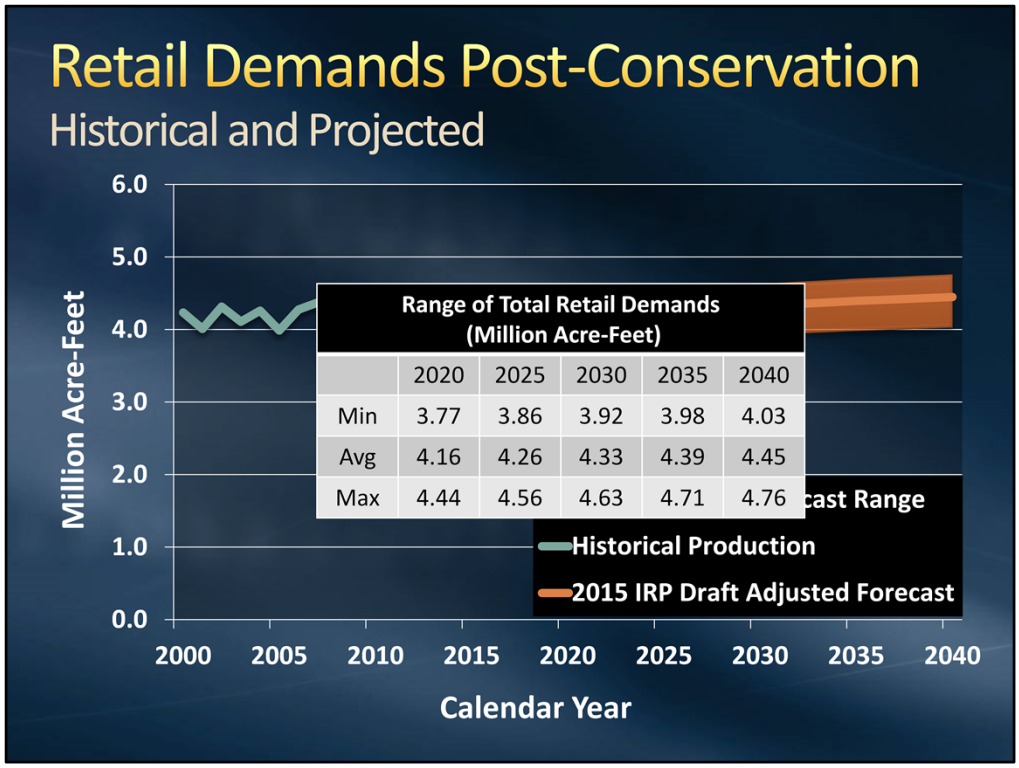
- Climate-based sensitivity is reduced
  - If it gets wet, they cannot reduce water use significantly
  - If it gets hot, they will not increase water use significantly
- Price-based conservation is reduced
  - When price increases, they cannot respond to price with water saving behavior


Outdoor Behavioral Impact on Observed Demand Reductions
100%
80%
60%
40%
20%
0%
Percent Behavioral
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Drought Emergency
Normal Conditions

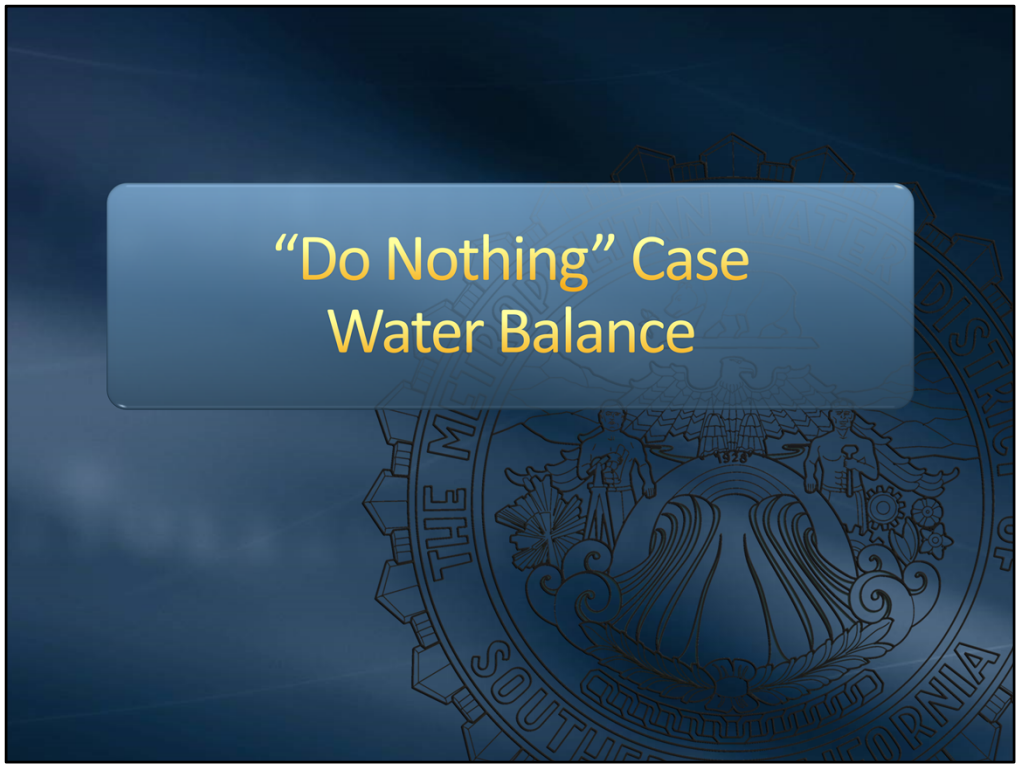
Price Effect and Behavioral Impact

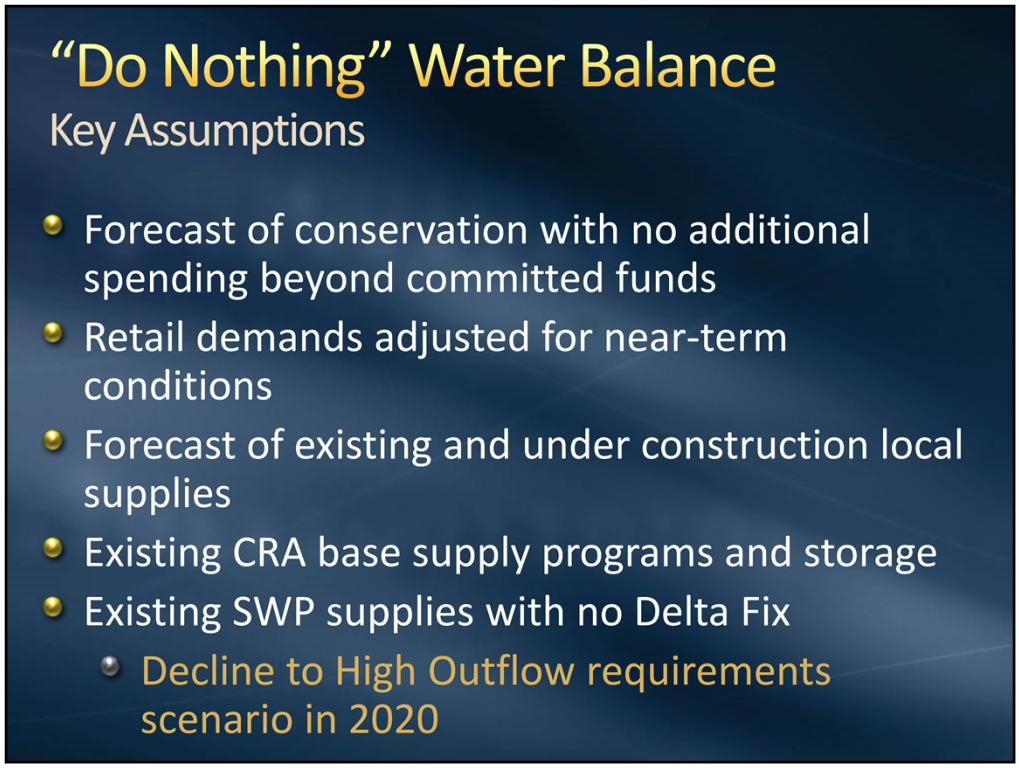



Climate Effect and Behavioral Impact
100%
80%
60%
40%
20%
0%
Climate Effect
Drought Emergency
Normal Conditions
100%
Outdoor Behavior
0%



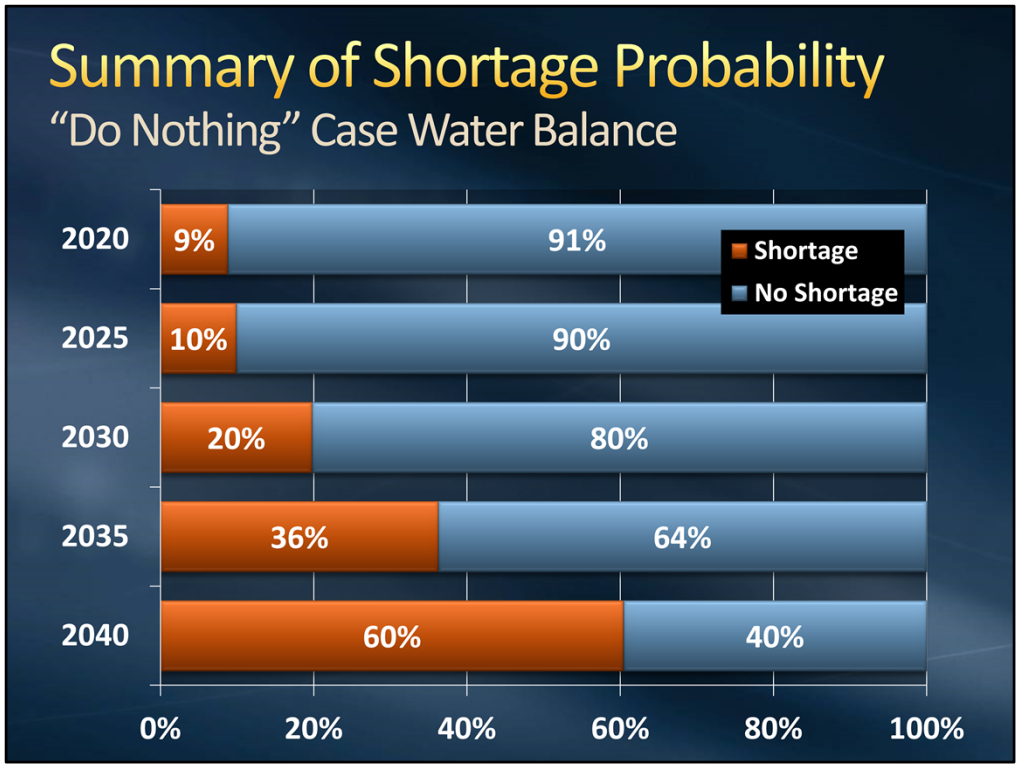
Another factor is **climate impacts**, we will see this in a number of places as we go through this presentation.
Forecast is not just a average, range, not just min- max either, we look at 90 different climate effects in each year of the forecast


"Do Nothing" Case
Water Balance



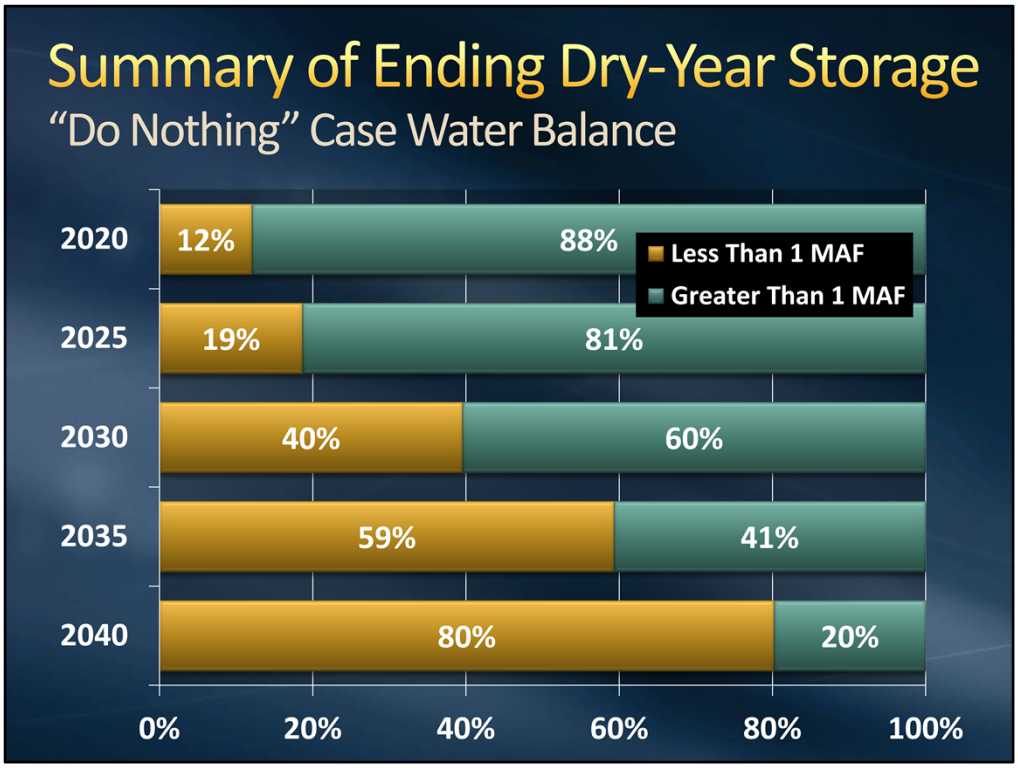
I want to highlight one of the adjustments that we've made to the **Work on this!!!**

Estimated 2015 – difference from forecast, considering climate conditions
Estimated based on past studies how much is behavioral and how much is structural (permanent)
Adjusted for conservation savings already captured in conservation forecast


Summary of Shortage Probability
"Do Nothing" Case Water Balance
2020
2025
2030
2035
2040
9%
91%
10%
90%
20%
80%
36%
64%
60%
40%
Shortage
No Shortage
0%
20%
40%
60%
80%
100%

Summary of Ending Dry-Year Storage

"Do Nothing" Case Water Balance



Observations

"Do Nothing" Case Water Balance

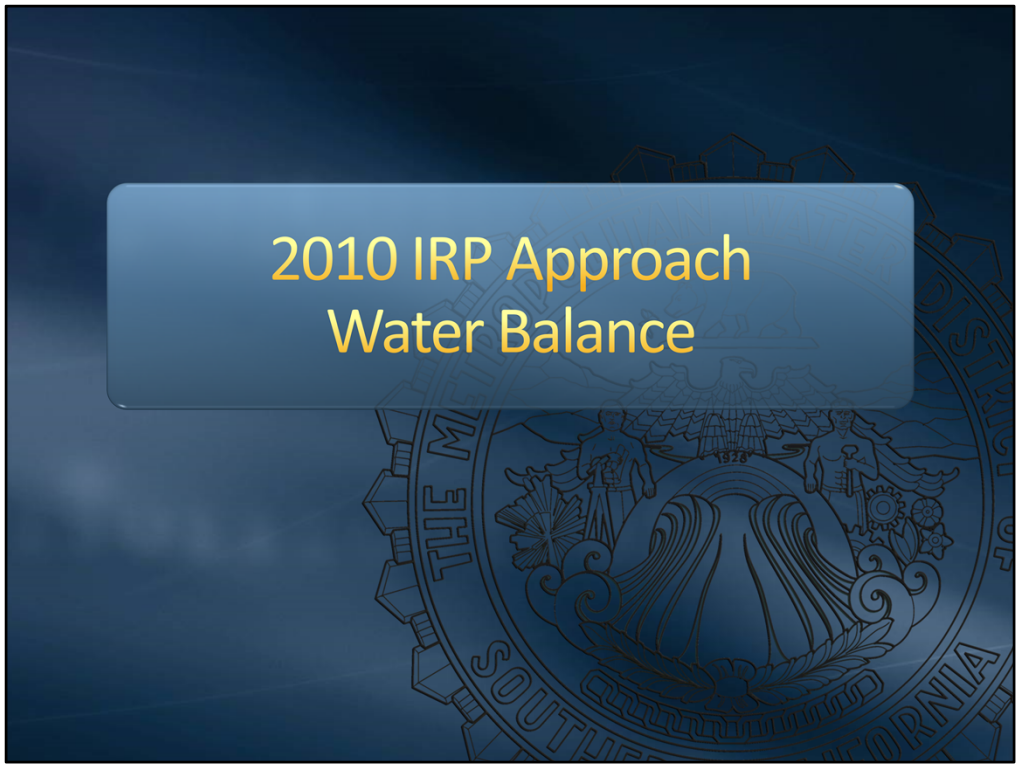
- The "do nothing" approach is not sustainable
- Shortage probability and size both increase over time
  - Total retail demands increase over time
  - Constant or decreasing local and imported supplies
- Storage quantity decreases over time
  - Less water to store
  - Higher needs for storage to balance supplies and demands
- Significant resource investments are needed

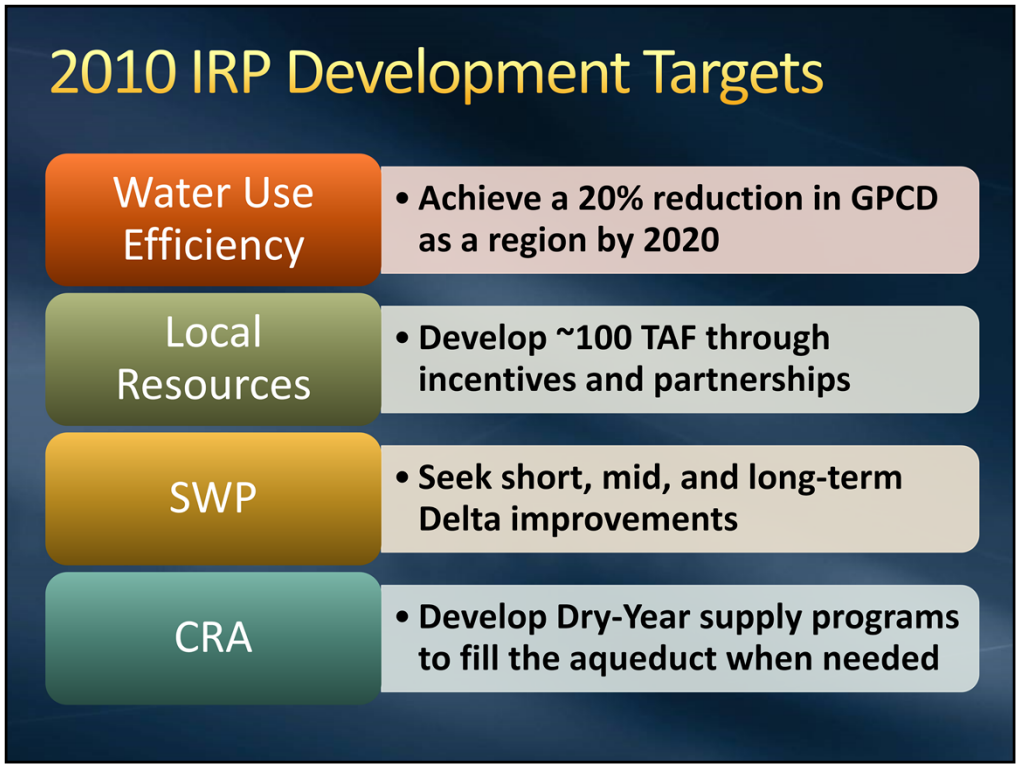
Answers our question #2 "What happens if we do nothing?"
Clearly not sustainable approach.

Shortage

Storage

Points to significant resource investment needs.


2010 IRP Approach
Water Balance

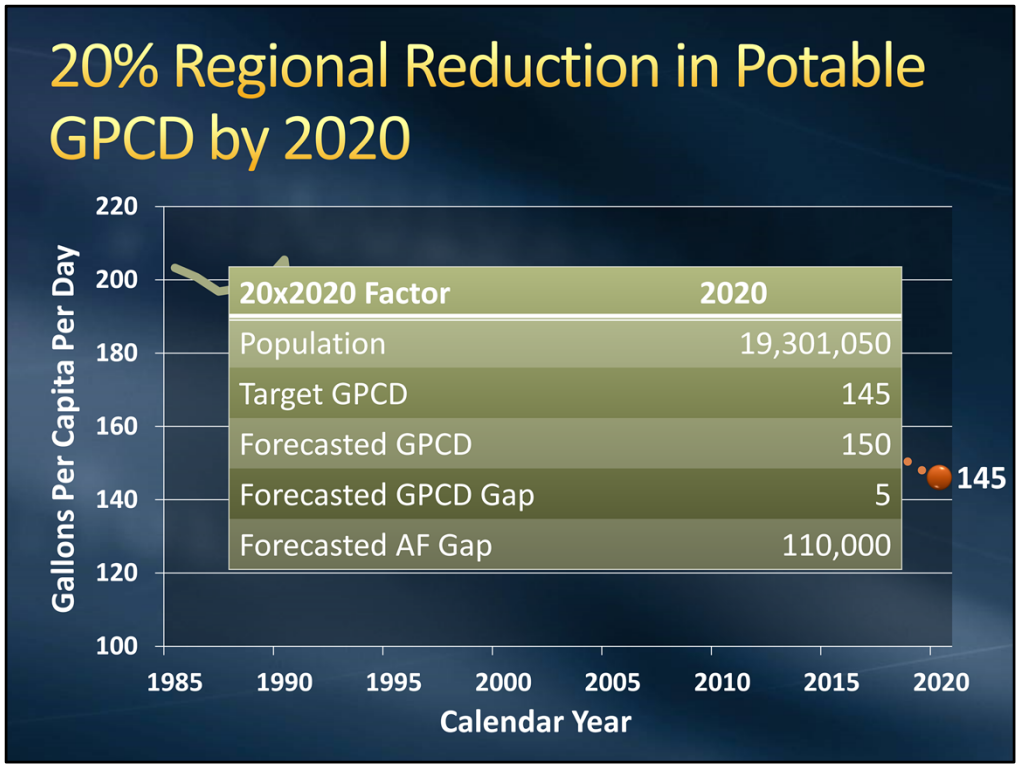


Water Use Efficiency
Conservation and recycling to achieve a 20% reduction at the regional level

Local Resources
Sought to develop just over 100 TAF of additional local supplies through groundwater recovery, seawater desalination (and recycling)

State Water Project
Show you what this looks like based on what Steve went over

Colorado River
Essentially there, assuming no additional development beyond existing supplies and programs… implications that we will touch on later.

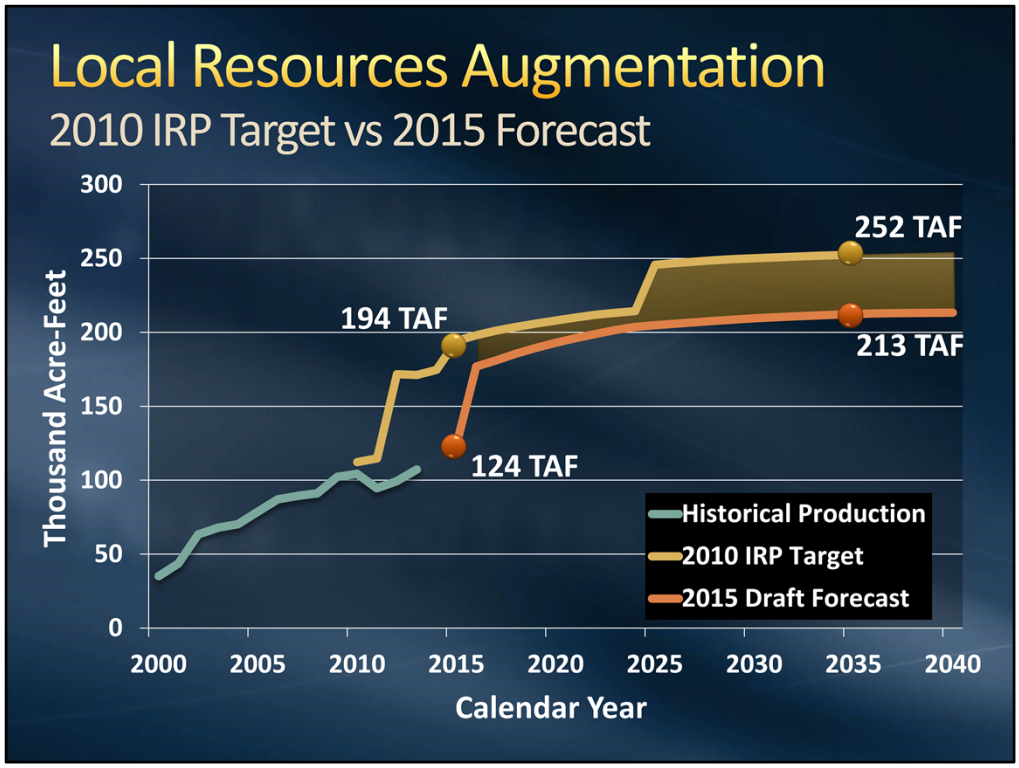


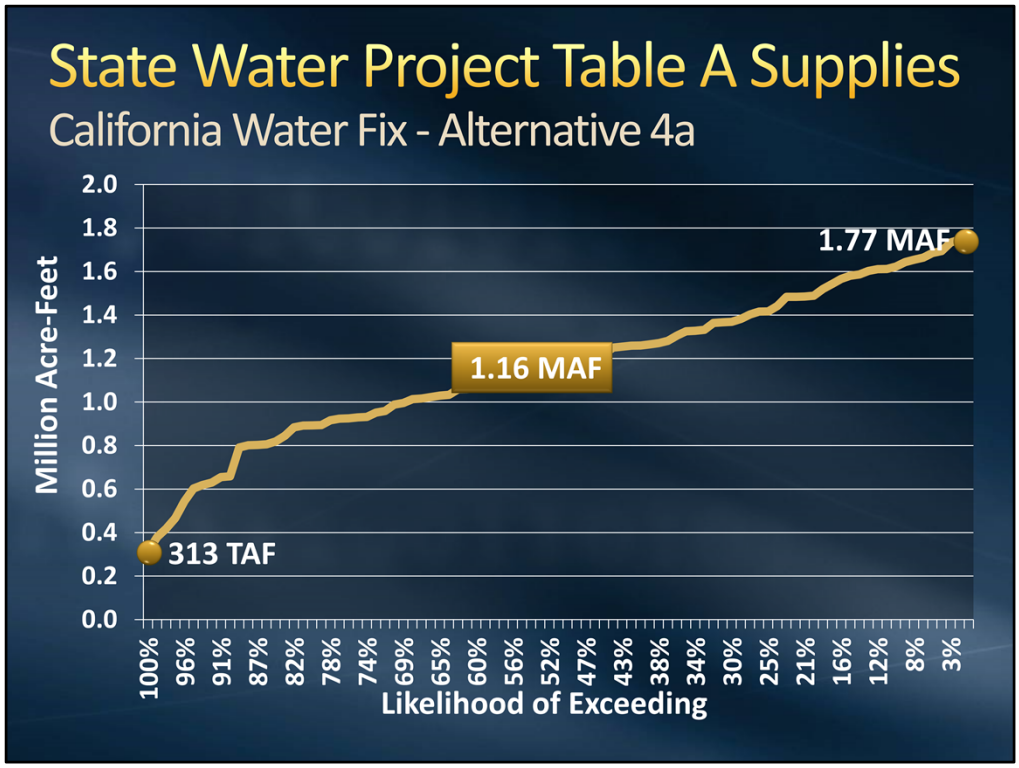
Under SBx7-7, Metropolitan as a wholesale water agency, is not required to reduce consumptive demand. However, Metropolitan is committed to help the region achieve a 20% reduction by 2020.

Before 1990, the average per capita use was about 200 GPCD for the region. With the plumbing code in place in 1992 and aggressive active conservation programs, per capita water use has stayed below 200 GPCD.

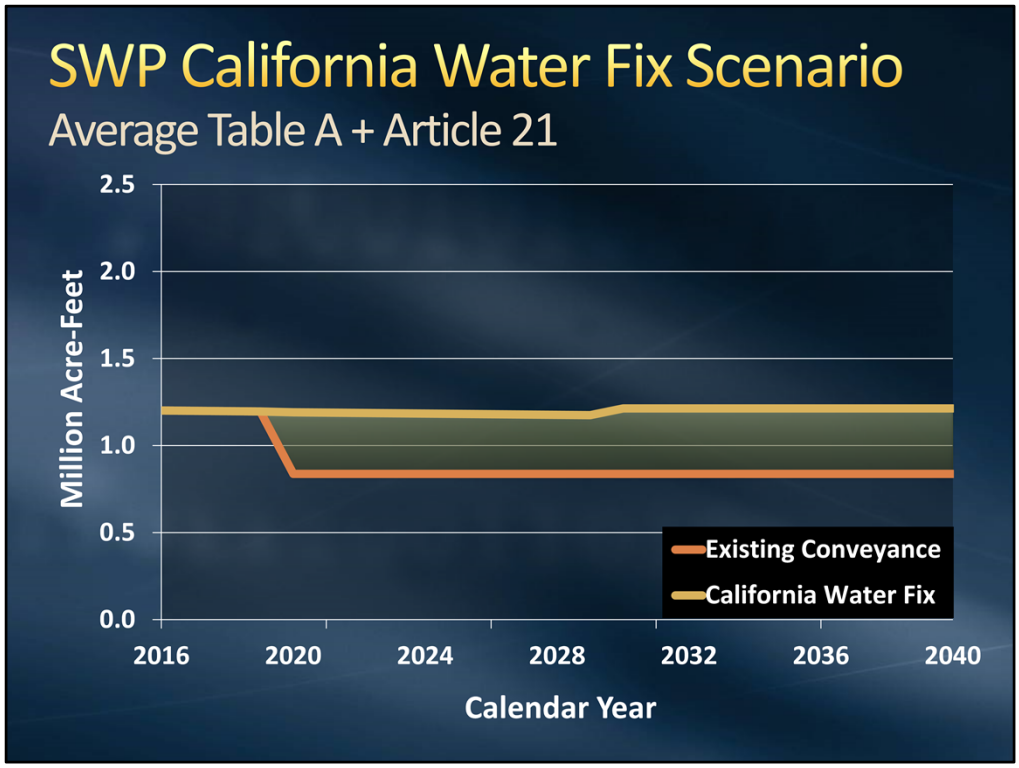
The baseline for calculating a 20% reduction is 181 GPCD. The 2020 target is 145 GPCD. So far, we've been tracking below the annual target. The annual target is represented by the dotted line.

As of 2013, per capita use dropped by 21% compared to pre-1990. And 13% from the baseline.


Local Resources Augmentation
2010 IRP Target vs 2015 Forecast
Thousand Acre-Feet
300
250
200
150
100
50
0
2000
2005
2010
2015
2020
2025
2030
2035
2040
Calendar Year
252 TAF
194 TAF
213 TAF
124 TAF
Historical Production
2010 IRP Target
2015 Draft Forecast



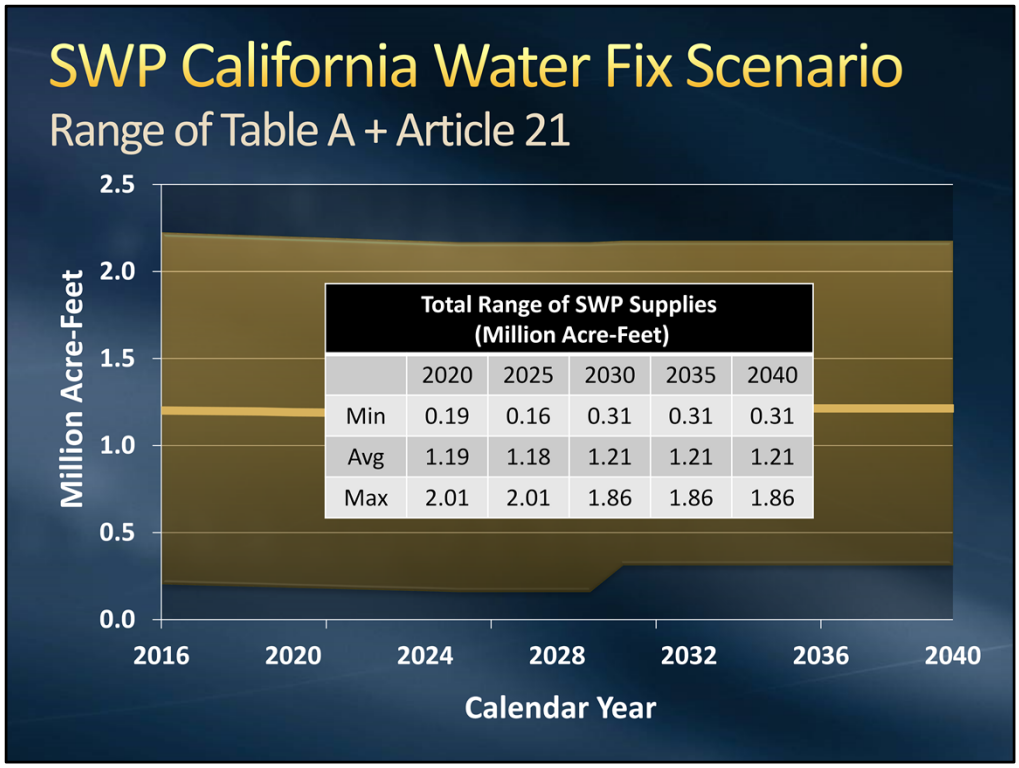
Full range of climate impacted supplies for Alternative 4a



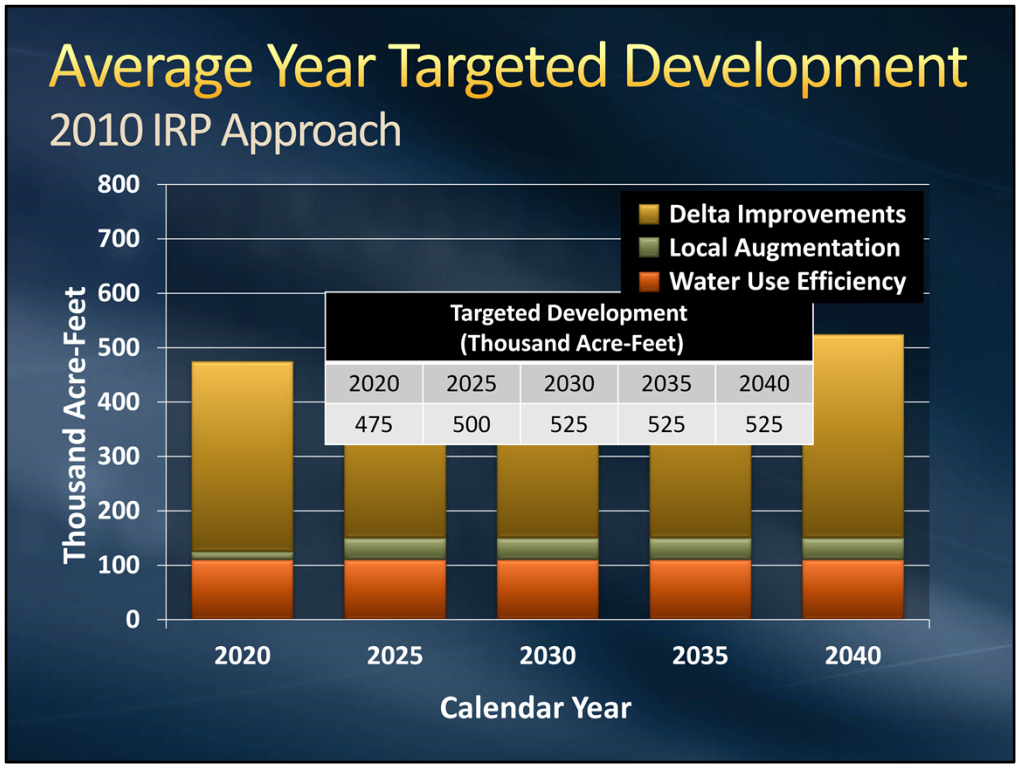
Let's see how this plays out over time.
Existing scenario for context

Added together table A and Article 21, same look over time:
Base case declining to early long-term, no high outflow scenario, cal water fix 2030 online date.

Assumptions for Shaded area!!!



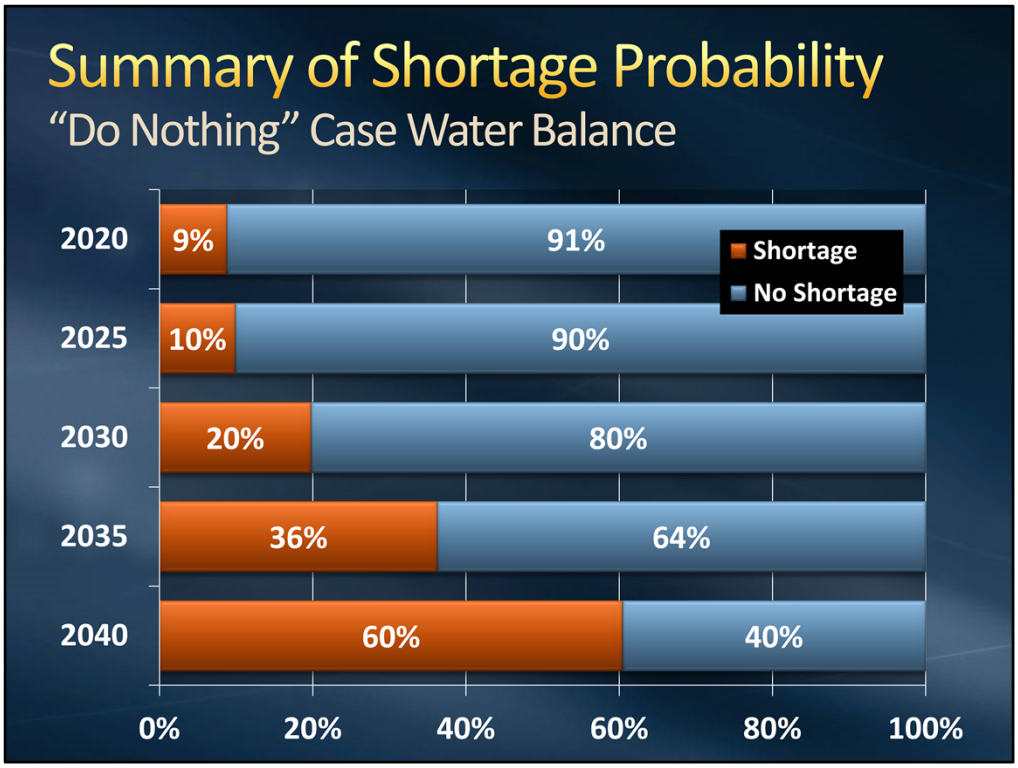
Full rage of climate impacts around that average forecast



Stack up additional investments that would be made under the 2010 IRP approach.
20% reduction: Demographics, demands, conservation, recycling, 130 TAF of additional water use efficiency
100 Local Augmentation: a bit over half-way there, 40 TAF remaining, Carlsbad making up most of difference
Delta – California water fix (average year supplies)
Feel for additional development. Made great strides since the 2010 IRP, still have a ways to go, no small task to do.

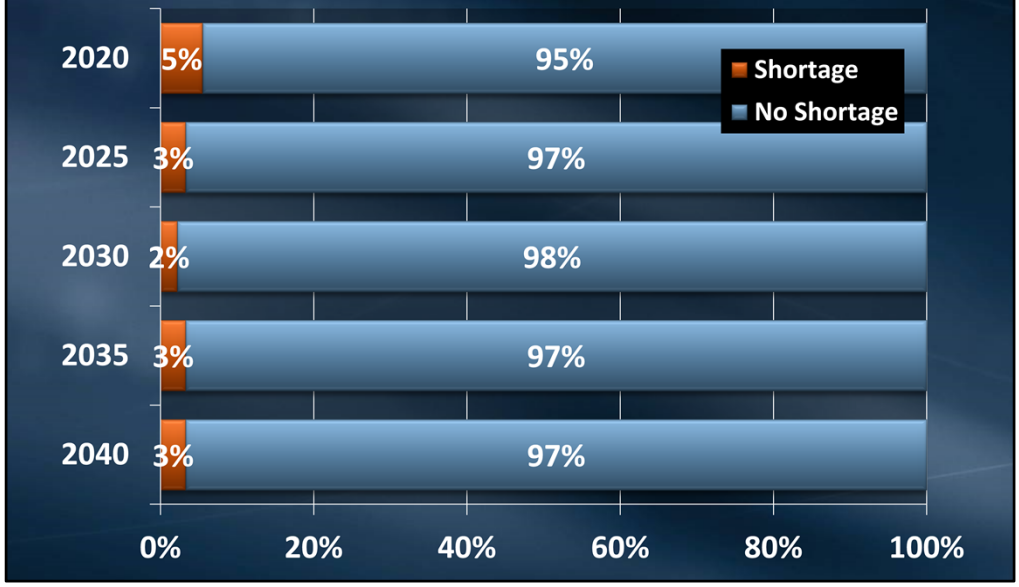
Summary of Shortage Probability

"Do Nothing" Case Water Balance



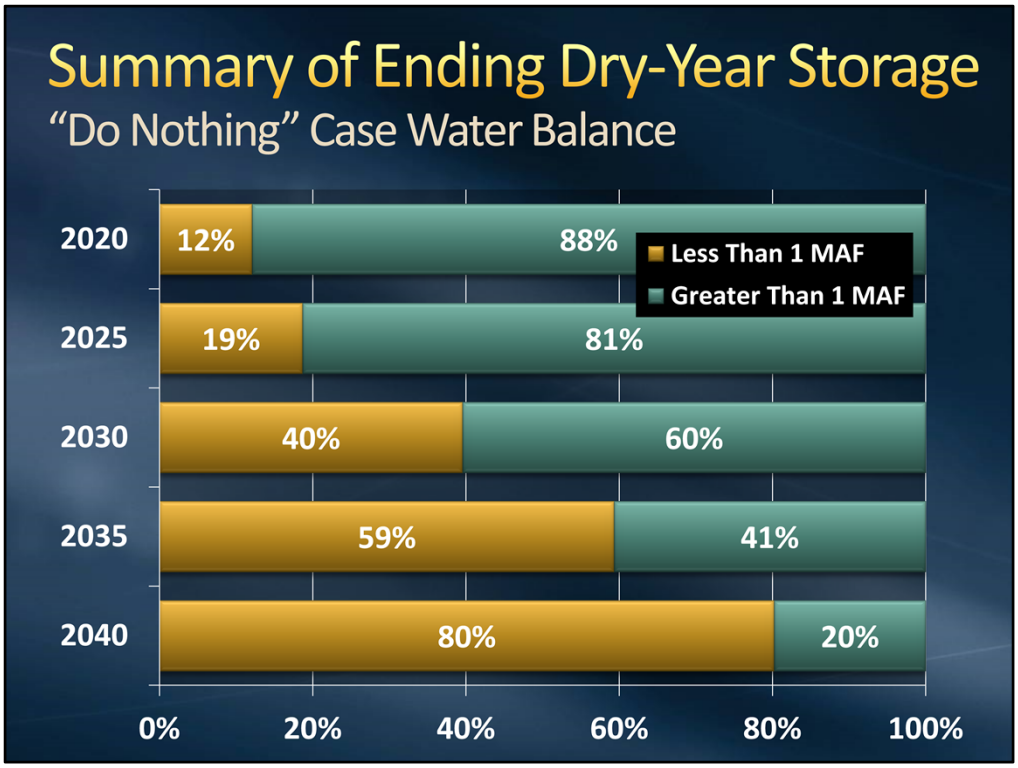
Summary of Shortage Probability

IRP Approach Water Balance



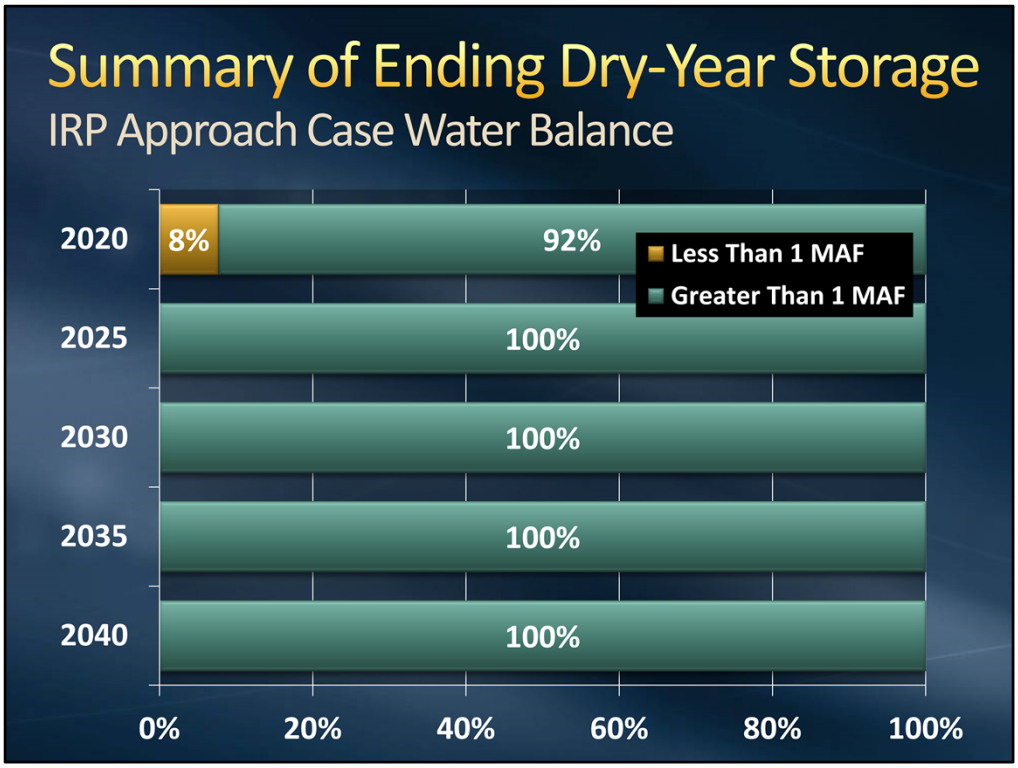
Summary of Ending Dry-Year Storage

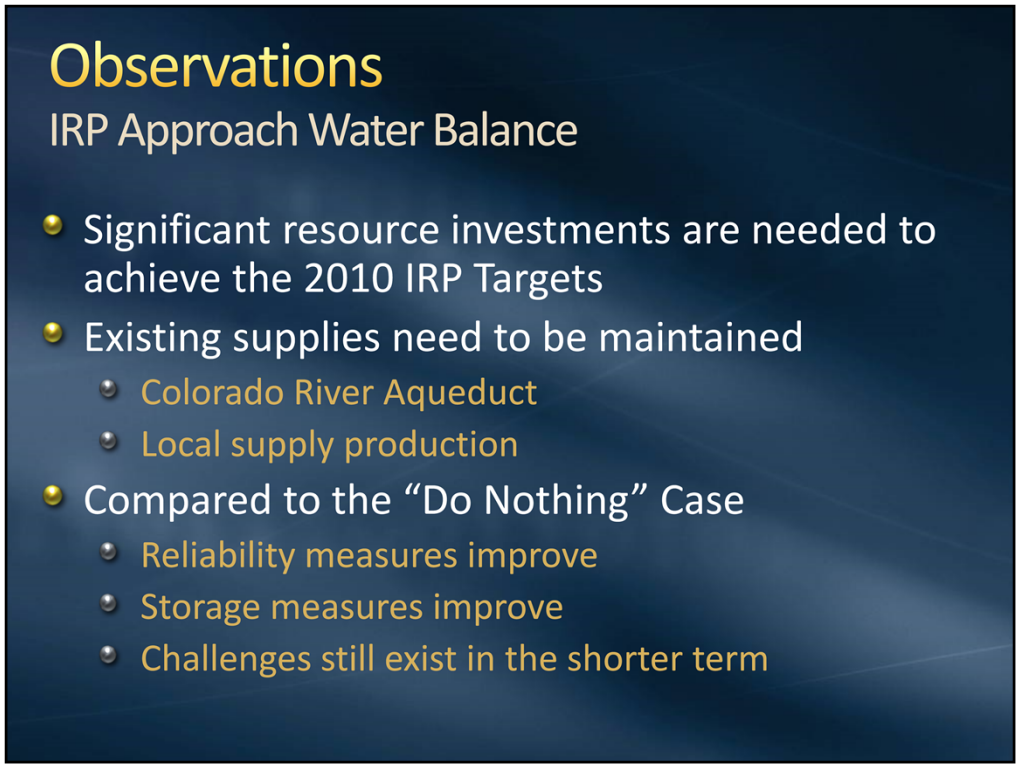
"Do Nothing" Case Water Balance



Summary of Ending Dry-Year Storage

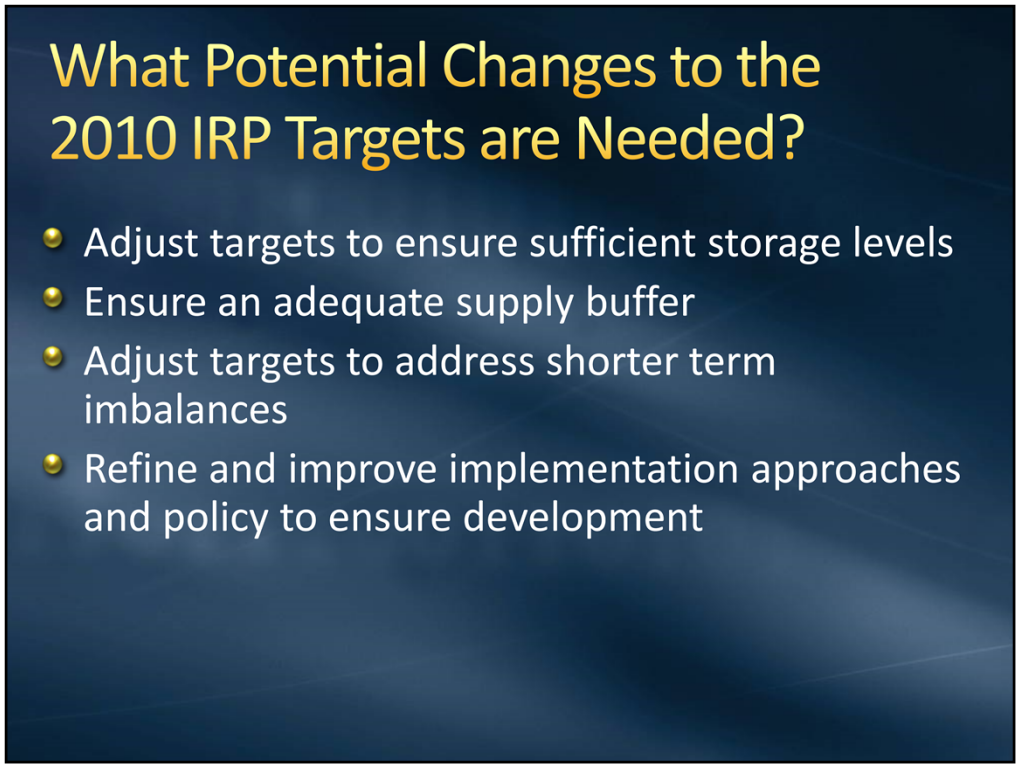
IRP Approach Case Water Balance





Still need to make these investments to achieve the reliability shown. 2010 targets represent continued significant investments.
Existing supply forecasts need to be maintained… uncertainty behind the Colorado river supplies, and local supplies particularly groundwater (will talk about next month)

Short-term challenges based on current conditions, and development schedules of supplies.



Brings us to our final question. “What potential changes are needed to the 2010 IRP targets?”

Not going to answer this question today… look at this next month. Results provide some direction.
Need to look at strategies or adjustments in the approach to deal with shorter-term

Need Help Here!


2015 IRP Approach
Refinements

Scenarios to Illustrate Potential Reliability/Risk

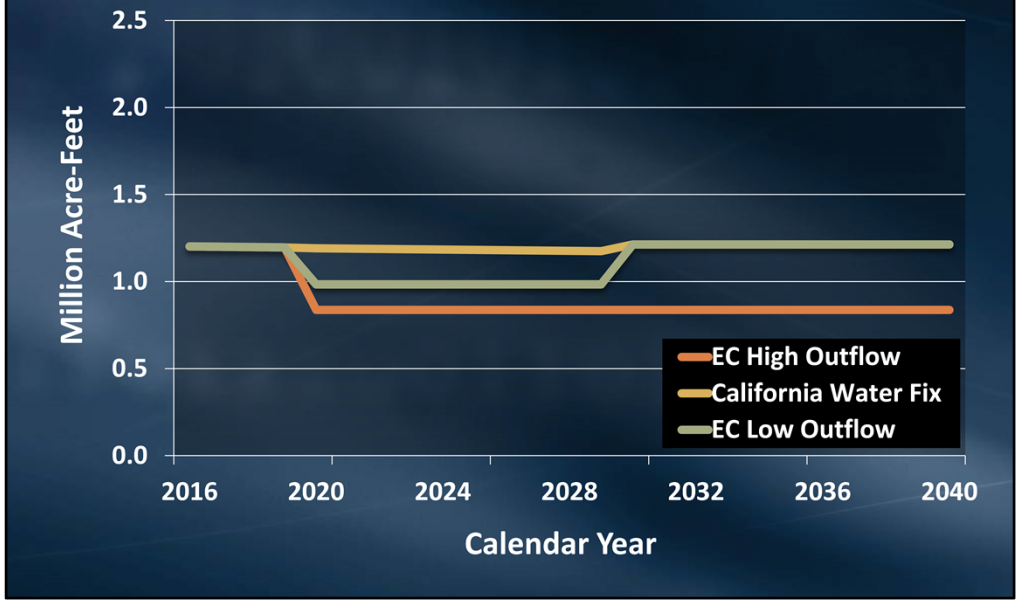
Four Reliability/Risk Scenarios

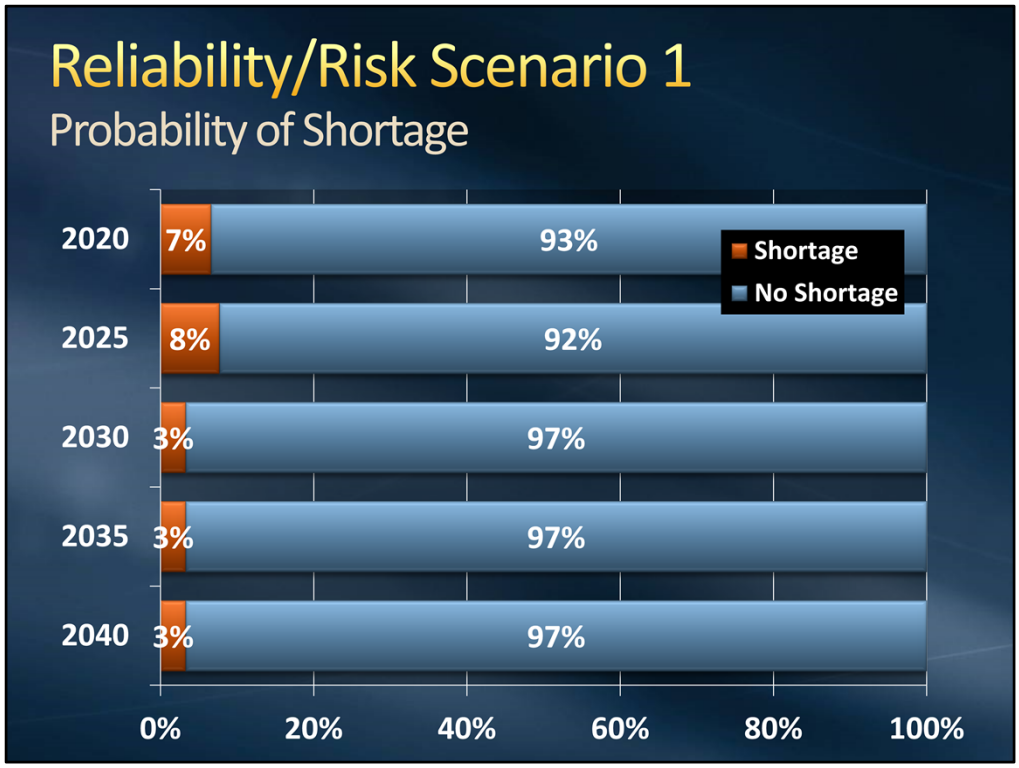
- Scenario 1: Near-term Delta actions are not as successful as planned
- Scenario 2: Local Resources production is lower than forecasted
- Scenario 3: Near-term Delta actions are not as successful as planned and local Resources production is lower than forecasted
- Scenario 4: The California Water Fix is not developed

Scenario 1: Draft 2015 IRP Approach with Existing Conveyance Low Outflow SWP

SWP ECLO Scenario

Average Table A + Article 21




Reliability/Risk Scenario 1
Probability of Shortage
2020
2025
2030
2035
2040
7%
93%
8%
92%
3%
97%
3%
97%
3%
97%
Shortage
No Shortage
0%
20%
40%
60%
80%
100%

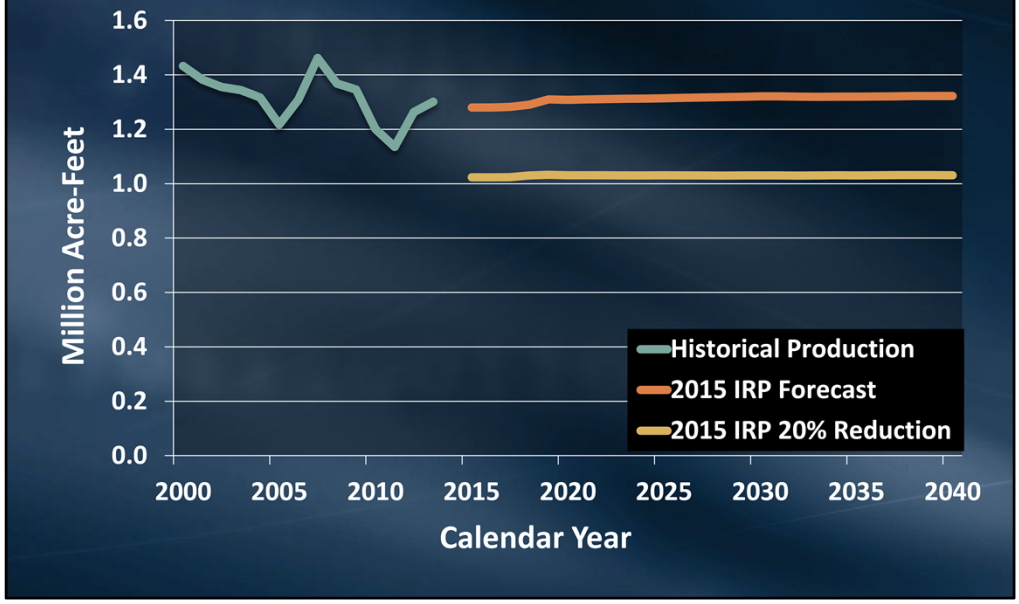
Scenario 2: Draft 2015 IRP Approach with 20% Reduction in Groundwater Production

Potential Risks to Local Supplies

- Reduction in local groundwater production as a proxy for overall risk
  - Water quality impacts
  - Availability of natural and/or imported recharge
  - Climate change impacts

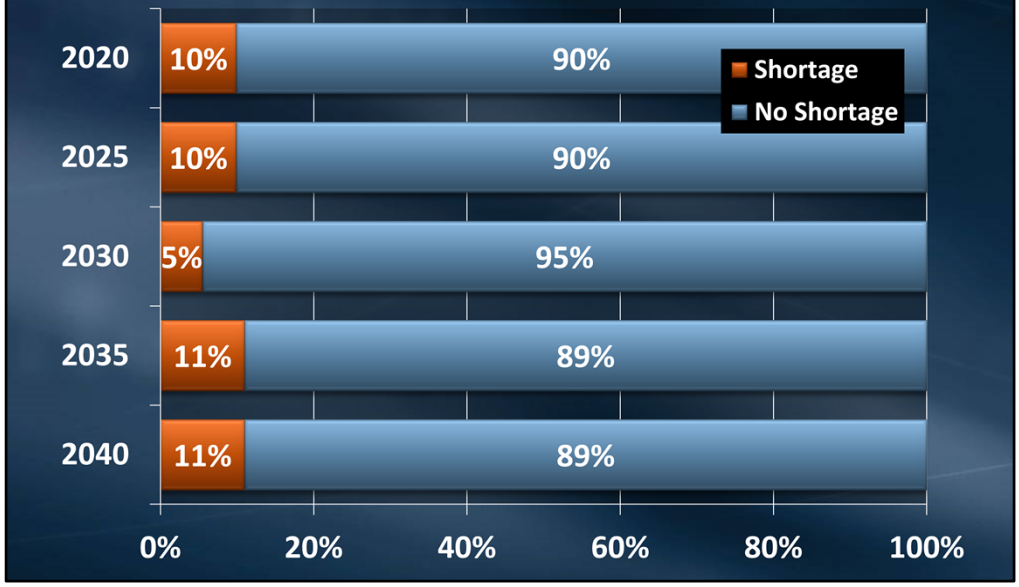
Local Groundwater Production

Historical and Projected

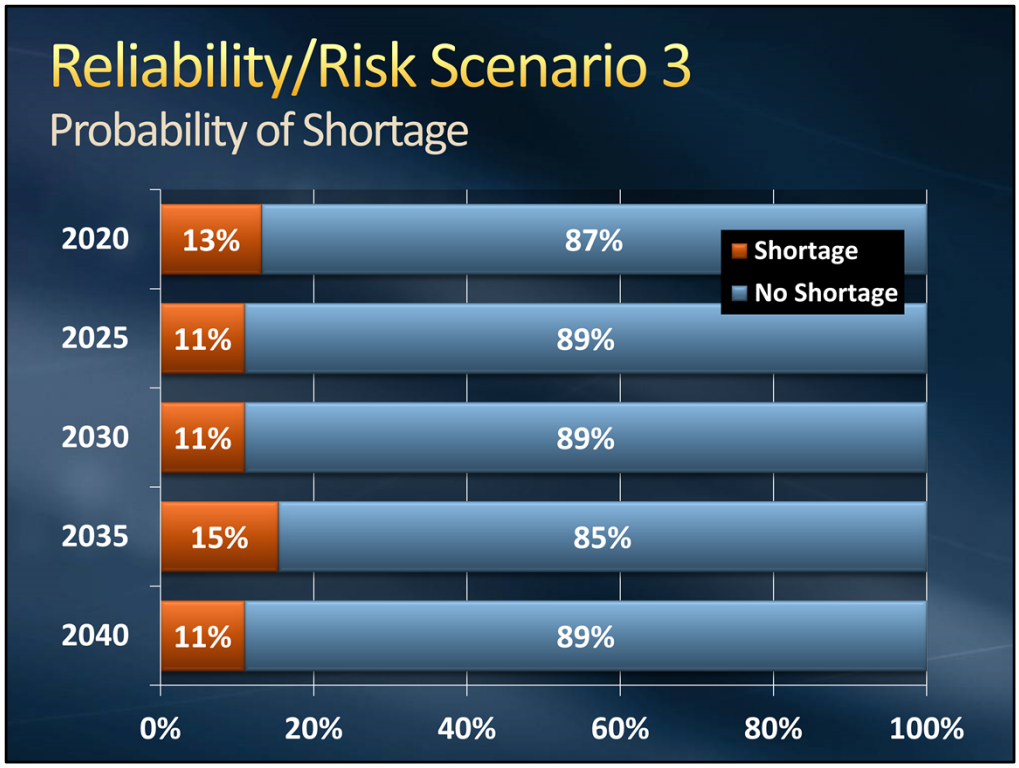


Reliability/Risk Scenario 2

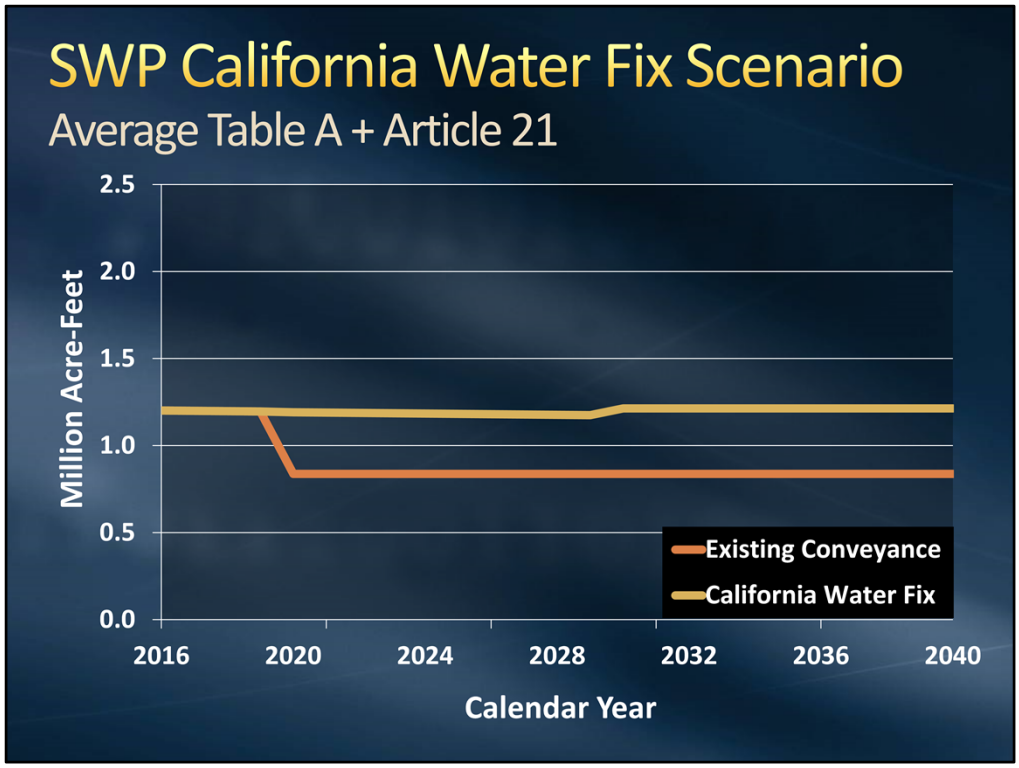
Probability of Shortage



Scenario 3: Draft 2015 IRP Approach with ECLO SWP and 20% Reduction in Groundwater Production


Reliability/Risk Scenario 3
Probability of Shortage
2020
2025
2030
2035
2040
13%
87%
11%
89%
11%
89%
15%
85%
11%
89%
Shortage
No Shortage
0%
20%
40%
60%
80%
100%

Scenario 4: Draft 2015 IRP Approach Without the California Water Fix



Let's see how this plays out over time.
Existing scenario for context

Added together table A and Article 21, same look over time:
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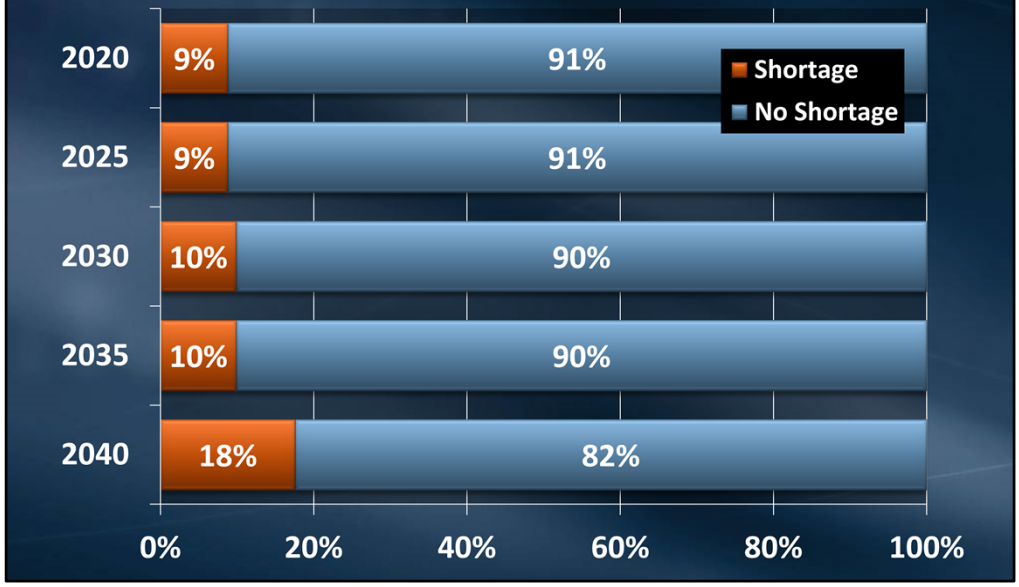
Assumptions for Shaded area!!!

Reliability/Risk Scenario 4

Probability of Shortage



Ensuring Sufficient Storage Levels

Ways to Meet Demands

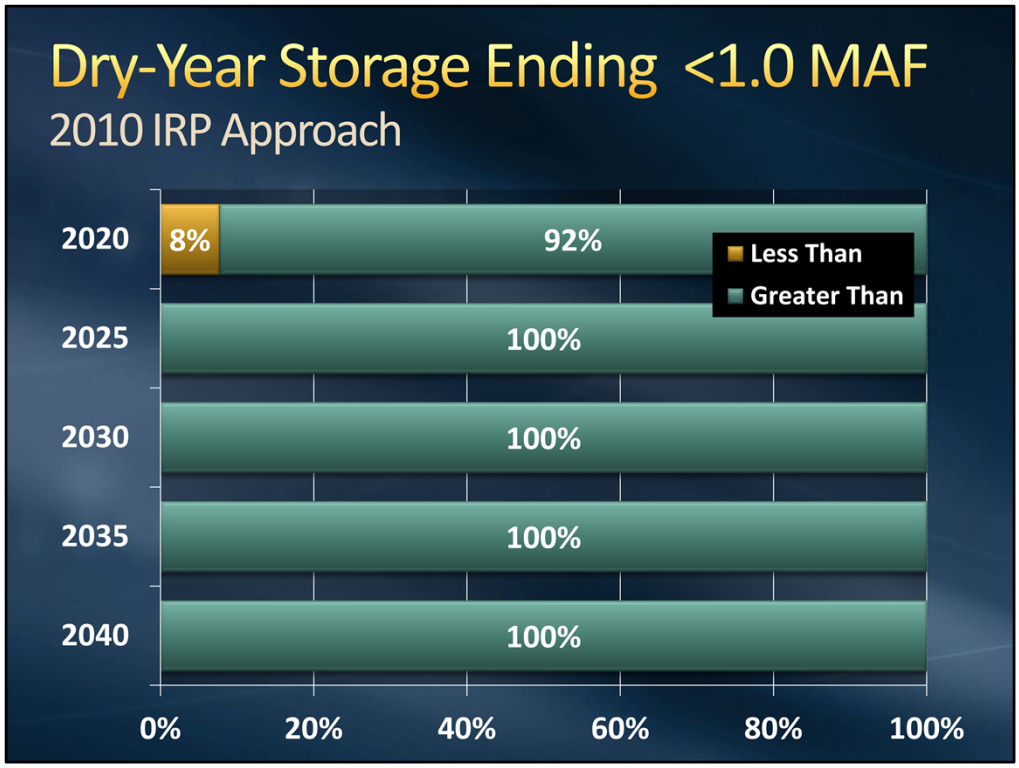
- Core Supplies
  - Provides water or demand reduction in every year
  - Usually requires capital investment
  - Examples
    - Recycled water
    - Imported supply
    - Conservation
- Storage
  - Manage wet year surplus supplies for dry year benefit
  - Usually requires capital investment
  - Surface or groundwater

Ways to Meet Demands (cont.)

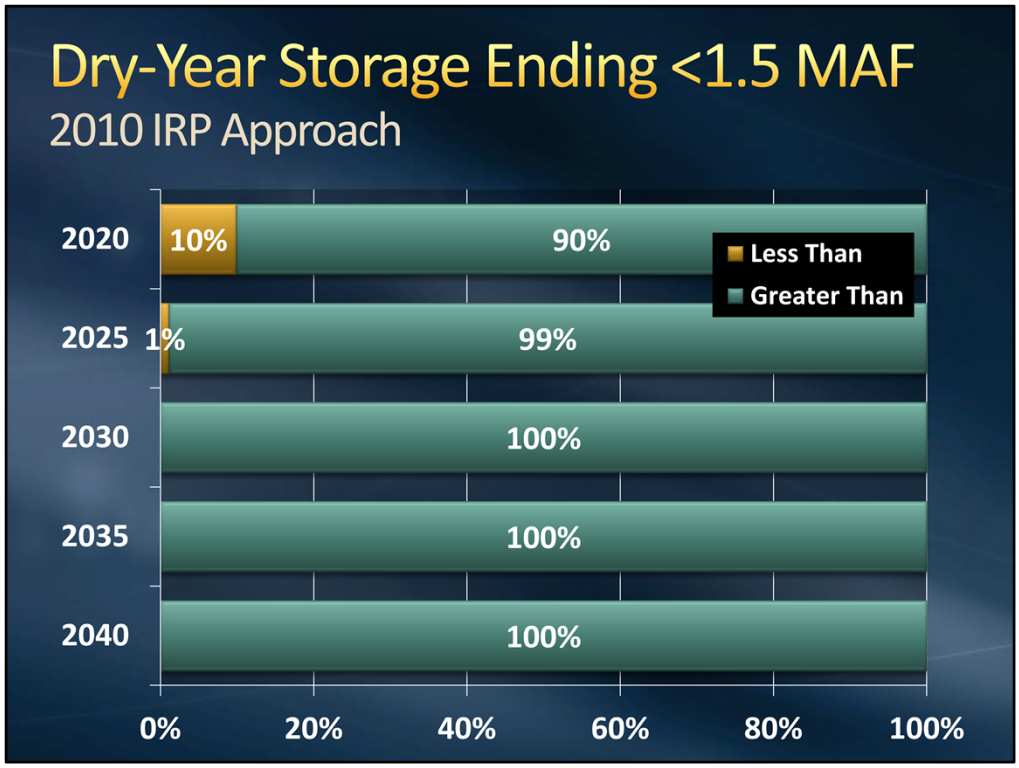
- Transfers and Exchanges
  - Can flexibly provides water in different year types
    - Availability can vary greatly from wet to dry years
  - Does not usually require capital investment
  - Can be leveraged by existing storage portfolio

Storage Reserve Threshold Analysis

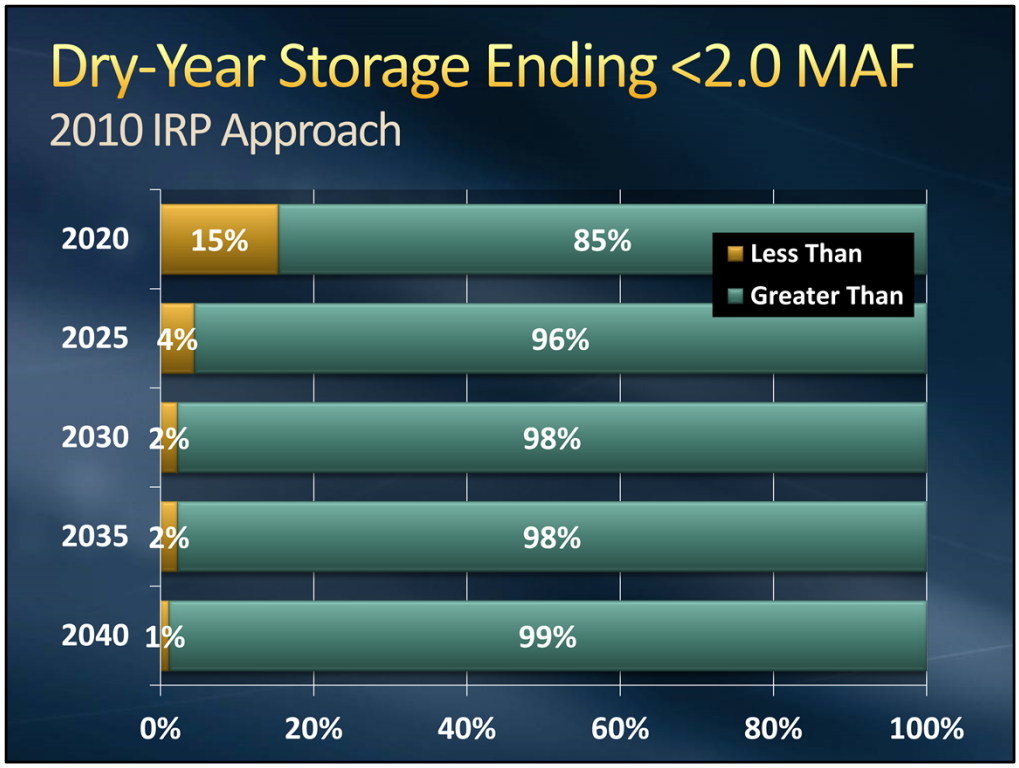
- Start with IRP Approach water balance
  - Includes 2010 IRP targeted development
- Evaluated results against different storage threshold levels
  - 1.0 MAF dry-year storage
  - 1.5 MAF dry-year storage
  - 2.0 MAF dry-year storage
- Add supplies and evaluate improvements in storage thresholds



Huge reduction in storage below 1 MAF.



Huge reduction in storage below 1 MAF.



Huge reduction in storage below 1 MAF.

Storage Analysis Findings

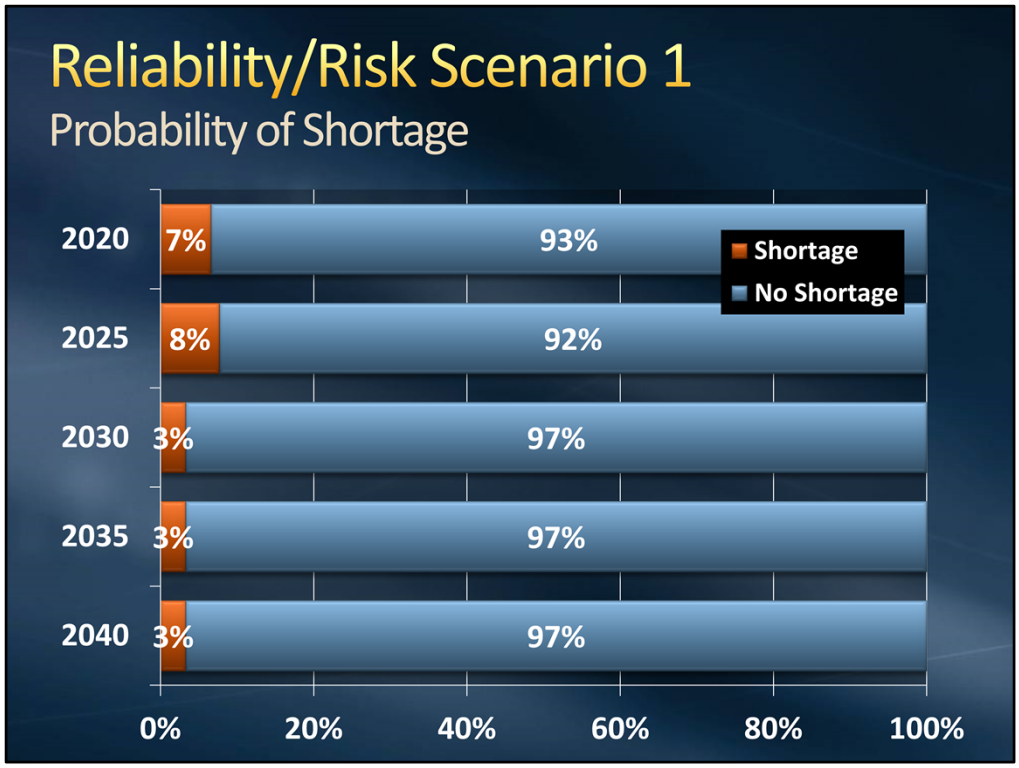
- Increasing core supplies improves results of multiple storage thresholds
  - Increased supplies allow more water to be stored
- 200 TAF of core supplies allows for meeting a 1.5 MAF reserve threshold
- 300 TAF of core supplies allows for meeting a 2.0 MAF reserve threshold
- Additional storage is a measure of “buffer” development for the IRP

Ensuring an Adequate Supply Buffer

Evaluate Impact of Storage Reserve Thresholds

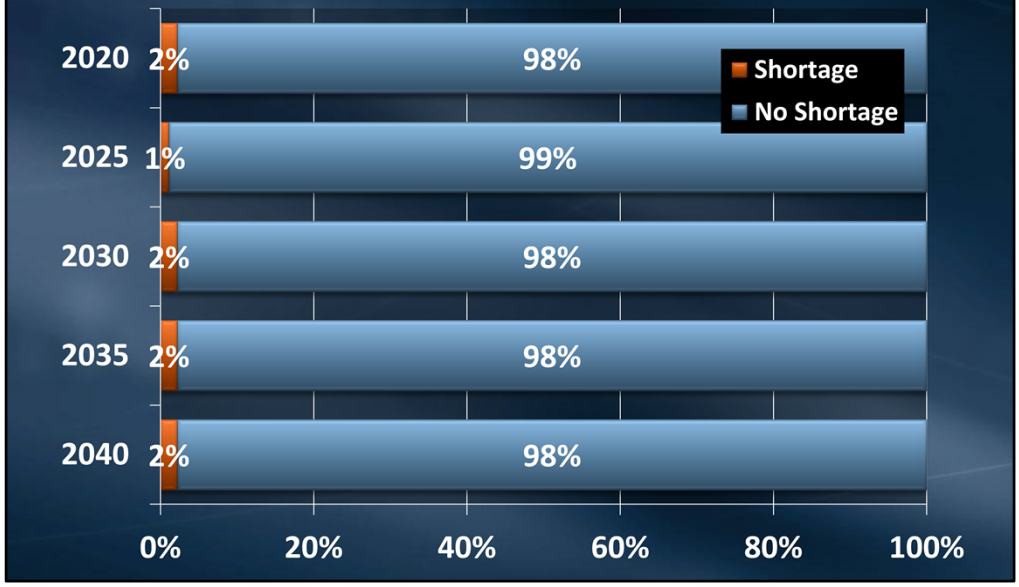
- Four reliability/risk scenarios
- Revaluate reliability with additional development to meet storage reserve thresholds
  - 1.5 MAF
  - 2.0 MAF

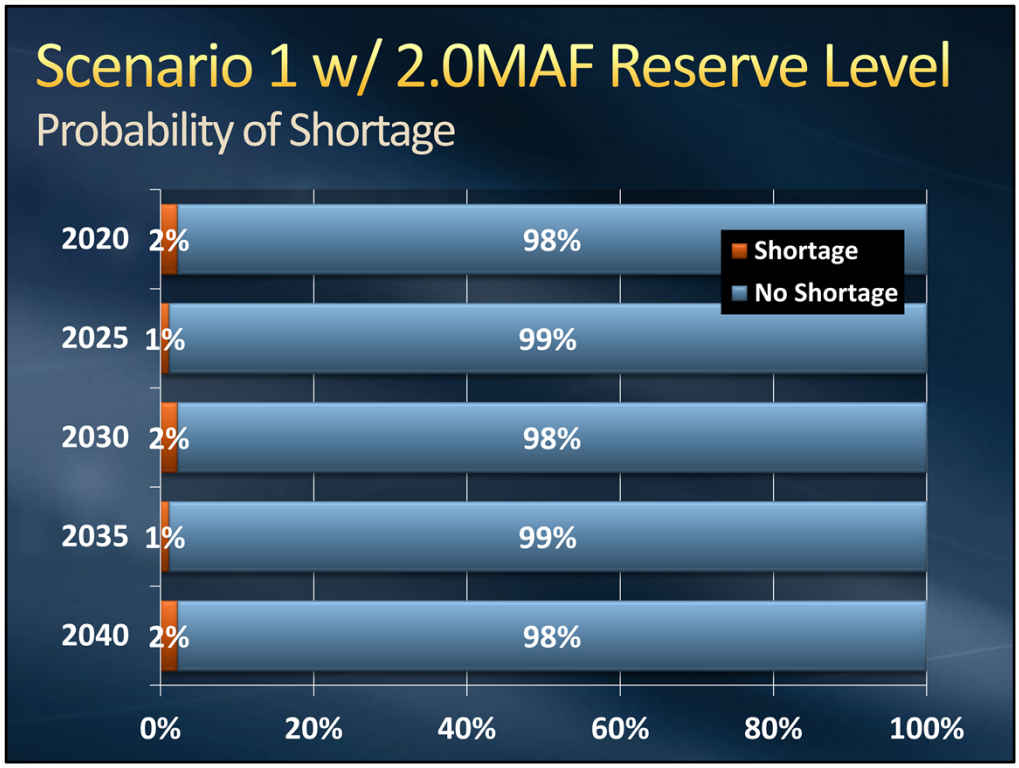
Scenario 1: Draft 2015 IRP Approach with Existing Conveyance Low Outflow SWP


Reliability/Risk Scenario 1
Probability of Shortage
2020
2025
2030
2035
2040
7%
93%
8%
92%
3%
97%
3%
97%
3%
97%
Shortage
No Shortage
0%
20%
40%
60%
80%
100%

Scenario 1 w/ 1.5MAF Reserve Level

Probability of Shortage

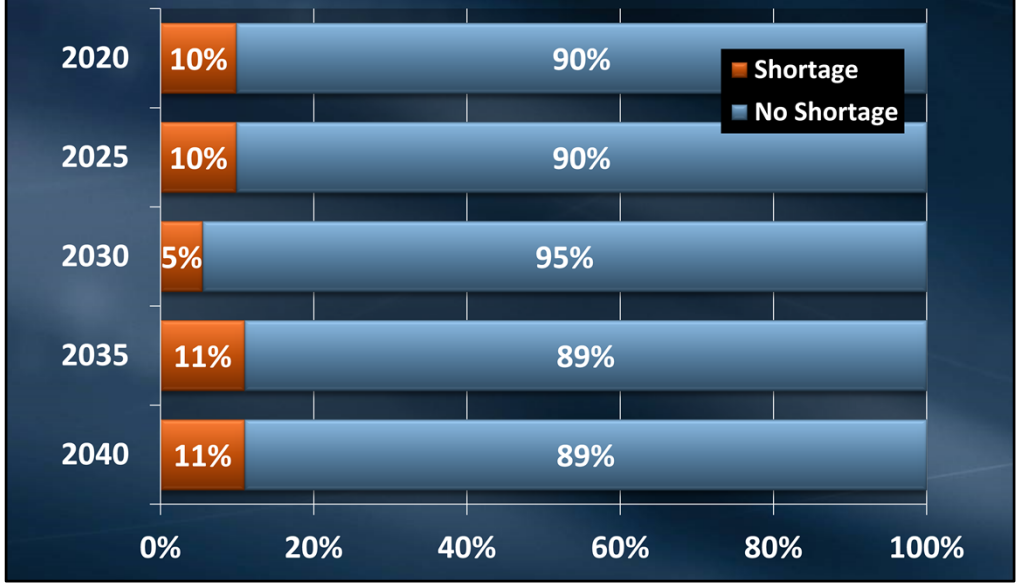


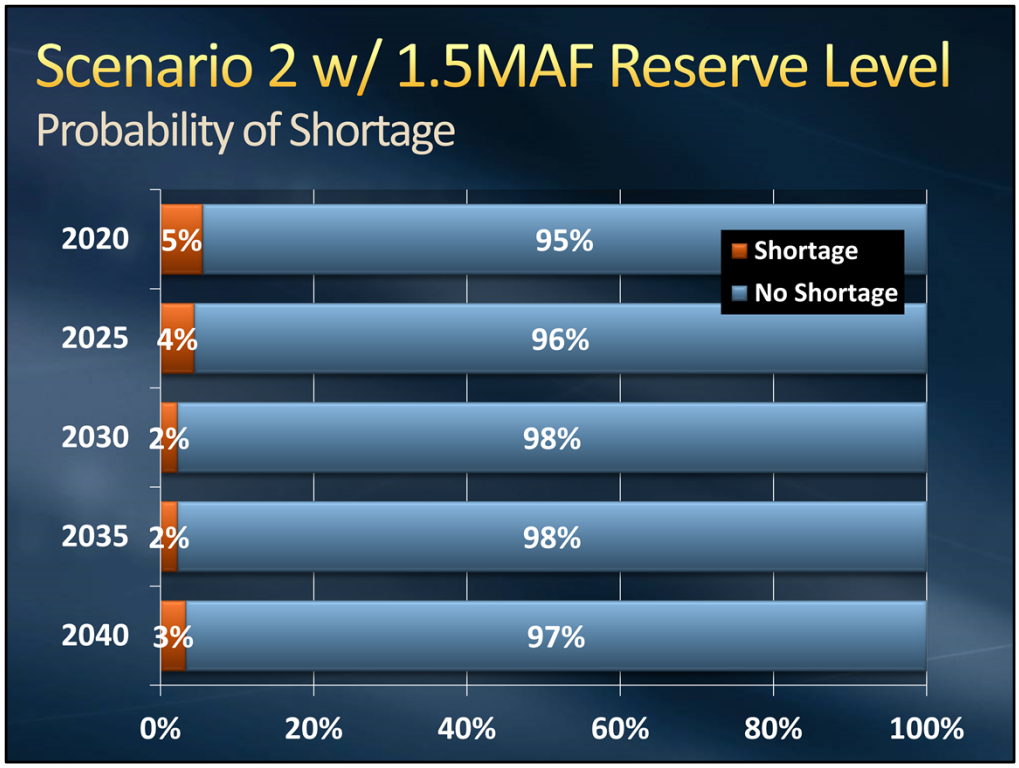

Scenario 1 w/ 2.0MAF Reserve Level
Probability of Shortage
2020
2025
2030
2035
2040
2%
1%
2%
1%
2%
98%
99%
98%
99%
98%
Shortage
No Shortage
0%
20%
40%
60%
80%
100%

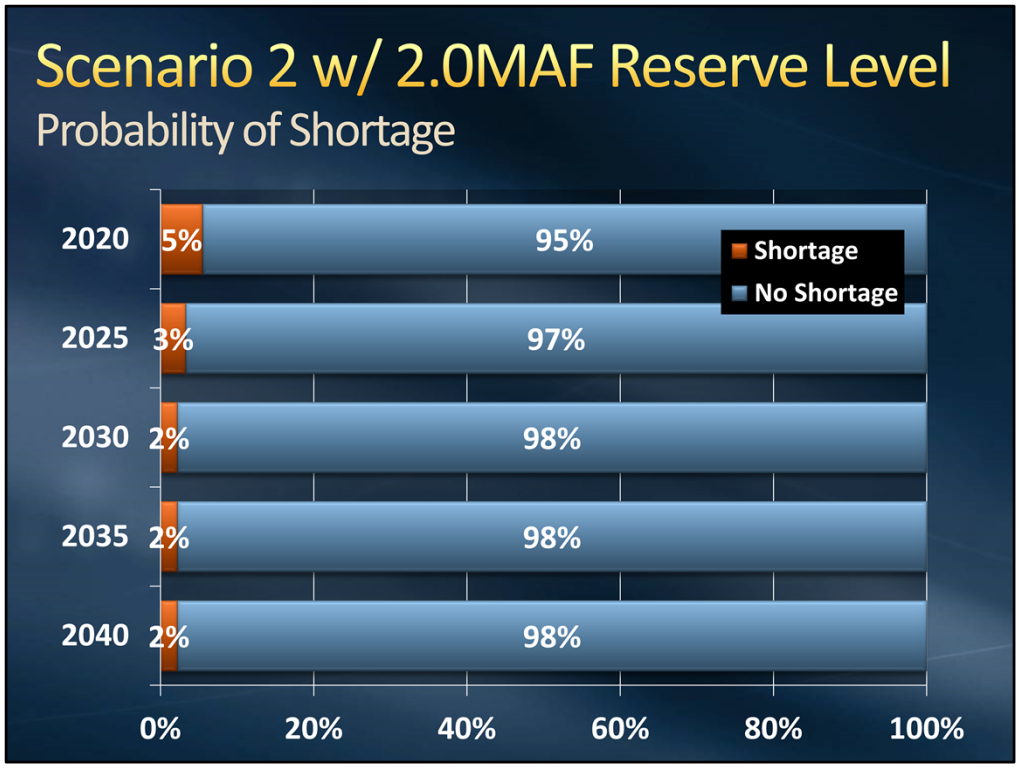
Scenario 2: Draft 2015 IRP Approach with 20% Reduction in Groundwater Production

Reliability/Risk Scenario 2

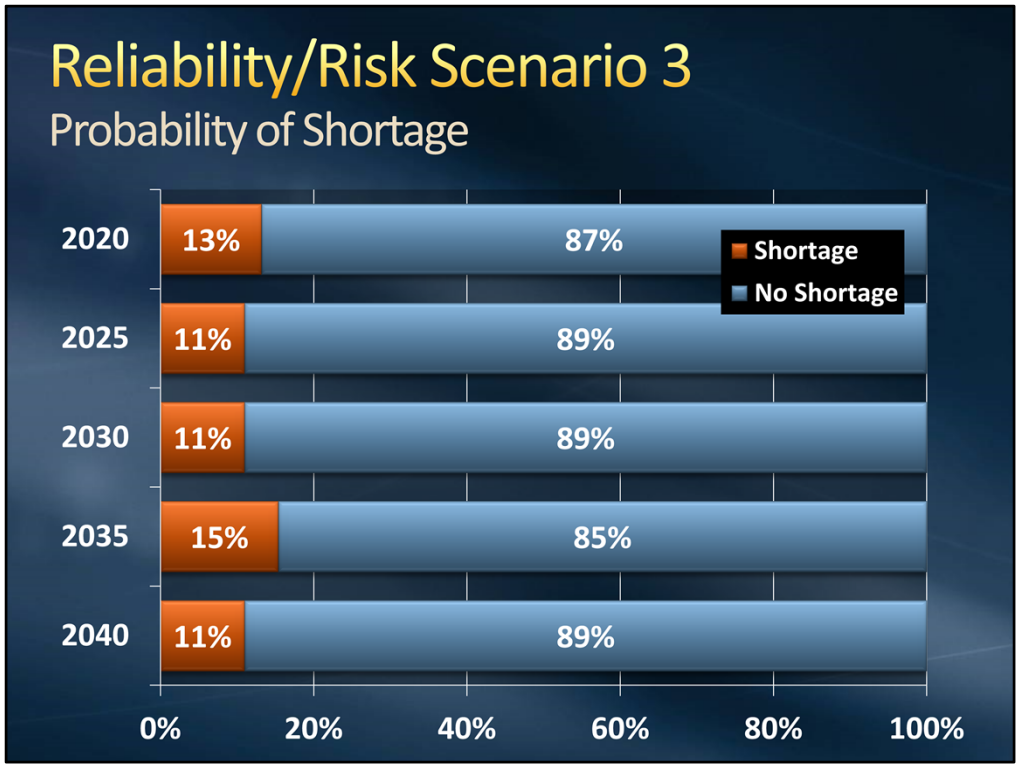
Probability of Shortage

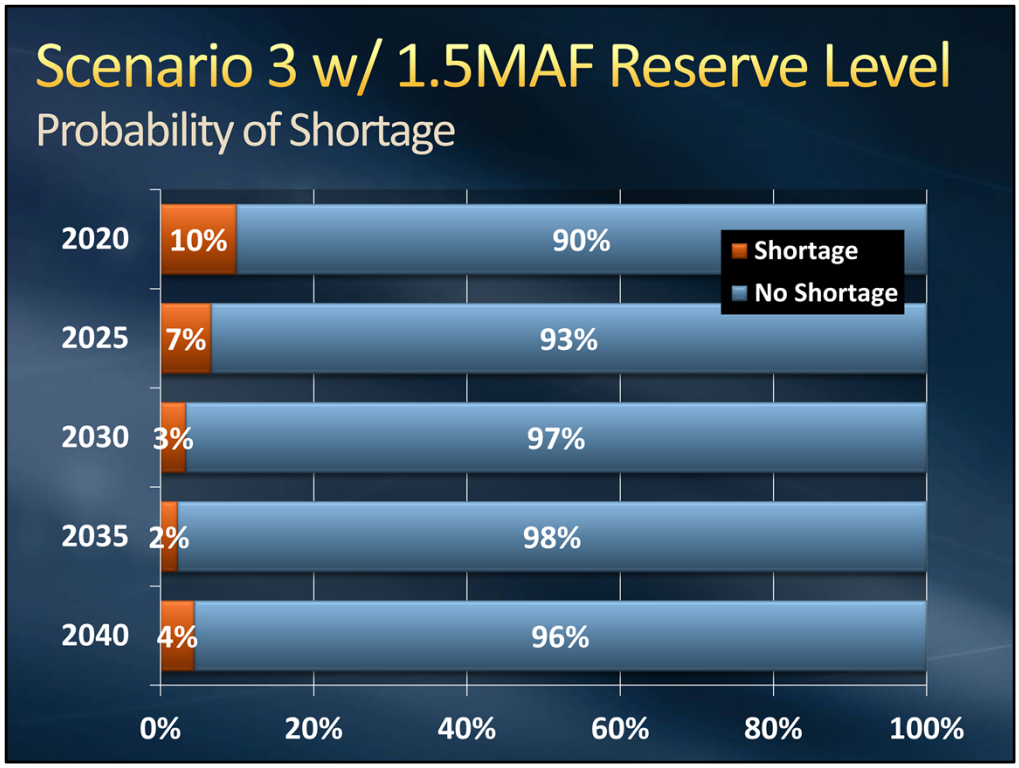


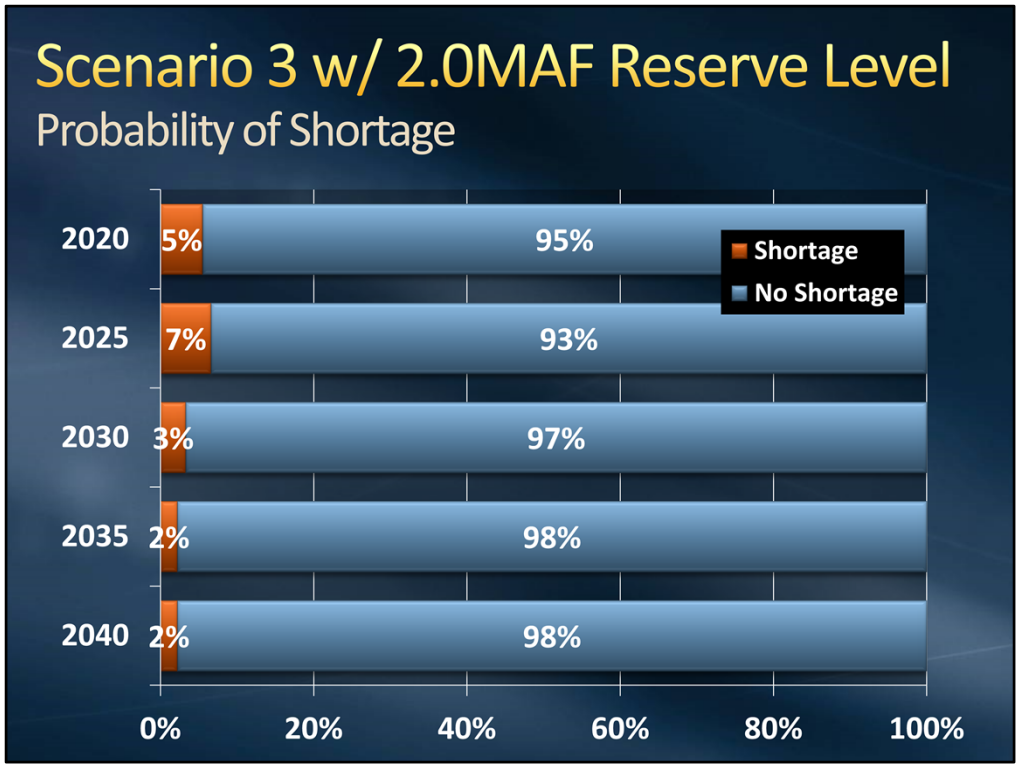

Scenario 2 w/ 1.5MAF Reserve Level
Probability of Shortage
2020
2025
2030
2035
2040
5%
4%
2%
2%
3%
95%
96%
98%
98%
97%
Shortage
No Shortage
0%
20%
40%
60%
80%
100%


Scenario 2 w/ 2.0MAF Reserve Level
Probability of Shortage
2020
2025
2030
2035
2040
5%
3%
2%
2%
2%
95%
97%
98%
98%
98%
Shortage
No Shortage
0%
20%
40%
60%
80%
100%

Scenario 3: Draft 2015 IRP Approach with ECLO SWP and 20% Reduction in Groundwater Production


Reliability/Risk Scenario 3
Probability of Shortage
2020
2025
2030
2035
2040
13%
87%
11%
89%
11%
89%
15%
85%
11%
89%
Shortage
No Shortage
0%
20%
40%
60%
80%
100%

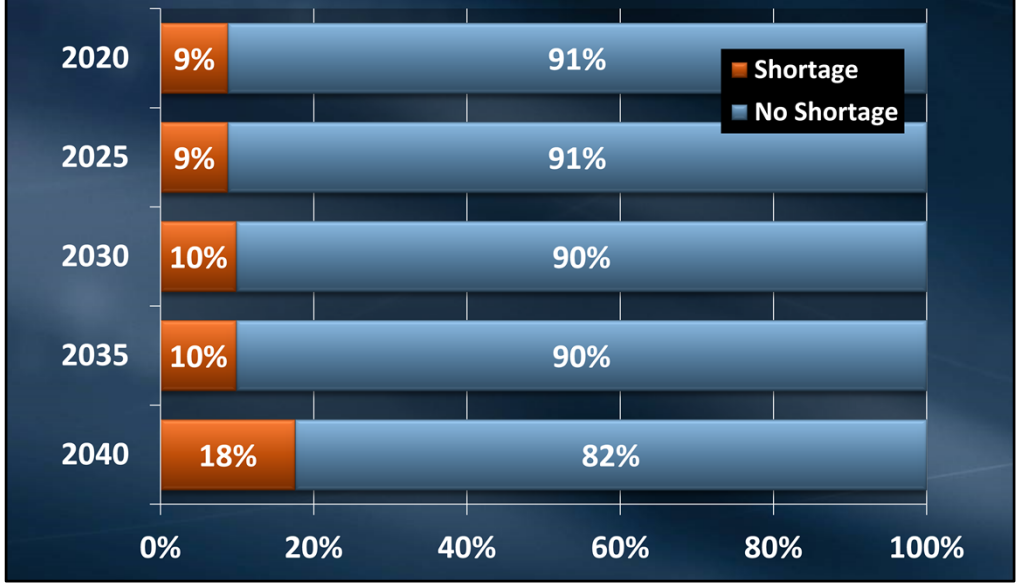

Scenario 3 w/ 1.5MAF Reserve Level
Probability of Shortage
2020
10%
90%
2025
7%
93%
2030
3%
97%
2035
2%
98%
2040
4%
96%
Shortage
No Shortage
0%
20%
40%
60%
80%
100%

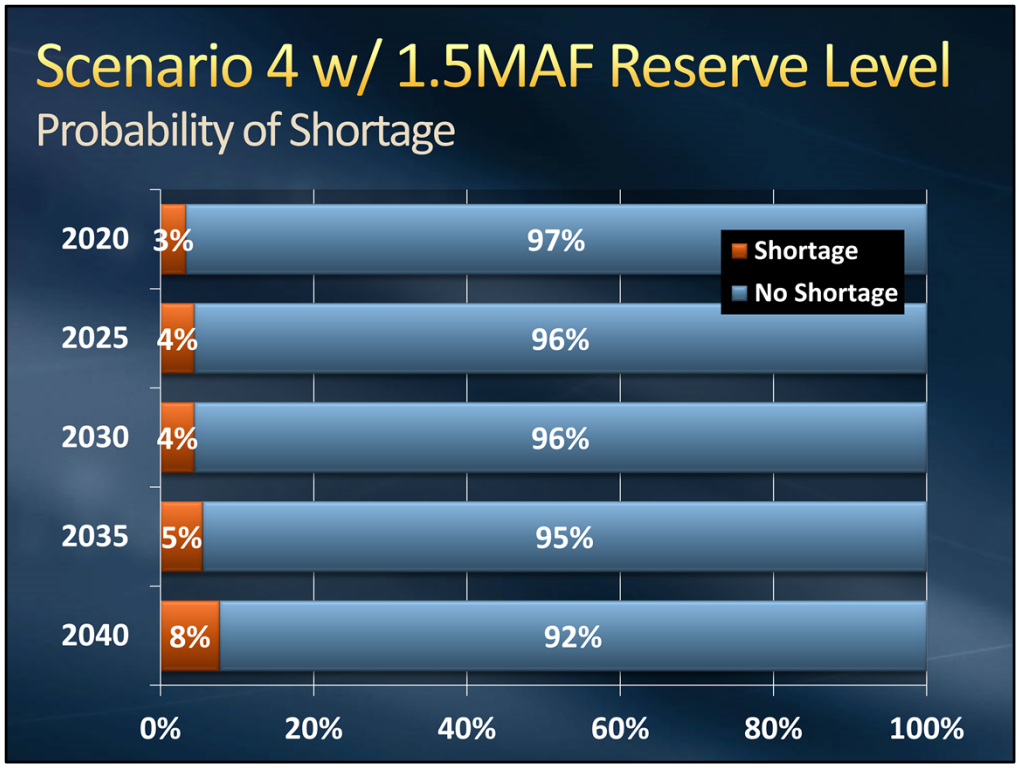

Scenario 3 w/ 2.0MAF Reserve Level
Probability of Shortage
2020
2025
2030
2035
2040
5%
7%
3%
2%
2%
95%
93%
97%
98%
98%
Shortage
No Shortage
0%
20%
40%
60%
80%
100%

Scenario 4: Draft 2015 IRP Approach Without the California Water Fix

Reliability/Risk Scenario 4

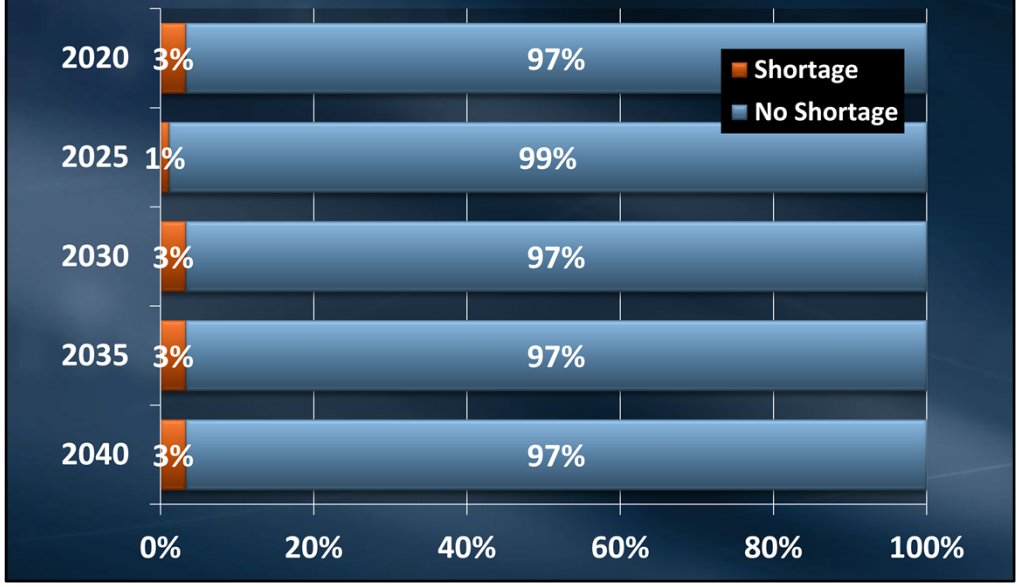
Probability of Shortage




Scenario 4 w/ 1.5MAF Reserve Level
Probability of Shortage
2020
3%
97%
2025
4%
96%
2030
4%
96%
2035
5%
95%
2040
8%
92%
Shortage
No Shortage
0%
20%
40%
60%
80%
100%

Scenario 4 w/ 2.0MAF Reserve Level

Probability of Shortage



Summary of Reliability Scenarios

- Increasing storage reserves by developing additional supplies serves as a buffer against potential risk
- Significant additional supplies would be needed
- Implementation approaches should be designed to address additional supply development if desired

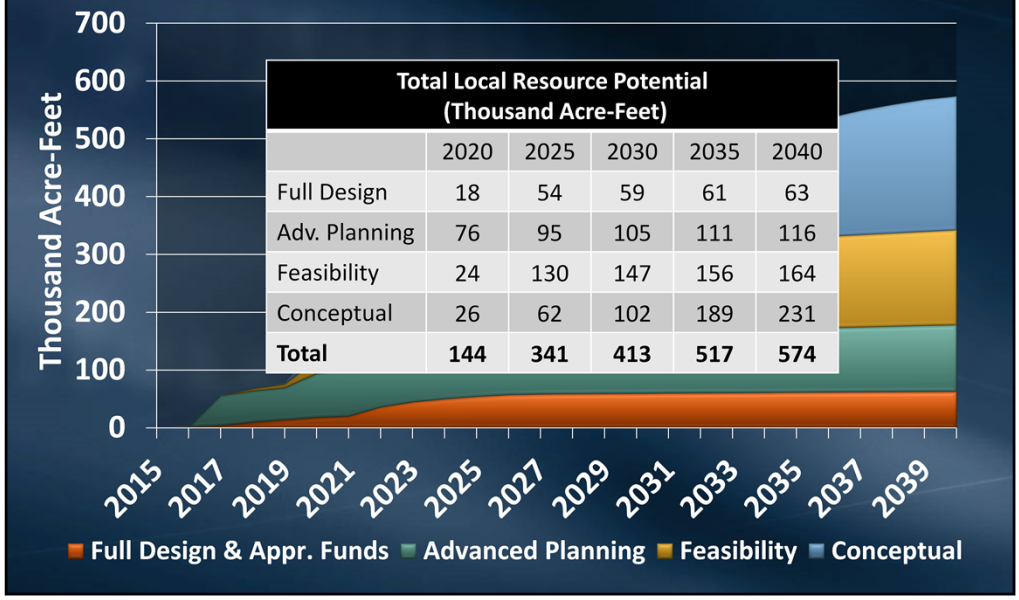
Addressing Shorter-Term Imbalances

What Can Be Done in the Near Term?

- Additional development of conservation and local resources
  - Beyond 2010 IRP targeted remaining
- Development of stormwater to reduce needs for imported recharge
- Development of a comprehensive transfers and exchanges strategy
  - Coordinated with storage Metropolitan and local storage resources

Total Local Resources Potential

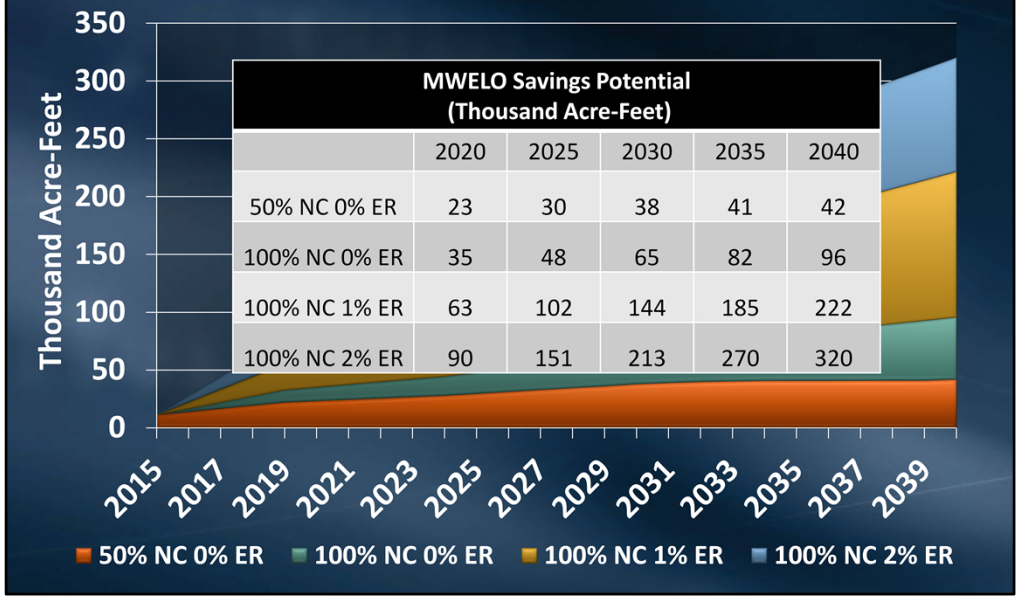
All Future Projects



Total Local Resource Potential (Thousand Acre-Feet)					
	2020	2025	2030	2035	2040
Full Design	18	54	59	61	63
Adv. Planning	76	95	105	111	116
Feasibility	24	130	147	156	164
Conceptual	26	62	102	189	231
Total	**144**	**341**	**413**	**517**	**574**

Potential MWELO Savings

New Construction and Replacement Scenarios



MWELO Savings Potential (Thousand Acre-Feet)

	2020	2025	2030	2035	2040
50% NC 0% ER	23	30	38	41	42
100% NC 0% ER	35	48	65	82	96
100% NC 1% ER	63	102	144	185	222
100% NC 2% ER	90	151	213	270	320

Near-term Stormwater Potential

- ~40 TAF per year of additional stormwater capture and recharge
  - Projects identified as in-design or construction start between 2015 and 2020
- Based on the Southern California Water Committee Stormwater Project Database
- Project types
  - Improvements to existing centralized facilities
  - New centralized capture and recharge facilities
  - Sediment removal projects
  - Distributed projects

*calculations on capture and recharge may not be consistent across projects
23 projects
Total Capital costs (2008 $) = $240 M
Sediment removal 5954
channel improvement 654
distributed 1346
new centralized 5680
centralized improvement 28300
Total: 41933.5
15,000 AF/yr from Cable Creek Basin and Spreading Grounds ($1,000,000 capital cost)?

Transfers and Exchanges Strategy

- Dry years – SWP Allocation less than 30%
  - Continue to pursue North of Delta purchases subject to availability and price
- Normal years – SWP Allocation between 30% and 60%
  - Pursue North of Delta purchases when availability and export capacities are higher and price is lower
- Wet years – SWP Allocation greater than 60%
  - Develop partnerships with South of Delta users for unbalanced exchanges
  - Leverage extensive storage resources

What are the Next Steps?

- Provide technical information and findings to IRP Committee
- Finalize proposed 2015 IRP development goals based on Board direction
- Refine and improve implementation approaches and policy to ensure development


Technical Process
Next Steps

Upcoming Technical Process Activities
September 2015

- IRP Committee Meeting September 29th
  - Colorado River Outlook and the IRP
  - Technical Process Draft Results
    - Supply/demand/storage scenarios
    - Potential resource development targets
  - Update on IRP Outreach

Upcoming Technical Process Activities
October 2015

- Member Agency Workgroup October 5th
- IRP Public Outreach Workshop October 22nd
- IRP Committee Meeting October 27th
  - Report on IRP Public Outreach Workshop
  - Technical Process Results
  - IRP Issue Paper Addendum
  - Inventory of Policy Issues


THE METROPOLITAN WATER DISTRICT OF
SOUTHERN CALIFORNIA