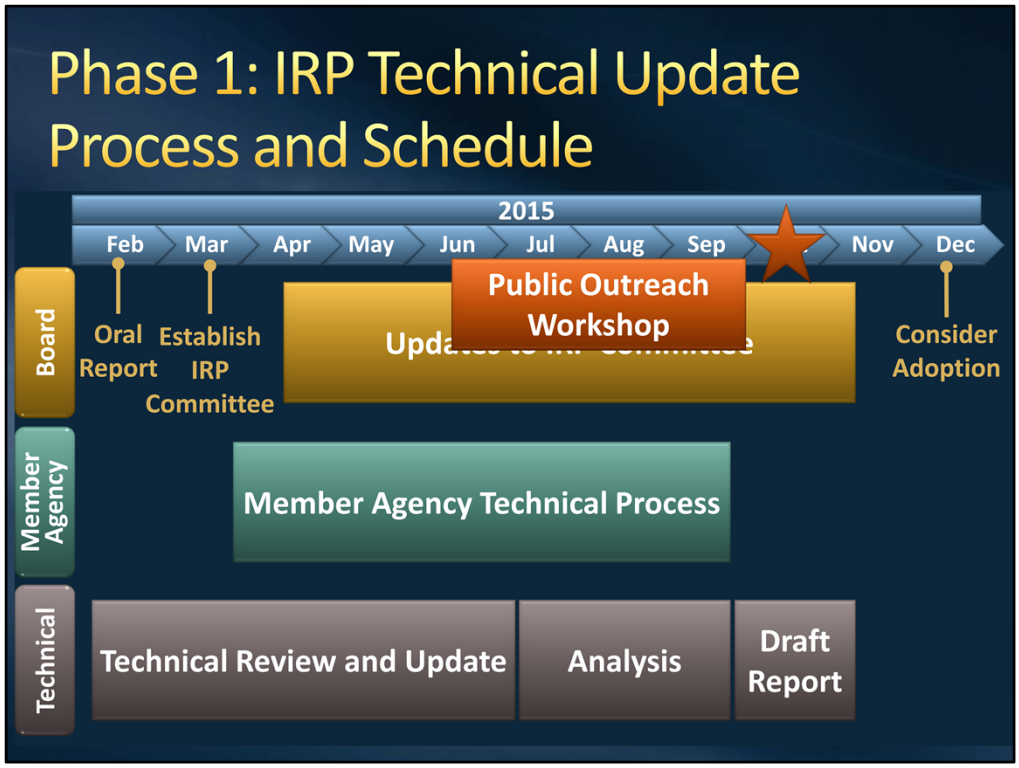
2015 IRP Technical Process

MWDOC Board Caucus
October 7, 2015

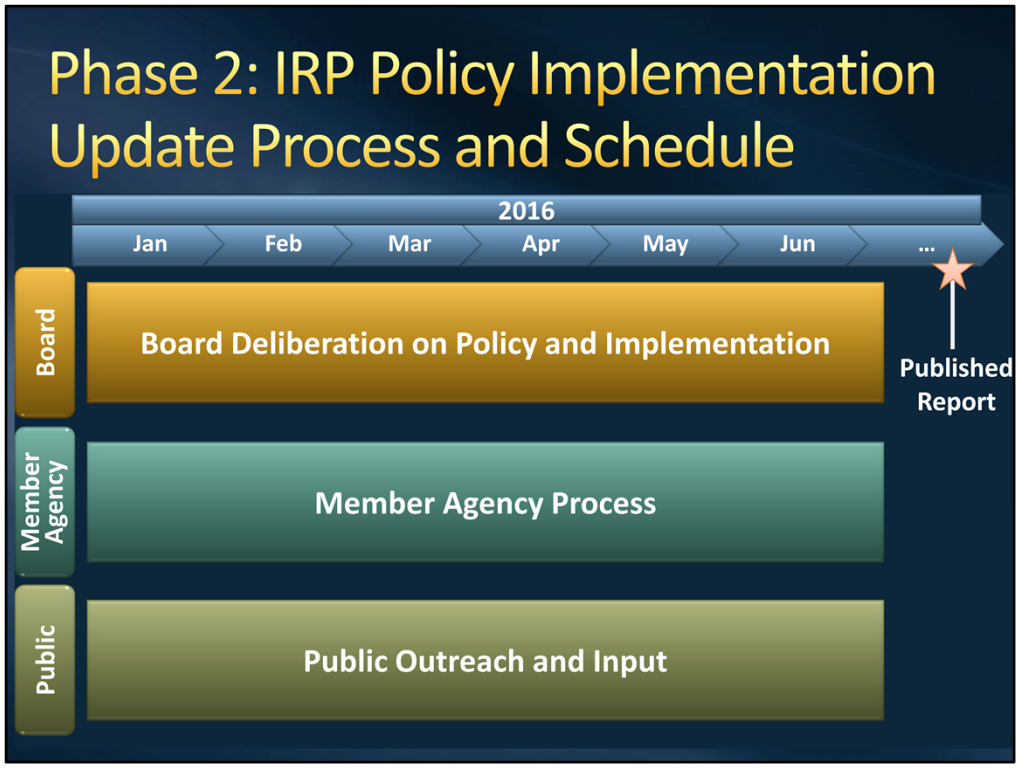


Internal Process –
Ongoing

MA Technical Process –
MA workgroup meetings twice a month April through August, as needed through October
WUE meetings monthly standing meeting April through July

Board –
Reporting in Feb and March (IRP Committee)
Monthly Updates from MA tech process
Wrapping up around the end of the year, head into Board Policy Process

Following slides breakdown activities at Board and MA levels



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Following slides breakdown activities at Board and MA levels

Four Key Framing Questions

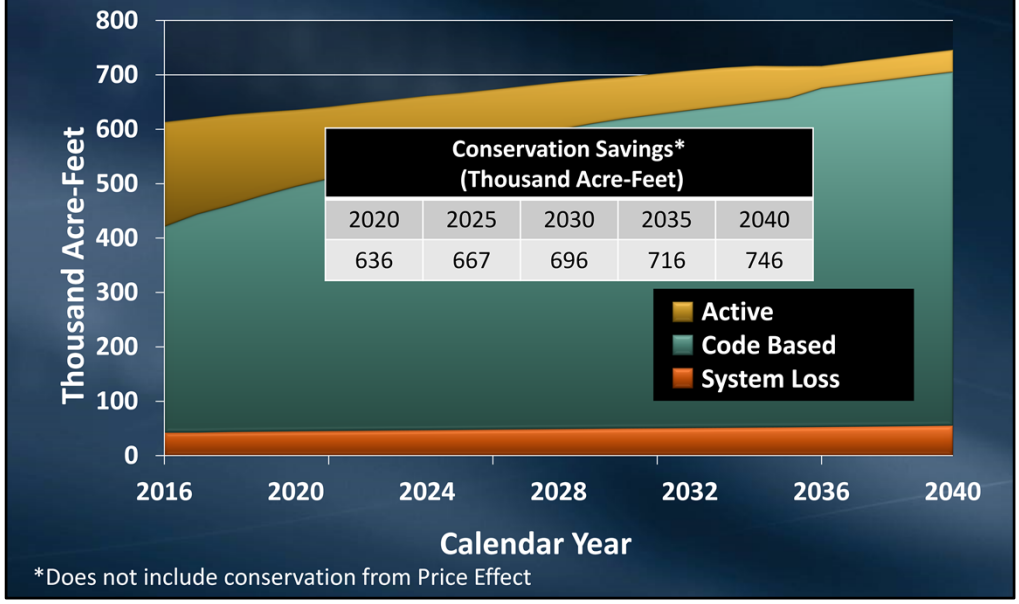
- What is our current outlook on supplies and demands?
- What happens if we do nothing?
- What happens if we continue developing the current 2010 IRP targets?
- What potential changes to the current 2010 IRP targets are needed?

What is Our Current Outlook on Supplies and Demands?

Conservation Savings

Conservation Savings*

Projected on 1990 Base Year



Conservation Savings* (Thousand Acre-Feet)				
2020	2025	2030	2035	2040
636	667	696	716	746

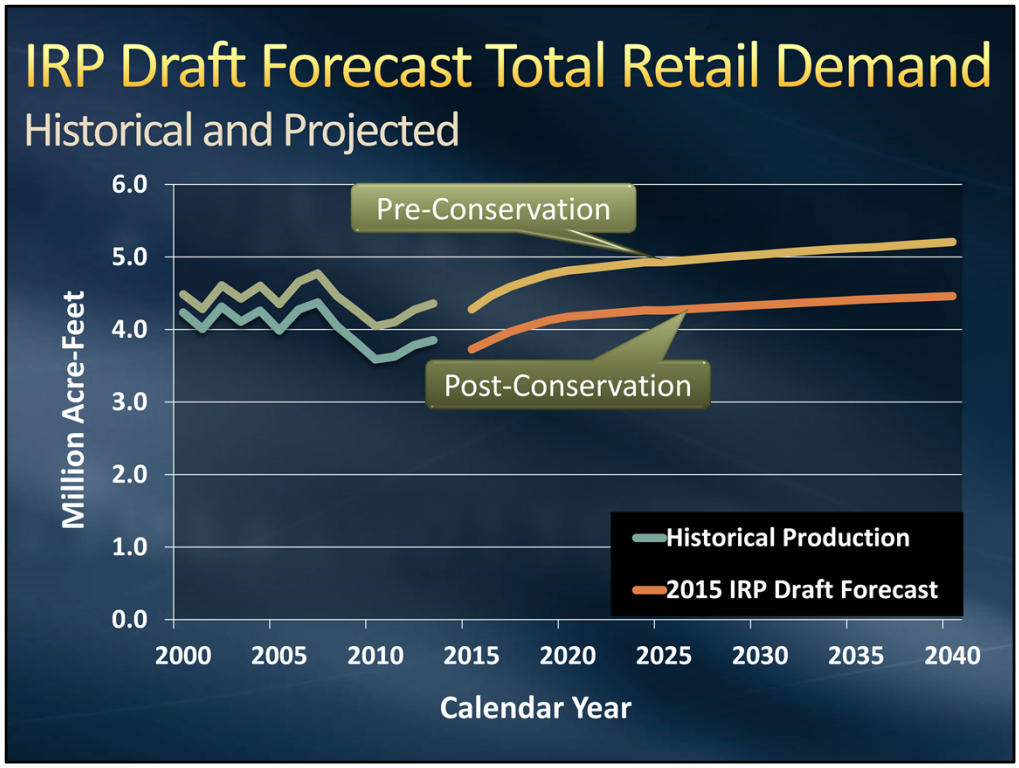
*Does not include conservation from Price Effect

Retail Demands

Total Retail Demands

Key Assumptions

- Updated demographic forecasts
  - SCAG RTP 12
  - SANDAG Series 13
- Retail M&I Demand
  - New econometric model
- Agency provided demand forecasts
  - Agricultural
  - Seawater Barrier
  - Replenishment

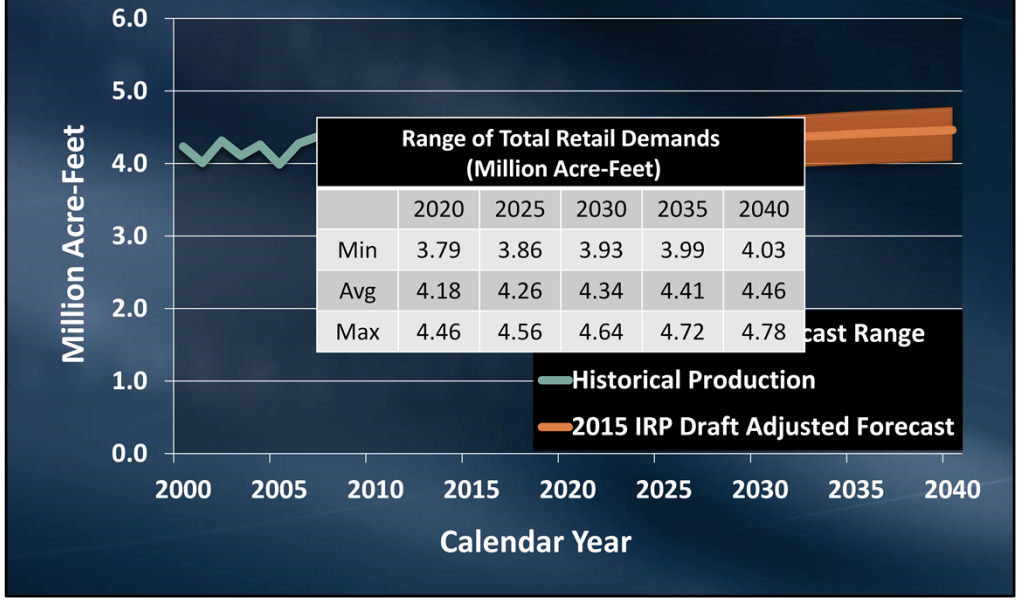

IRP Draft Forecast Total Retail Demand
Historical and Projected
Pre-Conservation
Post-Conservation
Million Acre-Feet
6.0
5.0
4.0
3.0
2.0
1.0
0.0
2000
2005
2010
2015
2020
2025
2030
2035
2040
Calendar Year
Historical Production
2015 IRP Draft Forecast

Near-Term Demand Adjustment
Key Assumptions

- Capture observed reduction in demand
- Estimate behavioral and structural elements
- Adjust climate effects and other conservation savings elements to avoid double-counting of reductions in the forecast

Retail Demands Post-Conservation

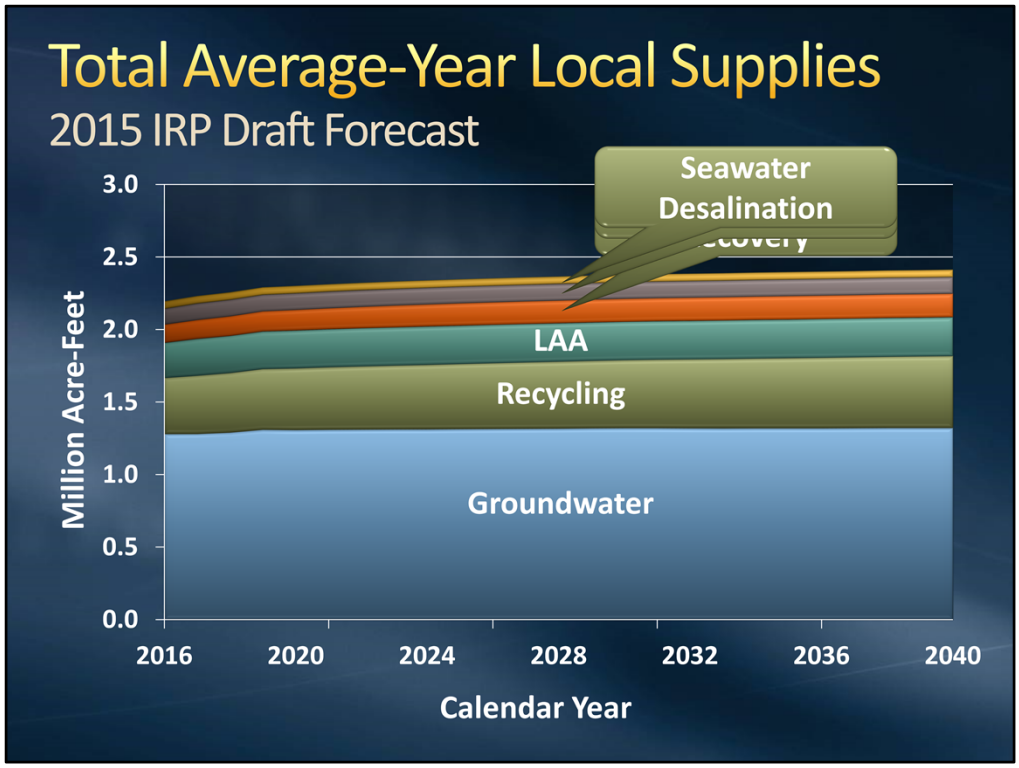
Historical and Projected



Range of Total Retail Demands (Million Acre-Feet)

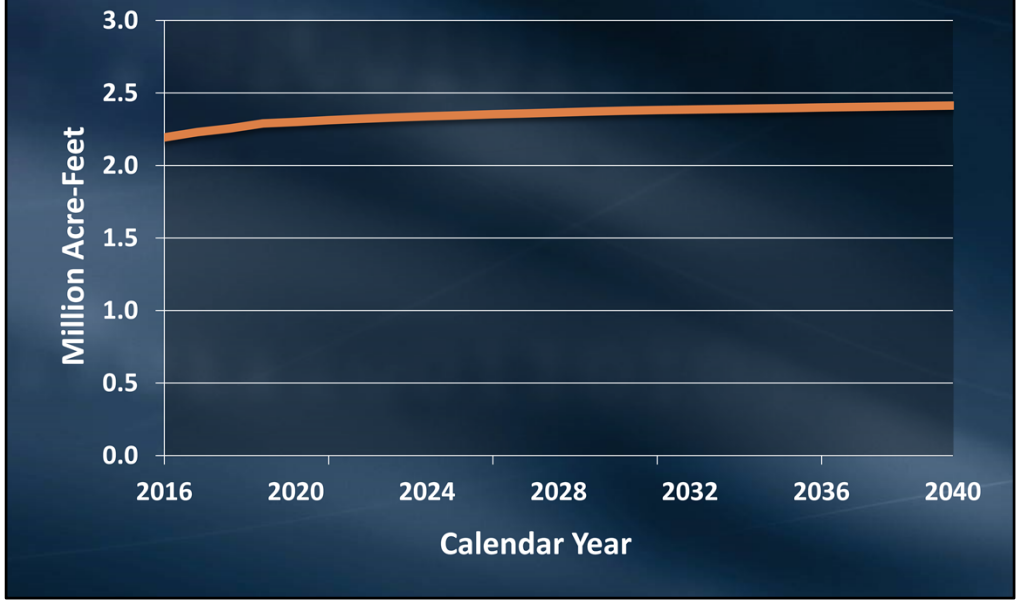
	2020	2025	2030	2035	2040
Min	3.79	3.86	3.93	3.99	4.03
Avg	4.18	4.26	4.34	4.41	4.46
Max	4.46	4.56	4.64	4.72	4.78

Local Supplies


Total Average-Year Local Supplies
2015 IRP Draft Forecast
Seawater Desalination
LAA
Recycling
Groundwater
Million Acre-Feet
3.0
2.5
2.0
1.5
1.0
0.5
0.0
2016
2020
2024
2028
2032
2036
2040
Calendar Year

Total Average-Year Local Supplies

2015 IRP Draft Forecast



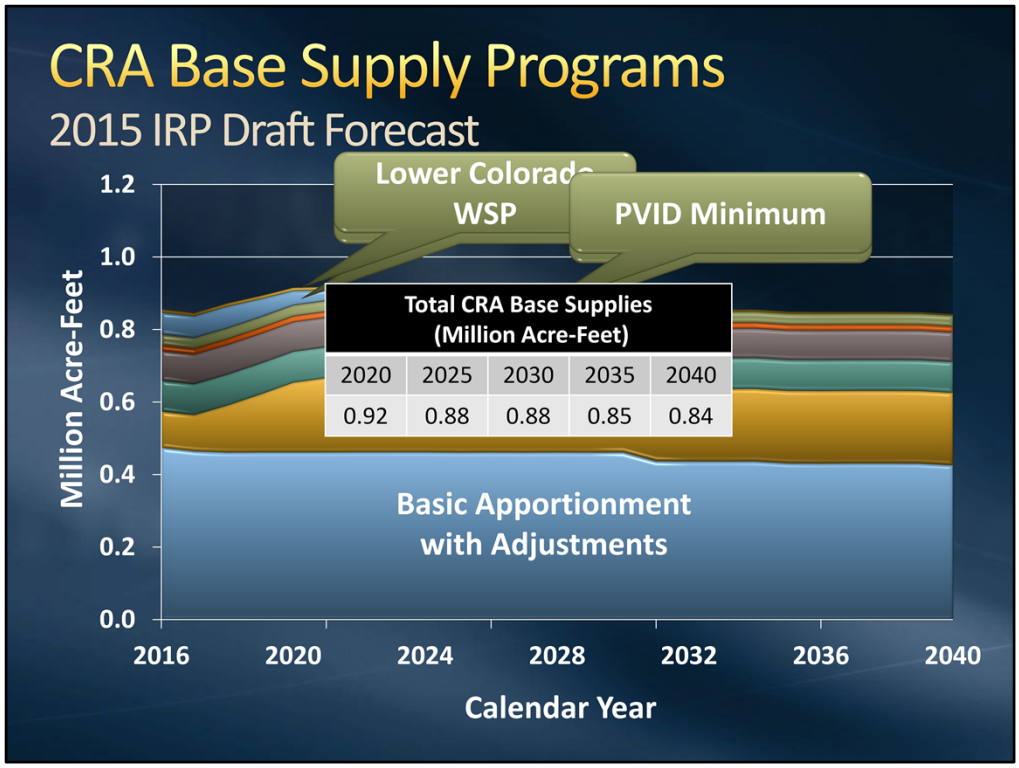
Total Range of Local Supplies

2015 IRP Draft Forecast

Total Range of Local Supplies (Million Acre-Feet)

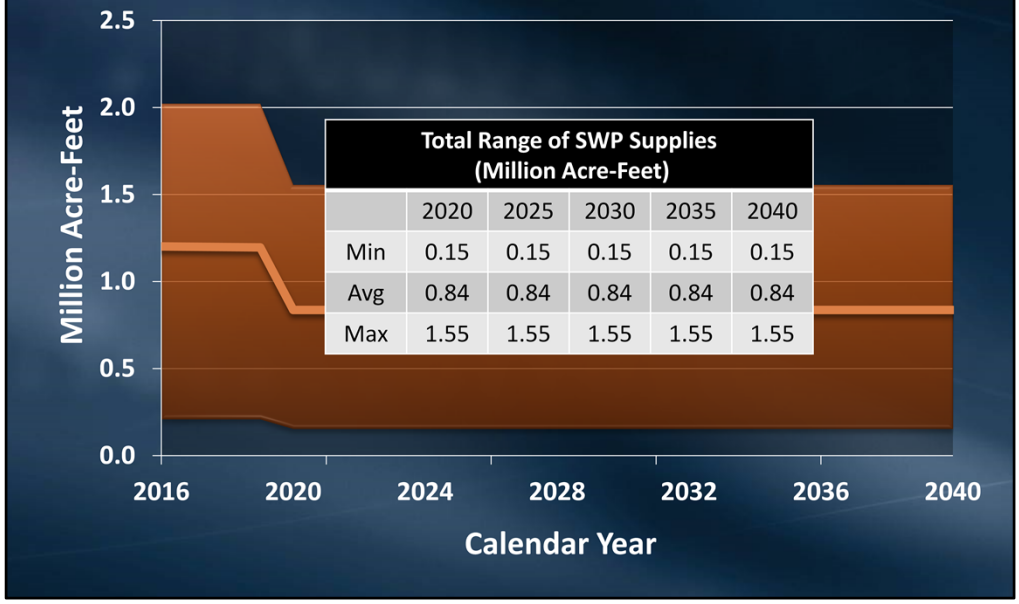
	2020	2025	2030	2035	2040
Min	2.02	2.09	2.11	2.17	2.18
Avg	2.30	2.35	2.38	2.40	2.41
Max	2.62	2.64	2.67	2.69	2.71

Imported Supplies


CRA Base Supply Programs
2015 IRP Draft Forecast
Lower Colorado WSP
PVID Minimum
Total CRA Base Supplies (Million Acre-Feet)
2020 2025 2030 2035 2040
0.92 0.88 0.88 0.85 0.84
Basic Apportionment with Adjustments
Million Acre-Feet
1.2
1.0
0.8
0.6
0.4
0.2
0.0
2016 2020 2024 2028 2032 2036 2040
Calendar Year

SWP Existing Conveyance Scenario

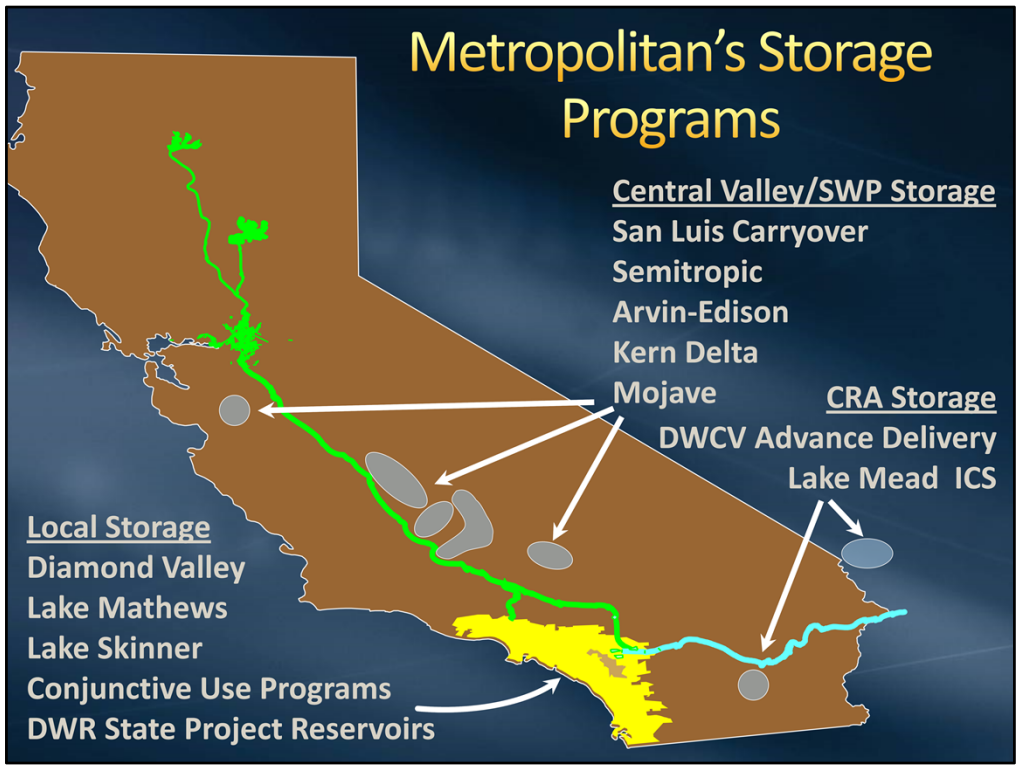
Draft Forecast Table A + Article 21



Total Range of SWP Supplies (Million Acre-Feet)

	2020	2025	2030	2035	2040
Min	0.15	0.15	0.15	0.15	0.15
Avg	0.84	0.84	0.84	0.84	0.84
Max	1.55	1.55	1.55	1.55	1.55

Storage Portfolio


Metropolitan's Storage Programs
Central Valley/SWP Storage
San Luis Carryover
Semitropic
Arvin-Edison
Kern Delta
Mojave
CRA Storage
DWCV Advance Delivery
Lake Mead ICS
Local Storage
Diamond Valley
Lake Mathews
Lake Skinner
Conjunctive Use Programs
DWR State Project Reservoirs

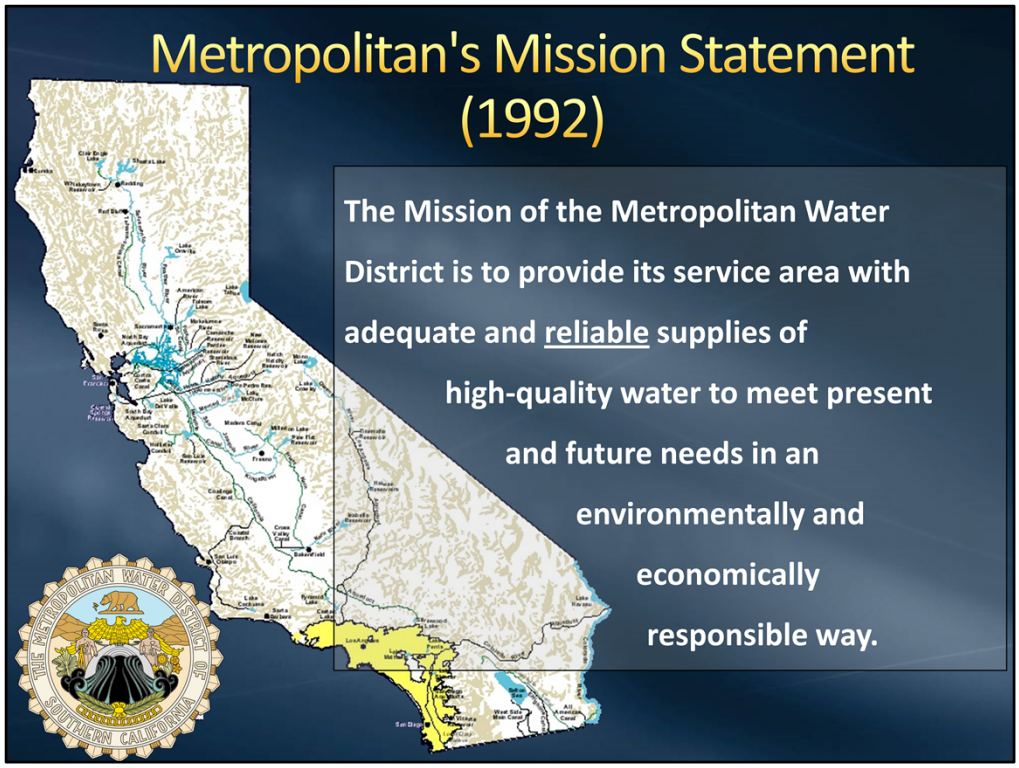
MWD Storage Programs Summary

Million Acre-Feet

	Storage Capacity	Put Capacity*	Take Capacity*	2016 Est. Starting
Central Valley & SWP	1.63	0.54	0.56	0.42
Colorado River	2.39	0.65	0.60	0.22
In-Region	1.30	0.90	0.94	0.14
Total Dry-Year	5.32	2.09	2.10	0.77
Emergency	0.63	0.63	0	0.63
Total	**5.95**	**2.72**	**2.10**	**1.40**

*Shows maximum capacities, actual capacity varies based on contract terms

Reliability Measures



Message Points

- Introduce the Metropolitan Water District
- Review the Mission Statement
- Emphasize that the Mission Statement drives the planning and development policies for Metropolitan

IRP Reliability Goals

- 1996
  - "…meet all retail-level water demands under all foreseeable hydrologic conditions"
  - "Through the implementation of the IRP, Metropolitan and its member agencies will have the full capability to meet full-service demands at the retail level at all times."
- 2004
  - Same as the 1996 goal plus a planning buffer
- 2010
  - Same as the 1996 goal plus the supply buffer and foundational actions

An Example of a Less Than 100% Reliability Goal

- Metropolitan will provide all of the firm wholesale demands to its member agencies 98% of the time, and have a shortage of no more than 10% the remaining 2% of the time.

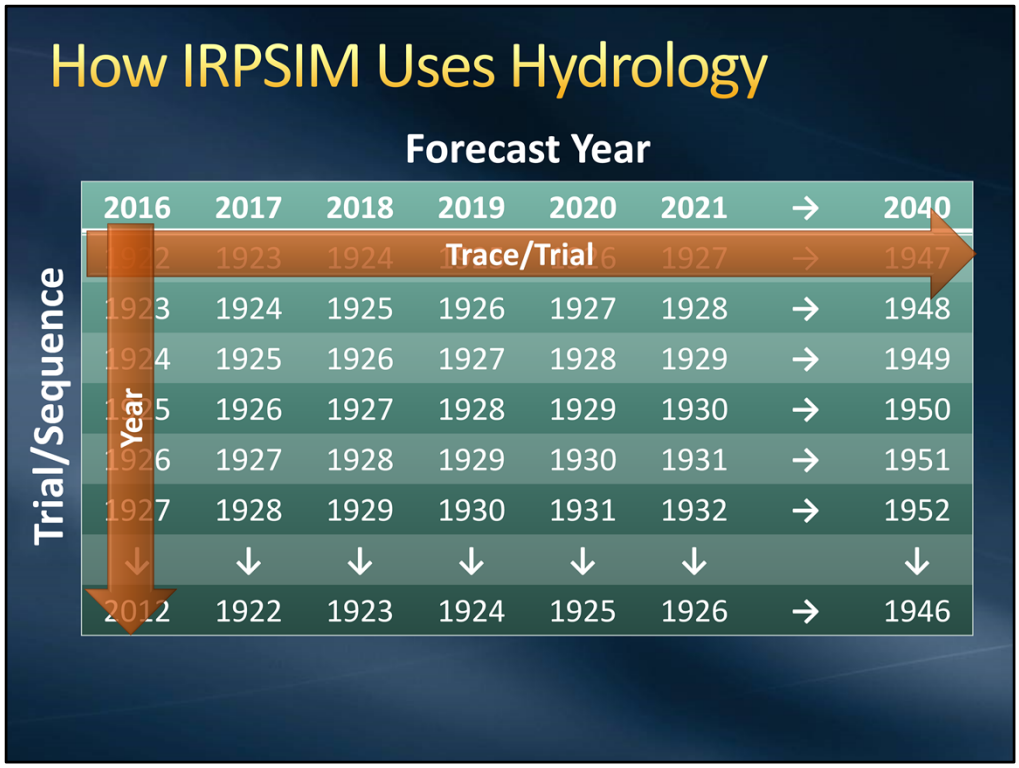
What is the Purpose of Reliability Analysis?

- Evaluates whether a supply mix meets demands in a manner consistent with reliability goals
- Serves as a test case
  - Tests supply and demand forecasts
  - Test ranges and variability due to climate and hydrologic factors

What is the Purpose of Reliability Analysis?

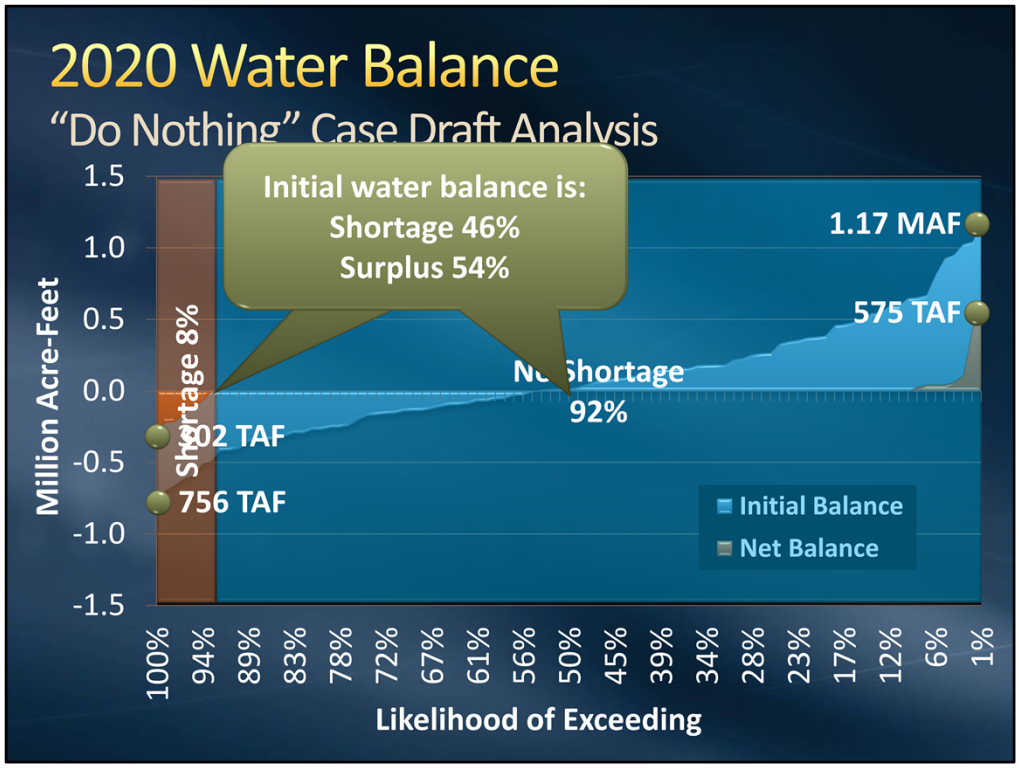
- Provides a range of outcomes for each forecast year
  - Uses 91 separate tests of supplies, demands, and storage
  - Based on climate and hydrologic conditions from 1922-2012
- Results show how many times out of 91 that there is no shortage, and what the resulting storage conditions are

How IRPSIM Uses Hydrology



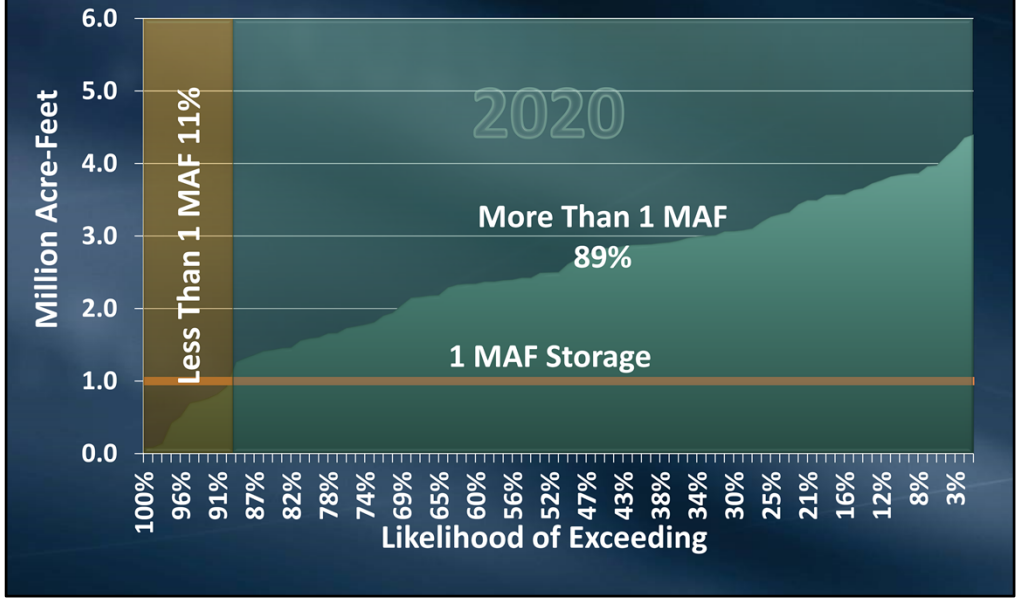
Potential Measures of Reliability

- Supply shortages
  - Frequency of shortage (a.k.a. probability)
  - Size of shortage
  - IRP reliability goal: “100% reliability under foreseeable hydrologic conditions”
- Storage thresholds
  - Minimum storage level
  - Average storage level


2020 Water Balance
"Do Nothing" Case Draft Analysis
Initial water balance is:
Shortage 46%
Surplus 54%
1.17 MAF
575 TAF
Net Shortage
92%
Shortage 8%
202 TAF
756 TAF
Initial Balance
Net Balance
Million Acre-Feet
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
100%
94%
89%
83%
78%
72%
67%
61%
56%
50%
45%
39%
34%
28%
23%
17%
12%
6%
1%
Likelihood of Exceeding

2020 Ending Dry-Year Storage Levels

"Do Nothing" Case Draft Analysis

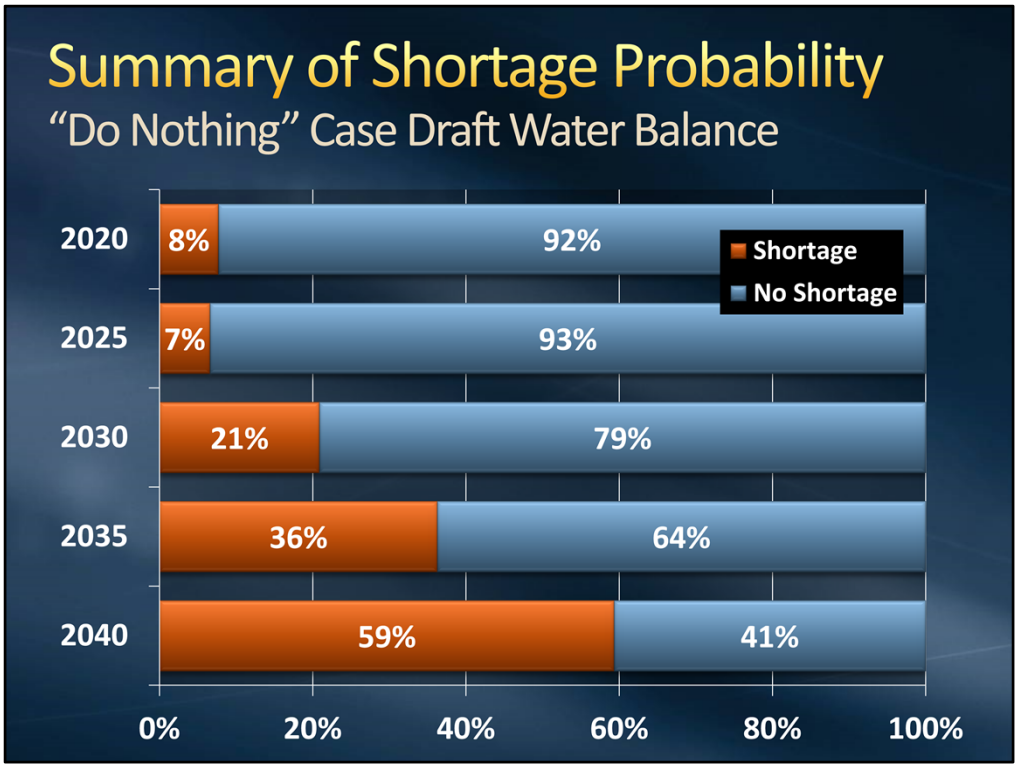


What Happens if We do Nothing?

"Do Nothing" Case
Draft Water Balance

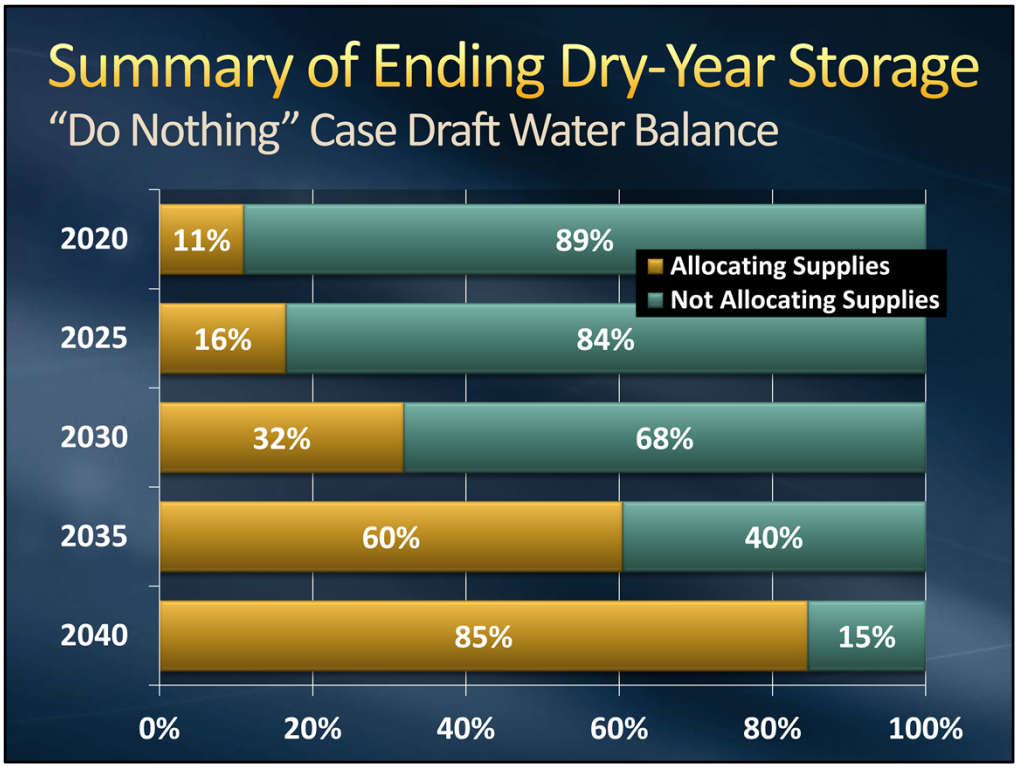
Summary of Shortage Probability

"Do Nothing" Case Draft Water Balance



Summary of Ending Dry-Year Storage

"Do Nothing" Case Draft Water Balance



Observations

"Do Nothing" Case Draft 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

What Happens if We Develop the 2010 IRP Update Targets?

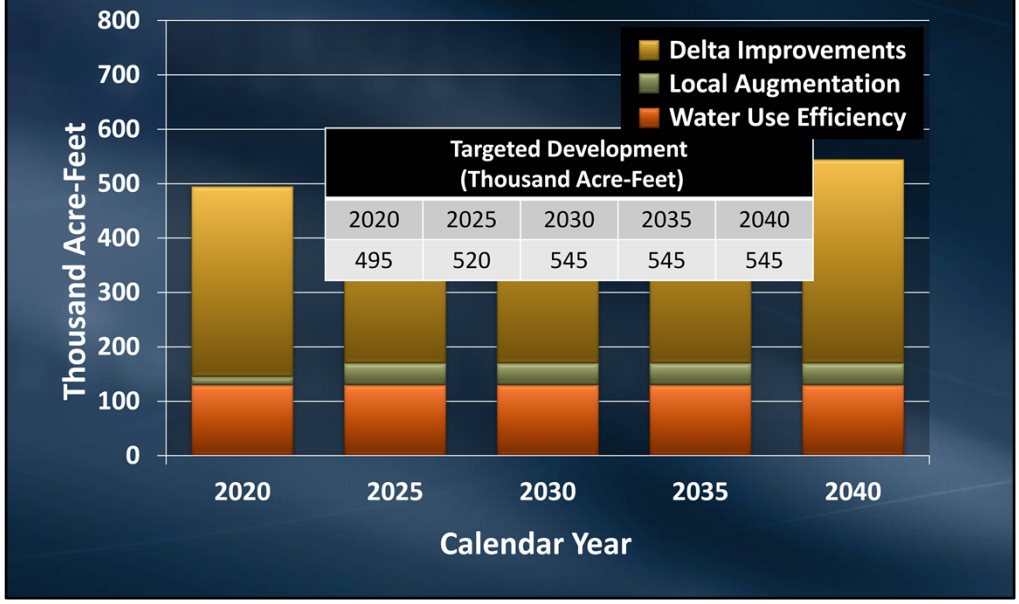
Current IRP Approach
Draft Water Balance

2010 IRP Development Targets

Water Use Efficiency	• Achieve a 20% reduction in GPCD as a region by 2020
Local Resources	• Develop ~100 TAF through incentives and partnerships
SWP	• Seek short, mid, and long-term Delta improvements
CRA	• Develop Dry-Year supply programs to fill the aqueduct when needed

Remaining Target Development

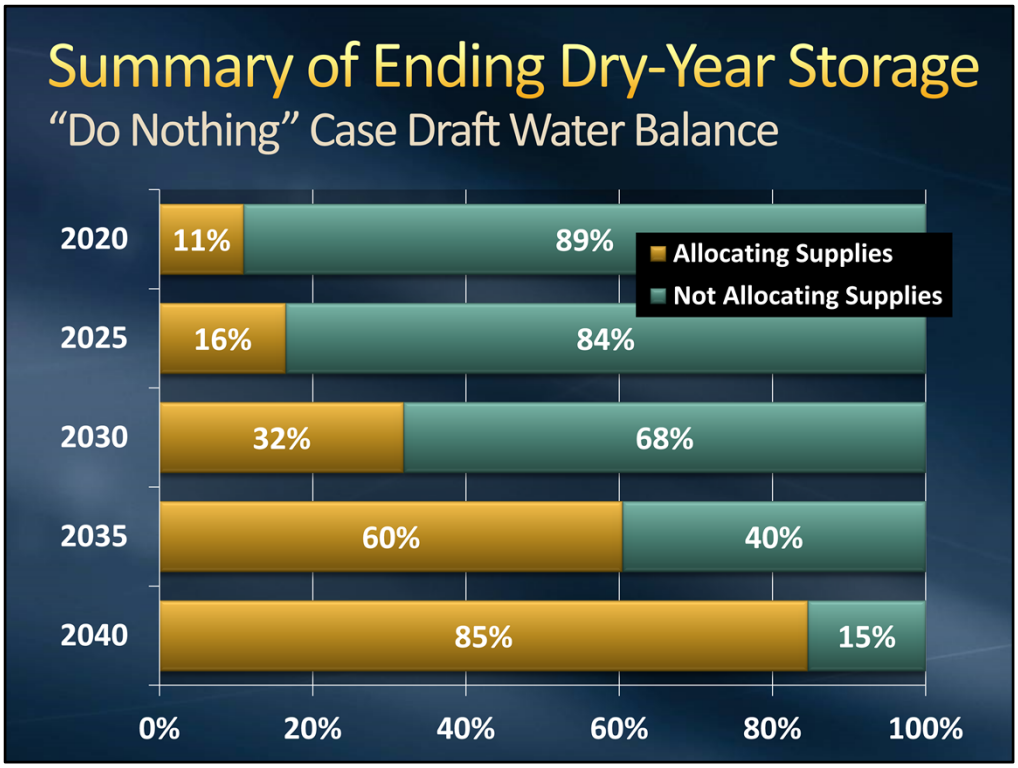
2010 IRP



Targeted Development (Thousand Acre-Feet)				
2020	2025	2030	2035	2040
495	520	545	545	545

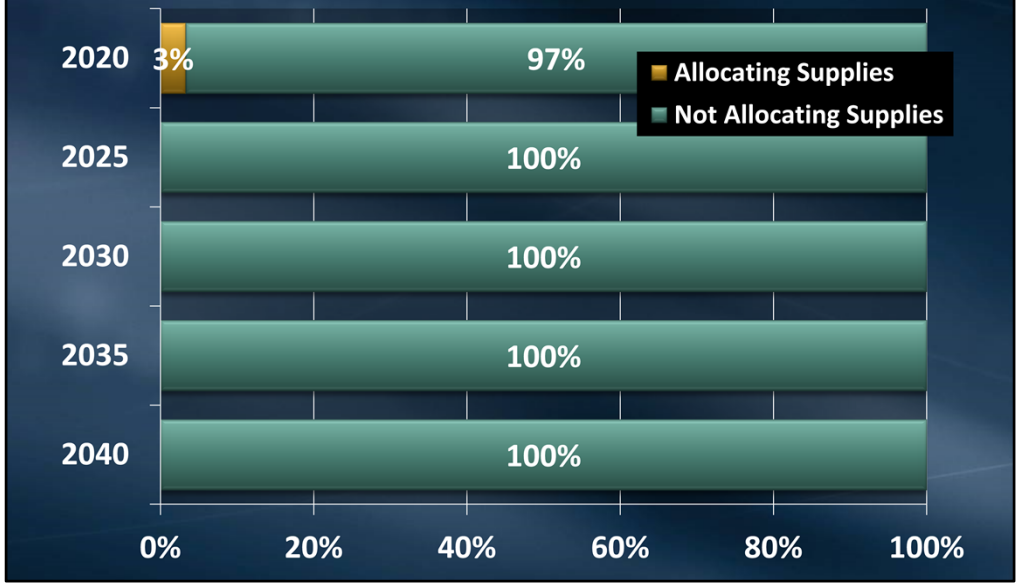
Summary of Ending Dry-Year Storage

"Do Nothing" Case Draft Water Balance



Summary of Ending Dry-Year Storage

Current IRP Approach Draft Water Balance



Observations

Current IRP Approach Draft Water Balance

- Significant resource investments are needed to achieve the current IRP Targets
  - 150 TAF of additional efficiency or local supply
  - California Water Fix
- Existing supplies need to be maintained
  - Colorado River Aqueduct
  - Local supply production
- Compared to the “Do Nothing” Case
  - Reliability and storage measures improve
  - Challenges still exist in the shorter term

What Potential Changes to the Current IRP Targets are Needed?

A look at risk and shorter-term challenges

Analysis of Alternative Scenarios

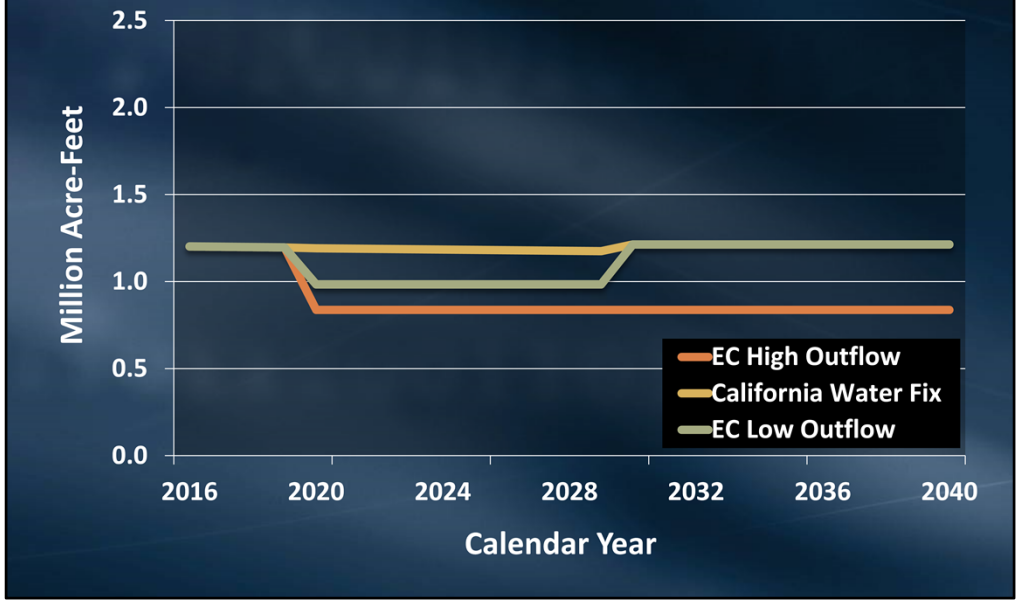
- Evaluated reliability impacts of three risk scenarios
  - Scenario 1: More restrictive Delta regulatory framework in the near-term
  - Scenario 2: Local Resources production is lower than projected
  - Scenario 3: Scenario 1 and 2 combined
- Determined additional supply development needed to mitigate risks
  - Added core supply in 50 TAF increments
  - Assumed additional supply available starting in 2020

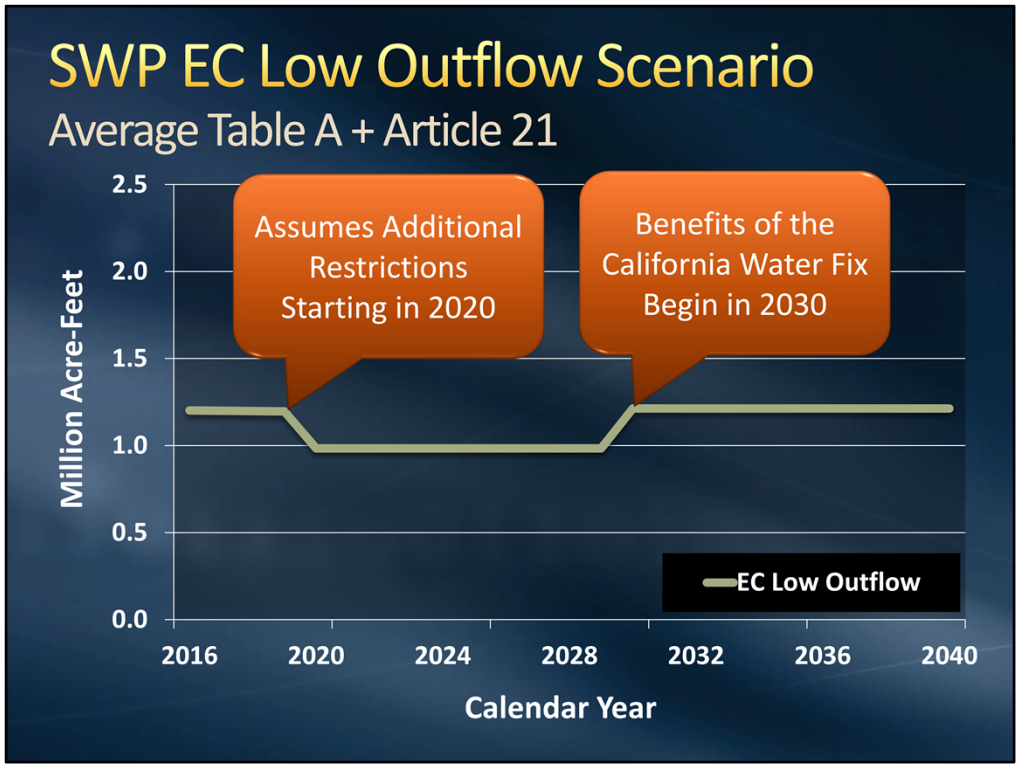
Scenario 1

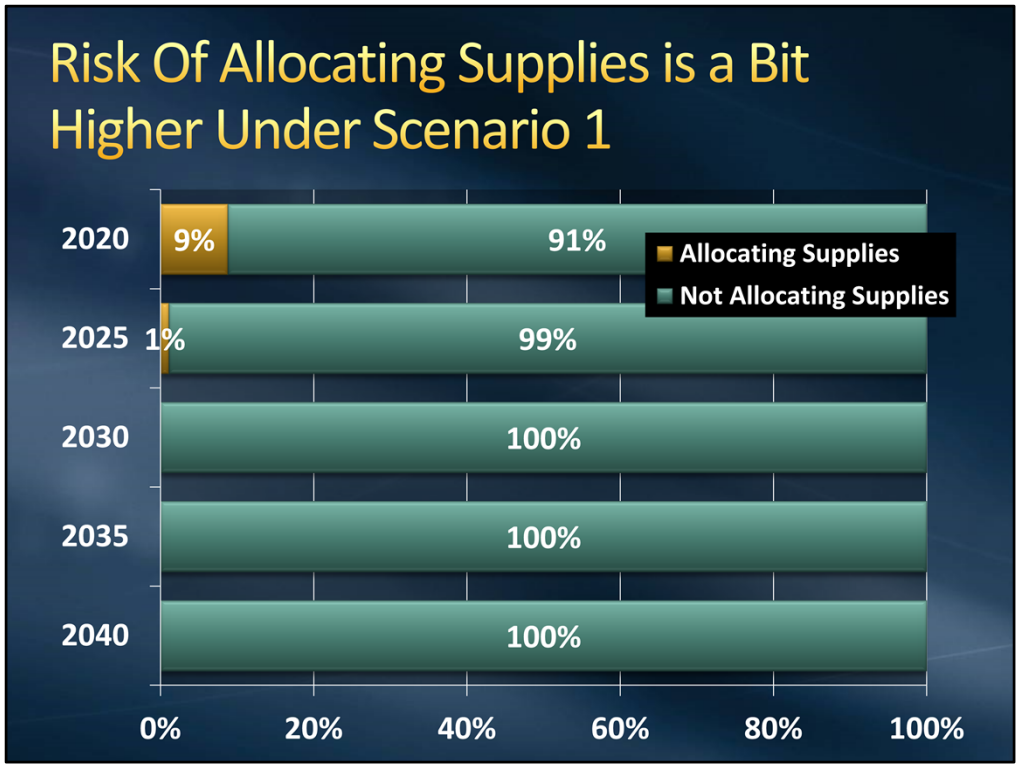
SWP Supplies Assuming Existing Conveyance and Low Outflow Requirements

SWP EC Low Outflow Scenario

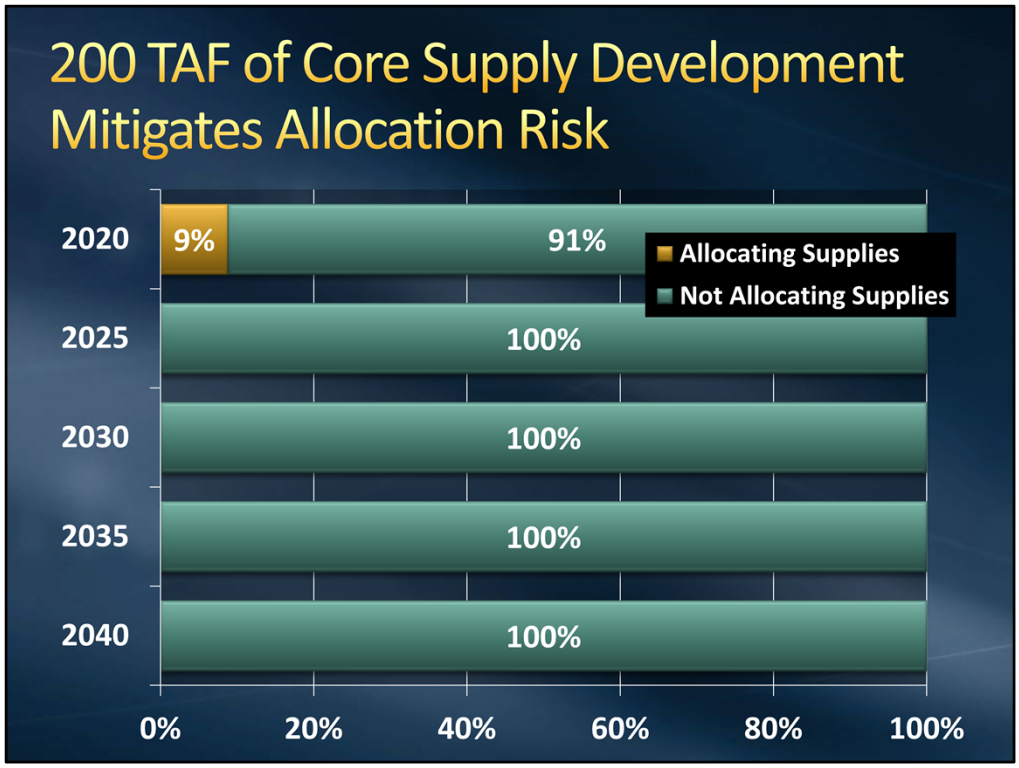
Average Table A + Article 21




SWP EC Low Outflow Scenario
Average Table A + Article 21
Assumes Additional Restrictions Starting in 2020
Benefits of the California Water Fix Begin in 2030
Million Acre-Feet
2.5
2.0
1.5
1.0
0.5
0.0
2016
2020
2024
2028
2032
2036
2040
Calendar Year
EC Low Outflow

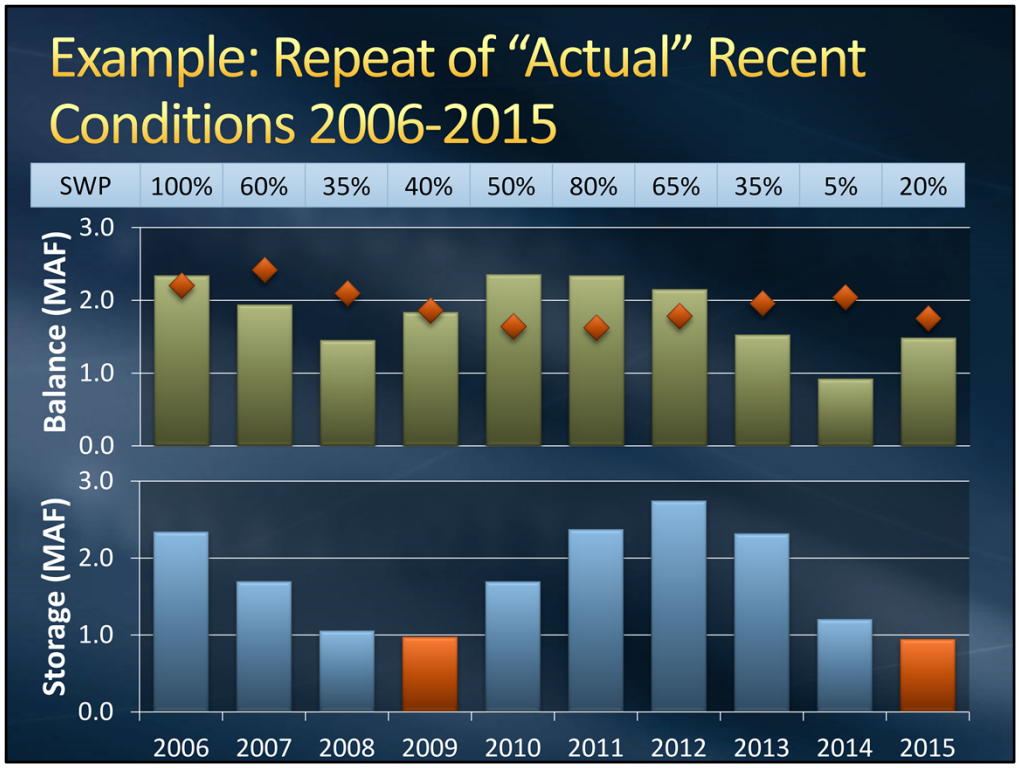


Huge reduction in storage below 1 MAF.

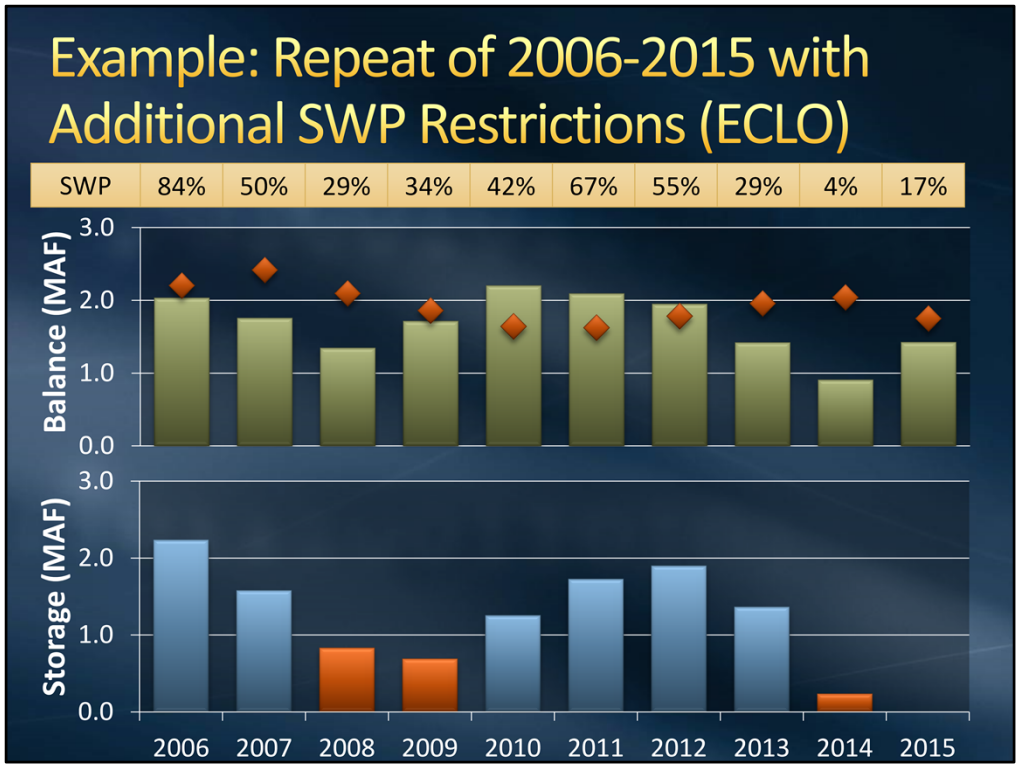


Huge reduction in storage below 1 MAF.

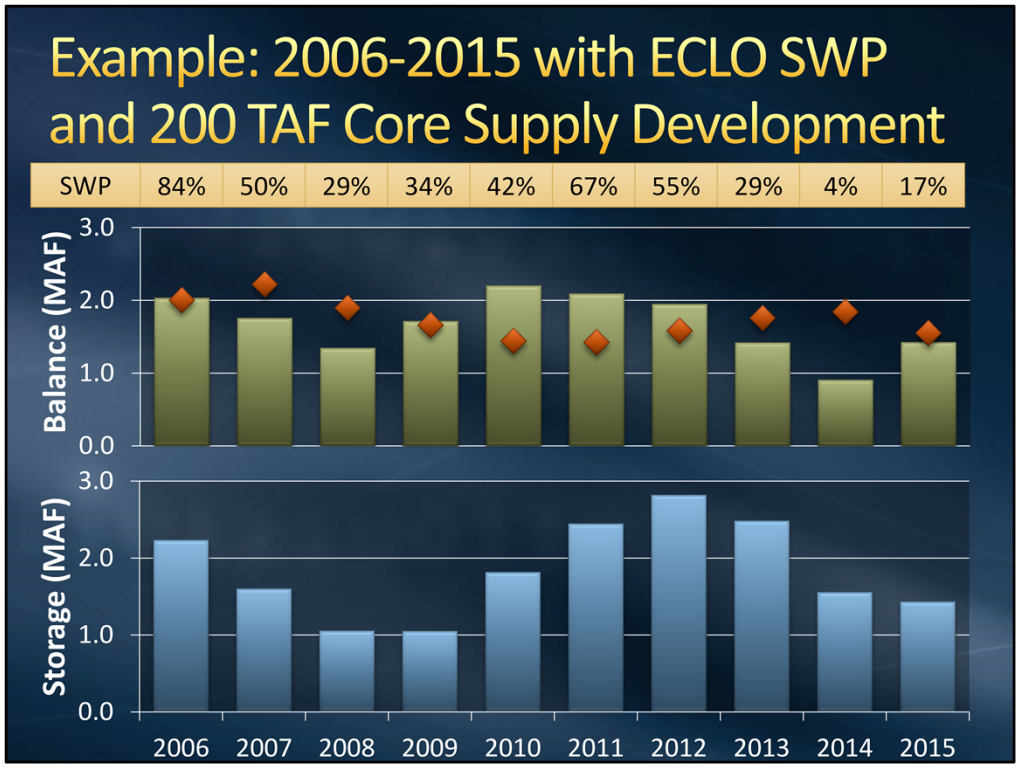
Example: Repeat of "Actual" Recent Conditions 2006-2015



Example: Repeat of 2006-2015 with Additional SWP Restrictions (ECLO)



Example: 2006-2015 with ECLO SWP and 200 TAF Core Supply Development



Scenario 2

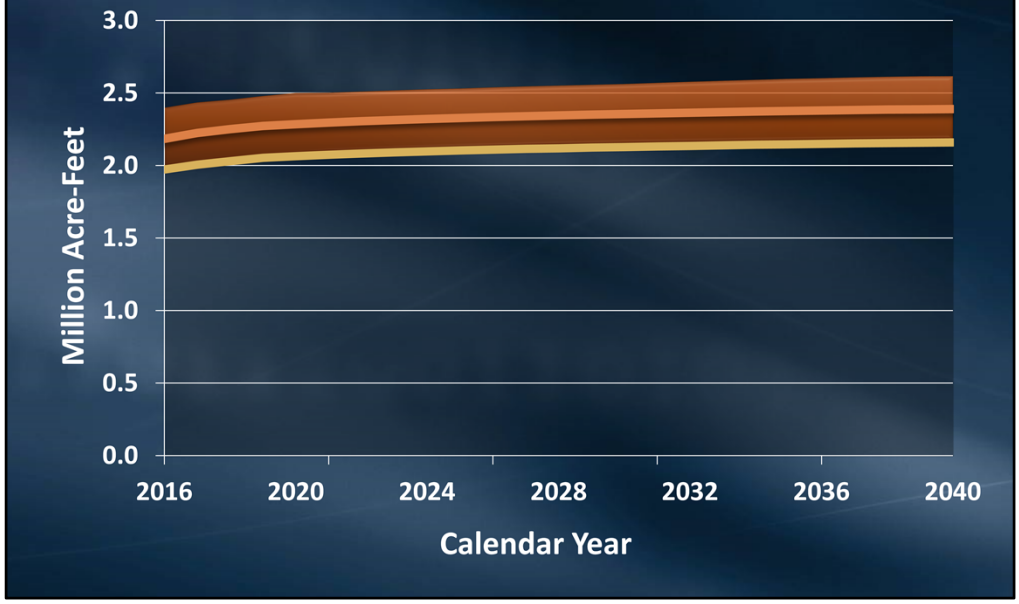
Reduced Local Supply Production

Potential Risks to Local Supplies

- Modeled as a 10% reduction in all local supply categories
- Represents potential reductions in supplies due to a number of factors:
  - Climate change impacts on groundwater recharge or surface supplies
  - Water quality impacts to groundwater or other supplies
  - Implementation risk to facility expansions
  - Infrastructure maintenance risks

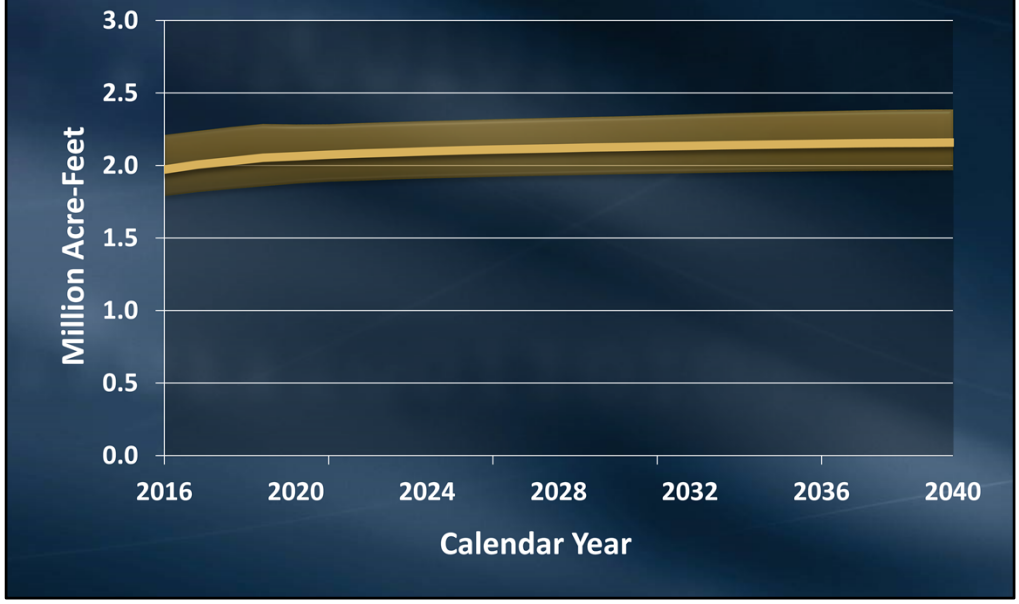
Total Range of Local Supplies

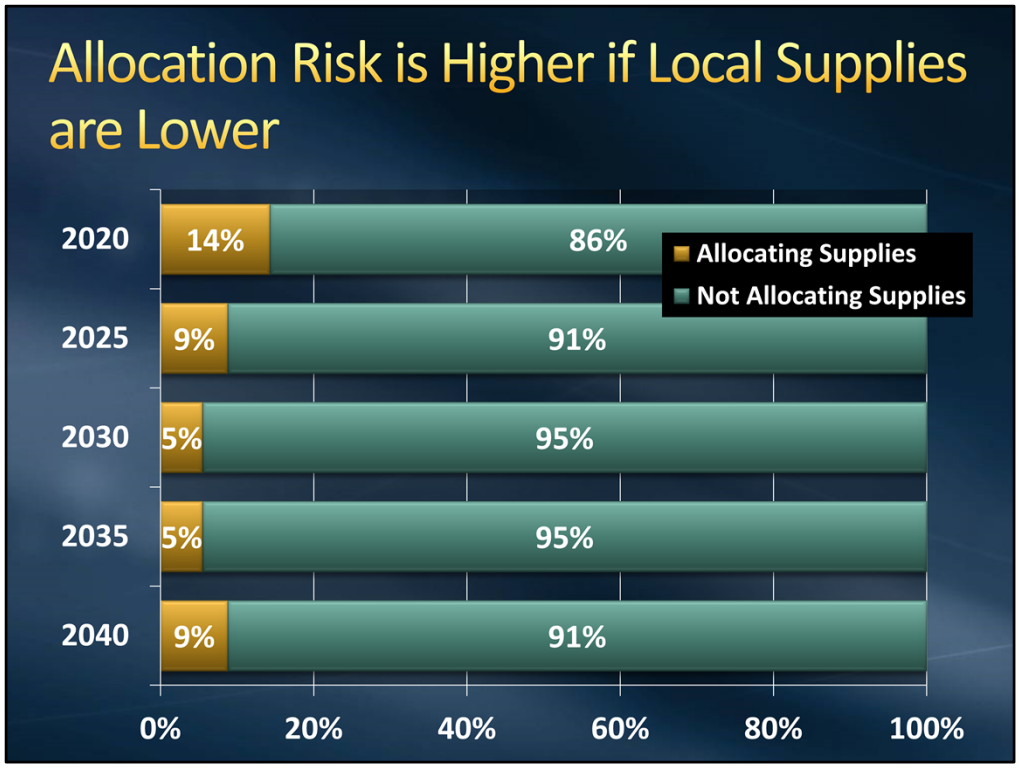
With a 10% Overall Reduction



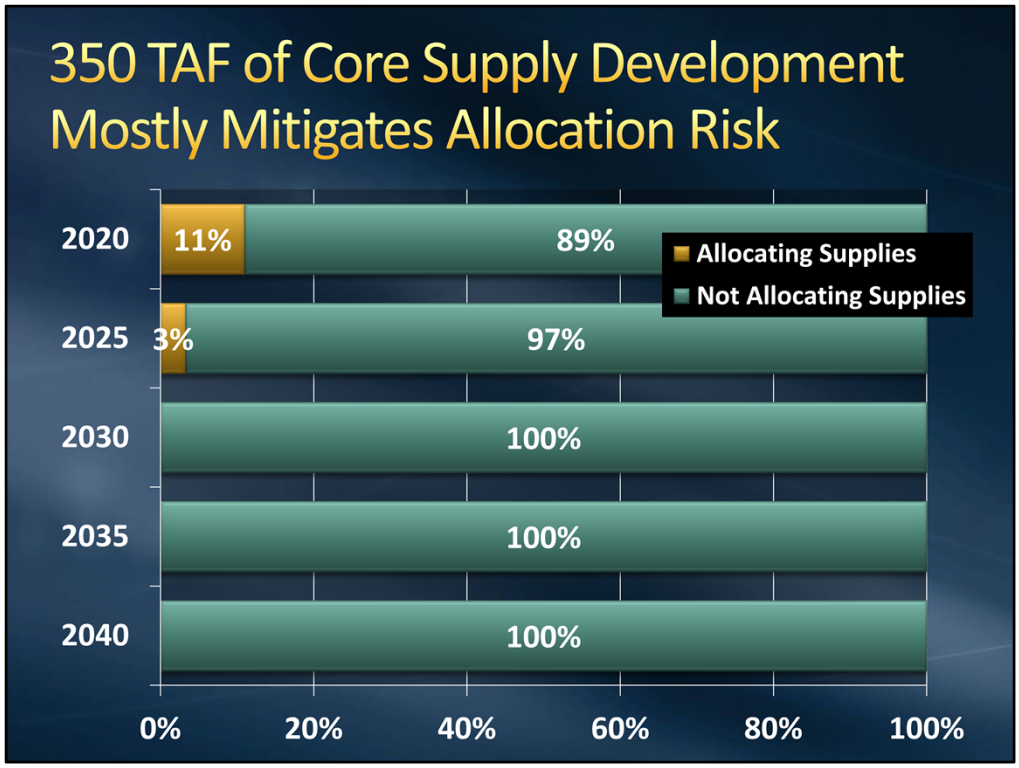
Total Range of Local Supplies

With a 10% Overall Reduction





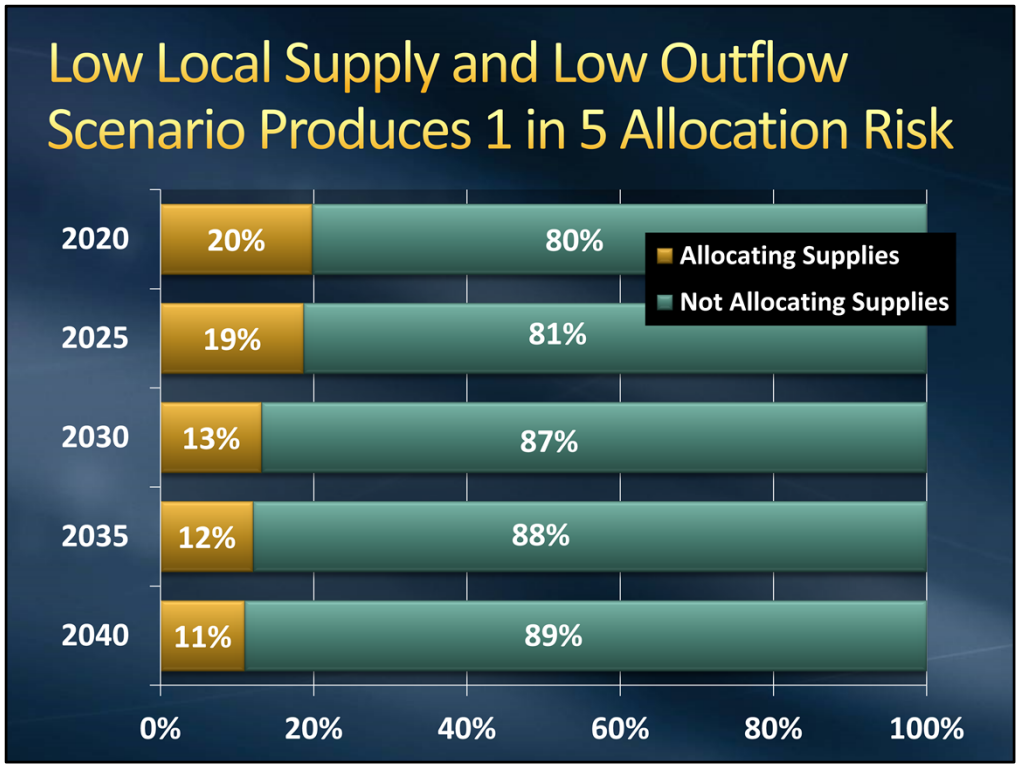
Huge reduction in storage below 1 MAF.



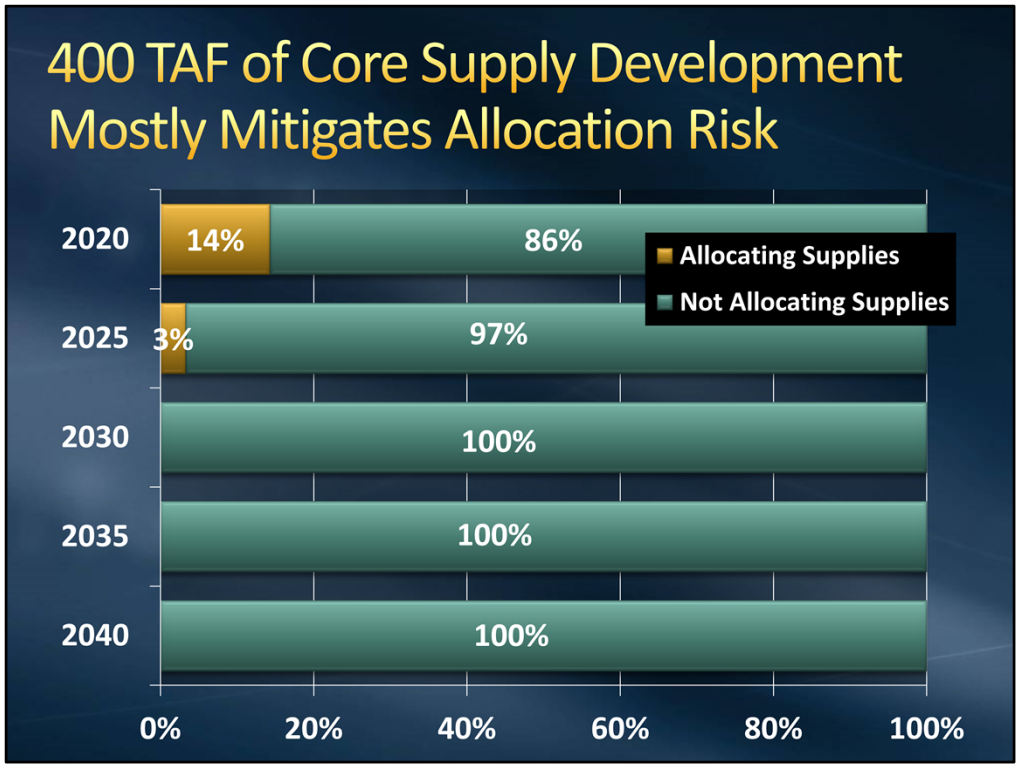
Huge reduction in storage below 1 MAF.

Scenario 3

Impact of Scenarios 1 and 2 Combined

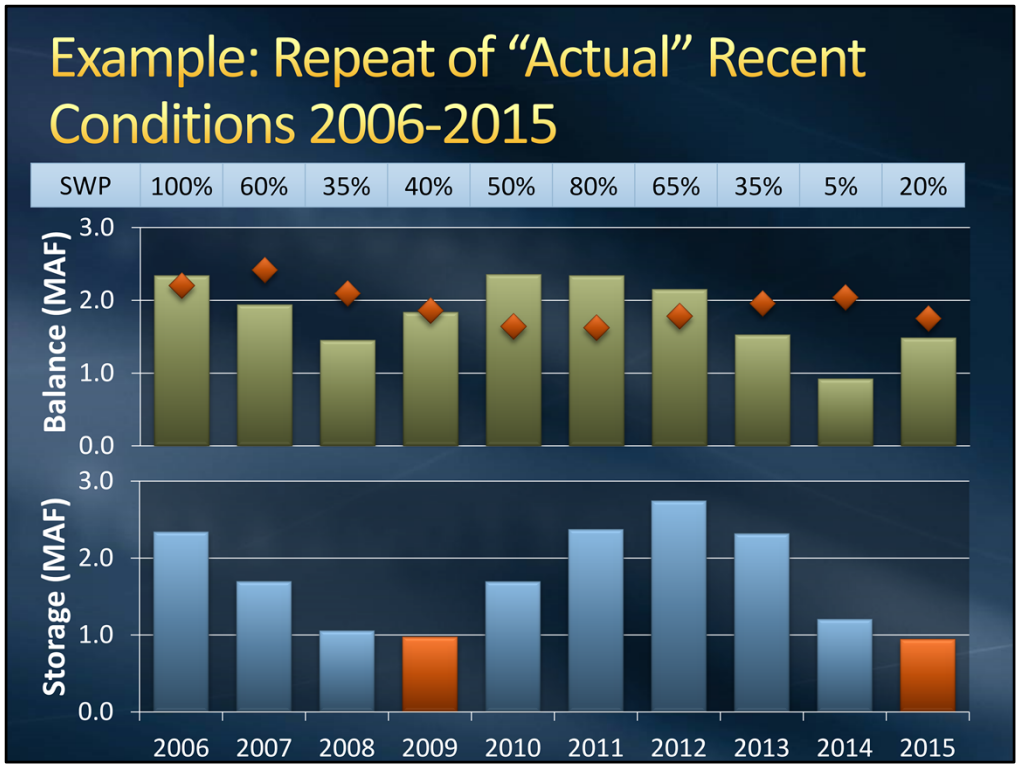


Huge reduction in storage below 1 MAF.



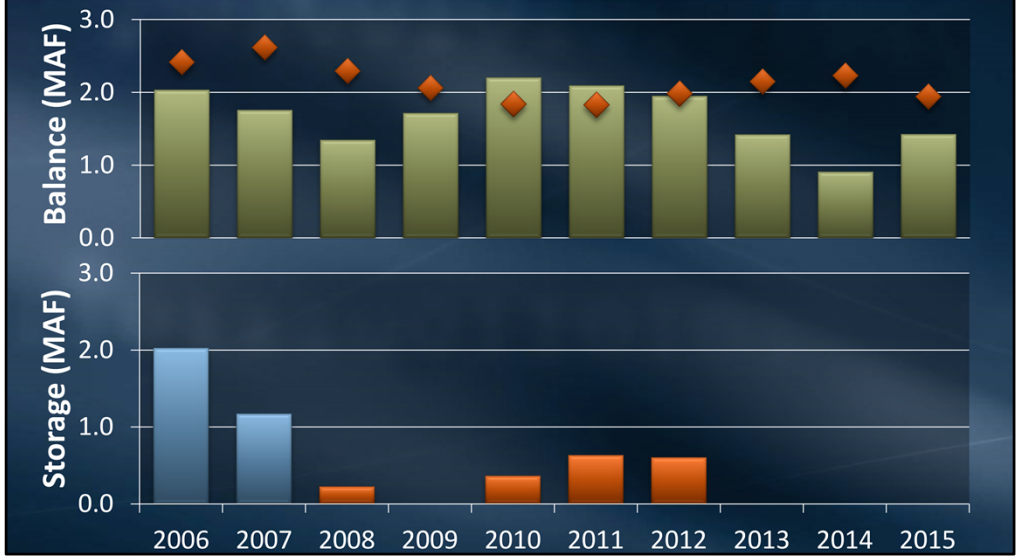
Huge reduction in storage below 1 MAF.

Example: Repeat of "Actual" Recent Conditions 2006-2015

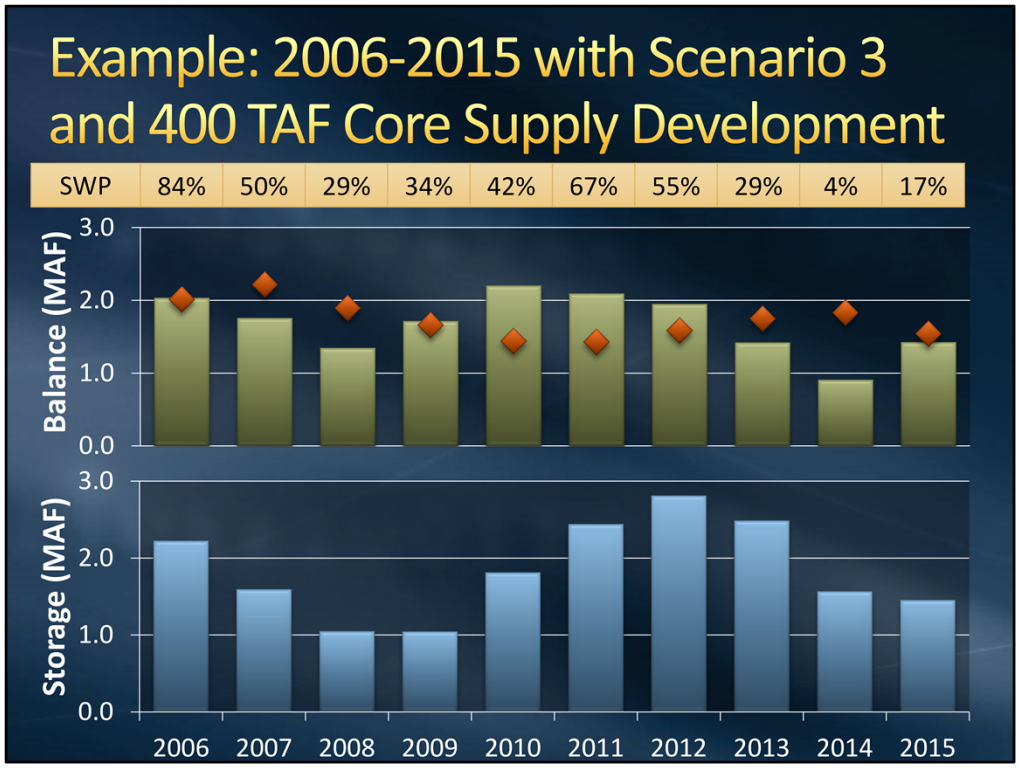


Example: Repeat of 2006-2015 with Scenario 3

SWP	84%	50%	29%	34%	42%	67%	55%	29%	4%	17%



Example: 2006-2015 with Scenario 3 and 400 TAF Core Supply Development



Summary of Risk/Storage Analysis

- The 2010 IRP Targets do not provide a sufficient buffer against the risks shown
  - Particularly if more than one of these risks occur at the same time
- Additional core supply needed to avoid allocating supplies:
  - 50 TAF to 250 TAF per year
- Total need including 150 TAF remaining 2010 IRP Target is:
  - 200 TAF to 400 TAF per year


Key Technical Findings

Summary of Key Technical Findings

- Additional local supply and conservation development is needed to mitigate risk
- Maintaining imported supplies continues to be critical
  - Limited opportunities for additional development of imported supplies beyond targets
- A comprehensive water transfer approach can address shorter-term reliability challenges
- Implementation policy and approach to developing local supplies and conservation is key

IRP Key Technical Findings
Conservation

- Meet regional 20x2020 GPCD reduction
- Pursue additional conservation in support of the State's Model Water Efficient Landscape Ordinance
  - Attain 100% compliance for new construction
  - Increase annual replacement rate for existing homes and businesses
- Continue device-based programs for residential, commercial and industrial

IRP Key Technical Findings
Local Resources

- Develop additional local supplies to meet growth and ensure adequate storage reserves
  - Pursue additional recycling, groundwater recovery, and seawater desalination
- Develop additional local supplies to reduce needs for imported replenishment
  - Expand opportunities for groundwater recharge from stormwater and recycling

IRP Key Technical Findings
Colorado River Aqueduct

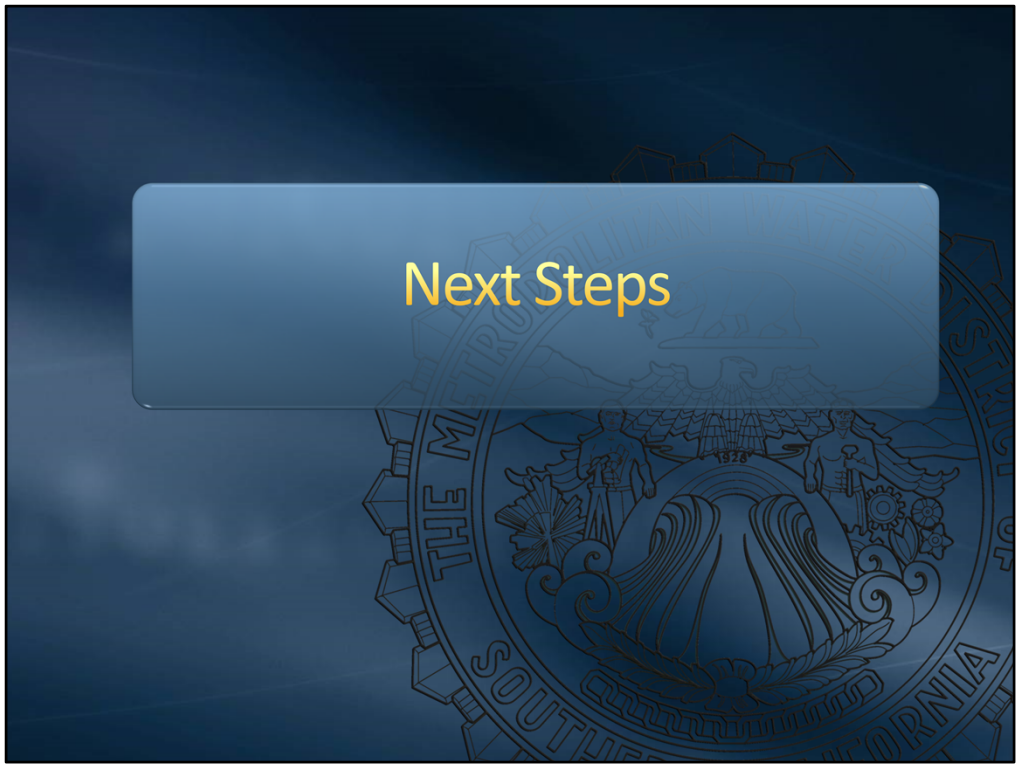
- Stabilize CRA base supplies against risks from growing demands, drought, etc.
  - Develop 1.0 MAF of base supply programs
- Maintain flexibility in CRA dry-year programs and storage
  - Ensure access to 1.2 MAF of supplies in dry-years

IRP Key Technical Findings
State Water Project

- Manage flow and export regulations in the near-term
  - Continue to engage in collaborative science-based approaches
- Pursue a long-term Delta solution
  - Continue active participation in the California Water Fix and the California EcoRestore efforts

IRP Key Technical Findings
Transfers and Exchanges

- Develop a comprehensive transfers and exchanges strategy
  - Focus on obtaining additional supplies in normal and wet years
- Ensure strategy works in conjunction with Metropolitan and local storage


Next Steps

Next Steps – Water Tomorrow

- Phase 1: IRP Technical Update
  - Finalize Results: October 2015
  - Public Outreach Workshop: October 22nd
  - IRP Committee considers Technical Update adoption: December 2015
  - IRP Technical Update Final Report: Early 2016
- Phase 2: Investigate Policy Implications
  - Kick-off: Early 2016


THE METROPOLITAN WATER DISTRICT OF
SOUTHERN CALIFORNIA