Integrated Resources Planning Committee

Item #4b

Subject: IRP Technical Process Draft Results

Purpose: the purpose of this presentation is to provide an overview of draft results developed in the IRP technical process.

IRP Committee/August 18, 2015

Integrated Resources Planning Committee

Item #4b

Review of IRP draft forecasts, existing conditions water balance analysis, and IRP approach water balance.

IRP Technical Process Draft Results

Integrated Resources Planning Committee
Item 4b
August 18, 2015

Four Key Framing Questions

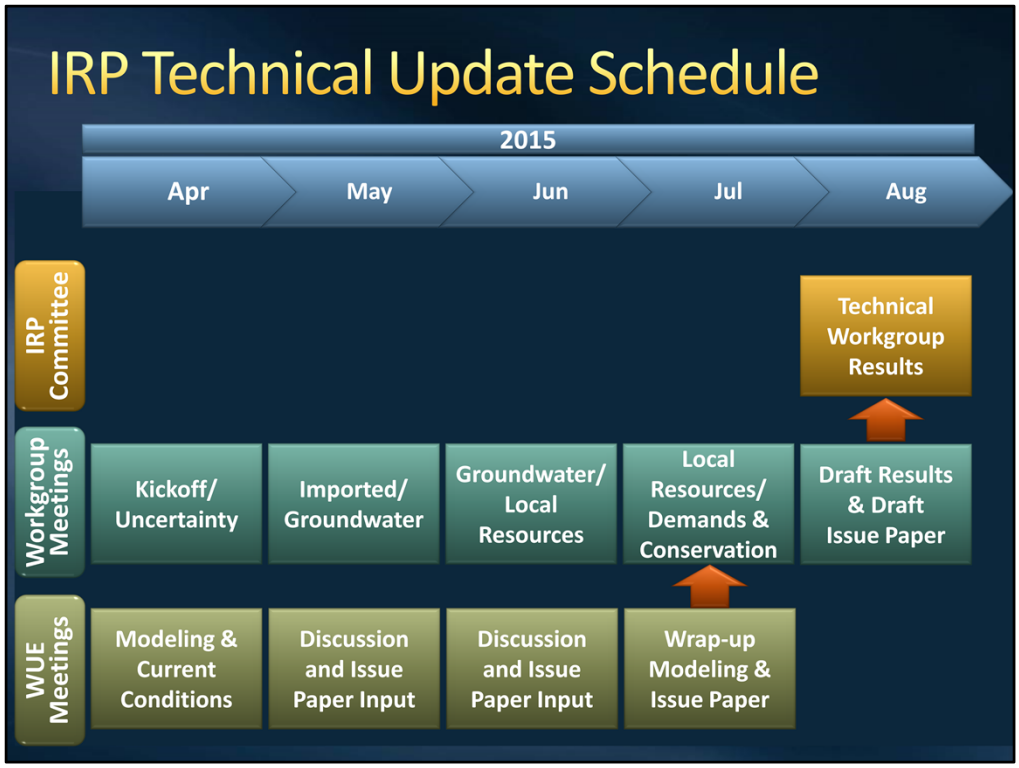
- What is our current outlook on supplies and demands?
- What happens if we do nothing?
- What happens if we continue developing the 2010 IRP targets?
- What potential changes to the 2010 IRP targets are needed?

Presentation Overview

- Draft IRP forecasts
  - Conservation savings
  - Retail demands
  - Local supplies
  - Imported supplies
- Draft water balance analyses
  - “Do Nothing” Case
  - 2010 IRP Approach
- Next steps

What is Our Current Outlook on Supplies and Demands?


Draft IRP Forecasts



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

Conservation Savings

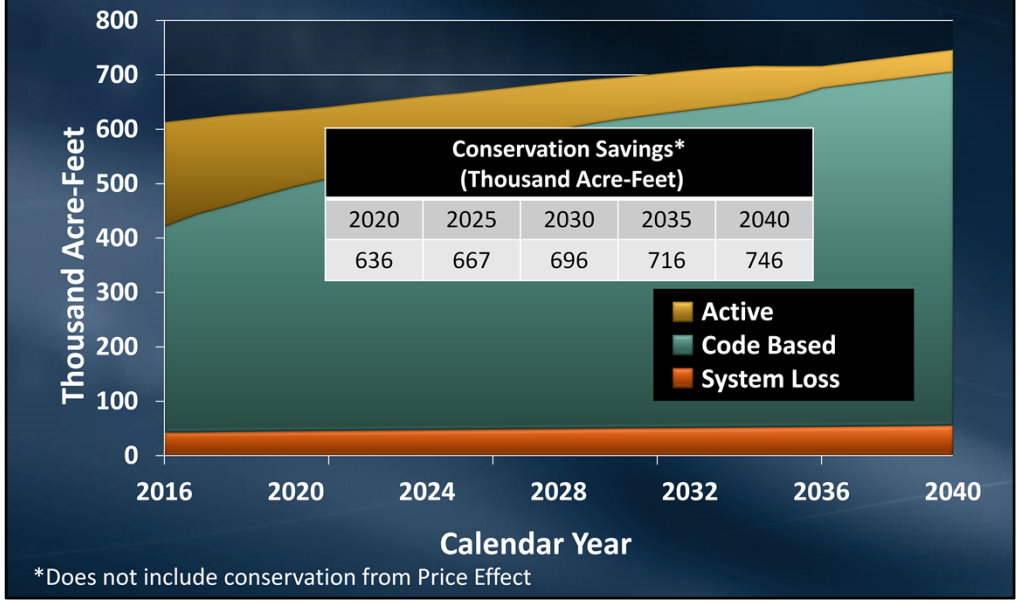
Conservation Savings

Key Assumptions

- Active and Code Based Conservation
  - Calculated in Conservation Savings Model
  - Forecast of active spending through FY 2015/16
- Price Effect Conservation
  - Embedded in econometric retail demand model
- System Loss Conservation
  - Savings from avoided system losses
  - Agency UWMP reported percent system loss

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

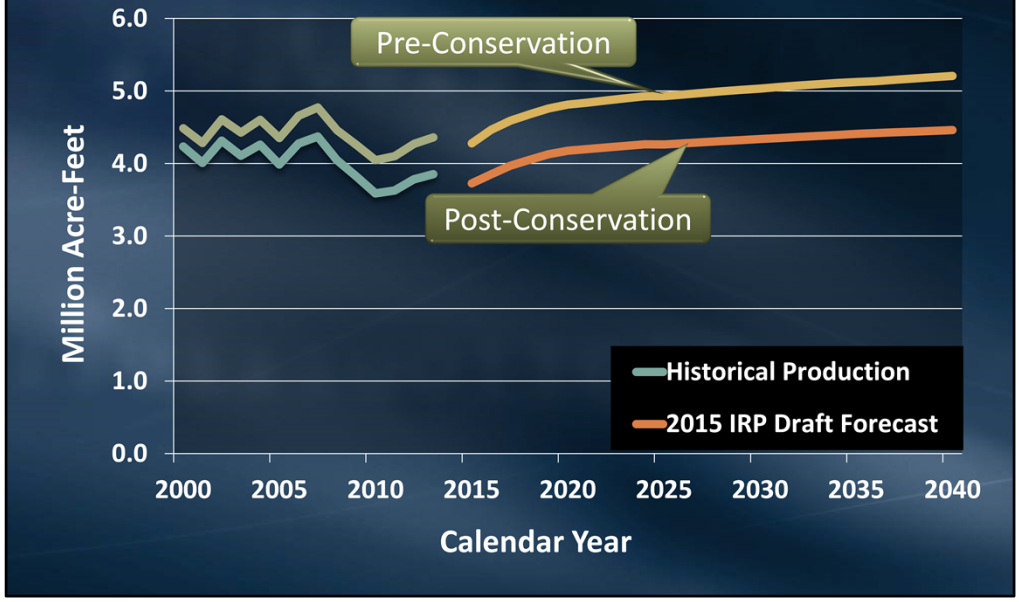
Total Retail Demands

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

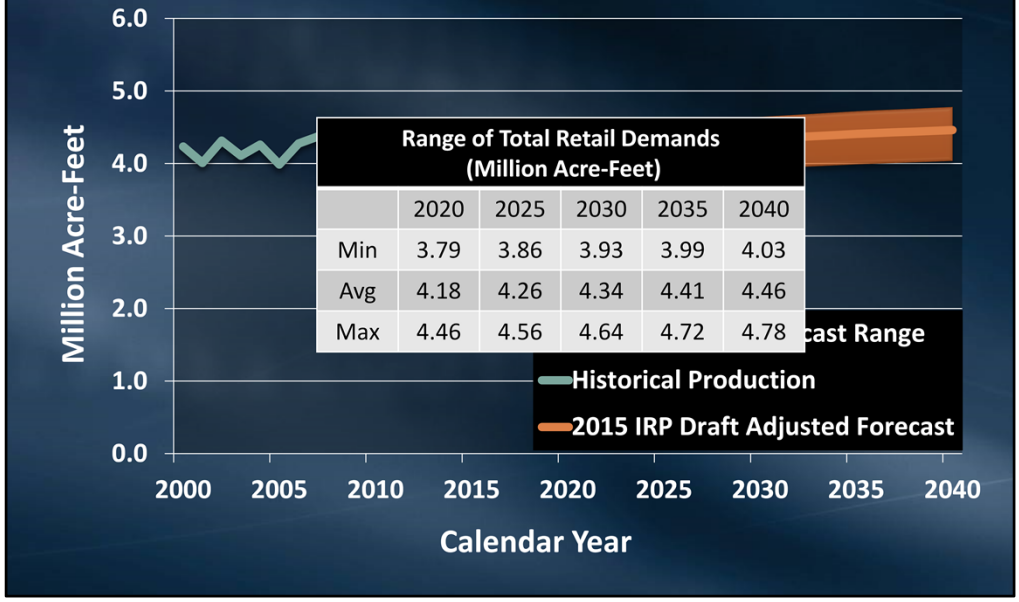


Near-Term Demand Adjustment
Key Assumptions

- 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

Why Only Existing and Under Construction Projects?

- Projects that are “in the ground”
  - Less speculation, so we can construct a “do nothing” case
- Inventory developed through member agency coordination
  - Project status: existing, under construction, advanced planning, etc.
  - Future projects are used to identify potential development

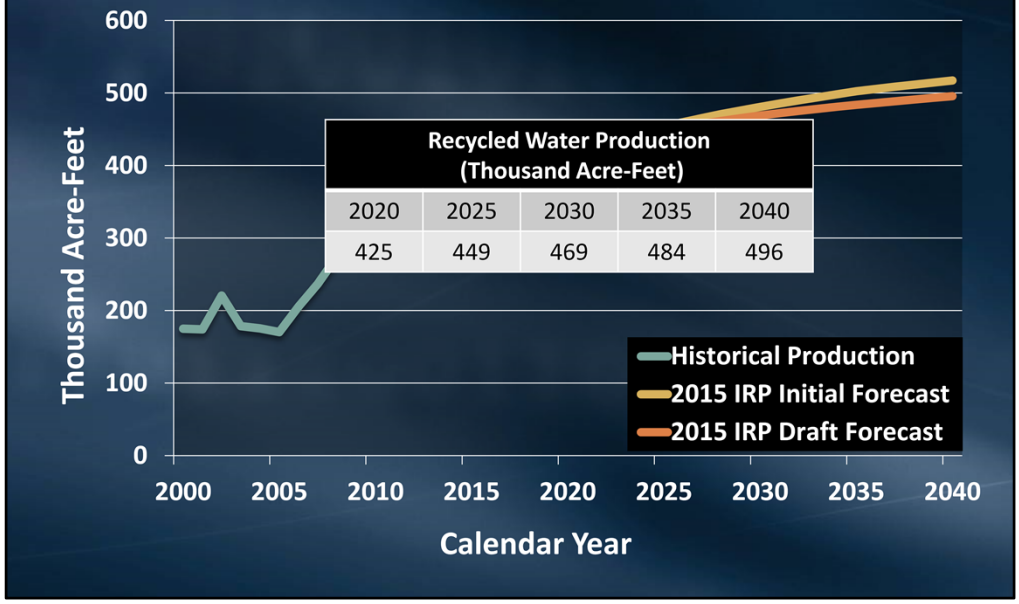
Recycled Water

Key Assumptions

- Existing projects based on observed annual growth rate
- Under construction projects based on regression modeling
  - Varies by project size
  - Indirect Potable Reuse forecasted separately
- Future projects are not included in forecast

Recycled Water Production

Historical and Projected



Recycled Water Production (Thousand Acre-Feet)				
2020	2025	2030	2035	2040
425	449	469	484	496

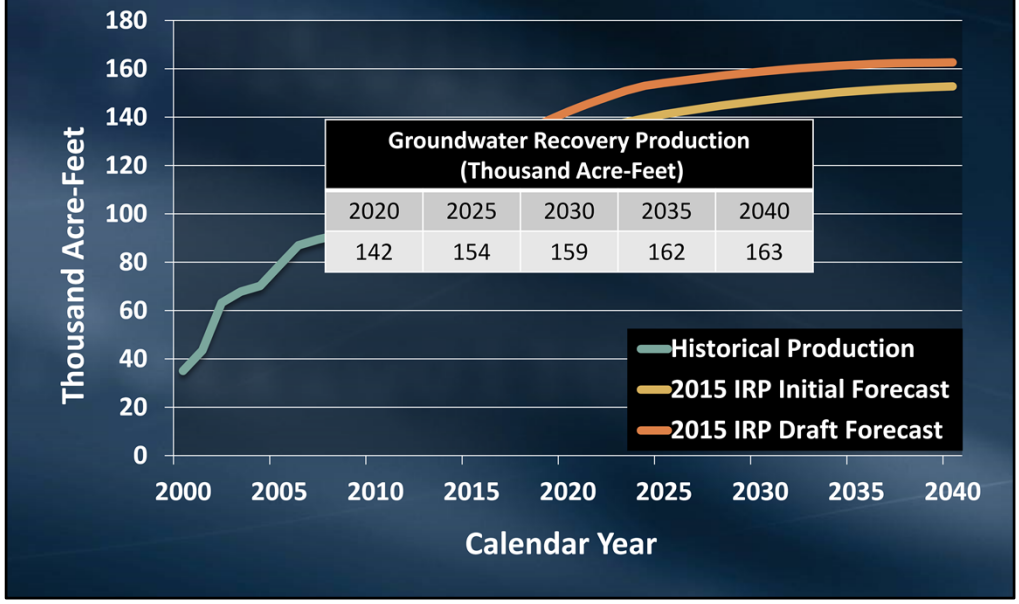
Groundwater Recovery

Key Assumptions

- Existing projects based on observed annual growth rate
- Under construction projects based on regression modeling
- Future projects are not included in forecast

Groundwater Recovery Production

Historical and Projected



Groundwater Recovery Production (Thousand Acre-Feet)				
2020	2025	2030	2035	2040
142	154	159	162	163

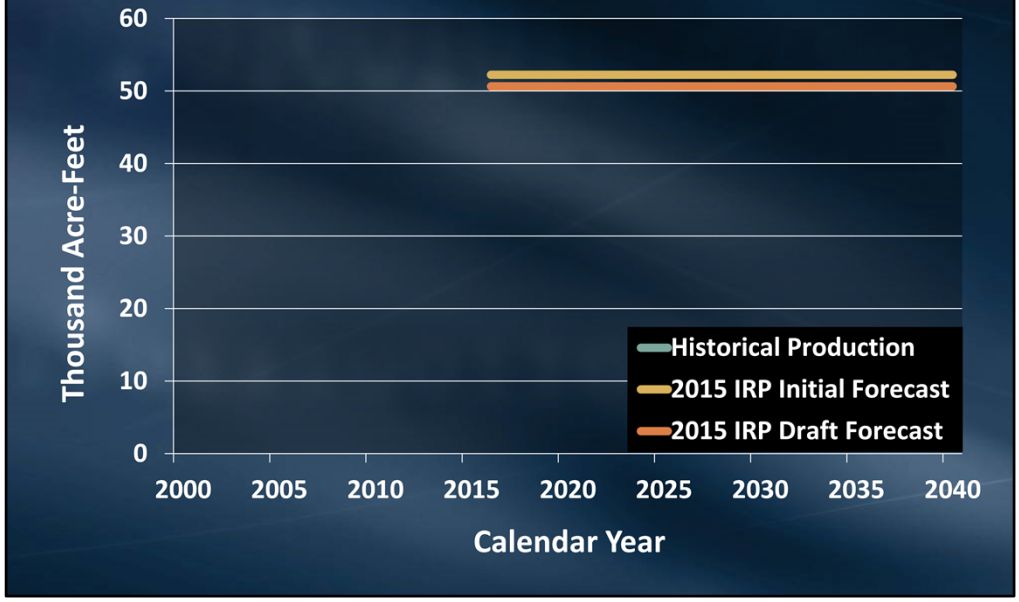
Seawater Desalination

Key Assumptions

- No existing projects
- Under construction projects include Carlsbad facility
  - Dry year = 100%
  - Normal year = 93%
  - Wet year = 86%
- Future projects are not included in forecast

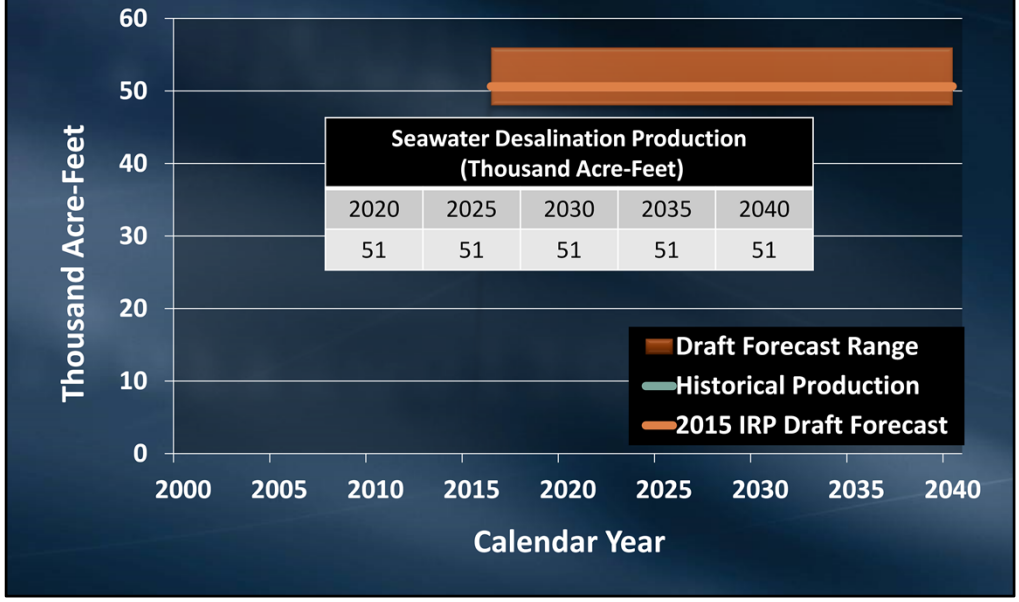
Seawater Desalination Production

Historical and Projected



Seawater Desalination Production

Historical and Projected



Seawater Desalination Production (Thousand Acre-Feet)				
2020	2025	2030	2035	2040
51	51	51	51	51

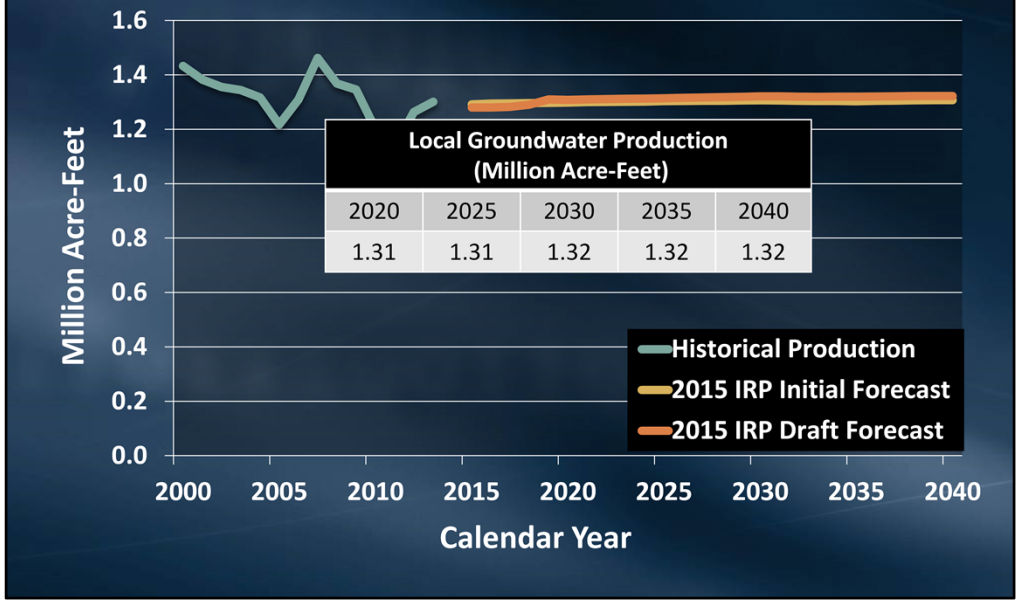
Local Groundwater

Key Assumptions

- Member Agency input
- Orange County Basin assumed 70% BPP for 2015-18 and 75% BPP thereafter
- Adjudicated basins based on 2009-13 averages
- Sustainable production
- Basin operating safe yield
- Supported by storm, recycled, and imported water

Local Groundwater Production

Historical and Projected



Local Groundwater Production (Million Acre-Feet)				
2020	2025	2030	2035	2040
1.31	1.31	1.32	1.32	1.32

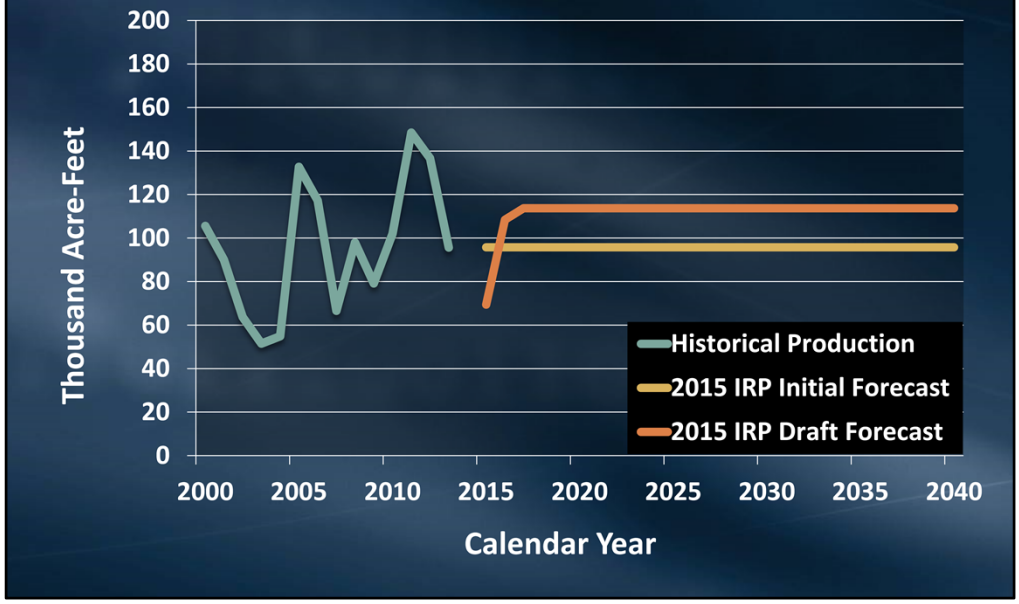
Surface Water

Key Assumptions

- Member Agency input
- SDCWA reservoir production based on regression model using 91 observed hydrologies
- Other reservoirs based on 2009-2013 average

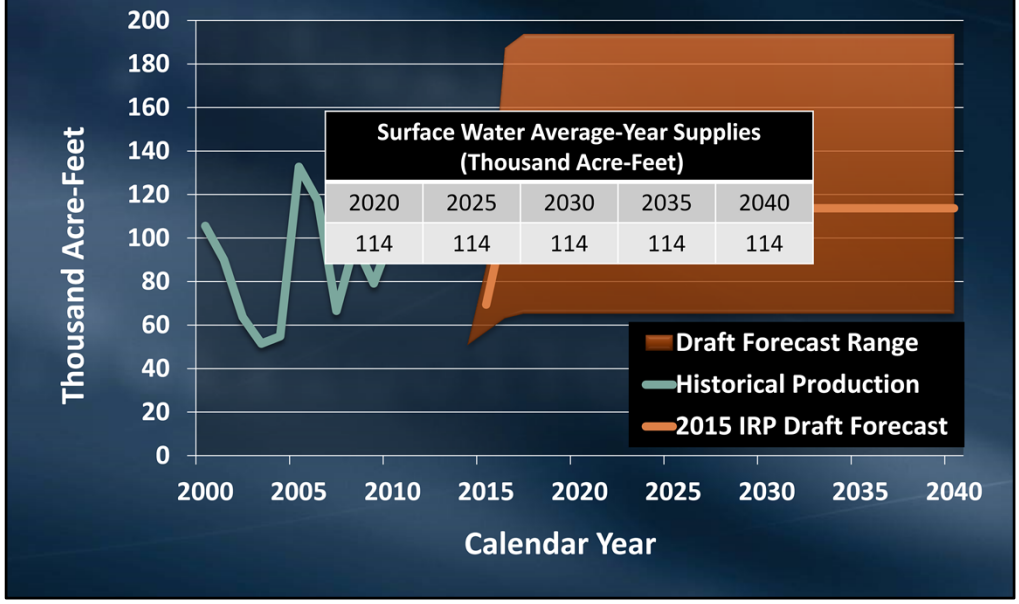
Surface Water Average-Year Supplies

Historical and Projected



Surface Water Average-Year Supplies

Historical and Projected



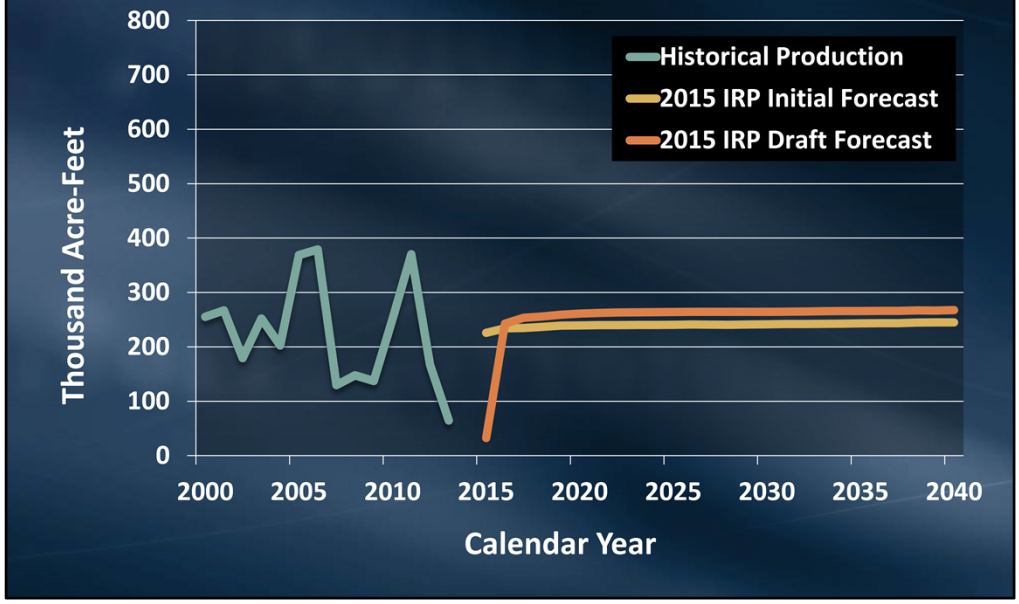
Surface Water Average-Year Supplies (Thousand Acre-Feet)				
2020	2025	2030	2035	2040
114	114	114	114	114

Los Angeles Aqueduct
Key Assumptions

- Los Angeles Aqueduct Simulation Model
  - LADWP provided forecast
- 1922-2012 hydrology

LAA Average-Year Supplies

Historical and Projected

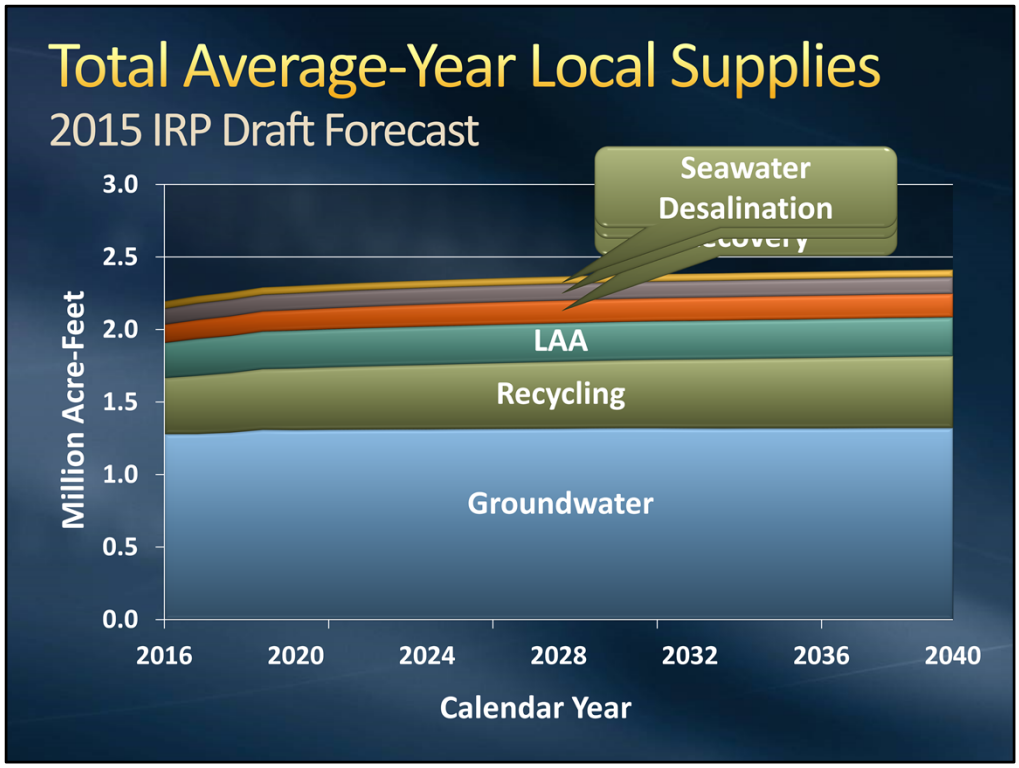


LAA Average-Year Supplies

Historical and Projected

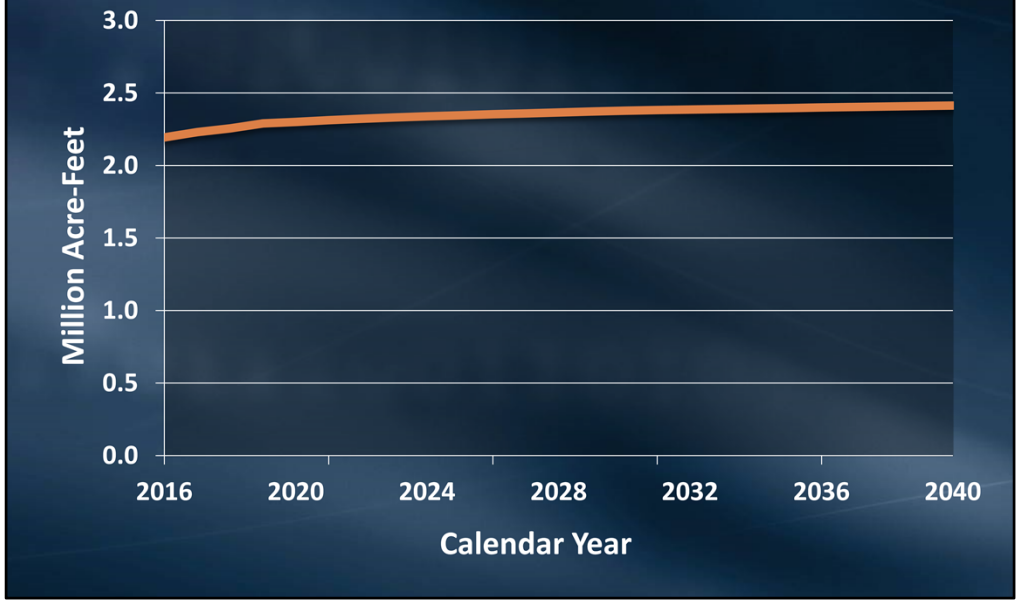
Los Angeles Aqueduct Average-Year Supplies (Thousand Acre-Feet)

2020	2025	2030	2035	2040
261	264	264	266	268


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)

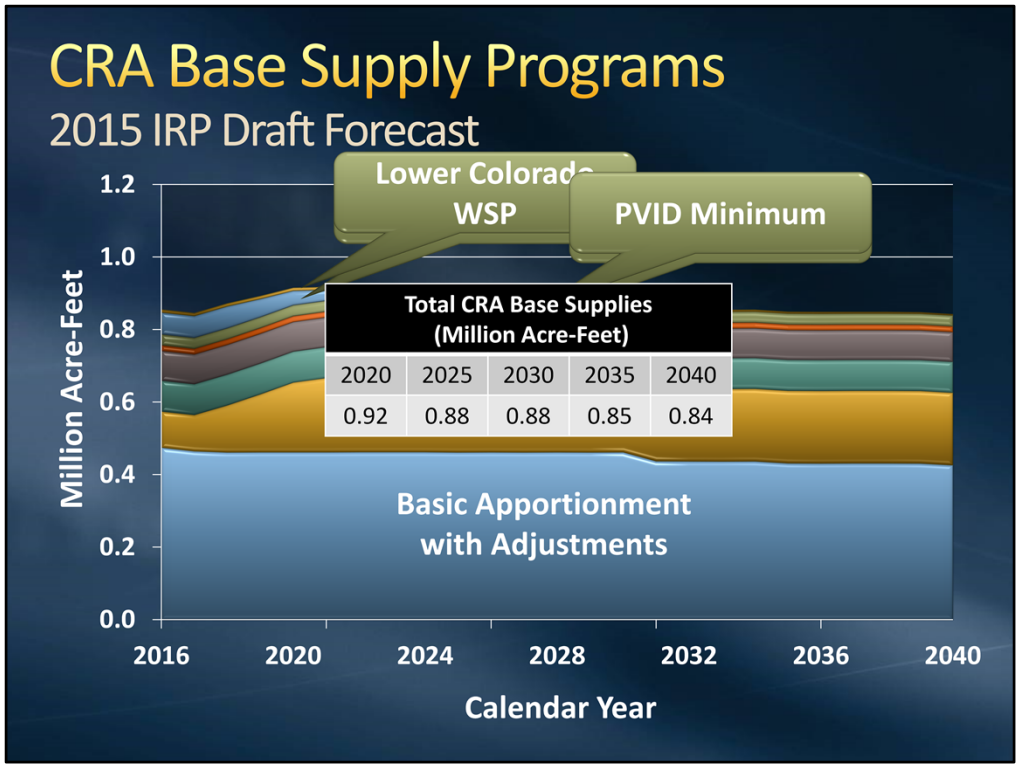
	2020	2025	2030	2035	2040
Min	2.02	2.09	2.11	2.17	2.18
Avg	2.30	2.35	2.38	2.40	2.41
Max	2.62	2.64	2.67	2.69	2.71

Imported Supplies

CRA Base Supply Forecast

Key Assumptions

- Includes Basic Apportionment, current programs, and adjustments
  - Programs and adjustments build according to QSA schedule
  - Current USBR long-term study
- CRA supplies that vary based on need are included in the IRP water balance studies

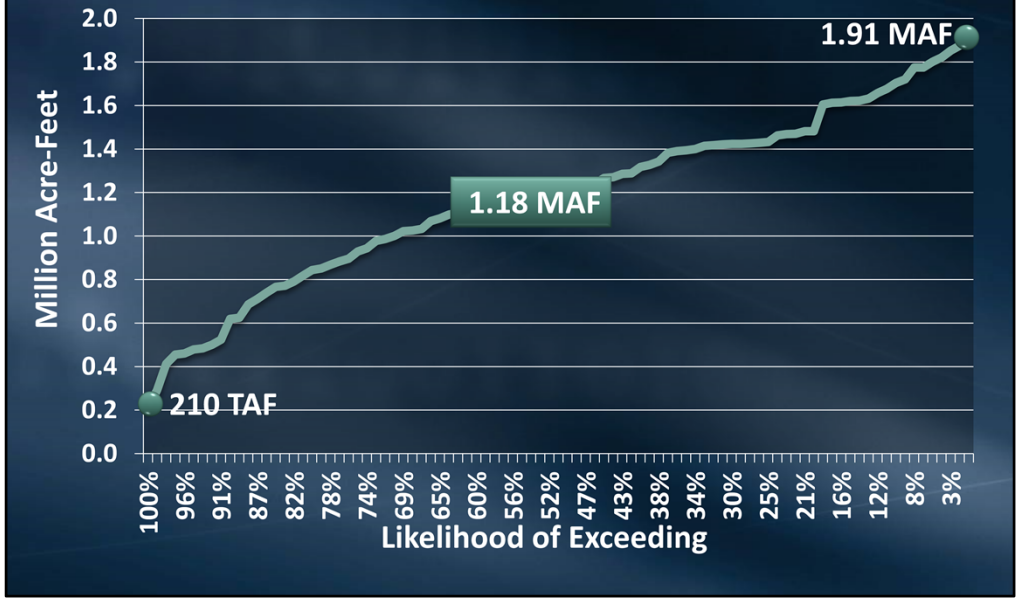

CRA Base Supply Programs
2015 IRP Draft Forecast
Lower Colorado WSP
PVID Minimum
Total CRA Base Supplies (Million Acre-Feet)
2020 2025 2030 2035 2040
0.92 0.88 0.88 0.85 0.84
Basic Apportionment with Adjustments
Million Acre-Feet
1.2
1.0
0.8
0.6
0.4
0.2
0.0
2016 2020 2024 2028 2032 2036 2040
Calendar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

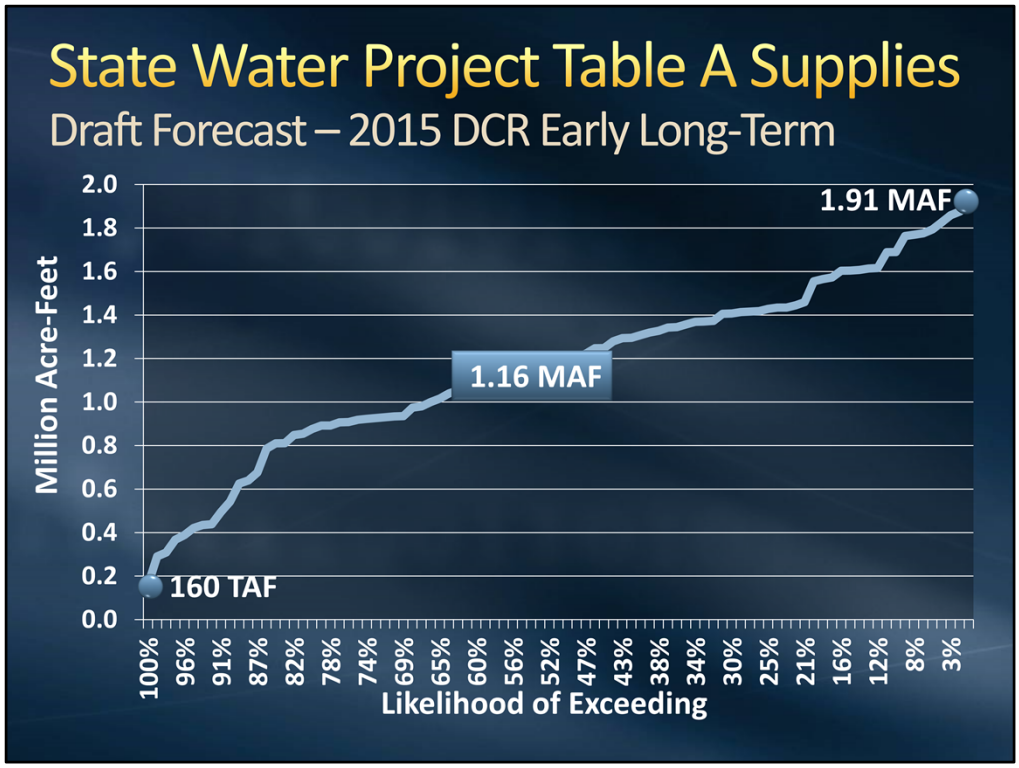
State Water Project Supplies
Key Assumptions

- 2015 DWR Draft Delivery Capability Report
  - Base Case
  - Early Long-Term (ELT)
  - Existing Conveyance High Outflow (ECHO)
- Existing Conveyance Scenario
  - 2016-2019 Base Case declines to ELT
  - 2020-2040 ECHO

State Water Project Table A Supplies

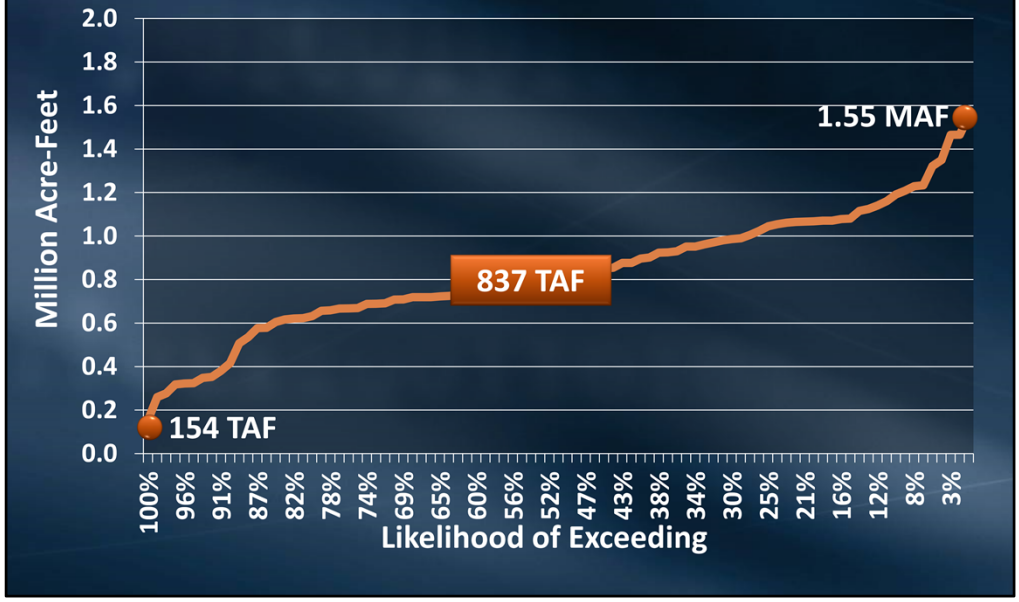
Draft Forecast – 2015 DCR Base Case

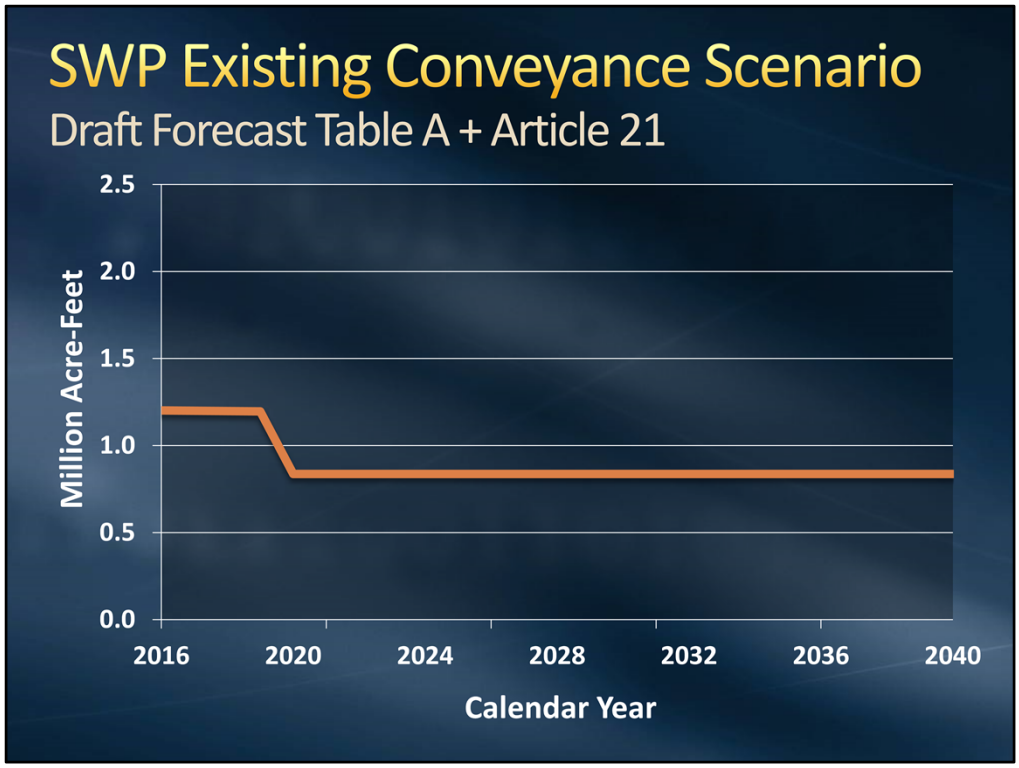



State Water Project Table A Supplies
Draft Forecast – 2015 DCR Early Long-Term
Million Acre-Feet
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1.91 MAF
1.16 MAF
160 TAF
100%
96%
91%
87%
82%
78%
74%
69%
65%
60%
56%
52%
47%
43%
38%
34%
30%
25%
21%
16%
12%
8%
3%
Likelihood of Exceeding

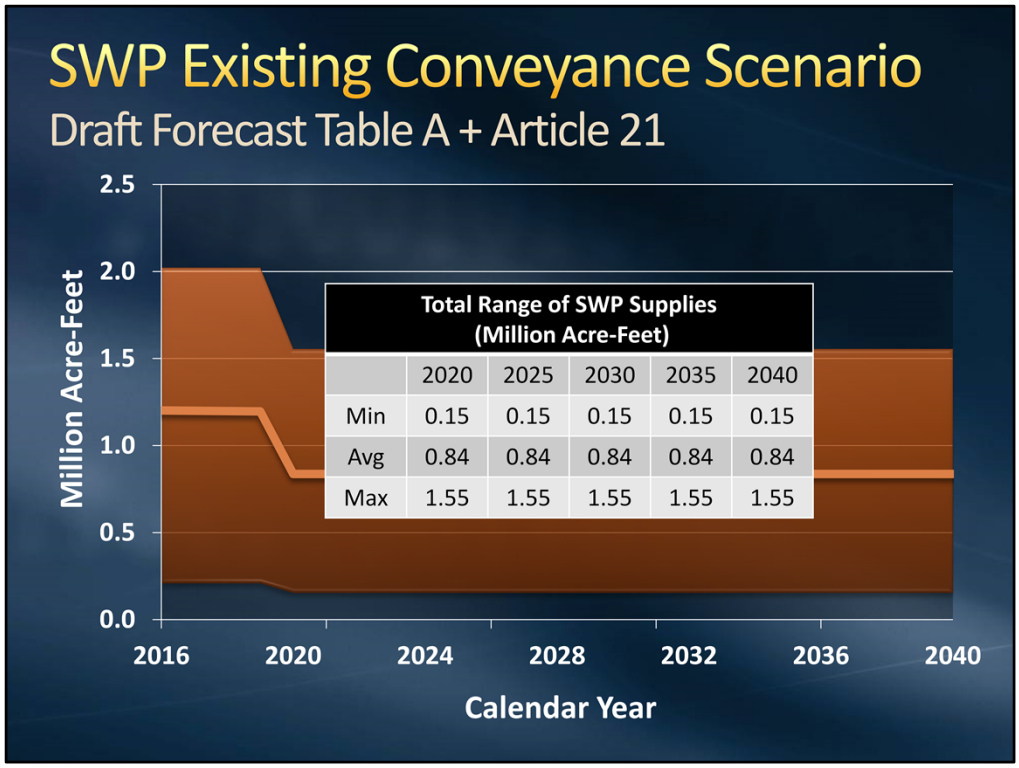
State Water Project Table A Supplies

Draft Forecast – 2015 DCR High Outflow (ECHO)

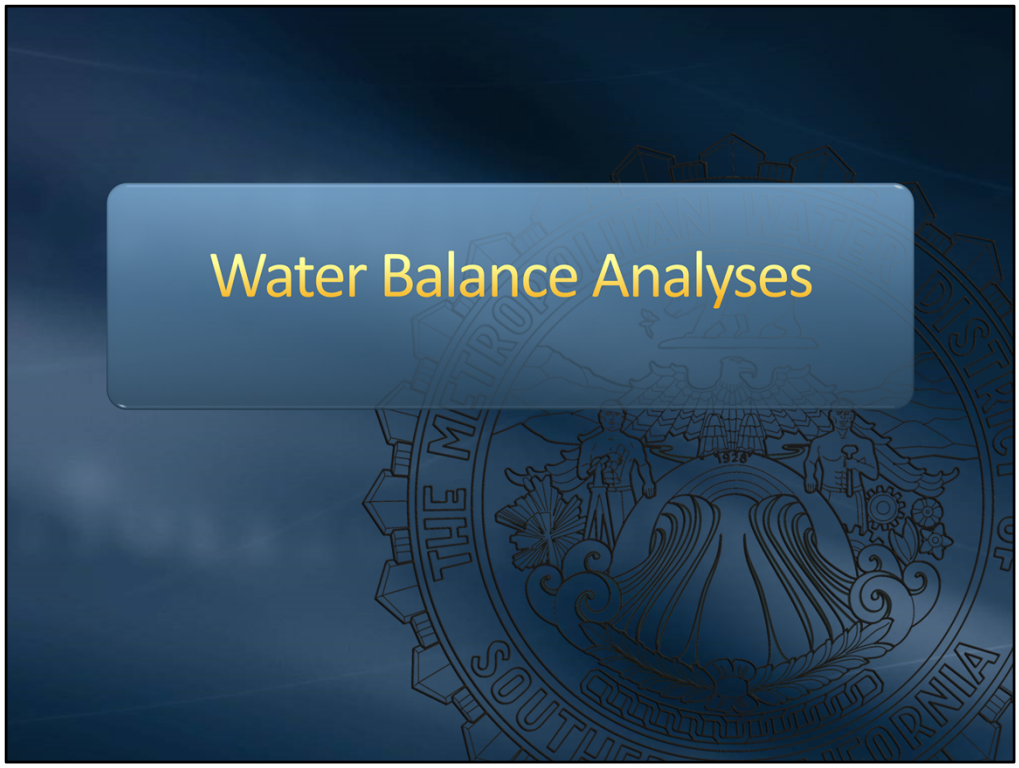




Use the 580 and the new 230 and show the growth in actual for rec and conservation

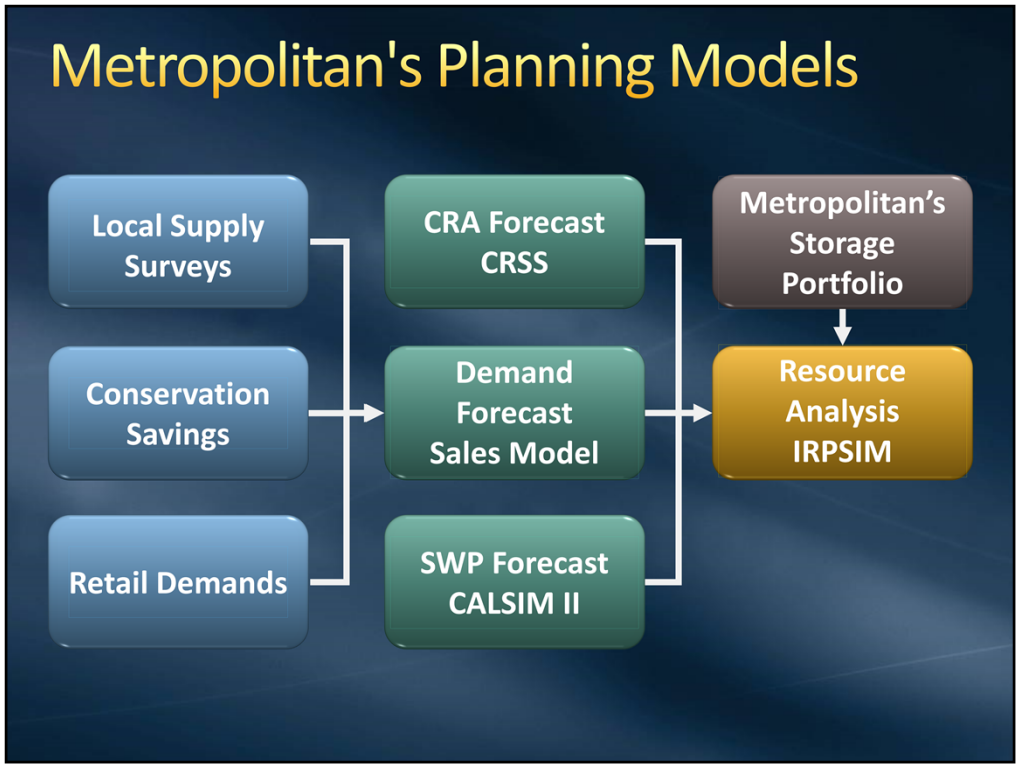


Use the 580 and the new 230 and show the growth in actual for rec and conservation

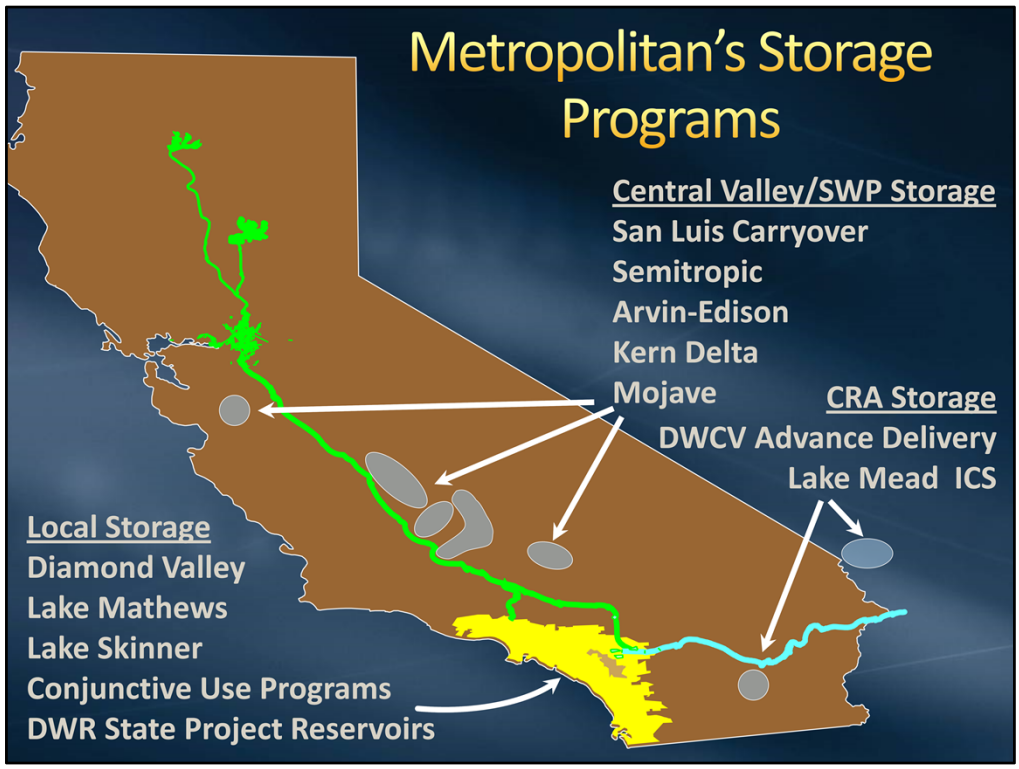

Water Balance Analyses

Needs for Building a Water Balance Analysis

- Forecasts of supplies and demands by hydrology
- A modeling tool that can:
  - Integrate hydrology based forecasts
  - Operate a storage and transfer portfolio
- Reliability measures to evaluate the water balance outcomes


Metropolitan's Planning Models
Local Supply Surveys
Conservation Savings
Retail Demands
CRA Forecast CRSS
Demand Forecast Sales Model
SWP Forecast CALSIM II
Metropolitan's Storage Portfolio
Resource Analysis IRPSIM

Storage Portfolio



Metropolitan has a number of storage programs inside & outside of the region. Partnerships have been developed with Central Valley agencies to store water. Several have been developed in recent years, and we have added additional programs this past year.

Storage Portfolio

Key Assumptions

- Each storage program is modeled in IRPSIM
  - Storage capacity
  - Put capacity
  - Take capacity
  - Program or evaporative losses
- 2016 estimated starting storage balances
- Emergency storage of ~630 TAF is held aside

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

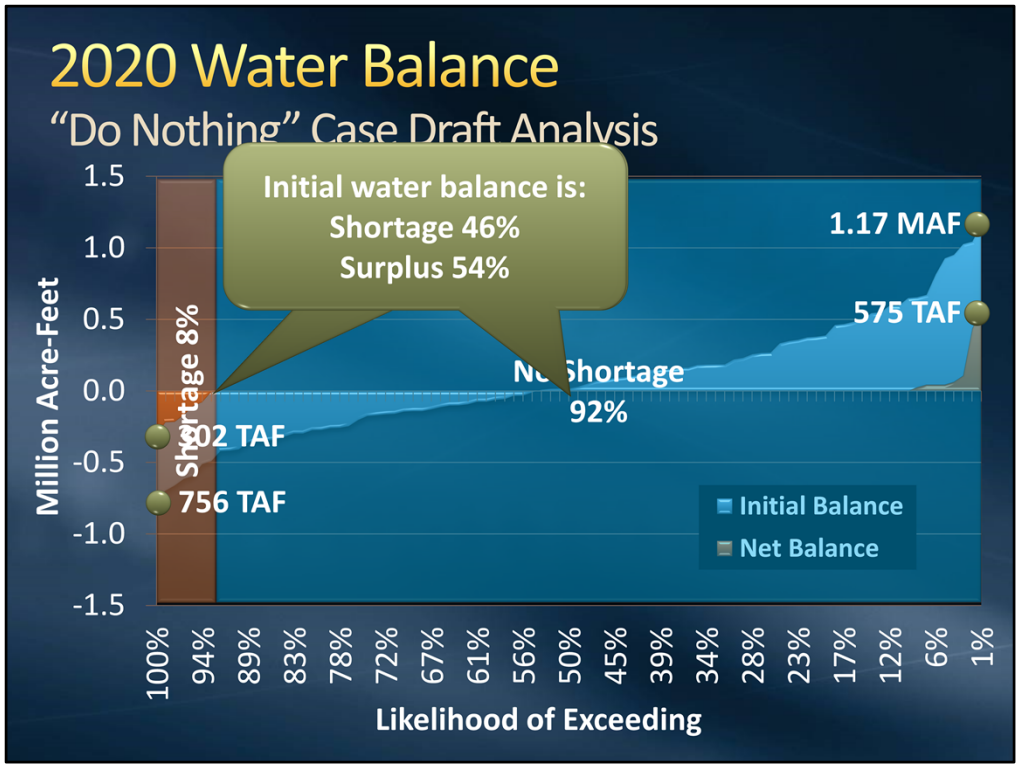
Reliability Measures

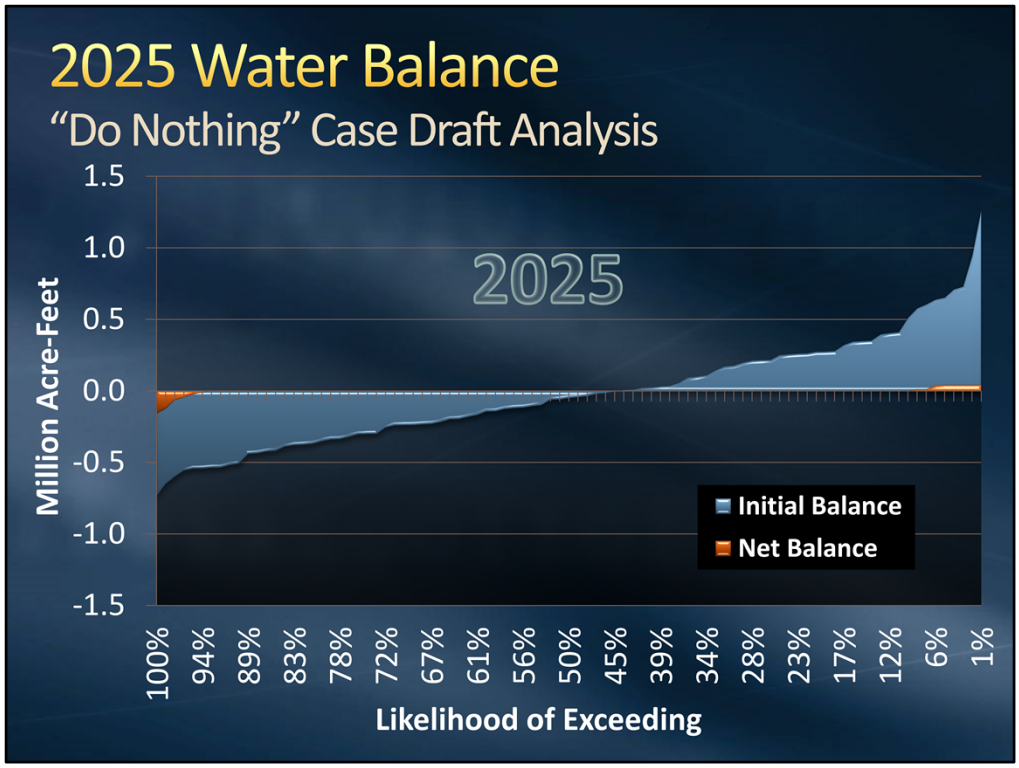
Potential Measures of Reliability

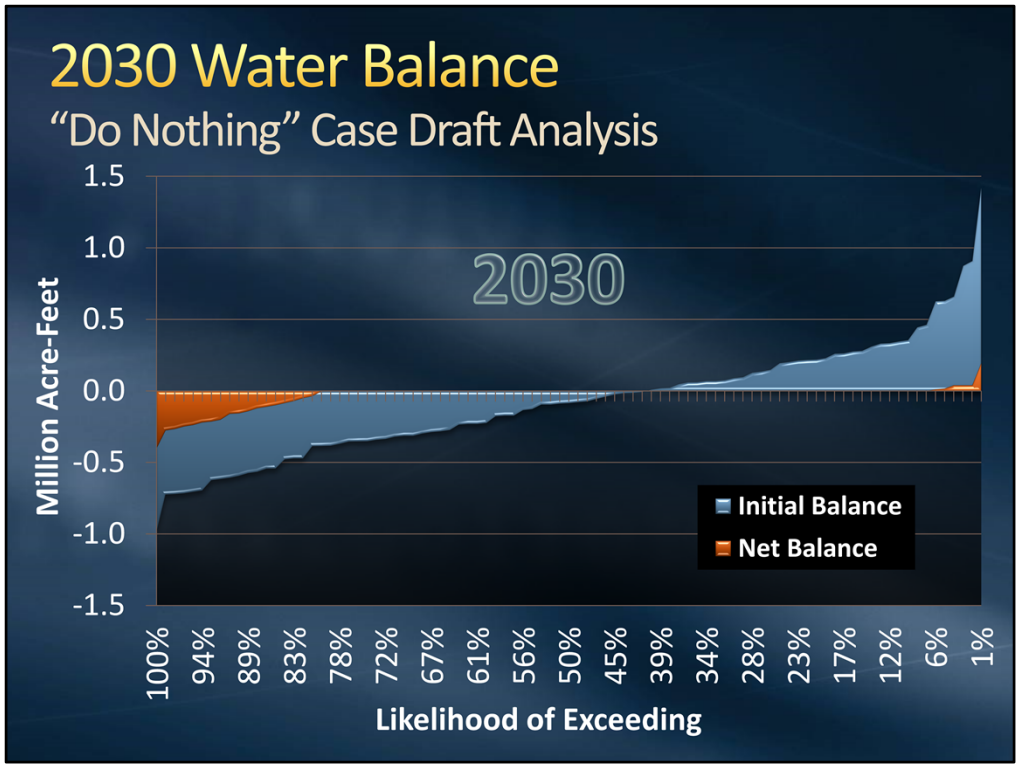
- Supply shortages
  - Frequency of shortage (aka probability)
  - Size of shortage
  - IRP reliability goal: “100% reliability under foreseeable hydrologic conditions”
- Storage thresholds
  - Minimum storage level
  - Average storage level

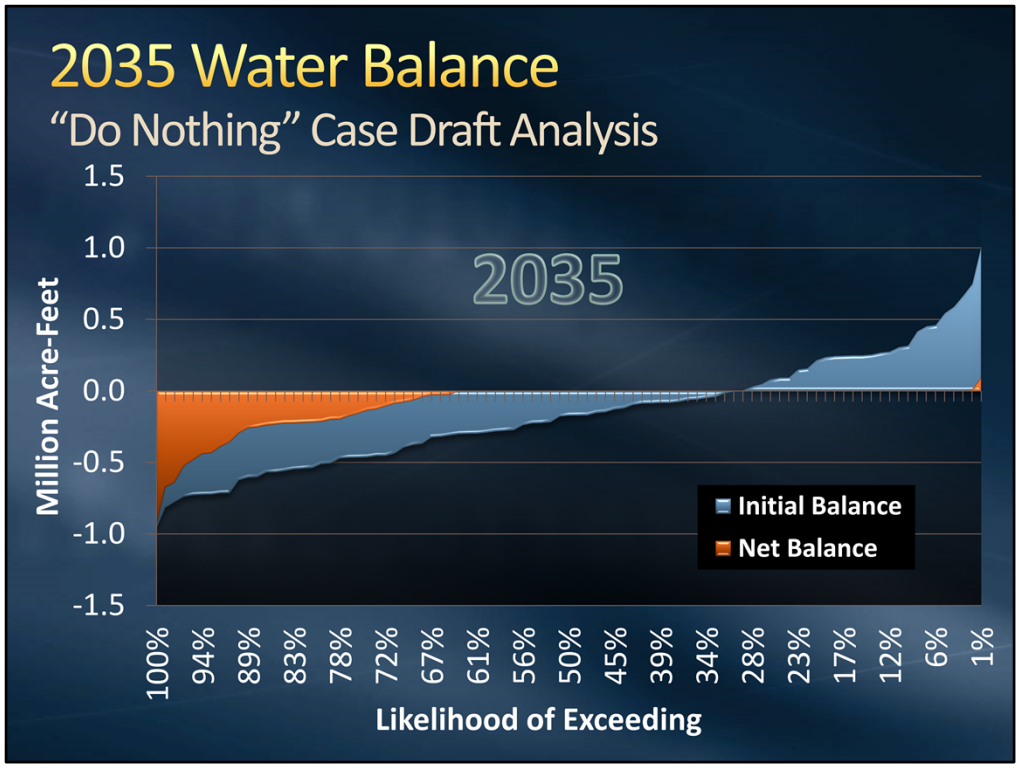
What Happens if We do Nothing?

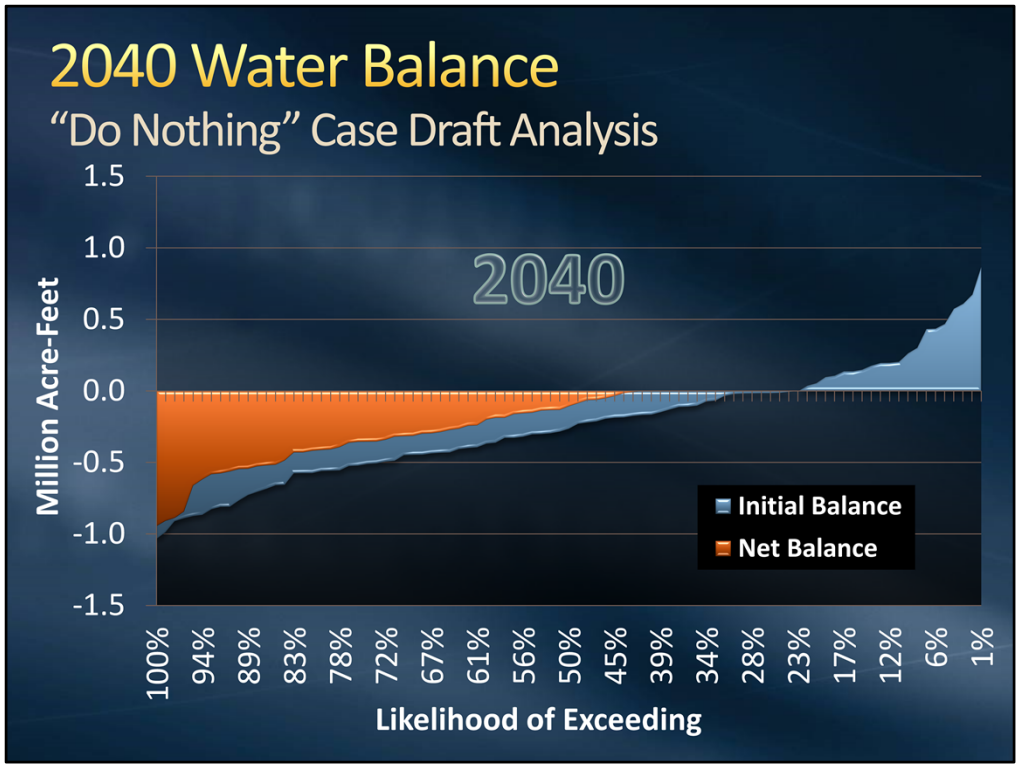
"Do Nothing" Case
Draft Water Balance


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


2025 Water Balance
"Do Nothing" Case Draft Analysis
2025
Million Acre-Feet
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
Initial Balance
Net Balance
100%
94%
89%
83%
78%
72%
67%
61%
56%
50%
45%
39%
34%
28%
23%
17%
12%
6%
1%
Likelihood of Exceeding

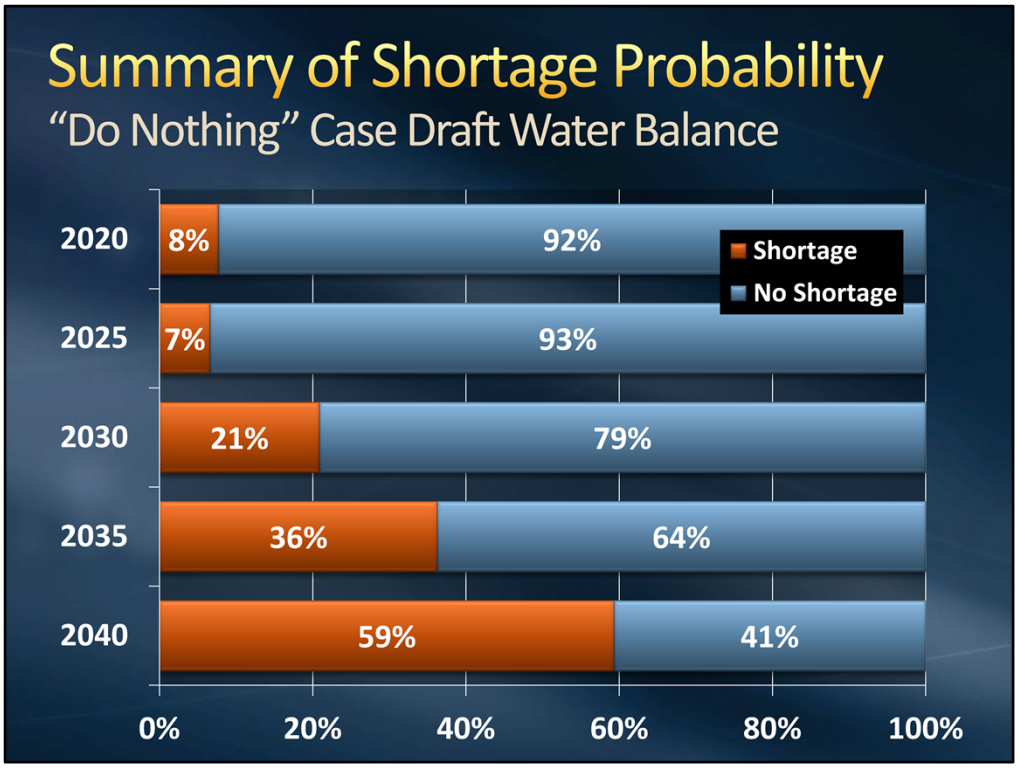

2030 Water Balance
"Do Nothing" Case Draft Analysis
2030
Million Acre-Feet
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
Initial Balance
Net Balance
100%
94%
89%
83%
78%
72%
67%
61%
56%
50%
45%
39%
34%
28%
23%
17%
12%
6%
1%
Likelihood of Exceeding

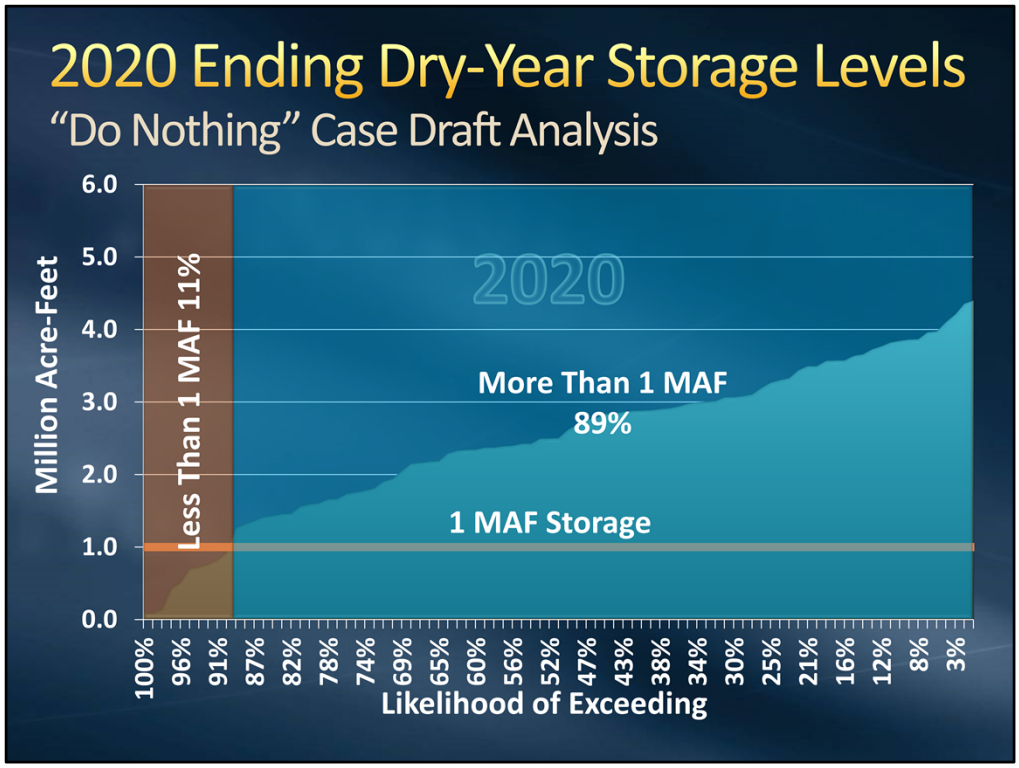

2035 Water Balance
"Do Nothing" Case Draft Analysis
2035
Million Acre-Feet
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
Initial Balance
Net Balance
100%
94%
89%
83%
78%
72%
67%
61%
56%
50%
45%
39%
34%
28%
23%
17%
12%
6%
1%
Likelihood of Exceeding


2040 Water Balance
"Do Nothing" Case Draft Analysis
2040
Million Acre-Feet
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
Initial Balance
Net Balance
100%
94%
89%
83%
78%
72%
67%
61%
56%
50%
45%
39%
34%
28%
23%
17%
12%
6%
1%
Likelihood of Exceeding

Summary of Shortage Probability

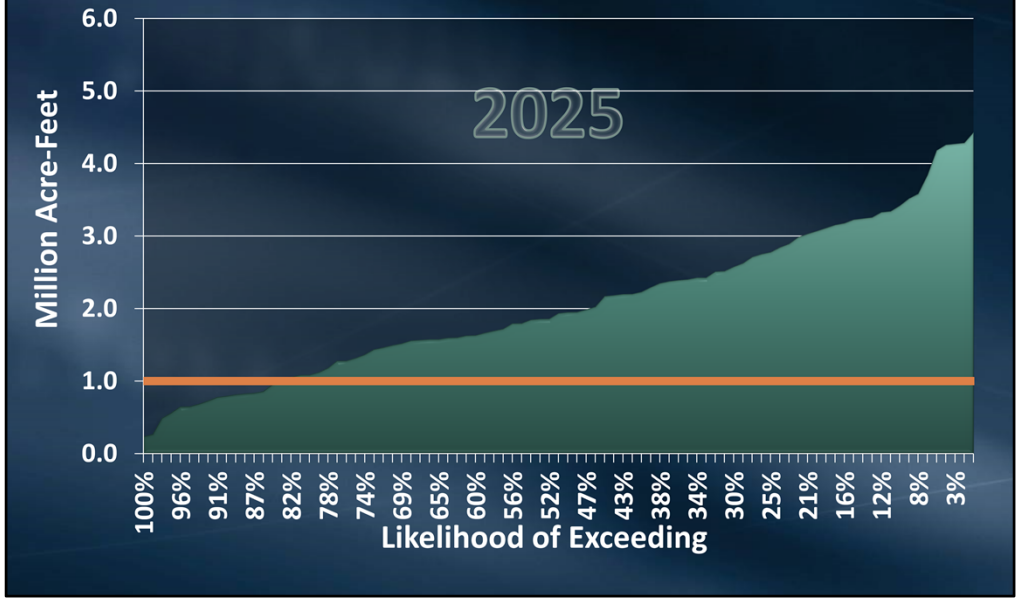
"Do Nothing" Case Draft Water Balance




2020 Ending Dry-Year Storage Levels
"Do Nothing" Case Draft Analysis
Million Acre-Feet
6.0
5.0
4.0
3.0
2.0
1.0
0.0
2020
Less Than 1 MAF 11%
More Than 1 MAF
89%
1 MAF Storage
100%
96%
91%
87%
82%
78%
74%
69%
65%
60%
56%
52%
47%
43%
38%
34%
30%
25%
21%
16%
12%
8%
3%
Likelihood of Exceeding

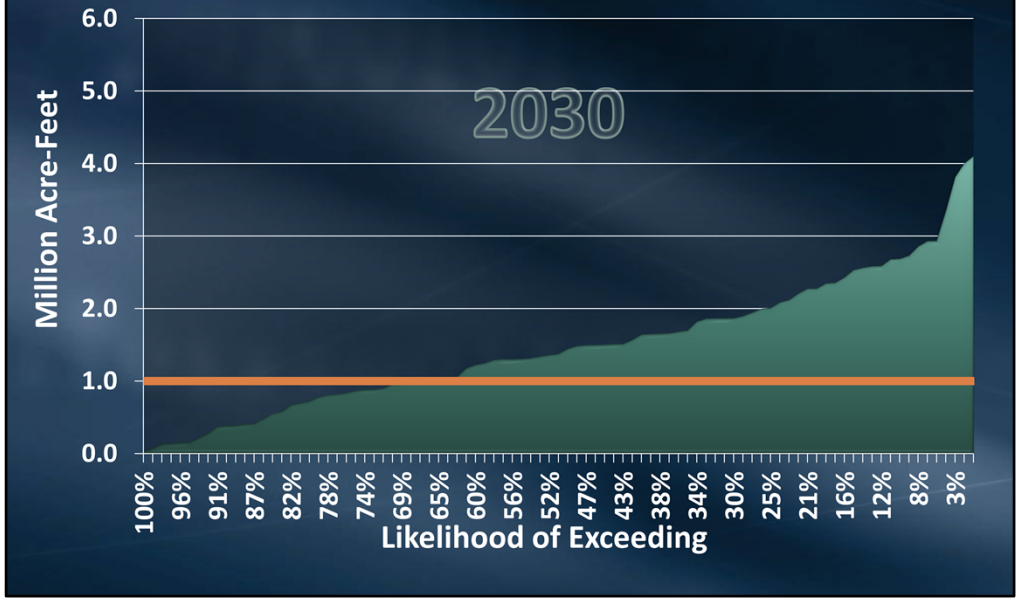
2025 Ending Dry-Year Storage Levels

"Do Nothing" Case Draft Analysis



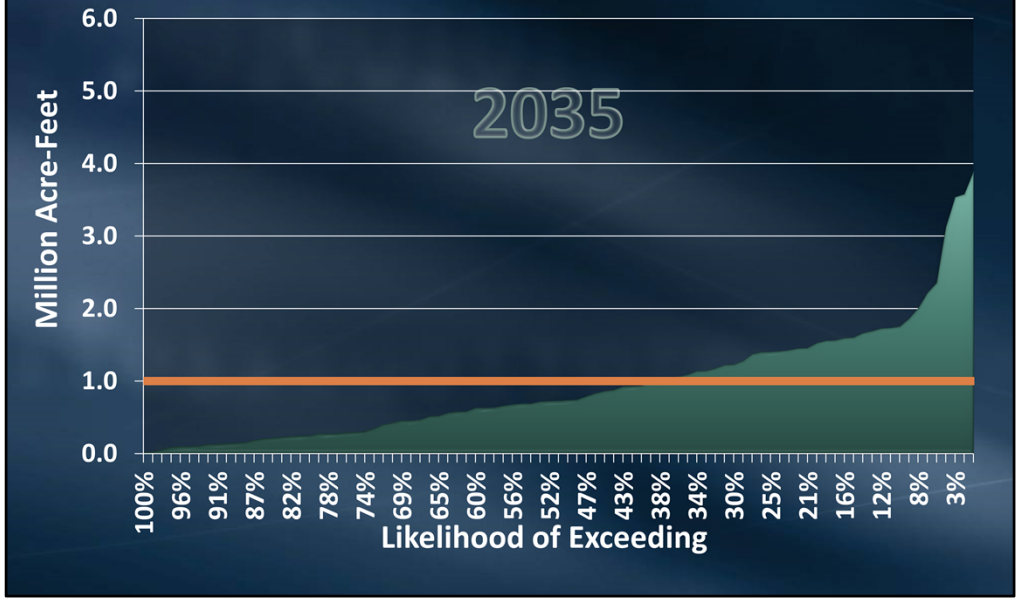
2030 Ending Dry-Year Storage Levels

"Do Nothing" Case Draft Analysis



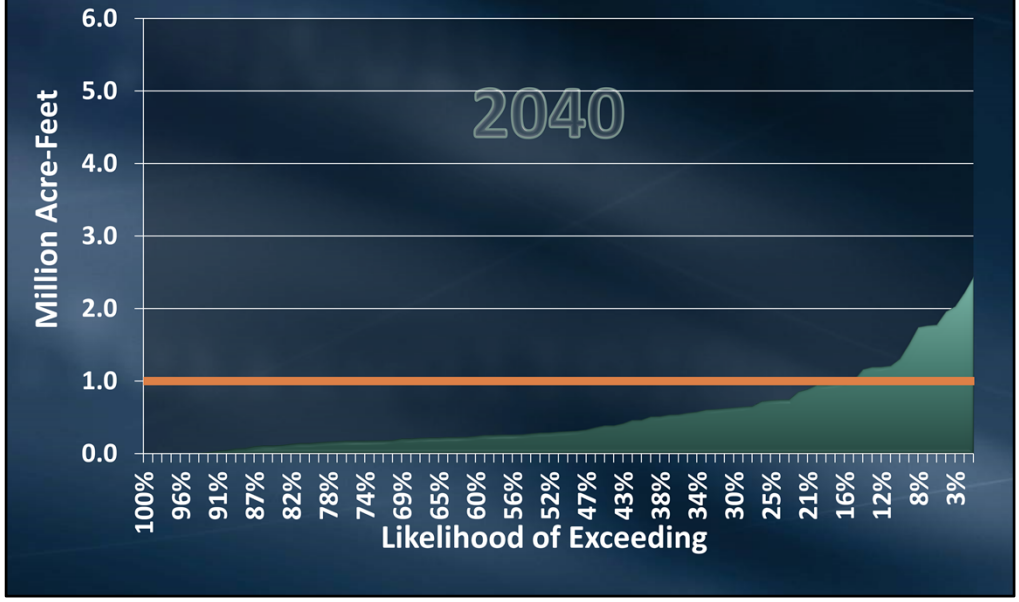
2035 Ending Dry-Year Storage Levels

"Do Nothing" Case Draft Analysis



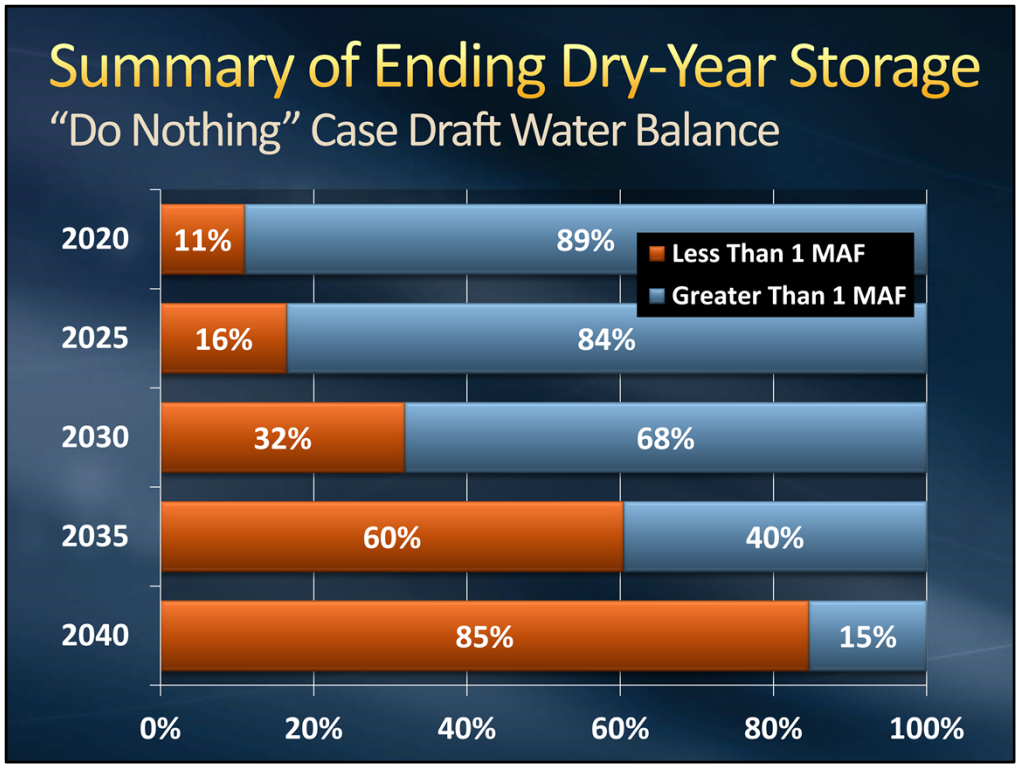
2040 Ending Dry-Year Storage Levels

"Do Nothing" Case Draft Analysis



Summary of Ending Dry-Year Storage

"Do Nothing" Case Draft Water Balance



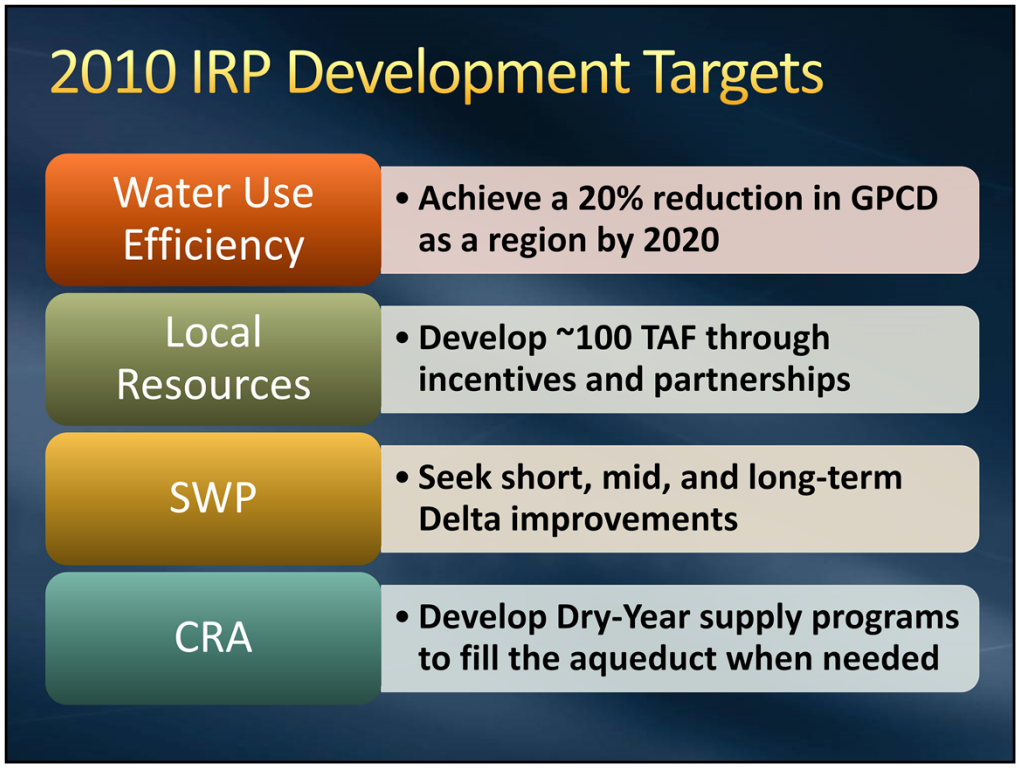
Observations

"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 Targets?

2010 IRP Approach
Draft Water Balance



Water Use Efficiency
Conservation and recycling to achieve a 20% reduction at the regional level
Commitment is above and beyond 20x2020 legislation

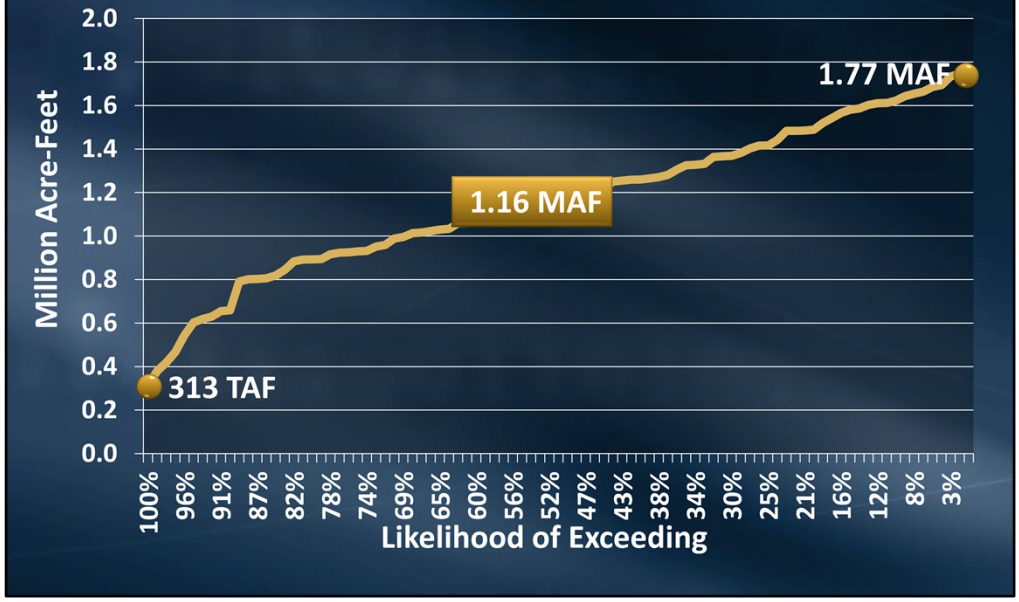
Local Resources
Sought to develop just over 100 TAF of additional local supplies through groundwater recovery, seawater desalination, and recycling

State Water Project
Pursue short, mid, and long-term improvements to help stabilize delta supplies
Short-term examples: emergency preparedness actions, Complete BDCDP
Mid-term examples: Implement BDCP, implement flood control protection
Long-term examples: Water supply conveyance, ecosystem restoration

Colorado River
Continue to develop dry-year supply programs on the Colorado River System
Provide flexibility in conjunction with Lake Mead ICS to provide a full CRA as needed

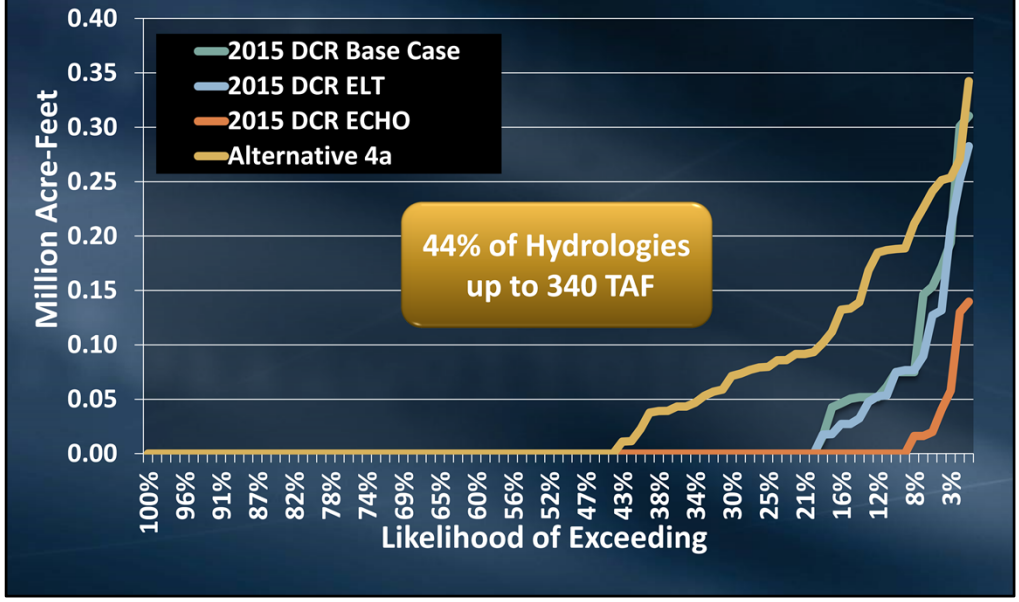
State Water Project Table A Supplies

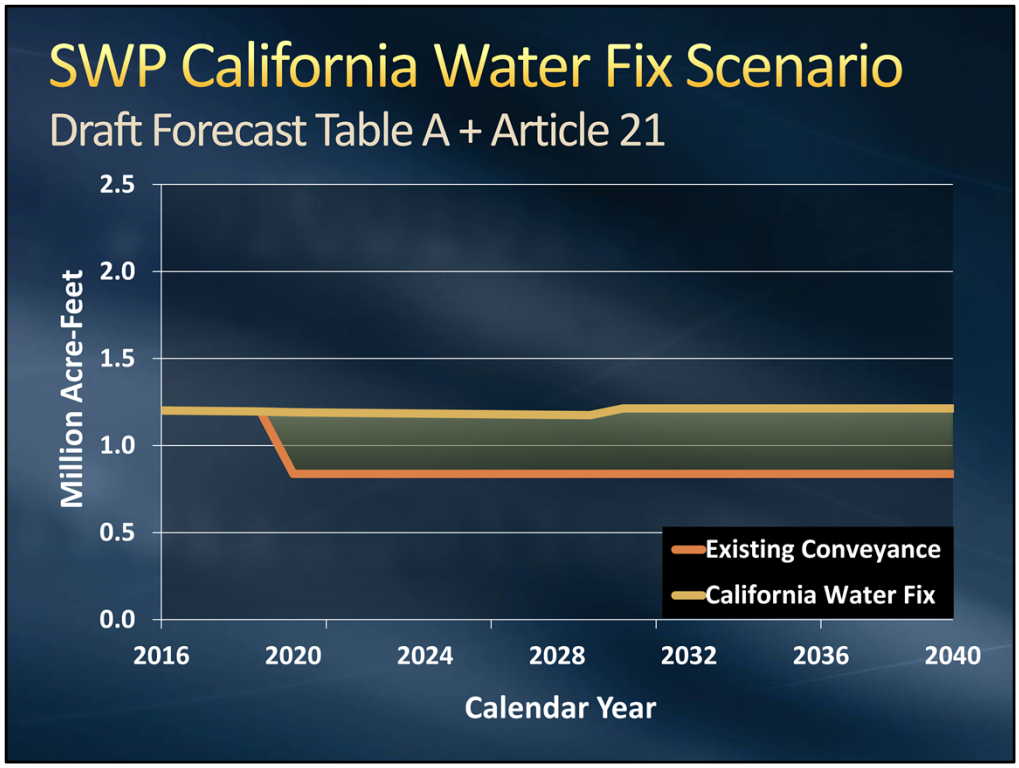
Draft Forecast – Alternative 4a



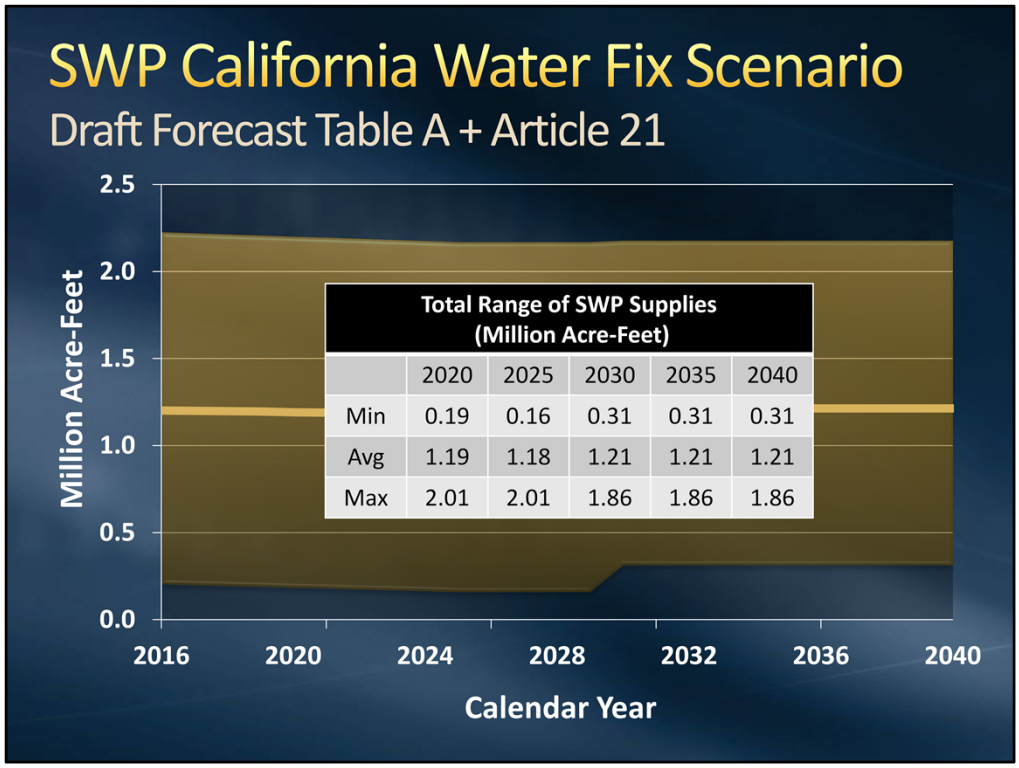
State Water Project Article 21 Supplies

Draft Forecast Summary





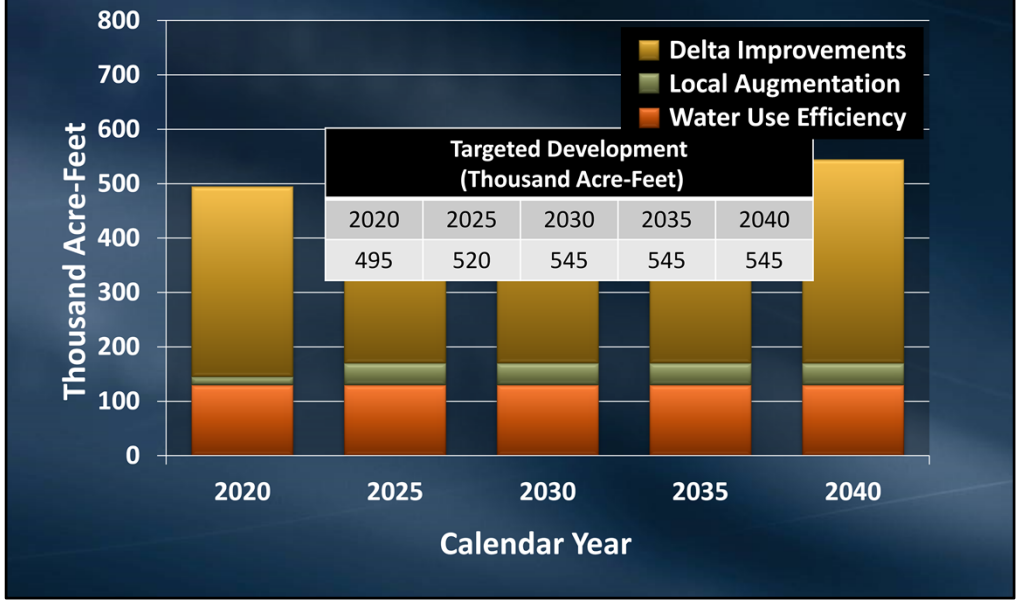
Use the 580 and the new 230 and show the growth in actual for rec and conservation



Use the 580 and the new 230 and show the growth in actual for rec and conservation

Targeted IRP Development

2010 IRP Approach

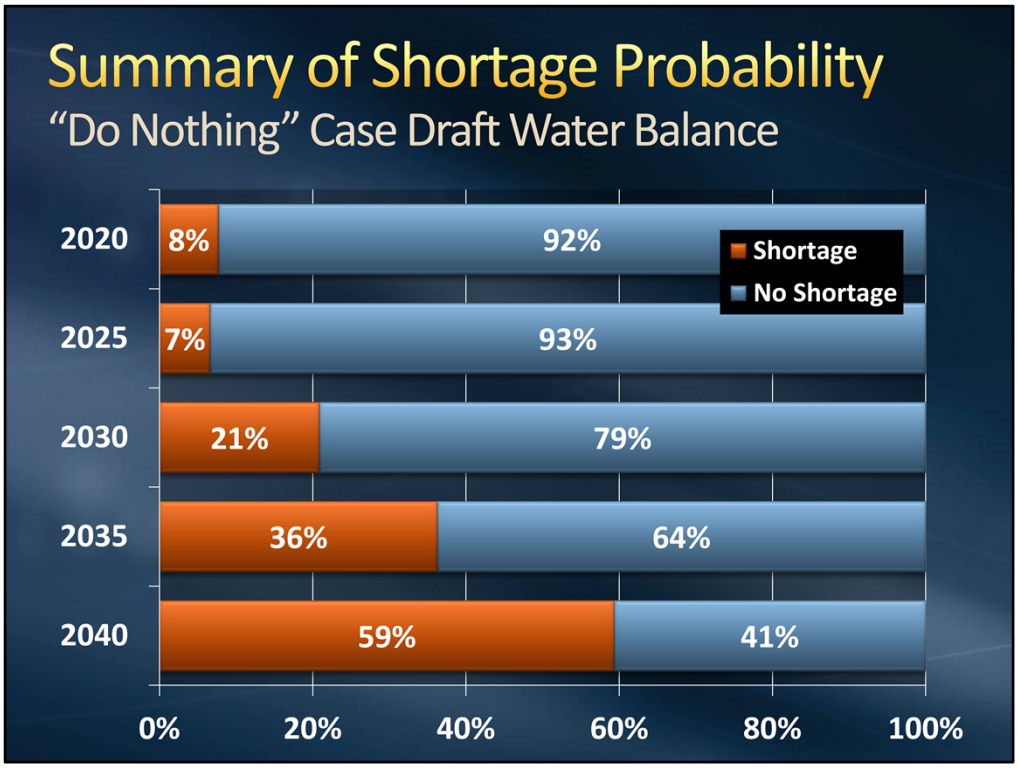


Targeted Development (Thousand Acre-Feet)

2020	2025	2030	2035	2040
495	520	545	545	545

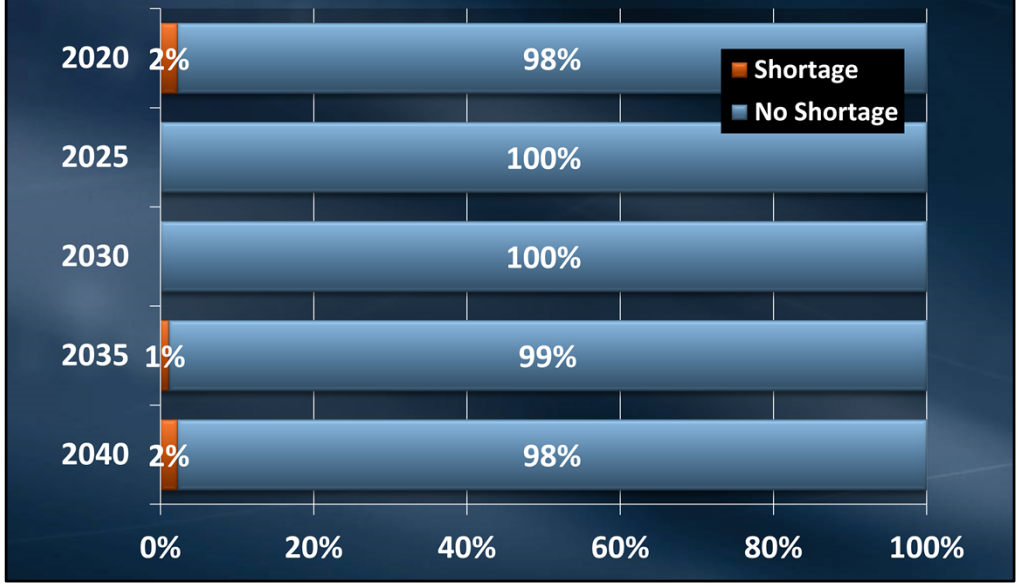
Summary of Shortage Probability

"Do Nothing" Case Draft Water Balance



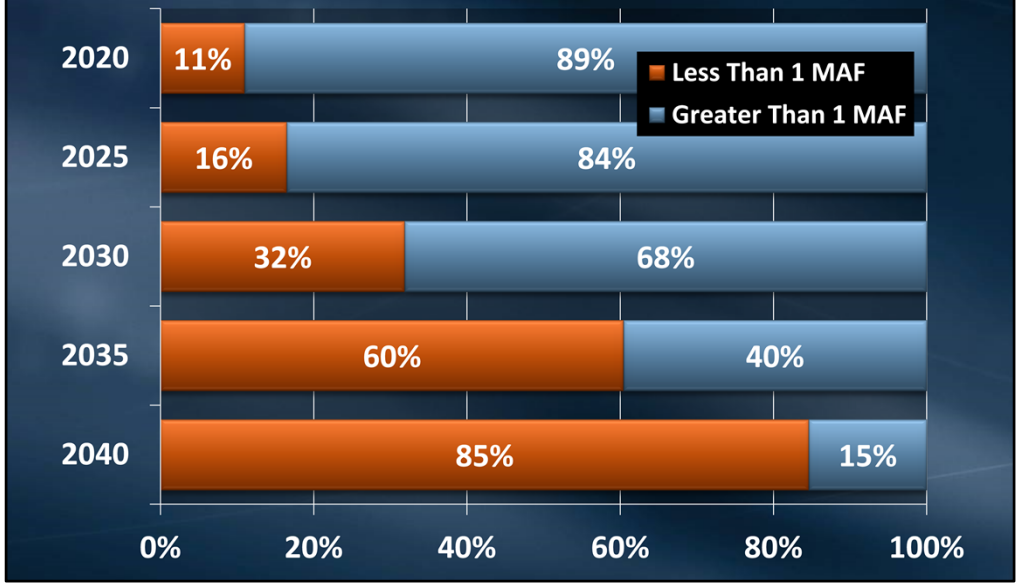
Summary of Shortage Probability

IRP Approach Draft Water Balance



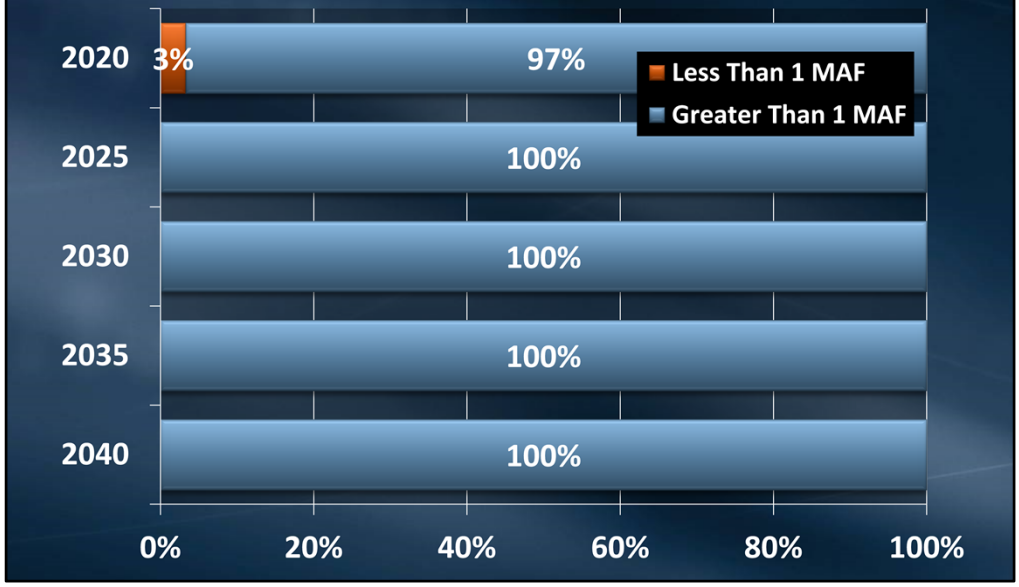
Summary of Ending Dry-Year Storage

"Do Nothing" Case Draft Water Balance



Summary of Ending Dry-Year Storage

IRP Approach Draft Water Balance



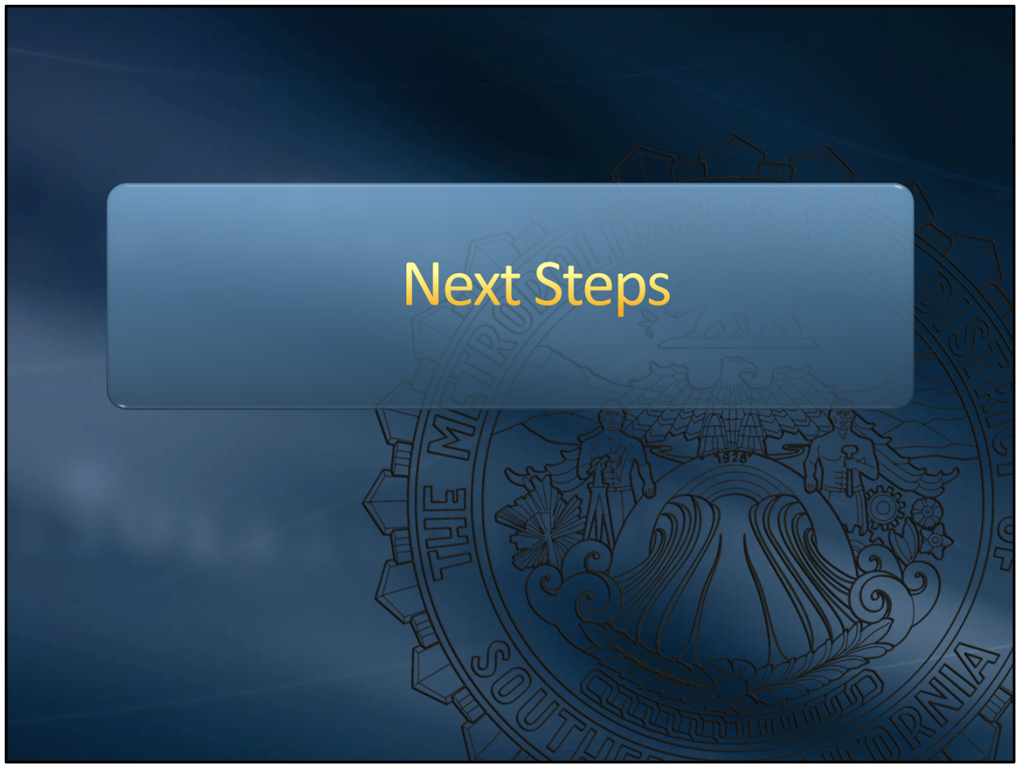
Observations

IRP Approach Draft Water Balance

- Significant resource investments are needed to achieve the 2010 IRP Targets
- Existing supplies need to maintained
  - Colorado River Aqueduct
  - Local supply production
- Compared to the “Do Nothing” Case
  - Reliability measures improve
  - Storage measures improve
  - Challenges still exist in the shorter term

What Potential Changes to the 2010 IRP Targets are Needed?

- Adjust targets to address shorter term imbalances
- Adjust targets to ensure sufficient storage levels
- Ensure an adequate supply buffer
- Refine and improve implementation approaches and policy to ensure development


Next Steps

Upcoming Technical Process Activities
September 2015

- Member Agency Workgroup September 9th
- IRP Committee Meeting September 22nd
  - Technical process draft results
    - Potential resource development targets
  - Update on IRP outreach

Upcoming Technical Process Activities
October 2015

- Member Agency Workgroup October 5th
- IRP Public Outreach Workshop
- IRP Committee Meeting October 27th
  - Update on IRP outreach
  - IRP Issue Paper Addendum
  - Inventory of policy issues
  - Approach for “IRP Phase 2” Board process


THE METROPOLITAN WATER DISTRICT OF
SOUTHERN CALIFORNIA