WATER TOMORROW

Integrated Water Resources Plan

Public Workshop

October 22, 2015

Metropolitan Water District of Southern California

Welcome/Introduction

Richard Atwater
MWD Director/Chair Integrated Resources Planning Committee

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Workshop Format and Objectives

Chris Moore and Ryan Golten
CDR Associates

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Workshop Objectives

Let you know what we are doing

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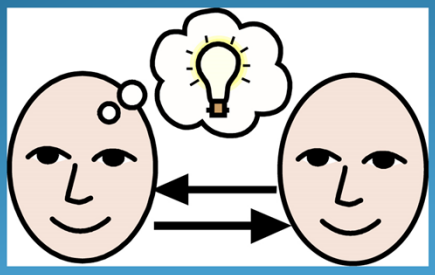
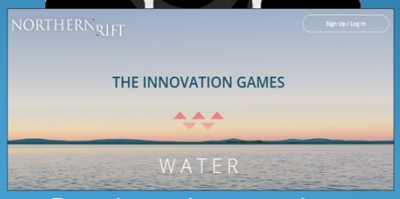


Share new ideas & knowledge

Gain feedback & discussion



Continue interactions

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Keynote Address: Water Tomorrow

Randy Record
MWD Board Chairman

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Southern California's Pursuit of Reliability

Debra Man
Assistant General Manager/
Chief Operating Officer

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Metropolitan Water District of Southern California

The Mission of the Metropolitan Water District is to provide its service area with adequate and reliable supplies of high-quality water to meet present and future needs in an environmentally and economically responsible way.

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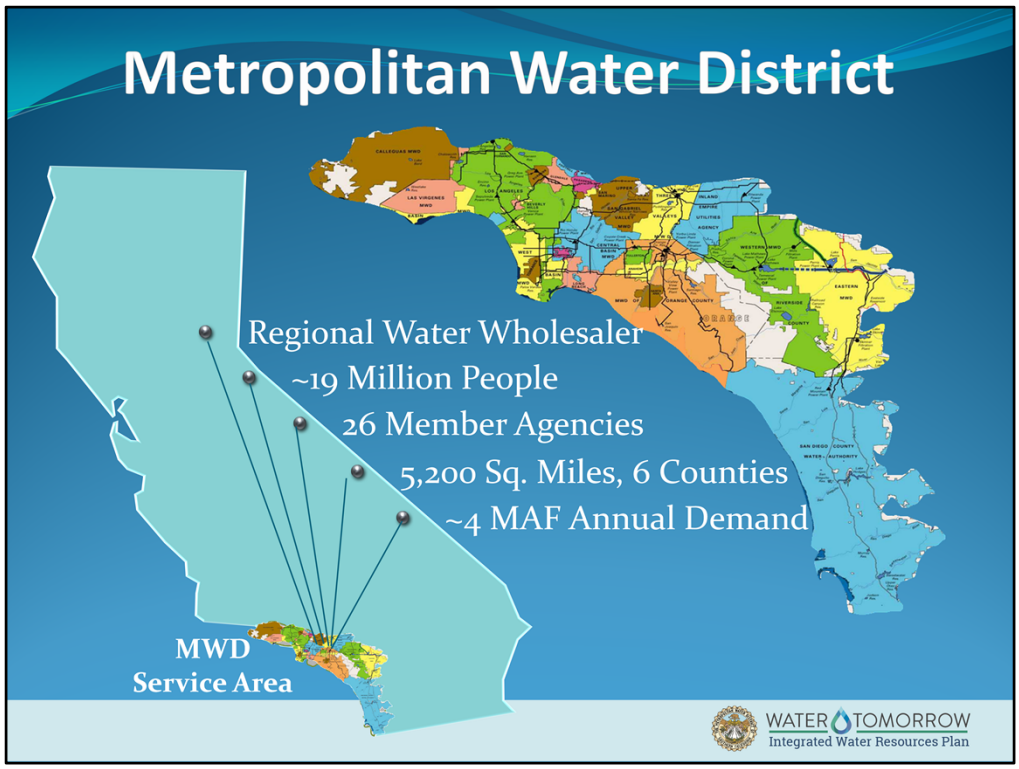
Metropolitan Water District
Regional Water Wholesaler
~19 Million People
26 Member Agencies
5,200 Sq. Miles, 6 Counties
~4 MAF Annual Demand
MWD
Service Area
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Sources of Water for Southern California
Lake Shasta
Lake Oroville
Sierra Mountains
Los Angeles Aqueduct
Delta
Colorado River Aqueduct Supplies
State Water Project Supplies
L.A. Aqueduct
California Aqueduct
Colorado River Aqueduct
Conservation
Local Groundwater and Recycling
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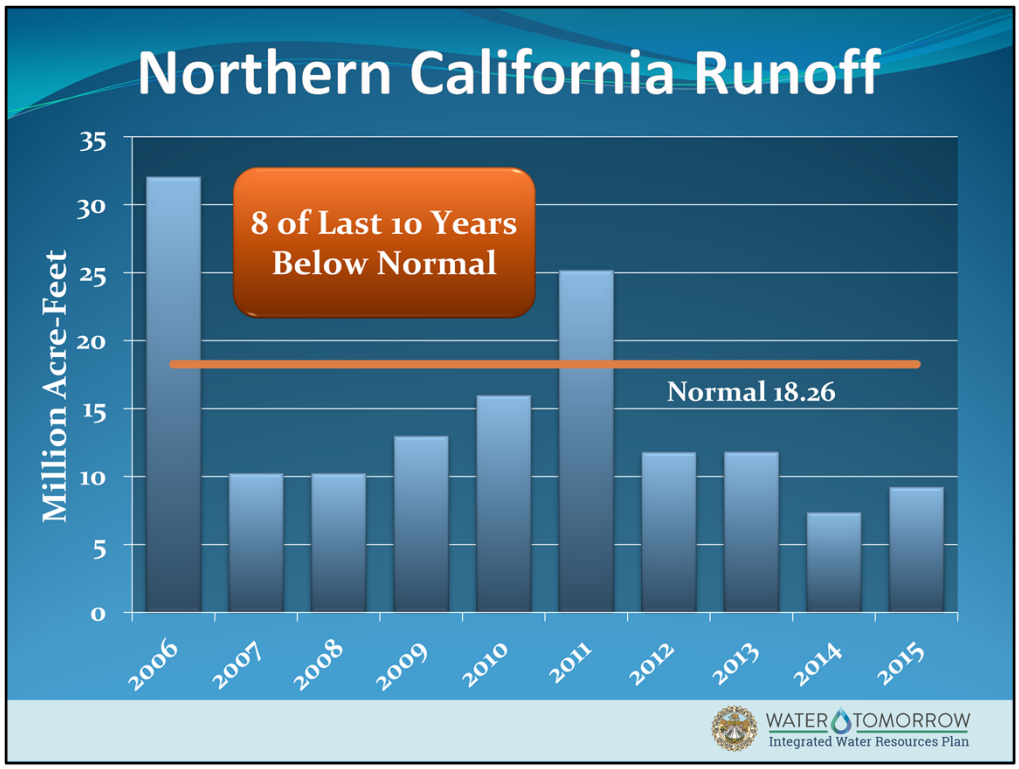
Northern California Runoff
Million Acre-Feet
35
30
25
20
15
10
5
0
8 of Last 10 Years Below Normal
Normal 18.26
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
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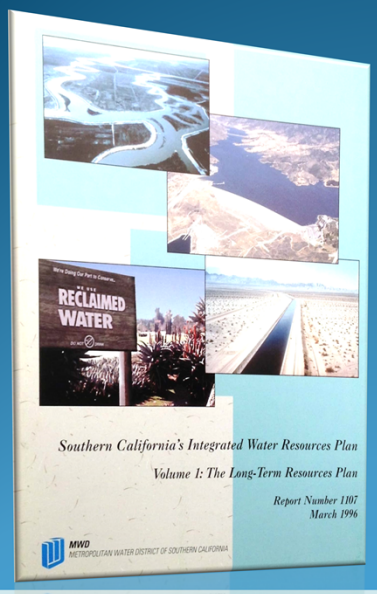
A New Planning Process Emerged



- The 1996 IRP focused on supply diversification
- Introduced a portfolio approach
- Established targets for major resource categories
- Established a regional reliability goal

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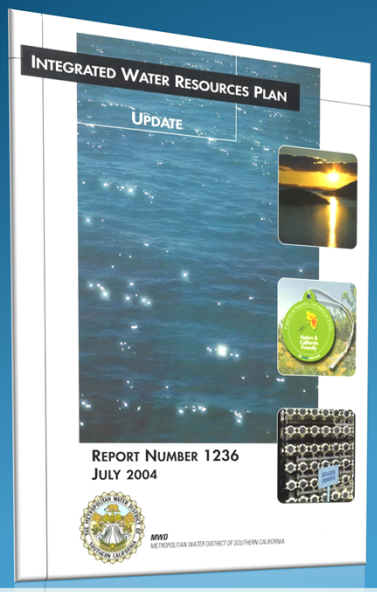
History of the IRP – 2004 Update



- Placed further emphasis on conservation and local resources development
- Introduced the concept of a "planning buffer"

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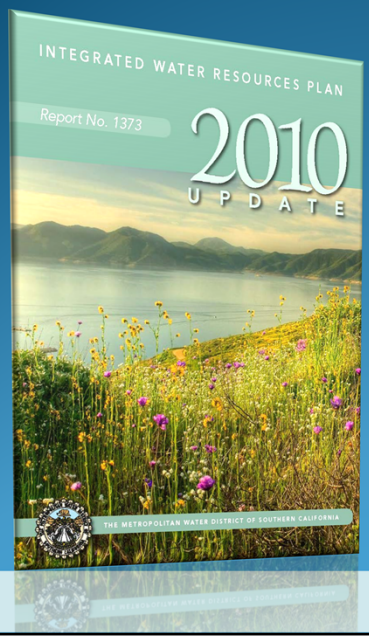
History of the IRP – 2010 Update



- Introduced an adaptive management approach
- Sought to stabilize imported supplies and meet growth through water use efficiency and local resources

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These plans led to action…

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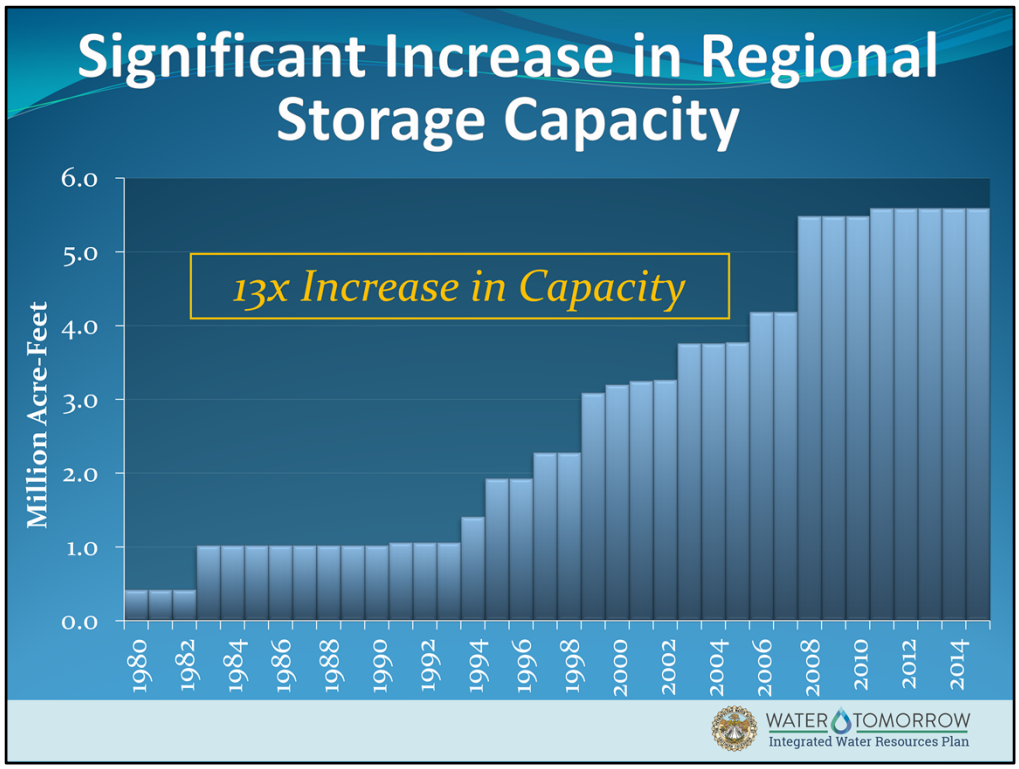
Significant Increase in Regional Storage Capacity
13x Increase in Capacity
Million Acre-Feet
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
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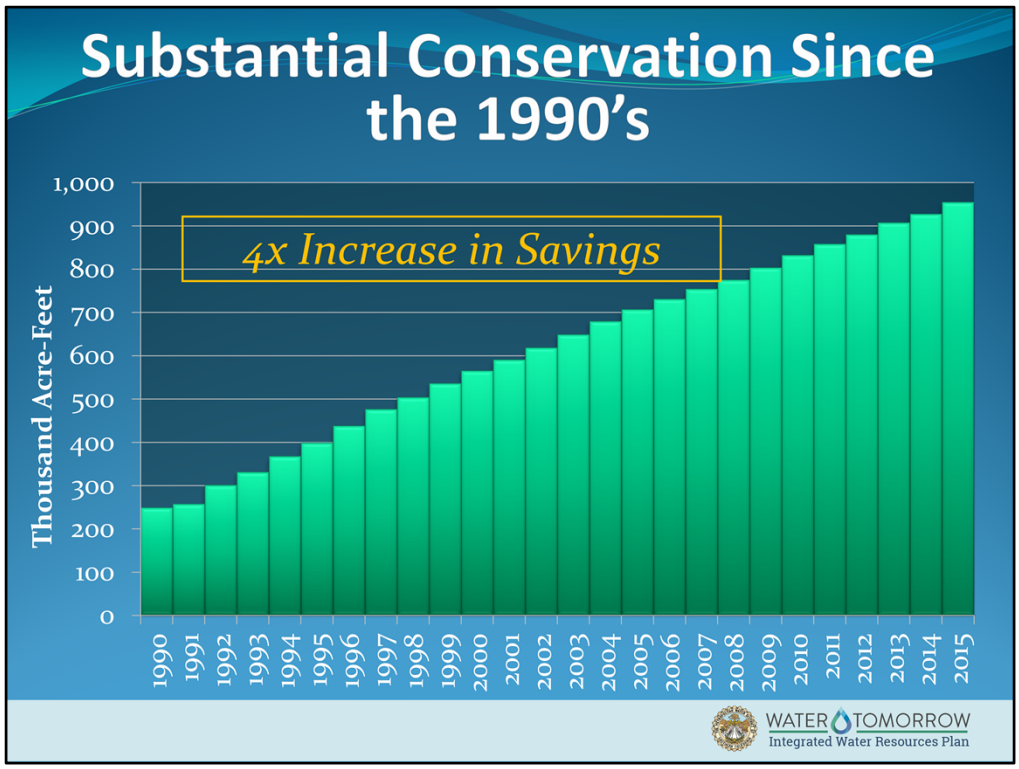
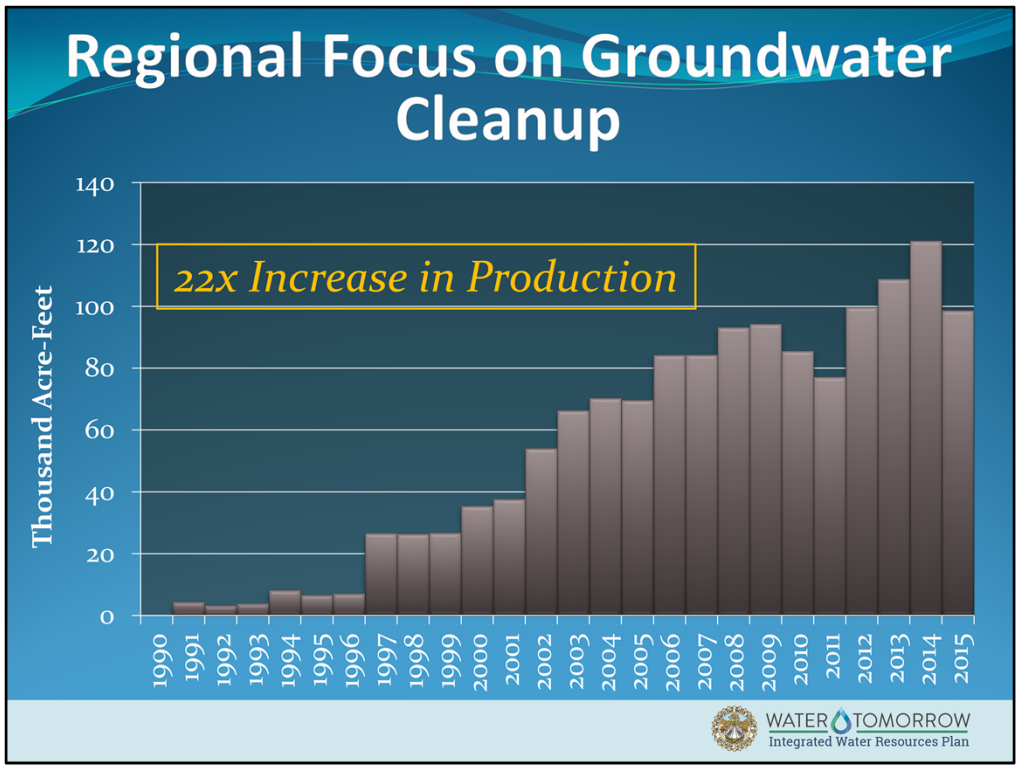


Fiscal Years 1990-2015

Total Conservation, including Active, Passive, Price, System Losses, and Pre-1990 Savings

Fiscal Years 1990-2015
Both LRP and non-LRP
Includes Santa Ana River Base Flows

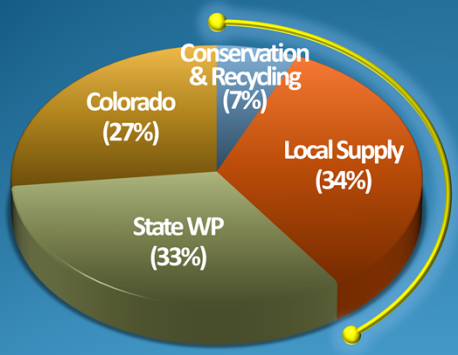
FY 2015 is an estimate



Fiscal Years 1990-2015
Both LRP and non-LRP

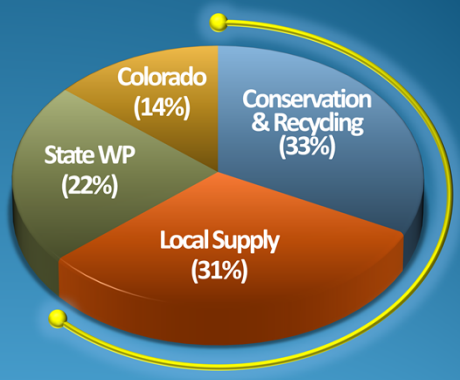
FY 2015 is an estimate

Diversification of Water Portfolio (Average Year)



1990 – 41% Local

Heavy dependence on imported supply and SWP Diversions



2035 – 64% Local

Emphasis on Conservation, Local Supplies, and Storage & Transfers

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Summary

- The IRP represents Metropolitan's long-term plan to assure adequate water supplies for Southern California
- The IRP sets targets to help meet the region's needs into the future
- These targets help guide policy and investment decisions for water supply development, and demand management

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The 2015 IRP Update Process

Jennifer Nevills
IRP Project Manager

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Key Drivers for the 2015 Update

- Incorporating changed conditions impacting supplies and demands
- Responding to new challenges
- Refining transfer and storage management strategies
- Overcoming barriers to implementation
- Coming to agreement on consistent/standard terms and definitions

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2015 Update Split into Two Parts

Phase 1: Technical Update (2015)

Develop regional targets to support long-term reliability	• People, economy, water demands • Climate change, hydrologic scenarios • Water supplies from existing and new projects

Phase 2: Implementation Policies (2016)

How might we achieve the resource targets?	• Local and regional responsibilities • Resource investment strategies • R&D priorities

2015 IRP Technical Update Approach

- Solidify technical information and assumptions
- Analyze supply and demand gaps over the next 25 years
- Review and update the 2010 IRP Update targets
- Assess strategies for managing short and long-term uncertainty

- Identify implementation policy issues
- Communicate technical findings and policy needs for Board discussions

IRP Phase 2

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What is Our Current Outlook of Supplies and Demands?

- Retail Demands and Conservation
- Local Supplies
  - Recycling
  - Seawater Desalination
  - Groundwater and Groundwater Recovery
  - Other Local Supplies
- Imported Supplies
  - State Water Project
  - Colorado River Aqueduct
- Transfers, Exchanges, and Storage

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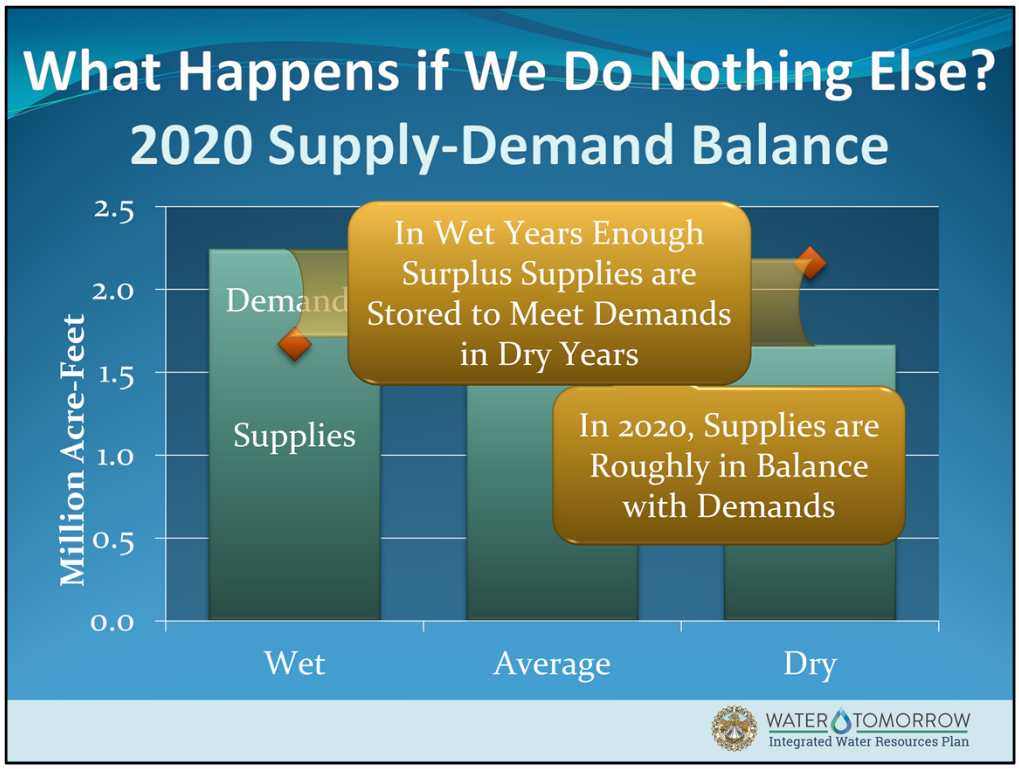
Much has Changed Since 2010

- Demands
  - Lower demographic projections
  - Significant new conservation savings
- Local supplies
  - Some new supplies coming online
  - Major reduction in groundwater projections
- State Water Project supplies
  - Projected yield of the Delta fix is lower
- Additional risks to consider


What Happens if We Do Nothing Else?
2020 Supply-Demand Balance
Million Acre-Feet
2.5
2.0
1.5
1.0
0.5
0.0
Demand
Supplies
In Wet Years Enough Surplus Supplies are Stored to Meet Demands in Dry Years
In 2020, Supplies are Roughly in Balance with Demands
Wet
Average
Dry
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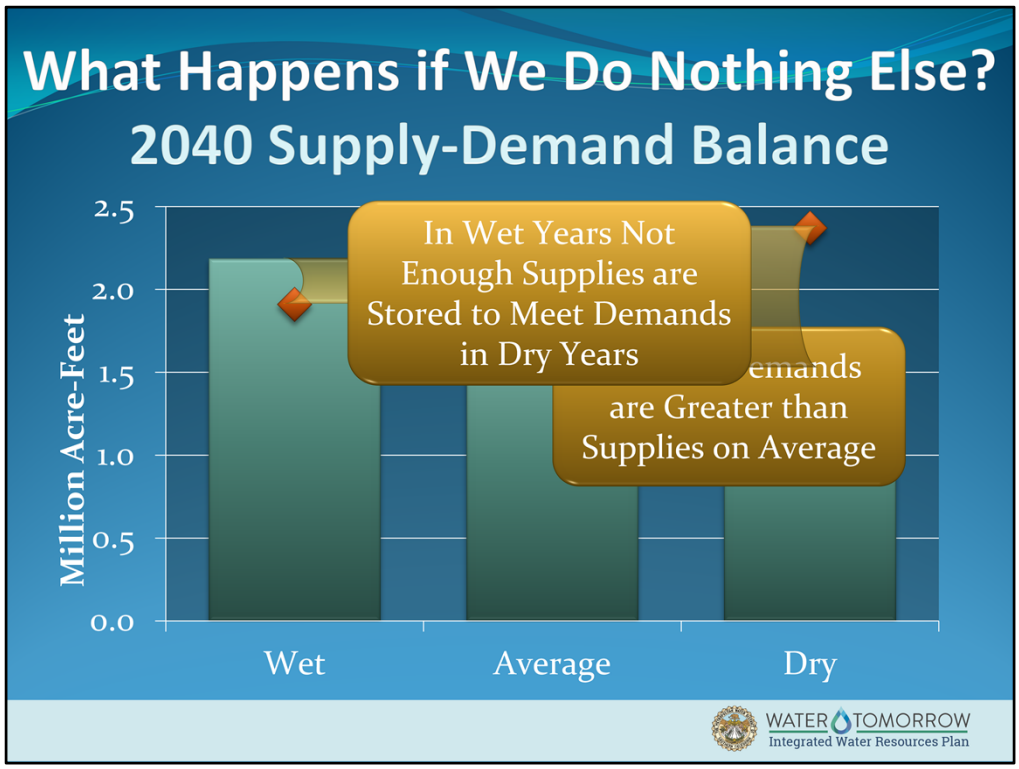
What Happens if We Do Nothing Else?
2040 Supply-Demand Balance
Million Acre-Feet
2.5
2.0
1.5
1.0
0.5
0.0
In Wet Years Not Enough Supplies are Stored to Meet Demands in Dry Years
emands are Greater than Supplies on Average
Wet
Average
Dry
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Without Further Actions

- The balance between supplies and demands becomes unsustainable
  - Total retail demands increase
  - Local and imported supplies decrease or remain constant
- The probability and size of shortages both increase over time
- The amount of water in storage decreases over time
- Significant resource investments are still needed to ensure future reliability

Water Tomorrow
The 2015 IRP Update

Deven Upadhyay
Water Resources Group Manager

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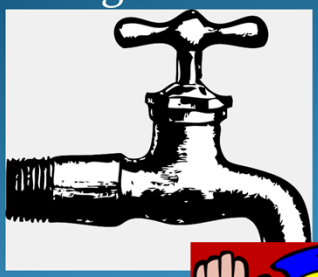
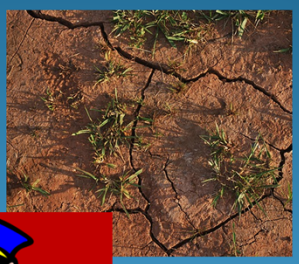
What Does Reliability Mean?

Nothing comes out the tap?





Limited outdoor watering use?

Limits enforced by fines and penalties?

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What Are the IRP Reliability Goals?

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

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What is the Purpose of Doing a 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
  - Tests ranges and variability due to climate and hydrologic factors
- Shows how often there are shortages or not
- Shows what the resulting storage conditions are

How Do We Test Reliability?

- Analyze a range of outcomes for each year in the forecast
  - 91 separate tests or supplies, demand, and storage
  - Based on climate and hydrologic conditions from 1922-2012
- Results show how many times out of 91 there are shortages, and how much water is in storage reserves
- Evaluate against the impacts of additional potential risks

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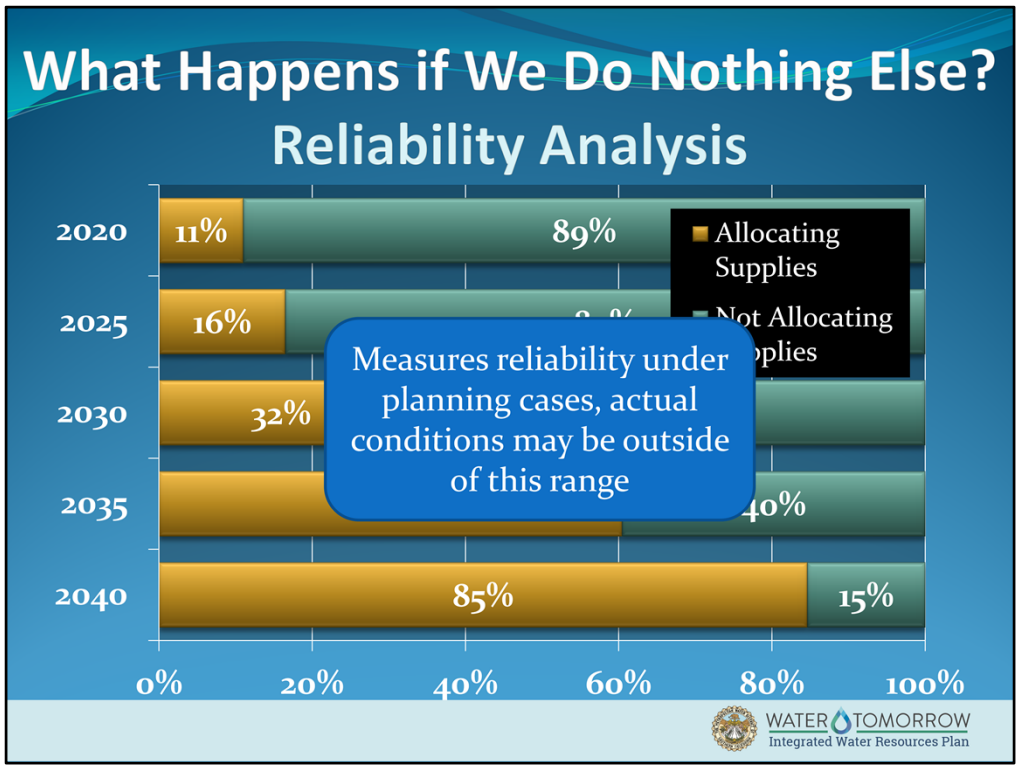
What Happens if We Do Nothing Else?
Reliability Analysis
2020
2025
2030
2035
2040
11%
89%
16%
32%
85%
15%
Allocating Supplies
Not Allocating
Measures reliability under planning cases, actual conditions may be outside of this range
0%
20%
40%
60%
80%
100%
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What About Other Risks?

- Things could be worse than in the case where we make no new investments
  - Climate Change
  - Water Quality
  - Implementation Risks
- Given these risks… how to we ensure reliability?

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New Targets are Under Consideration

Conservation

- Meet a 20% Reduction in GPCD
- Pursue efficiencies in outdoor water use
- Continue incentives for water conserving devices

Local Resources

- Develop additional local supplies to ensure robust storage reserves that guard against risk

State Water Project

- Pursue a stable water supply for all Californians through the California Water Fix and California Eco Restore

Colorado River Aqueduct

- Build, stabilize, and protect supply programs against risk and growing demands on the Colorado River
- Maintain flexible programs for dry year use

Open Q&A: Technical, Process, and Clarifications

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Looking to the Future in Conservation

Brandon Goshi
Manager of Water Policy and Strategy

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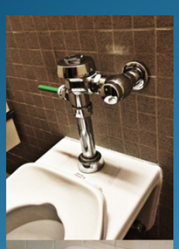
Long History of Residential and Commercial Rebate Programs



Food Service

Cooling Tower Controllers

Plumbing

Flow Control & Dry Pumps

Residential Efficiency

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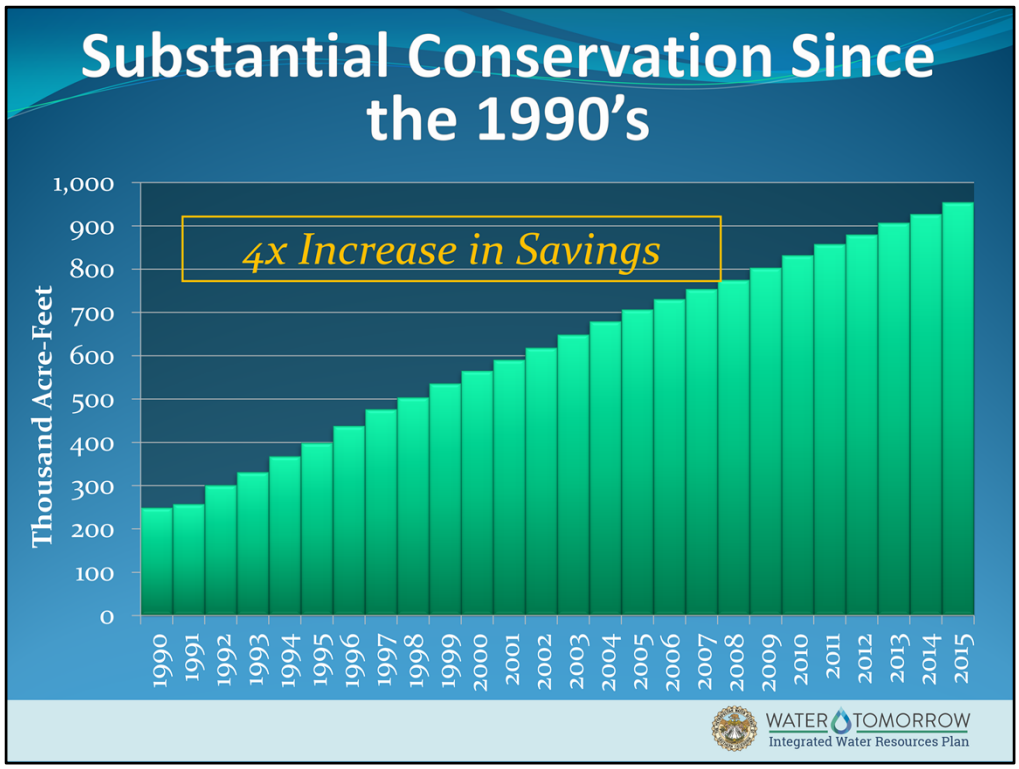
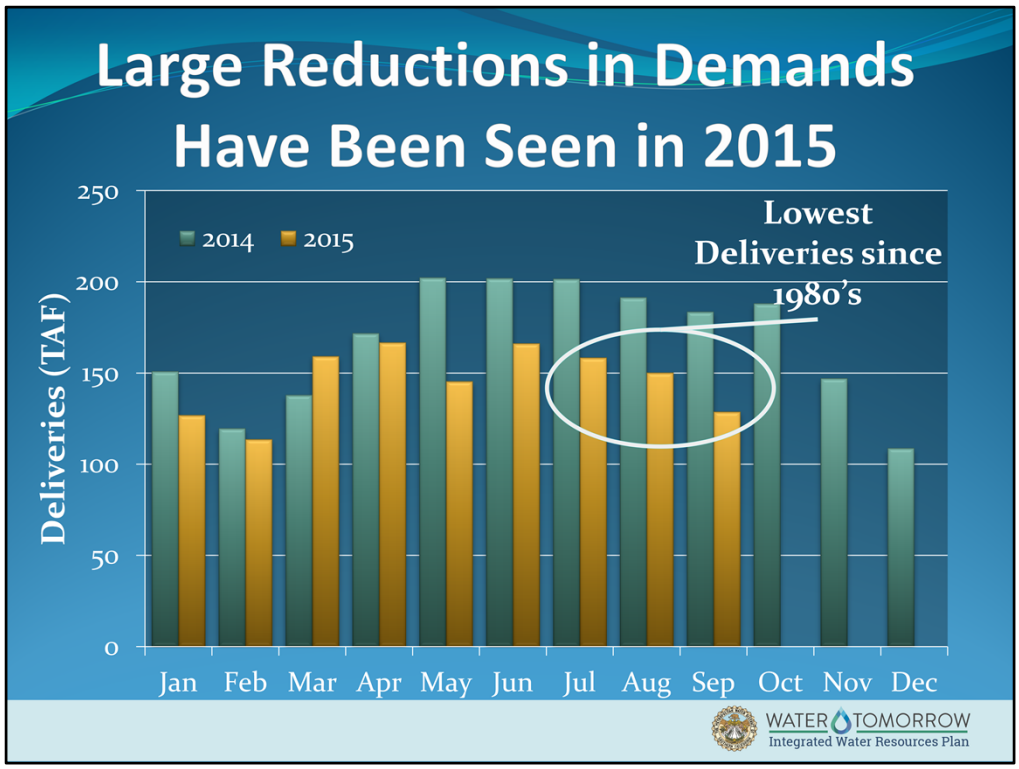


Fiscal Years 1990-2015

Total Conservation, including Active, Passive, Price, System Losses, and Pre-1990 Savings


Large Reductions in Demands Have Been Seen in 2015
Deliveries (TAF)
250
200
150
100
50
0
2014
2015
Lowest Deliveries since 1980's
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
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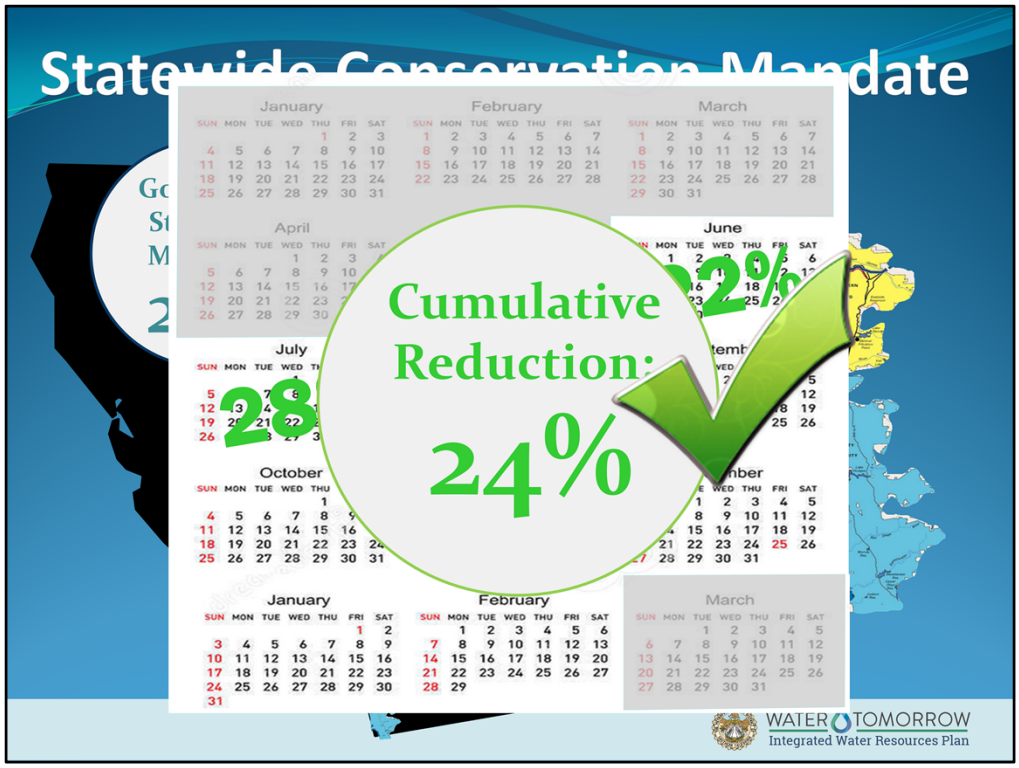
Emphasis is Shifting to Outdoors

Devices

Water Use Surveys

Landscaping


Statewide Conservation Mandate
Cumulative Reduction:
24%
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Model Water Efficient Landscape Ordinance Revised in 2015

- Applies to:
  - New Development 500+ sq. ft.
  - Rehabilitated Landscapes 2,500+ sq. ft.
- Local agencies must adopt the Ordinance, or develop ordinances at least as effective by Dec. 1, 2015

Major Changes:

- **Stricter irrigation system requirements**
- **Stricter limits on high water use plants**
- **Onsite stormwater capture provisions**
- **Incentives for graywater**
- **Annual reporting to the State by local agencies on implementation/ enforcement**

Facilitated Dialogue:
Looking to the Future in Conservation

Chris Moore and Ryan Golten
CDR Associates

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Lunch Break

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Continuing to Build Local Supplies

Brandon Goshi
Manager of Water Policy and Strategy

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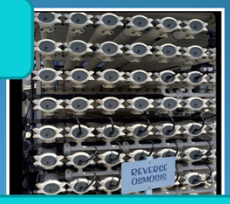
What Local Resource Development Options Are There?

Recycled Water

Stormwater

Groundwater Recovery



Seawater Desalination

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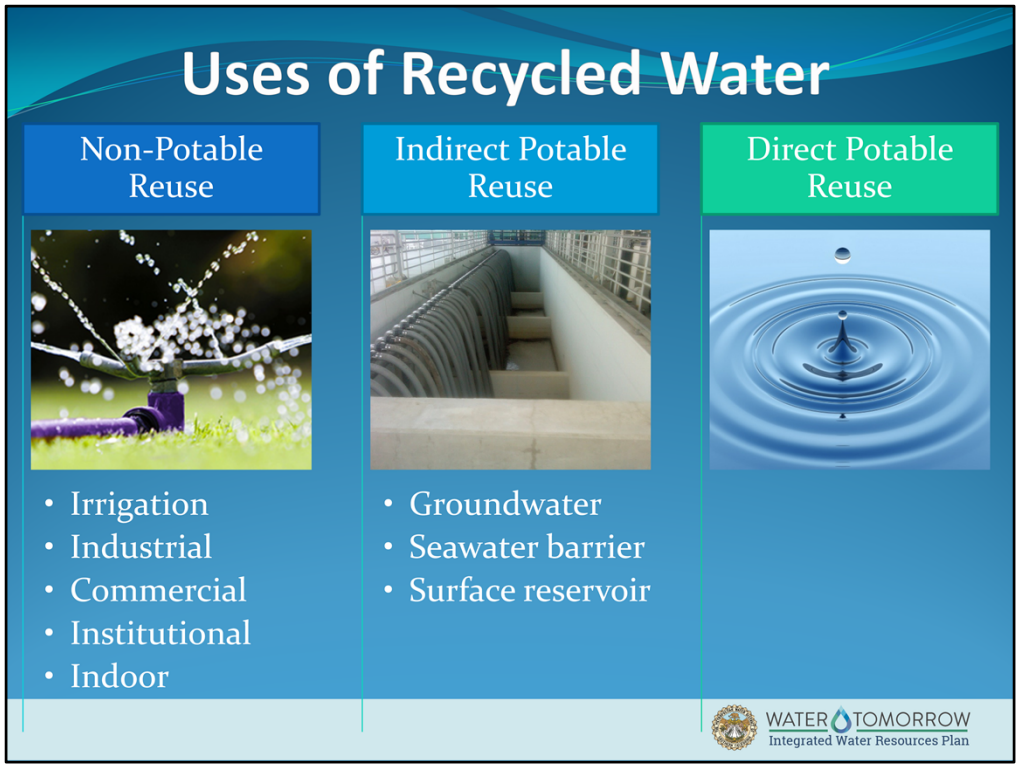
Recycled water: GWRS - 100,000 acre-feet for indirect potable reuse
Groundwater recovery: Chino Basin Desalter - 35,000 acre-feet
Seawater Desalination: Carlsbad Facility - 56,000 acre-feet online fall of 2015



Recycled Water

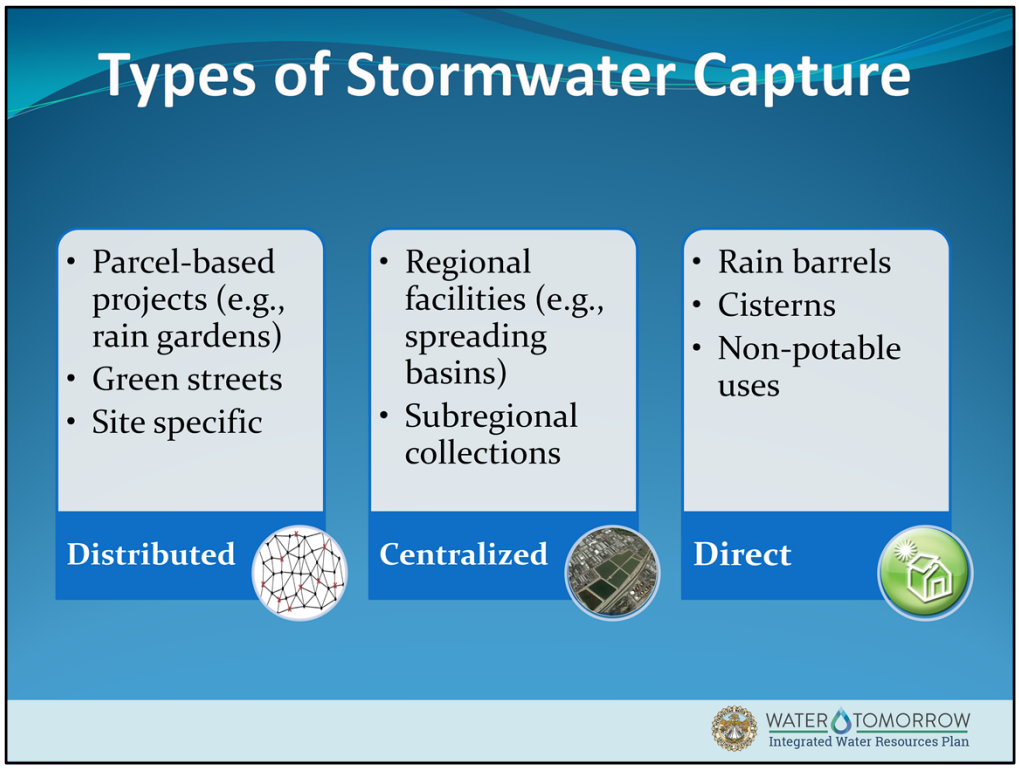
- Improving public perception/education for different uses
  - Non-potable reuse (irrigation etc.)
  - Indirect potable reuse (groundwater/surface water recharge to drinking water)
  - Direct potable reuse (direct to drinking water)
- Matching water quality to use (preserving potable water supplies for potable uses)
- Managing salinity to preserve the maximum potential uses for water
- Streamlining regulatory/permitting processes
- Advancing technologies

Graywater and Stormwater Direct Use

Streamlining regulatory/permitting processes

Operations and maintenance needs

Matching water quality to use (preserving potable water supplies for potable uses)



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Streamlining regulatory/permitting processes

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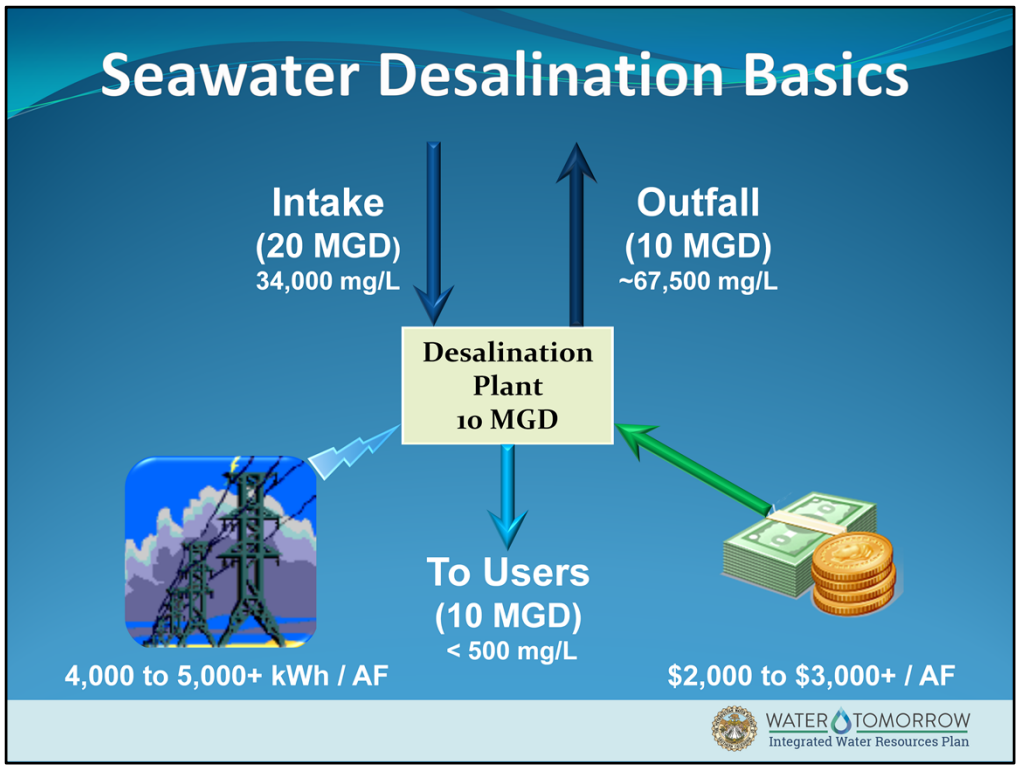

Seawater Desalination

- Reducing impacts to marine environment
- Streamlining regulatory/permitting processes
- Reducing energy use
- Advancing technologies

Facilitated Dialogue:
Continuing to Build Local Resources

Chris Moore and Ryan Golten
CDR Associates

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Ensuring Sustainable Groundwater Management

Brandon Goshi
Manager of Water Policy and Strategy

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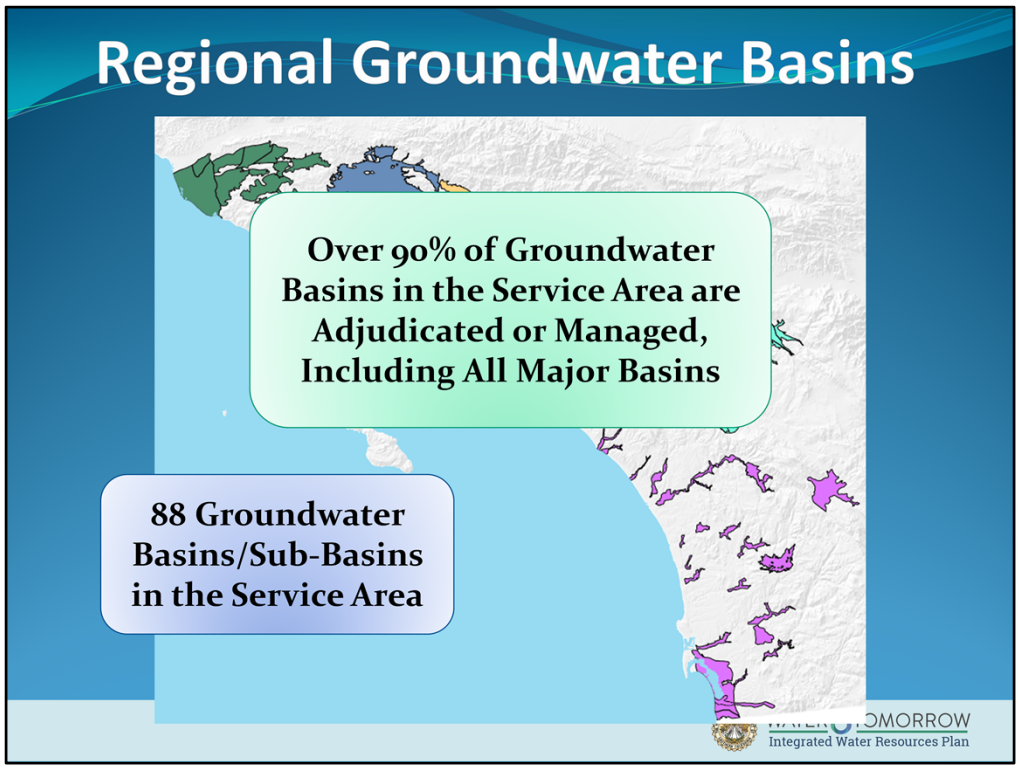
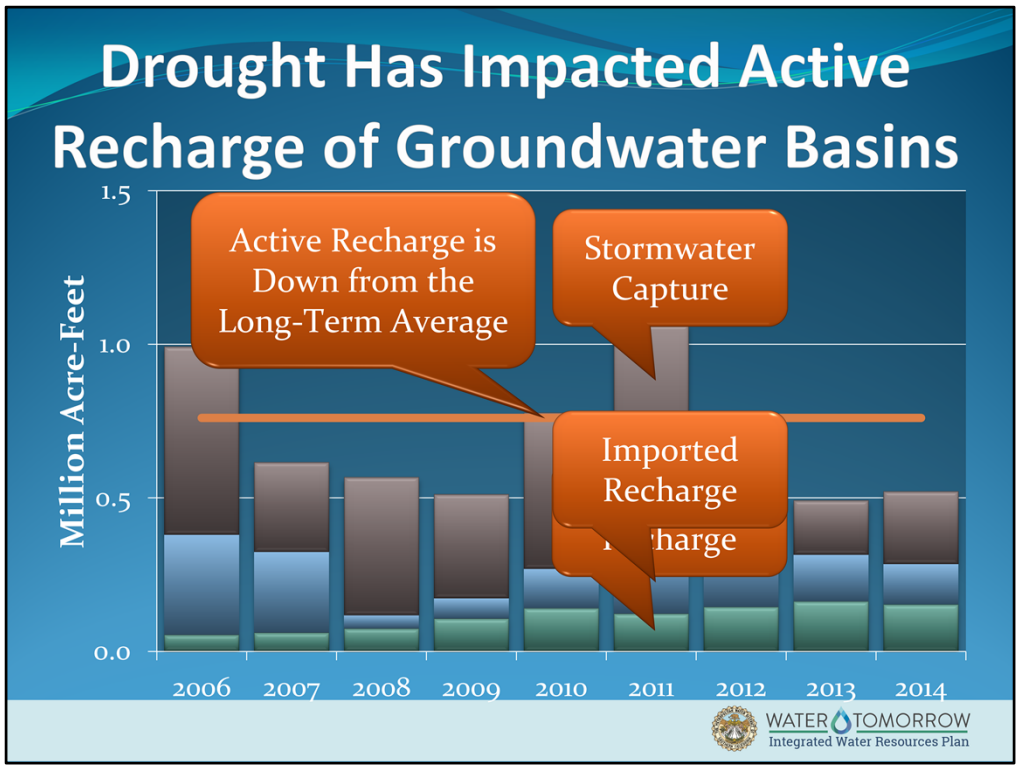


Basin Name Status
Fox Canyon GMA Managed
Central Adjudicated
West Coast Adjudicated
Raymond Adjudicated
Main San Gabriel Adjudicated
ULARA Adjudicated
Chino Adjudicated
Orange County Managed
West San Jacinto Managed
Hemet-San Jacinto Adjudicated



Groundwater basin levels and safe yields

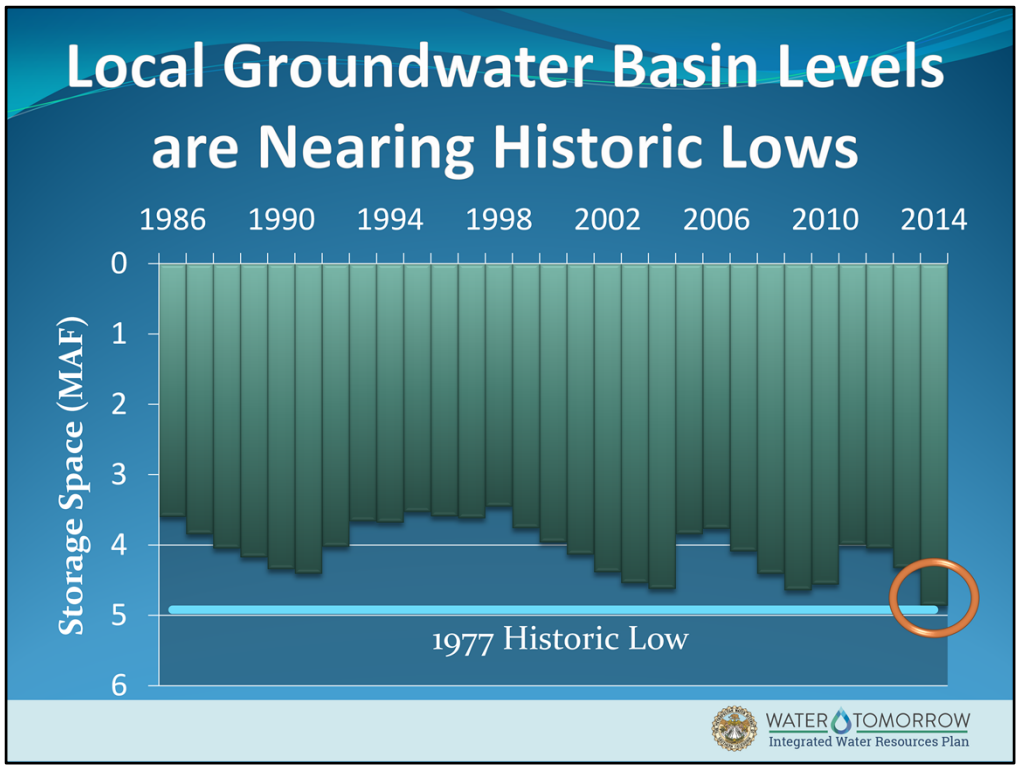
- Protecting basins from the challenges of urbanization, climate change, water quality

Contaminated groundwater

- Improving technologies for cleanup and disposal of waste

Stormwater capture and recycling for groundwater recharge

- Improving public perception/education
- Streamlining regulatory/permitting processes
- Advancing technologies



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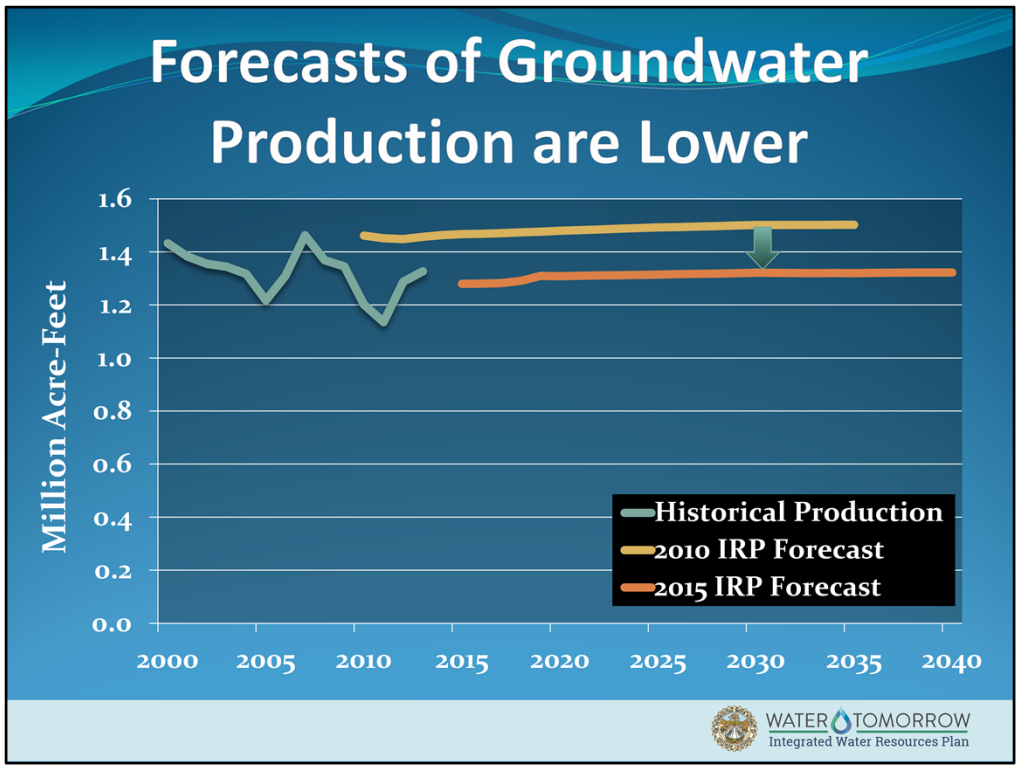
Forecasts of Groundwater Production are Lower
Million Acre-Feet
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
2000
2005
2010
2015
2020
2025
2030
2035
2040
Historical Production
2010 IRP Forecast
2015 IRP Forecast
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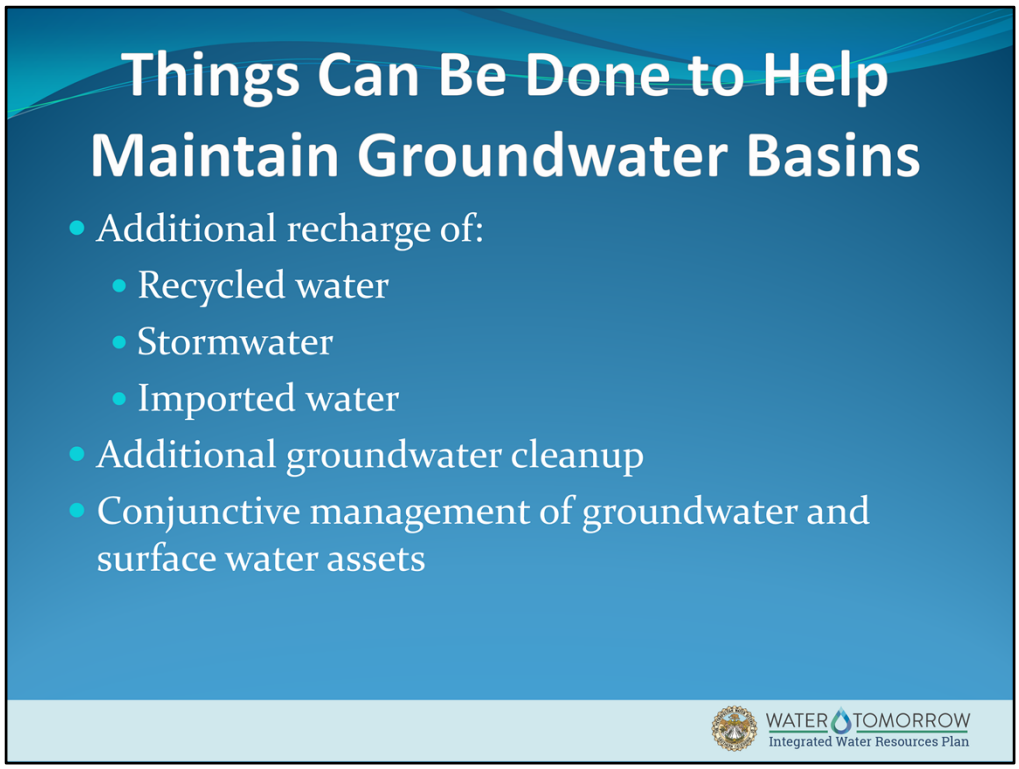

Recognize that GW Basins are an asset to the region…

Facilitated Dialogue:
Ensuring Sustainable Groundwater Management

Chris Moore and Ryan Golten
CDR Associates

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Stabilizing Imported Supplies

Brandon Goshi
Manager of Water Policy and Strategy

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Imported Supplies Provide An Important Baseline for the Region

Colorado River Aqueduct

State Water Project

Storage and Transfers/Exchanges

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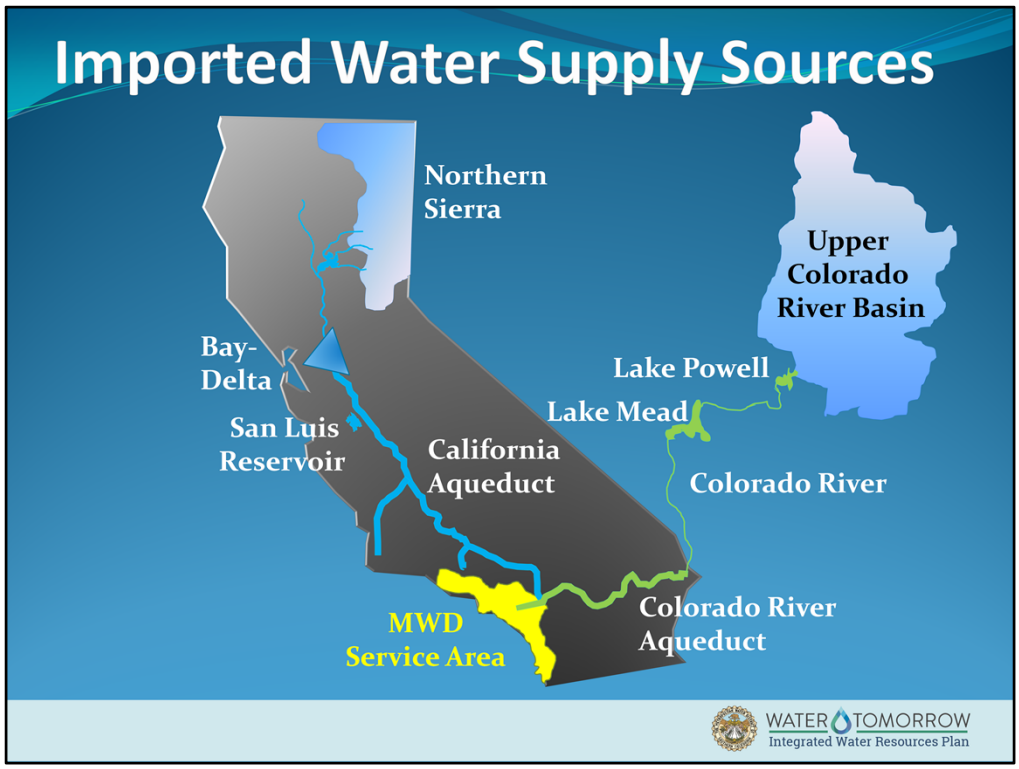
Imported Water Supply Sources
Northern Sierra
Upper Colorado River Basin
Bay-Delta
Lake Powell
Lake Mead
San Luis Reservoir
California Aqueduct
Colorado River
MWD Service Area
Colorado River Aqueduct
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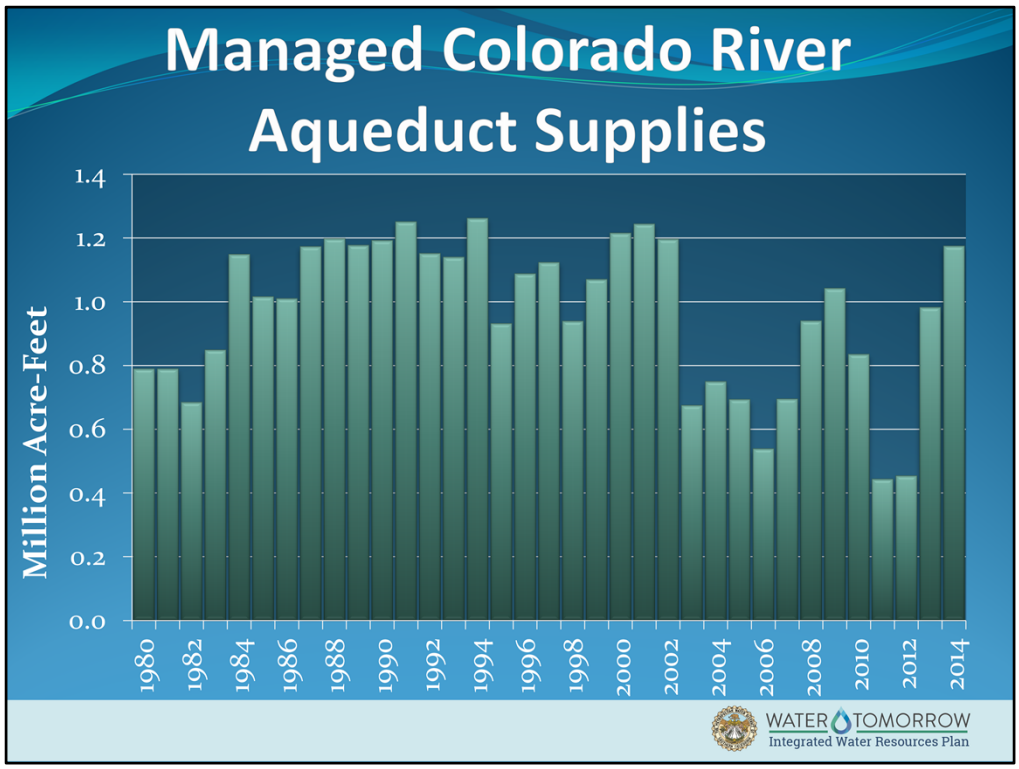
Managed Colorado River Aqueduct Supplies
Million Acre-Feet
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
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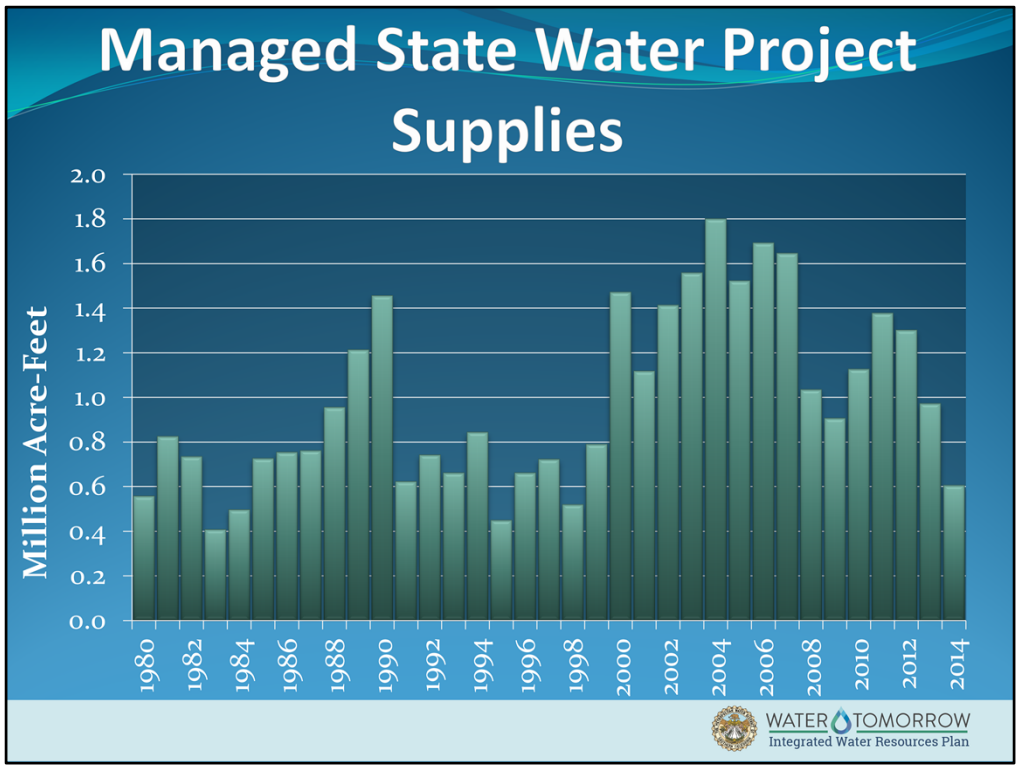
Managed State Water Project Supplies
Million Acre-Feet
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
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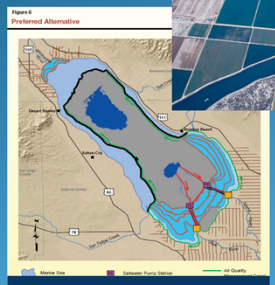
Focusing on Maintaining CRA Base Supplies to Manage Risks

Growing Demands



Salton Sea

Continuing Drought

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Pursuing a Long-Term Solution in the Bay-Delta

- Protects State's water supplies through Delta system upgrades
- Improves river flow direction
- Reduces fish impacts
- Water contractor funded

- Supports long-term health of native fish and wildlife
- Implements habitat restoration
  - ~30,000 acres in 5 years
- Broader public funding

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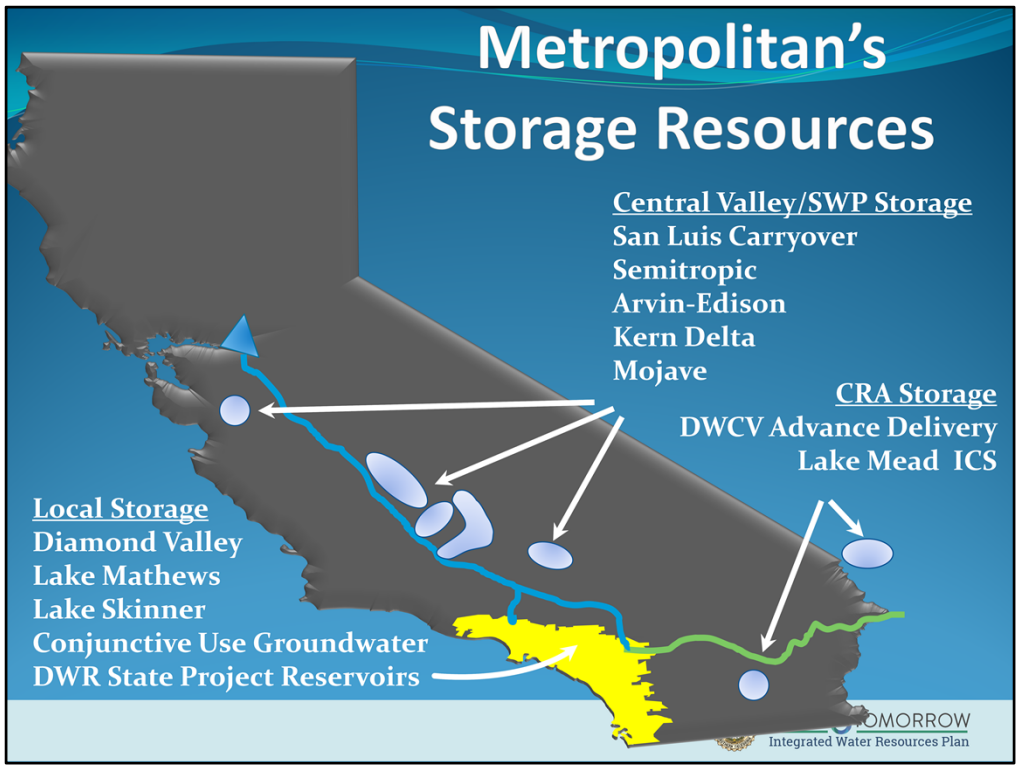
Metropolitan's
Storage Resources
Central Valley/SWP Storage
San Luis Carryover
Semitropic
Arvin-Edison
Kern Delta
Mojave
CRA Storage
DWCV Advance Delivery
Lake Mead ICS
Local Storage
Diamond Valley
Lake Mathews
Lake Skinner
Conjunctive Use Groundwater
DWR State Project Reservoirs
OMORROW
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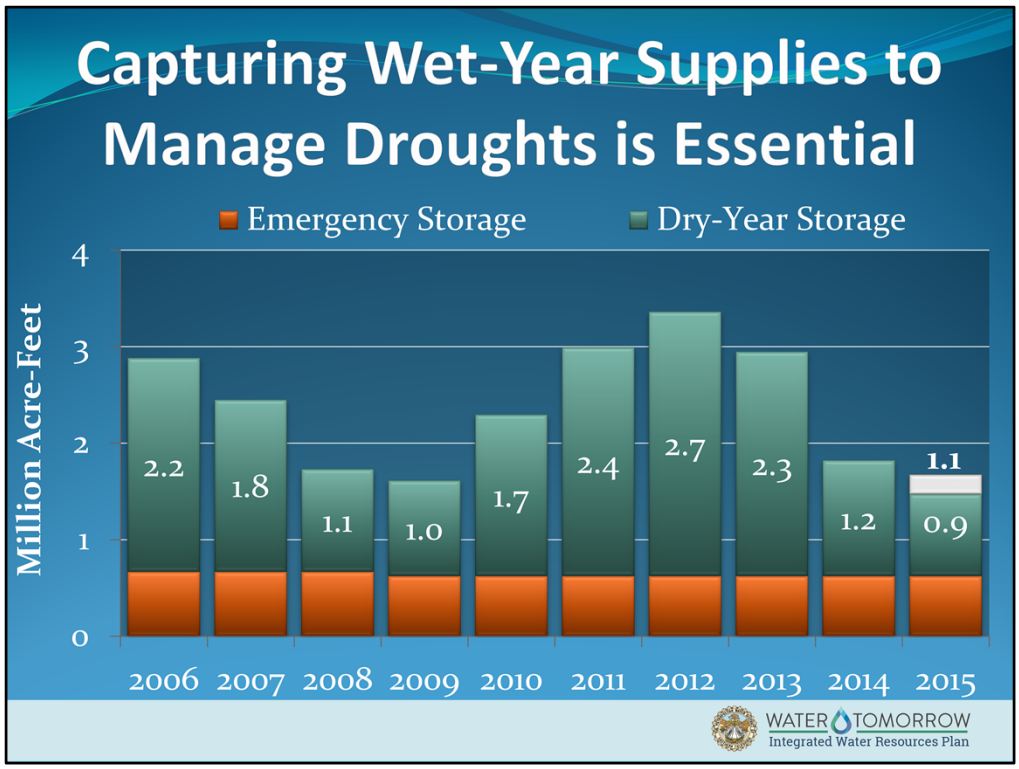
Capturing Wet-Year Supplies to Manage Droughts is Essential
Emergency Storage
Dry-Year Storage
Million Acre-Feet
4
3
2
1
0
2.2
1.8
1.1
1.0
1.7
2.4
2.7
2.3
1.2
1.1
0.9
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
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Facilitated Dialogue:
Stabilizing Imported Supplies

Chris Moore and Ryan Golten
CDR Associates

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Water Tomorrow Innovation Game

Robert DePinto
Northern Rift Inc.

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Open Public Comment

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Closing Remarks

Richard Atwater
MWD Director/Chair Integrated Resources Planning Committee

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