ABSTRACT & POWERPOINT PRESENTATION

Keynote Presentation:

History of Groundwater Conjunctive Use in Southern California

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- National Water Research Institute
- Orange County Water District
- Water Research Foundation

www.nwri-usa.org/rechargesymposium2011.htm

History of Groundwater Conjunctive Use with MWD Imported Supplies and Future Opportunities to Increase Groundwater Storage in Southern California

by

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The history of Metropolitan Water District's role in groundwater conjunctive use in southern California has been well documented (Bloomquist and Ostrom, "Dividing the Waters", 1991 and MWD Proposed Groundwater Recovery Program, 1992). In general, MWD has promoted and encouraged the adjudication and groundwater basin management strategies within its service area since the 1970s through the following actions:

- MWD pricing policies to encourage groundwater conjunctive use and cleanup of contaminated aquifers;
- Rebates for funding recycled water recharge and groundwater cleanup, including brackish desalination; and
- MWD agreements to fund groundwater storage and recovery projects;
- Funding and participation in research on technologies to enhance aquifer recharge and recovery
- ; and
- Regulatory and legislative advocacy.

In the mid 1990s MWD developed a regional "Integrated Water Resources Plan" that recommended expanded use of the storage and conjunctive us of the groundwater basins within southern California (MWD Integrated Water Resources Plan, 1996).

Some of these recommendations have been implemented, but there significant opportunities to expand the storage utilization of the groundwater basins in a regional, collaborative manner (Atwater and Bloomquist, "Rates, Rights, and Regional Planning in the Metropolitan Water District", AWRA, 2002).

Recent regional planning studies (RAND, Preparing for an Uncertain Future Climate in the Inland Empire, 2008) highlight the need to expand groundwater recharge and storage to reduce risks of extreme shortages in the future as a result of climate change and other uncertainties with the imported supplies. MWD's draft Integrated Water Resources Plan Update (July, 2010) recommends an adaptive management strategy that includes expanding groundwater storage and recovery throughout southern Calif. To ensure that the region has reliable supplies with the uncertainties of imported water supplies from the Colorado River and northern California, groundwater basin management in southern California will become increasingly important and cost effective. Utilization of new technologies for aquifer recharge and recovery of stored water will be a critical "strategic" investment decision for the region. However, institutional collaboration will be the biggest challenge to implementing these programs to enhance groundwater storage and recovery in southern California.

History of Conjunctive Use in Southern California

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Key Historical Events:

Colorado River Aqueduct brought in imported supplies 1940s

State Water Project imported supplies in early 1970s

Droughts

- 1977
- 1990-1992
- 2007-2010

- AGWA Drought Benefits Paper (1999)

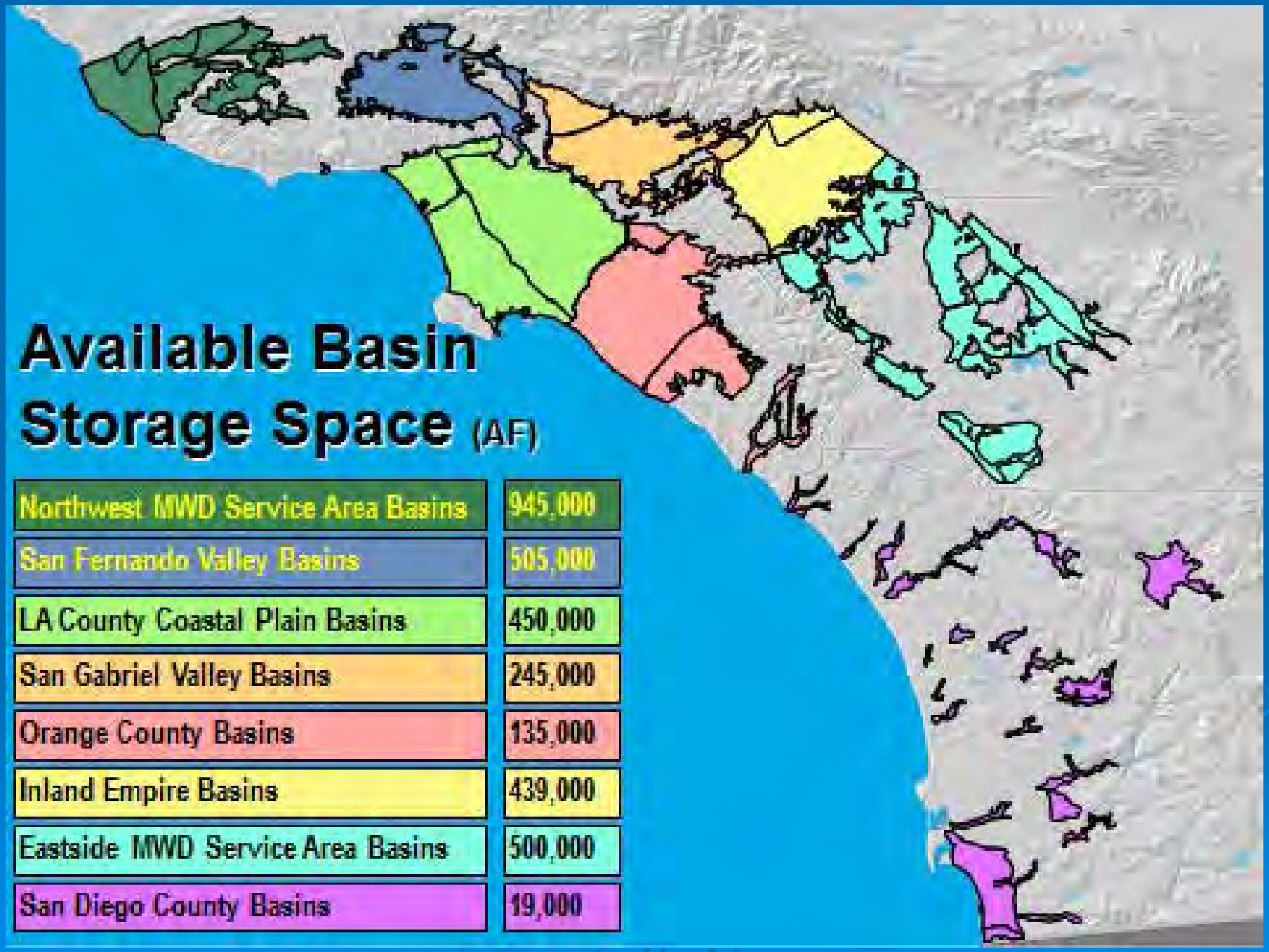
Metropolitan Water District of Southern California

- Serves 6 counties, 18 million people
- Growth: ~170,000 people/yr.
- Provides for $800+ billion regional economy
- Supplies ~50% of region's water supply

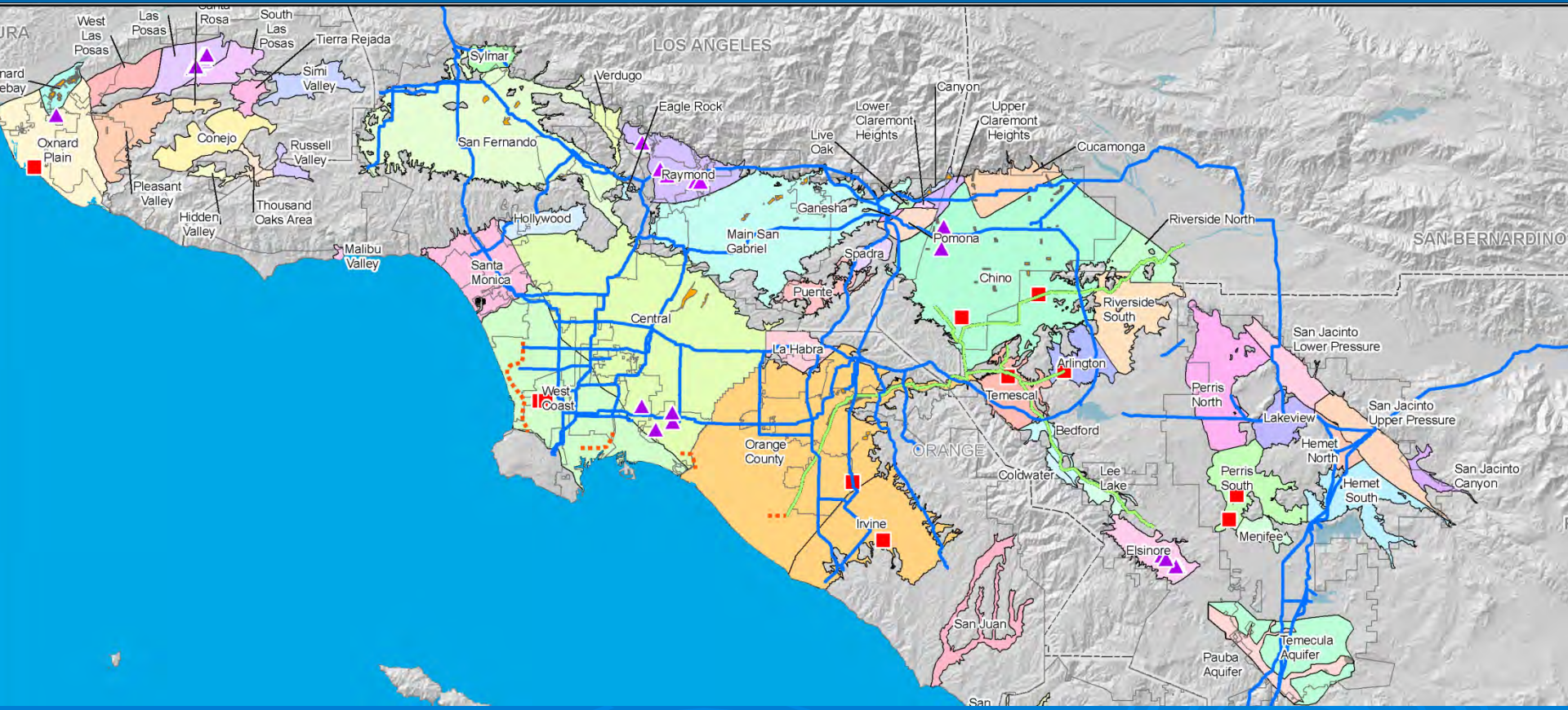
MWD Key Role in Conjunctive Use

- The physical solution to all groundwater management in southern California was based upon the availability to affordable imported supplies for groundwater replenishment beginning in the 1940s.

- MWD built its imported delivery system specifically to help overcome seawater intrusion and groundwater overdraft problems.


Available Basin Storage Space (AF)
Northwest MWD Service Area Basins 945,000
San Fernando Valley Basins 505,000
LA County Coastal Plain Basins 450,000
San Gabriel Valley Basins 245,000
Orange County Basins 135,000
Inland Empire Basins 439,000
Eastside MWD Service Area Basins 500,000
San Diego County Basins 19,000

MWD Distribution System



History of Groundwater Adjudications

- 1940s Raymond Basin
- 1950s West Coast Basin
- 1960s Central Basin
- 1970s San Fernando, Main San Gabriel, Chino
- 1980s Fox Canyon GMA
- 1990s Six Basin and Temecula

Orange County and Central Basin (over 3 MAF) 1960 -1990

Orange County

- Purchased MWD replenishment supplies from Colorado River
- Seawater barriers (Alamitos Gap joint project with Central Basin and LAFCD)

Central Basin

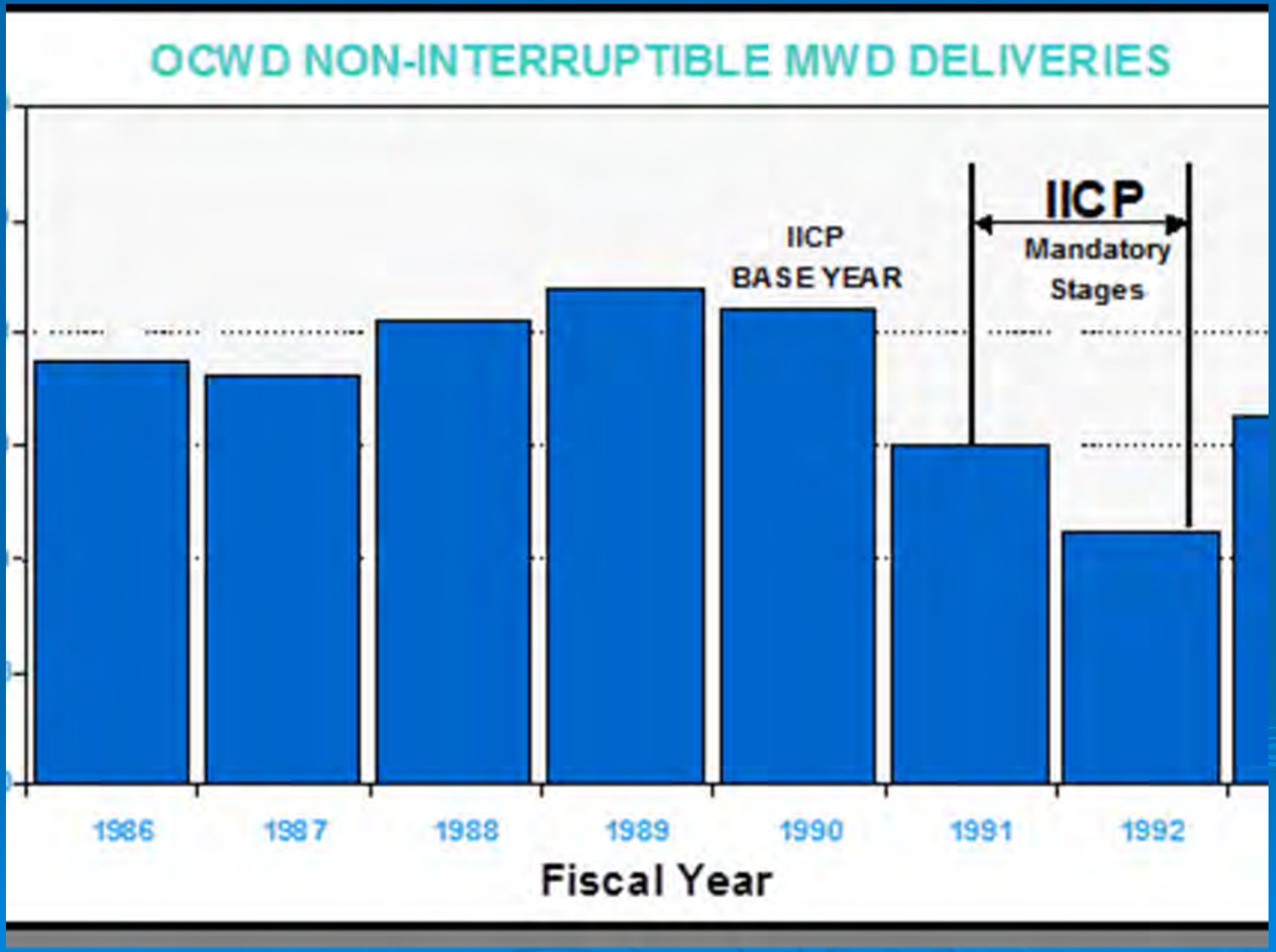
- Purchased MWD replenishment supplies from Colorado River
- Both worked together on MWD in lieu deliveries

In lieu Replenishment

- Began in Redondo Beach (WBMWD and WRD) to slow down seawater intrusion in early 1960s
- Grew to the Interruptible Program in early 1980s and was widely used.
- Modified into the Seasonal Storage Program in 1988

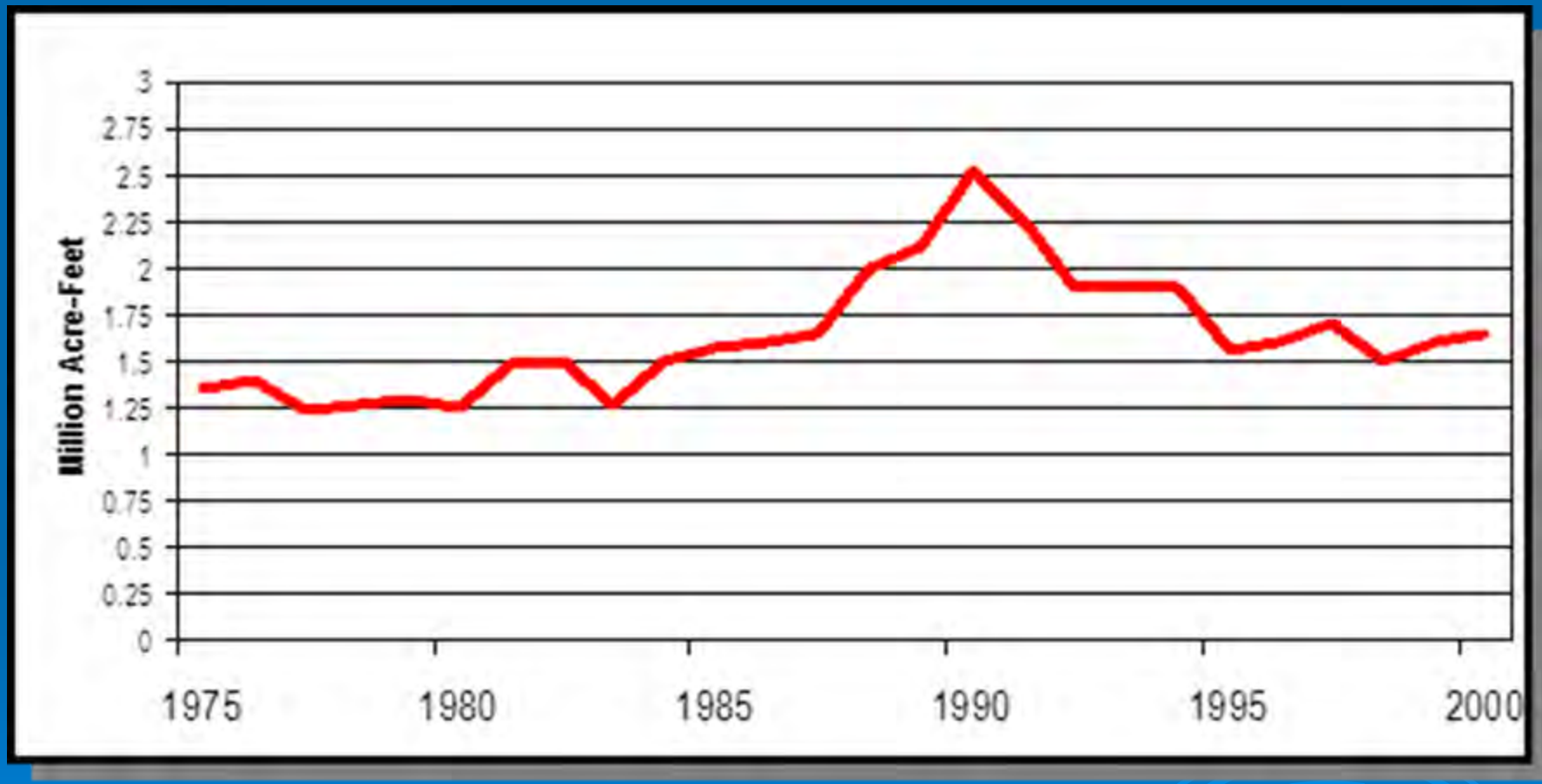
Historic Year 1990

- Calendar Year 1990 MWD sold a record amount of imported water “2.6 MAF”
- Over 1 MAF was conjunctive water deliveries!
- 1991 Drought MWD stopped all groundwater replenishment deliveries and reduced imported water sales by almost 1 MAF!



OCWD Performance during Drought 1991 – 1992

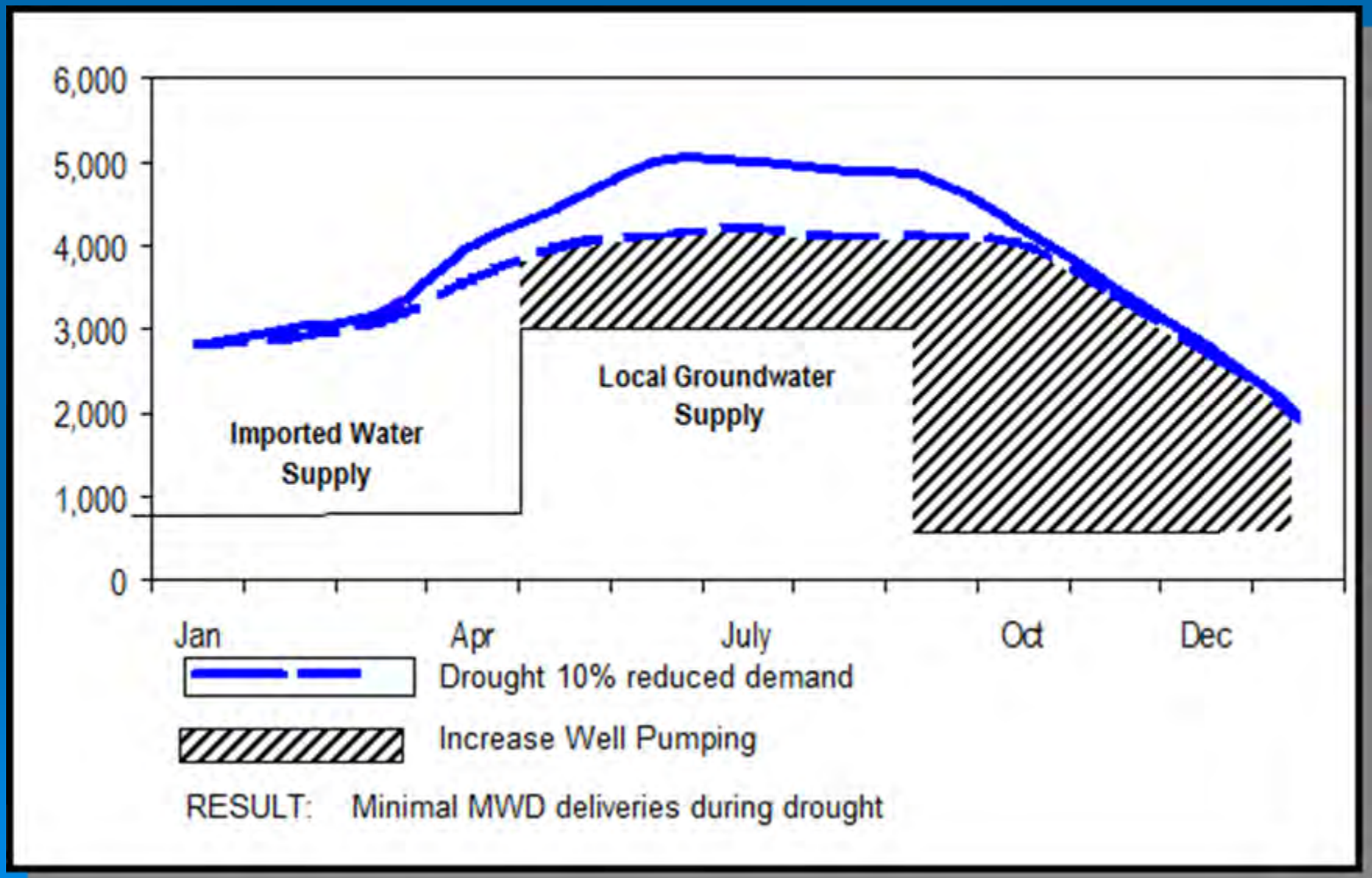
MWD Water Sales



Key Regional Benefits of Conjunctive Use

- Transmission of imported water (avoidance expensive pipelines)
- Summertime peaking management
- Seasonal storage (winter to summer)
- Drought and emergency reserves
- Regional supply benefits
- Capture and store surplus Colorado River and SWP supplies ("new yield")
- Avoid or defer MWD capital improvements, to import delivery system, and
- Enhance system reliability

Conjunctive Use Operations in 1991



Seawater Barriers

- MWD built pipelines to seawater barriers in West Coast, Central and Orange Basin during the 1960s
- Provided discounted water for barriers until 1991
- Today recycled water is primarily used for seawater barriers

MWD Developed Conjunctive Use Agreements Outside of its Service

- Coachella and Desert Water Agency (1980s)
- Kern County --- Semitropic, Arvin-Edison, North Kern (1990s)
- San Bernardino Valley MWD, Mojave Water Agency (2000s)
- Colorado River banking in Arizona

Last Decade (2000-2010)

- MWD contracts for conjunctive use
  - North Las Posas
  - Orange County
  - Raymond Basin with Foothill MWD
  - Chino Basin
  - Central Basin with Long Beach

MWD Conjunctive Use outside of it Service Area

- Coachella Valley beginning in the early 1980s
- Kern County beginning in the early 1990s
- Mojave Water Agency, SBMWD (early 2000 period)

MWD Pricing

Interruptible Program 1981

- Ag water
- Reservoirs
- Groundwater replenishment
- In lieu groundwater replenishment
- Seawater barriers
- Year around deliveries

Seasonal Storage Service 1988

- No ag water
- No seawater barriers
- Deliveries were from Oct thru April
- Better accountability

2002 New MWD Rates

- In lieu and groundwater replenishment continued but discounts have been decreasing consistently each year.
- May 2007 all groundwater replenishment stopped with the Delta Crisis and drought shortages!

Future Trends

- Recycled water replenishment is expanding rapidly
- Stormwater capture and recharge investments growing rapidly
- Use of MWD imported supplies for conjunctive use decreasing significantly because of price and uncertainty of supplies

Future Trends (Cont.)

- Salinity Management Issues
- Groundwater desalination and treatment of impaired aquifers
- Other Water Quality Problems:
  - VOCs
  - Perchlorate
  - Chrom 6
  - CECs (emerging contaminants)

Thank You!

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