



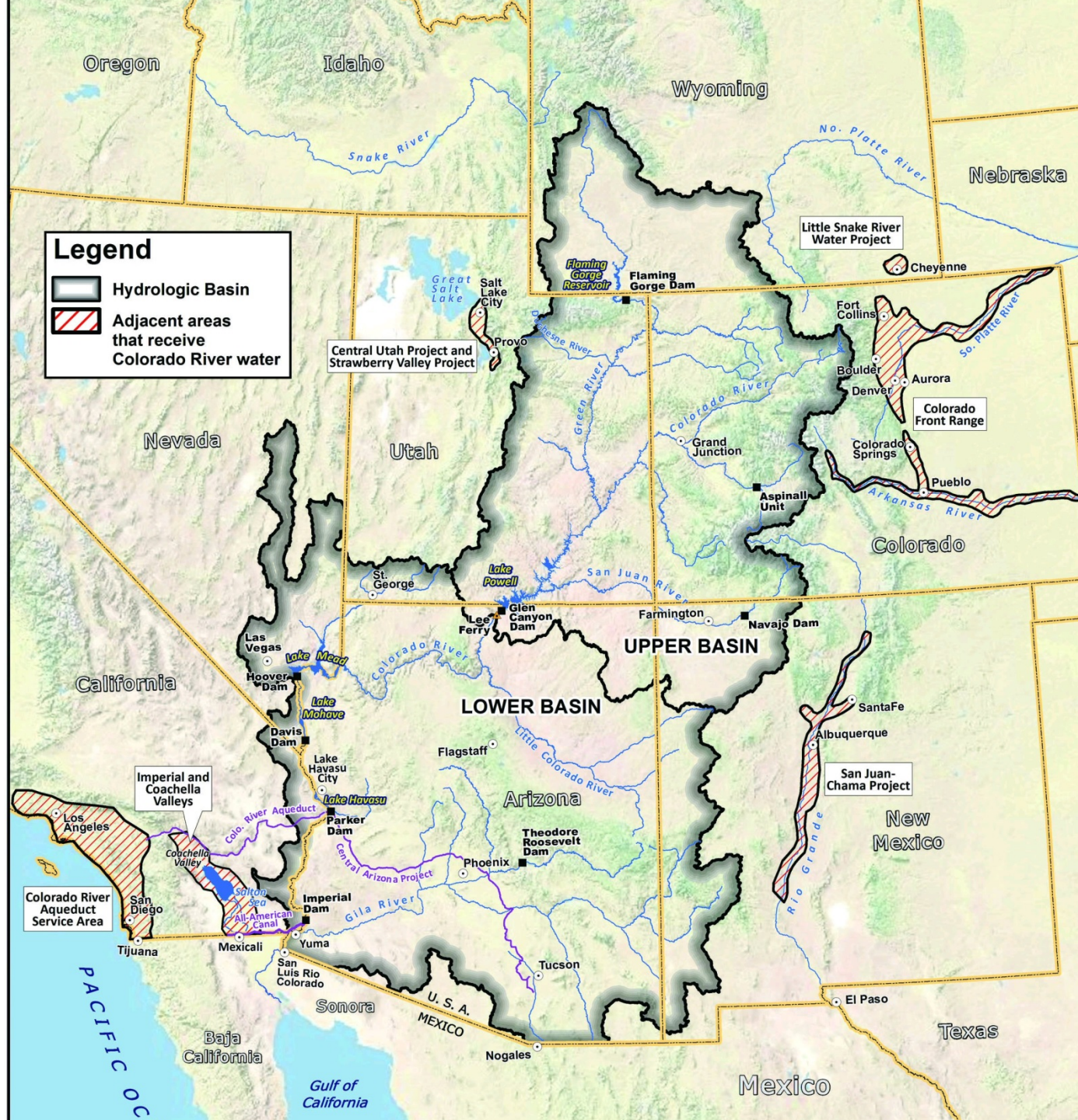
# **Time Running Out: Efforts to Develop a Sustainable Colorado River**

**June 22, 2016**

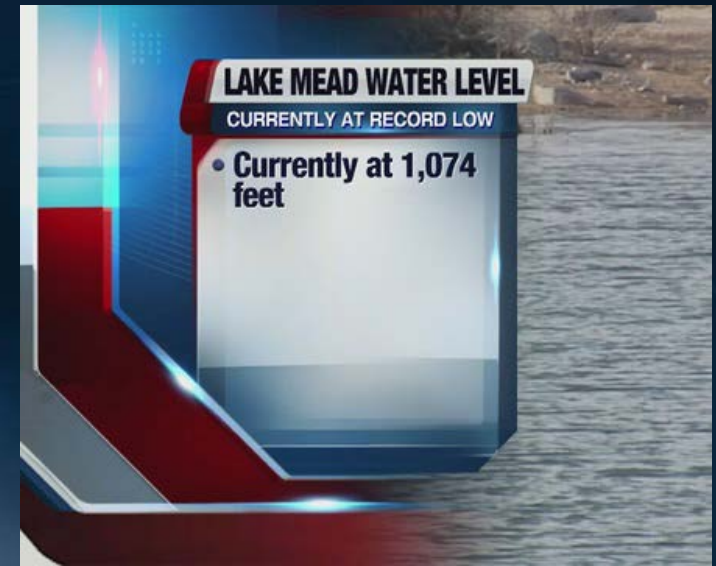
**WESTCAS Annual Conference**

**Bill Hasencamp  
Metropolitan Water District**

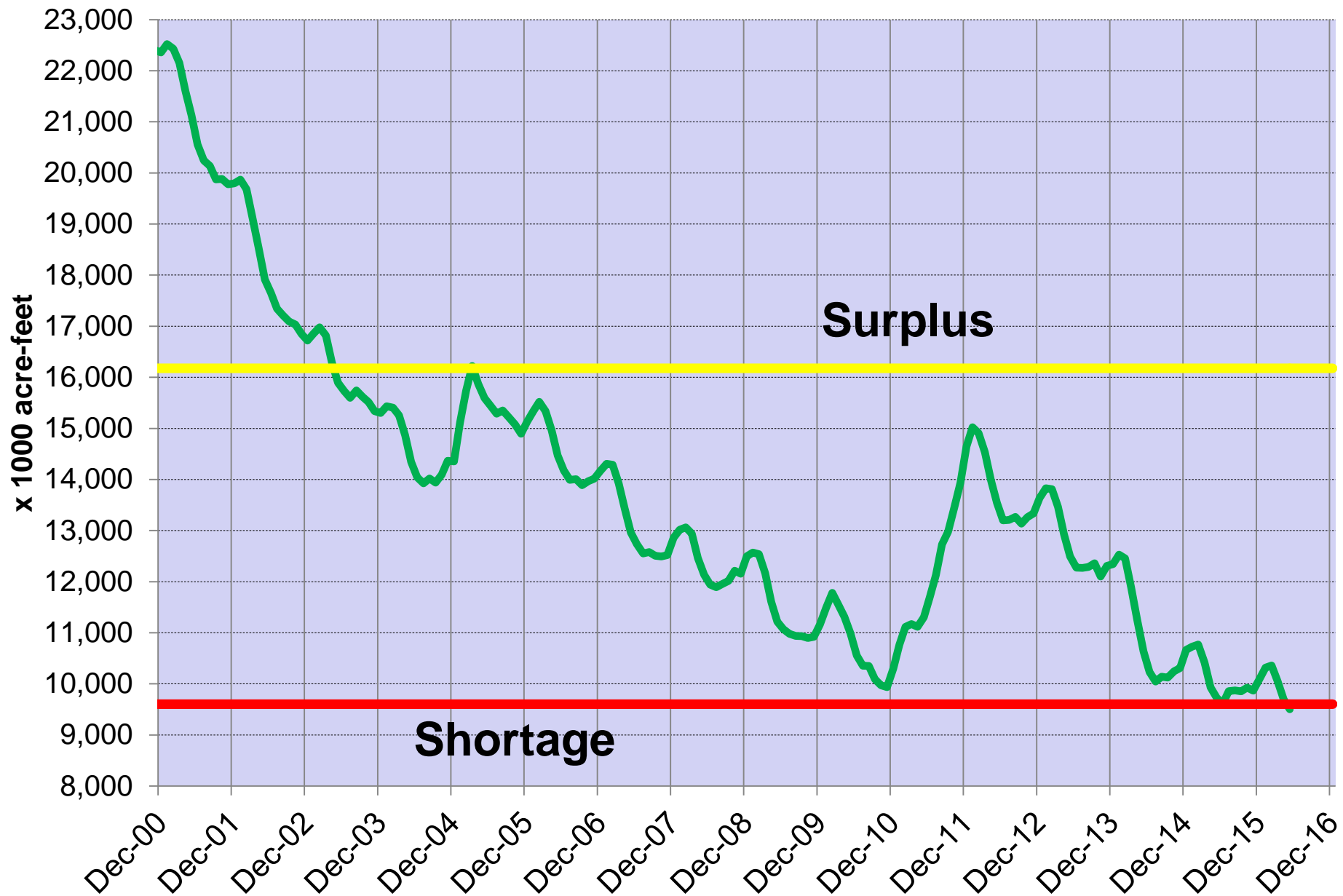






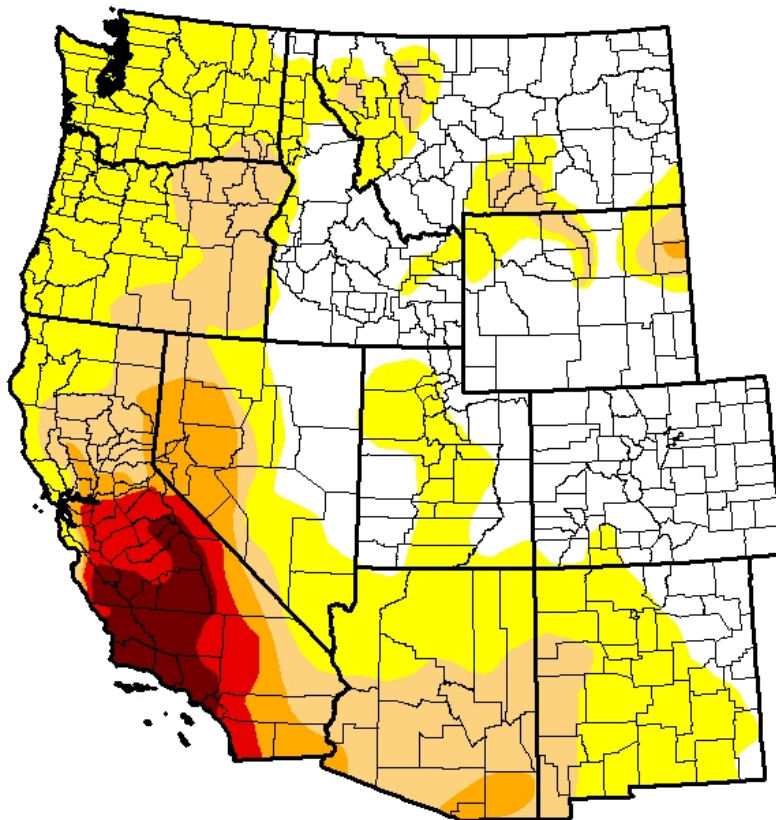


# Lake Mead Storage 2000 – 2016



# Drought Monitor Indicates Upper Colorado Basin not in drought

## U.S. Drought Monitor West



**June 14, 2016**

(Released Thursday, Jun. 16, 2016)

Valid 8 a.m. EDT

*Drought Conditions (Percent Area)*

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
<b>Current</b>	38.27	61.73	27.32	10.74	5.73	2.81
<b>Last Week</b> 6/7/2016	40.40	59.60	27.91	10.74	6.21	2.81
<b>3 Months Ago</b> 3/15/2016	32.27	67.73	30.28	16.37	9.54	4.74
<b>Start of Calendar Year</b> 12/29/2015	33.17	66.83	45.07	29.30	15.92	6.85
<b>Start of Water Year</b> 9/29/2015	22.77	77.23	57.81	42.42	26.50	7.62
<b>One Year Ago</b> 6/16/2015	27.93	72.07	56.17	34.48	17.13	7.26

### Intensity:

<span style="background-color: yellow; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> D0 Abnormally Dry	<span style="background-color: red; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> D3 Extreme Drought
<span style="background-color: orange; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> D1 Moderate Drought	<span style="background-color: darkred; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> D4 Exceptional Drought
<span style="background-color: #f4a460; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> D2 Severe Drought	

*The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.*

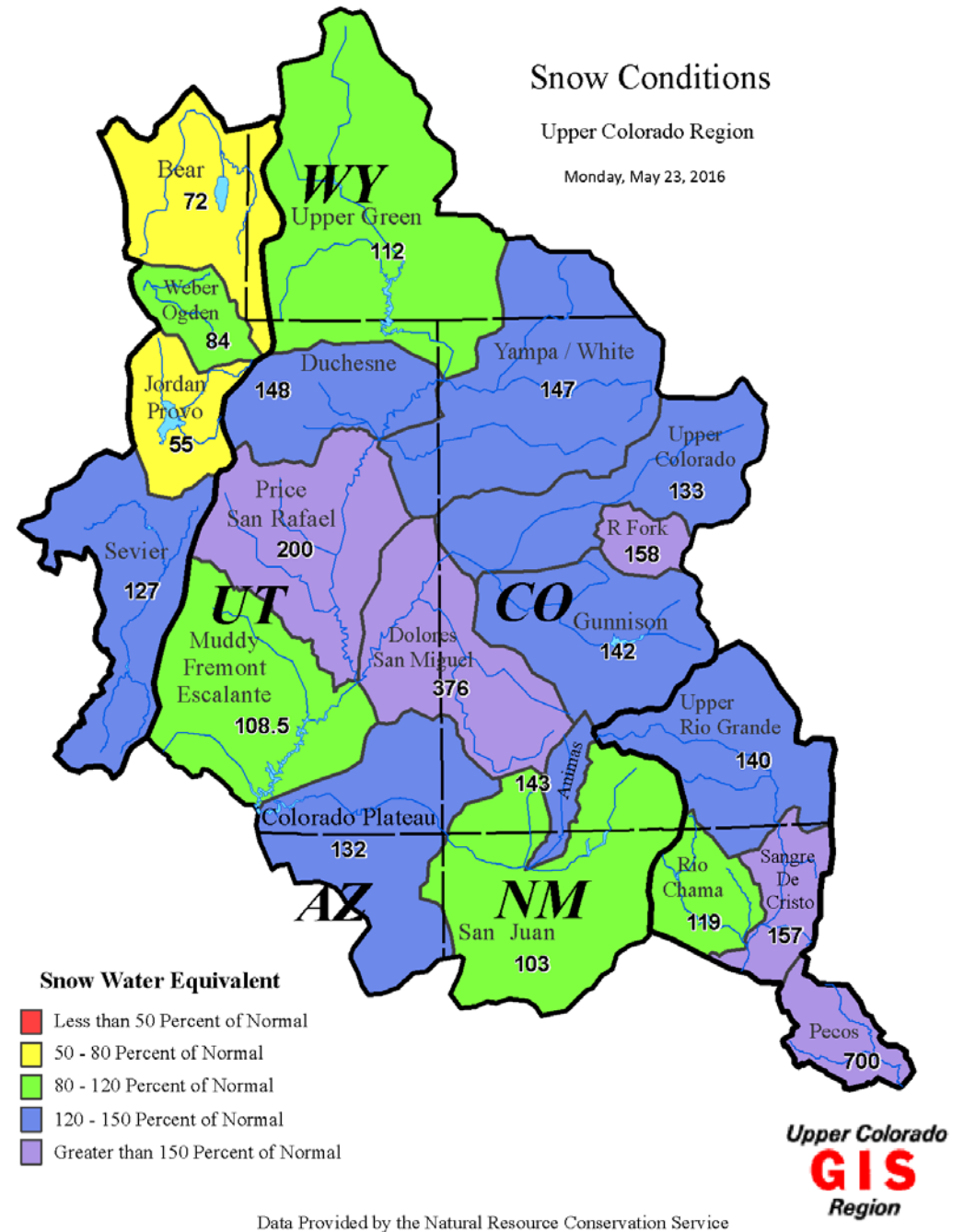
### **Author:**

Chris Fenimore  
NOAA/NESDIS/NCEI



<http://droughtmonitor.unl.edu/>

Upper Basin  
snowpack had a  
good year

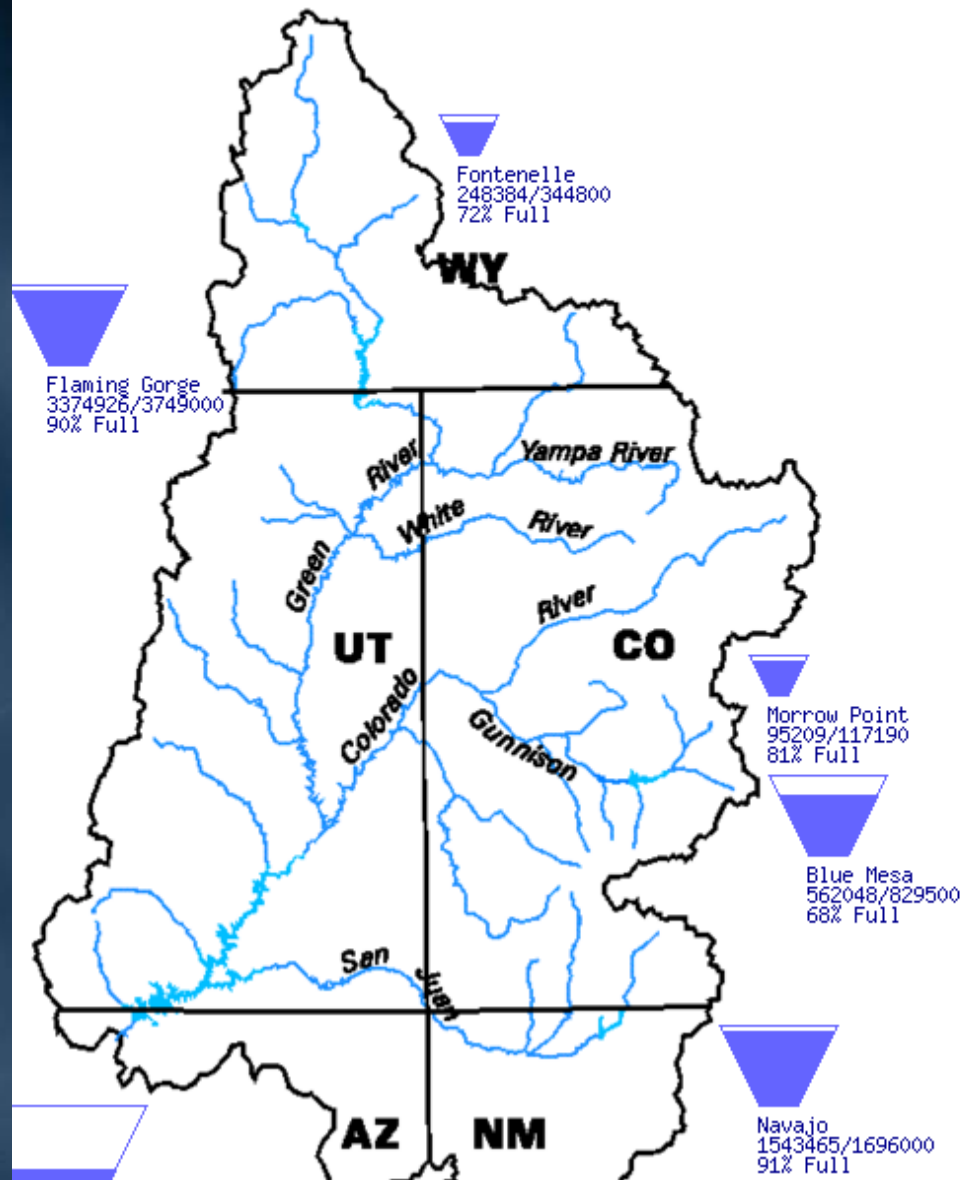




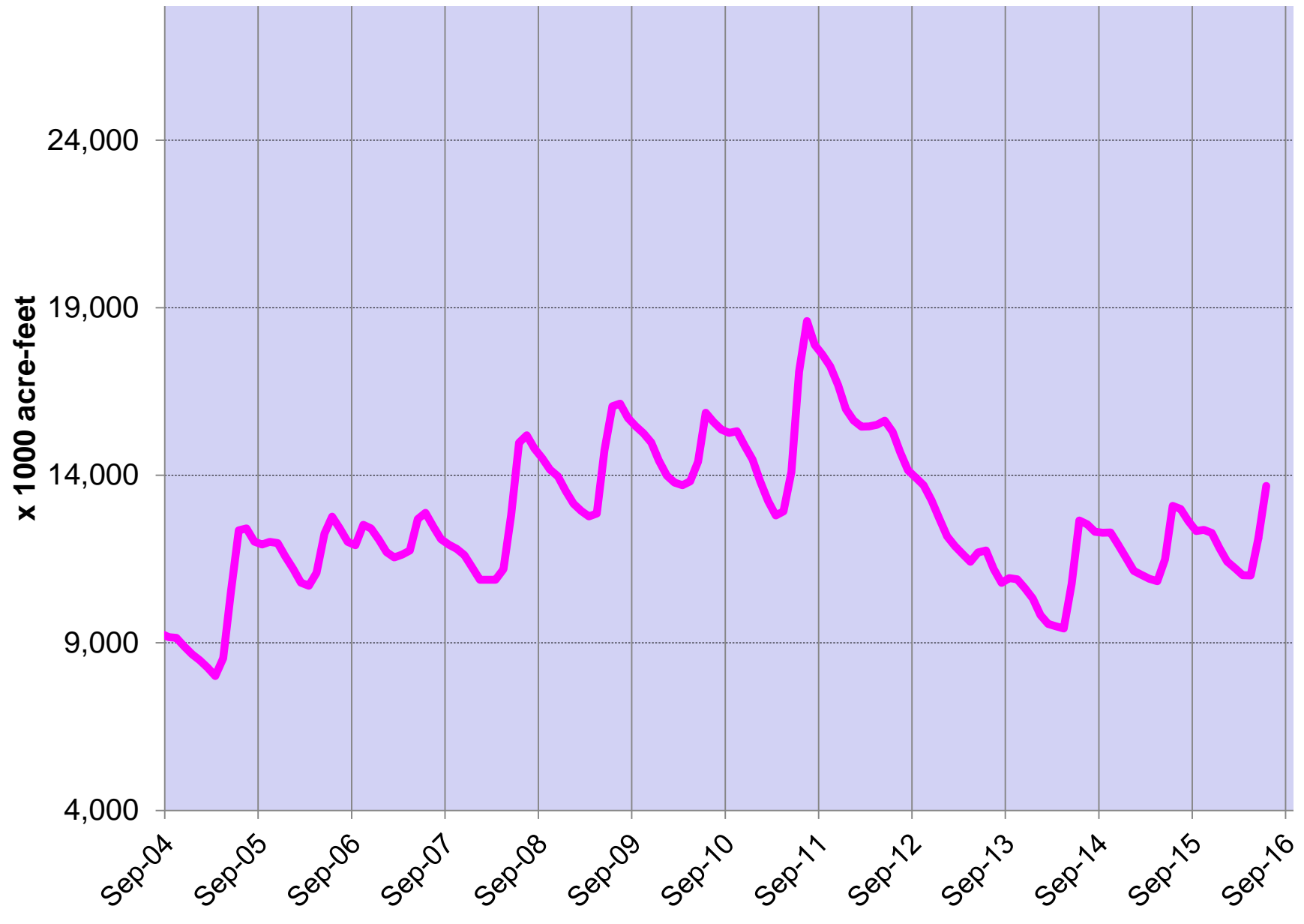
# Upper Basin Reservoirs in good shape

ent as of:  
6

## Upper Colorado River Drainage Basin



# Lake Powell Storage 2004 – 2016





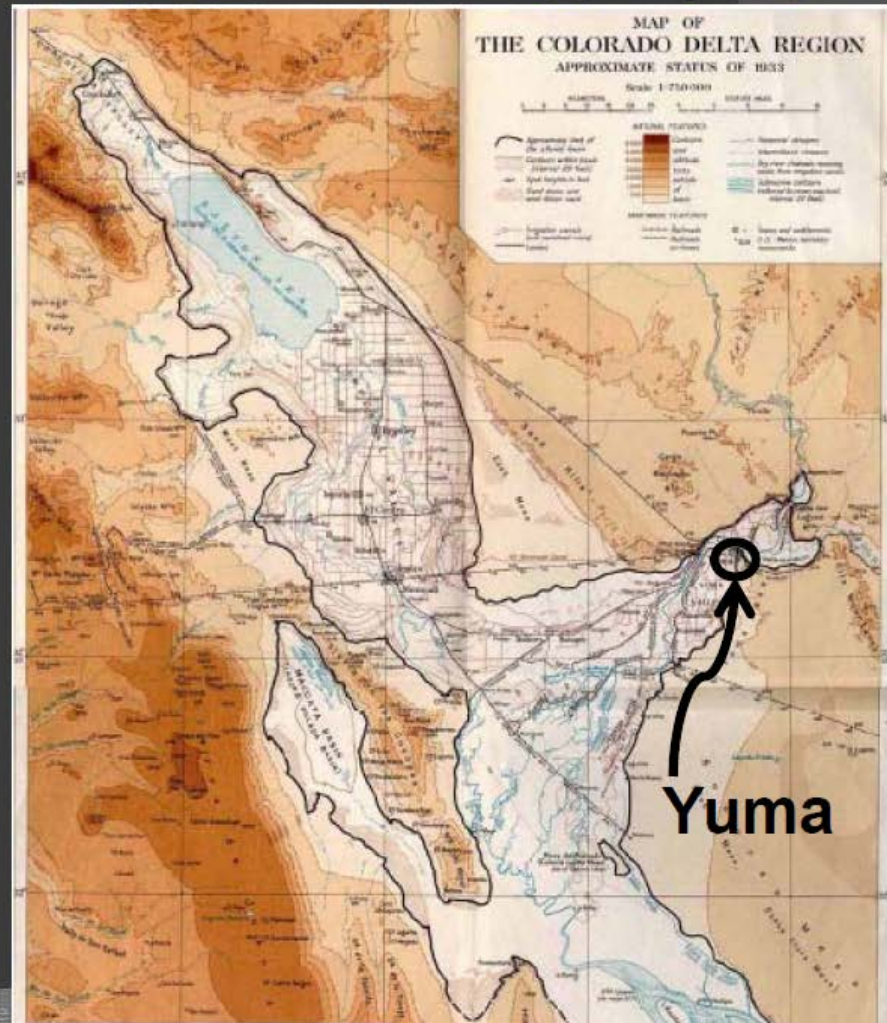
# Colorado River Compared to Other River Basins

	(maf/yr)
Mississippi River	420
Columbia River	190
Nile River	70
Colorado River	17

# Colorado River Basin Geography

## Ancient Mouth

- Near present location of Laguna Dam
- Gulf of California reached north into Indio, California



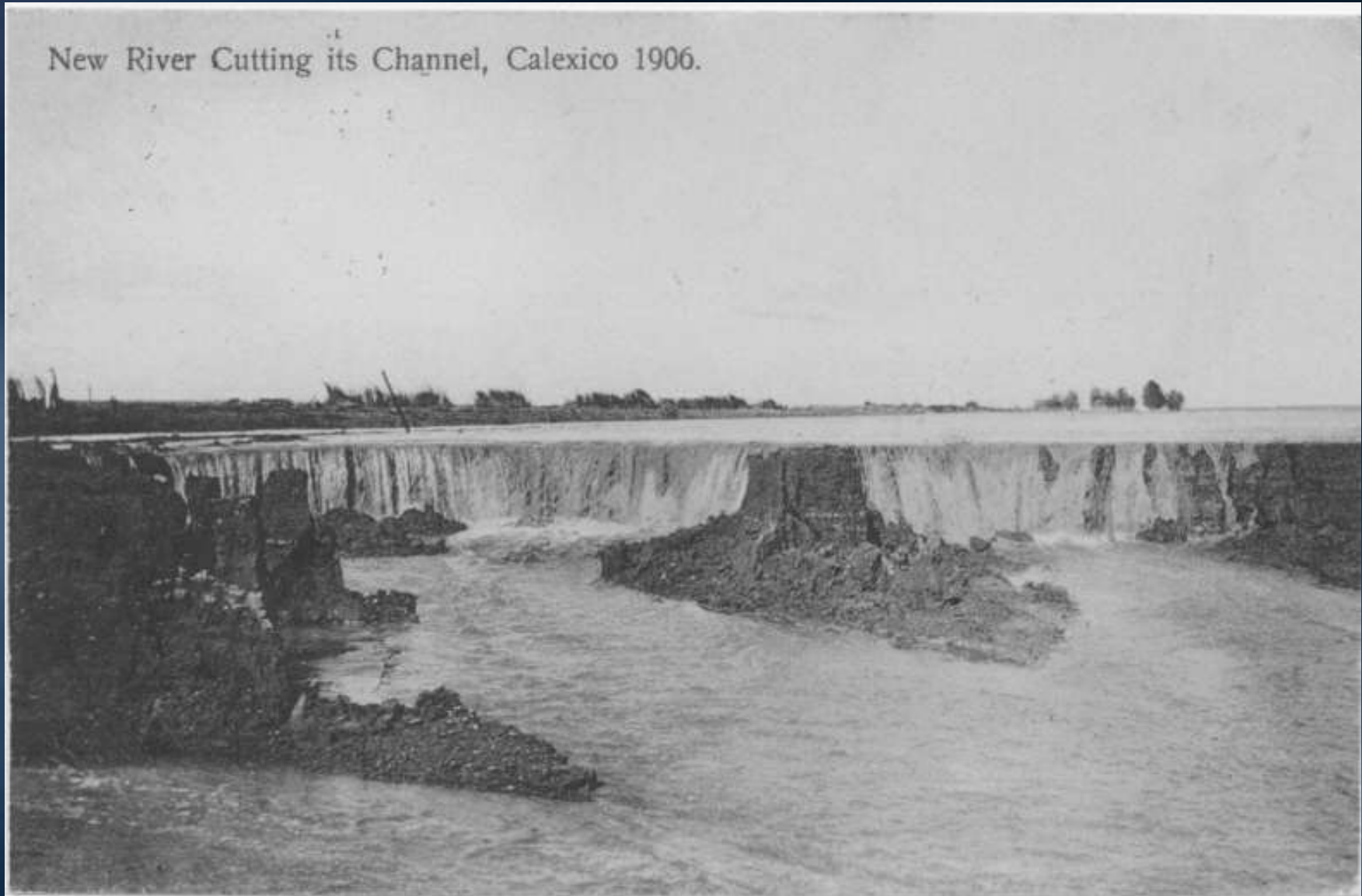








New River Cutting its Channel, Calexico 1906.





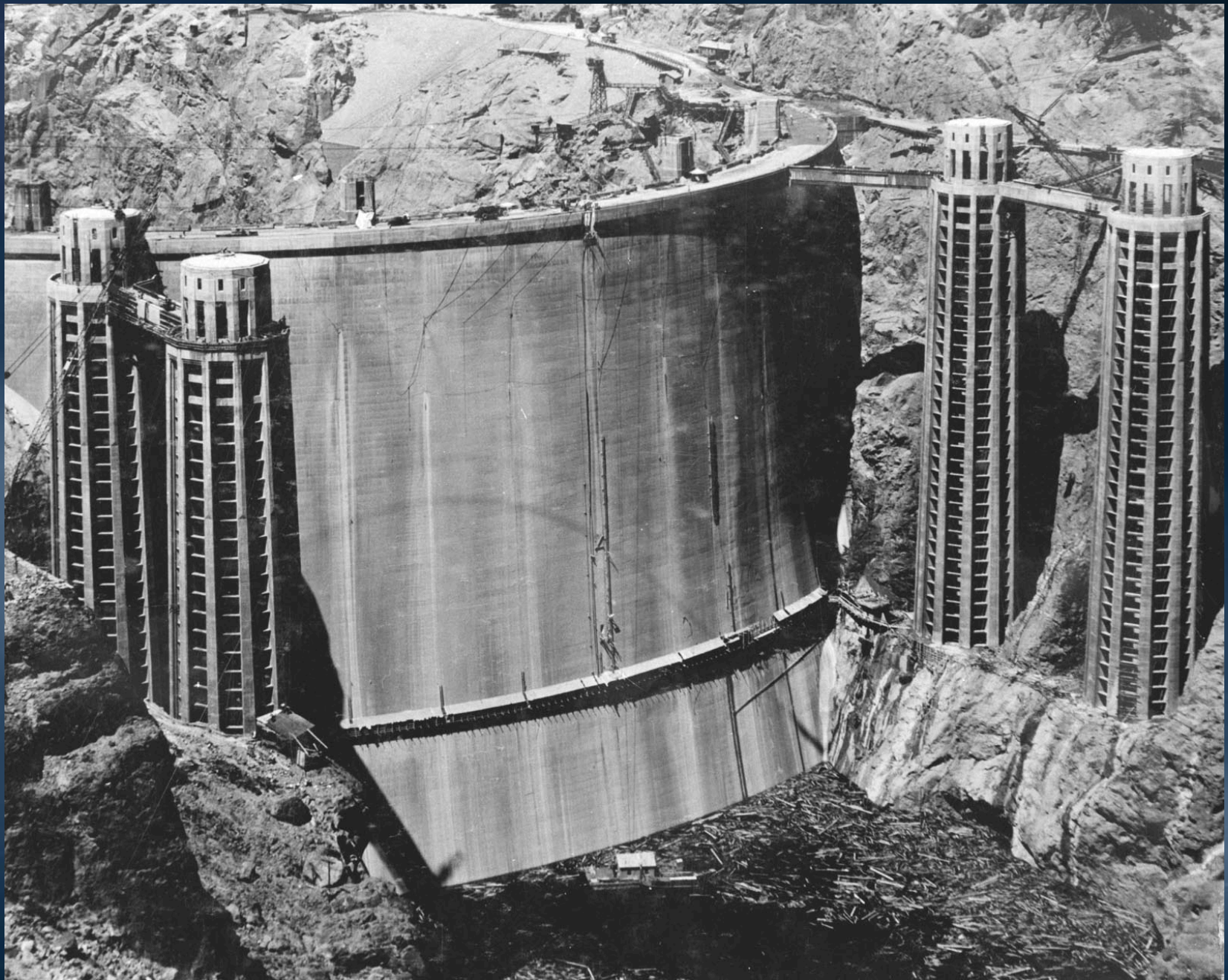




# 1922 Compact and 1944 Treaty Allocations

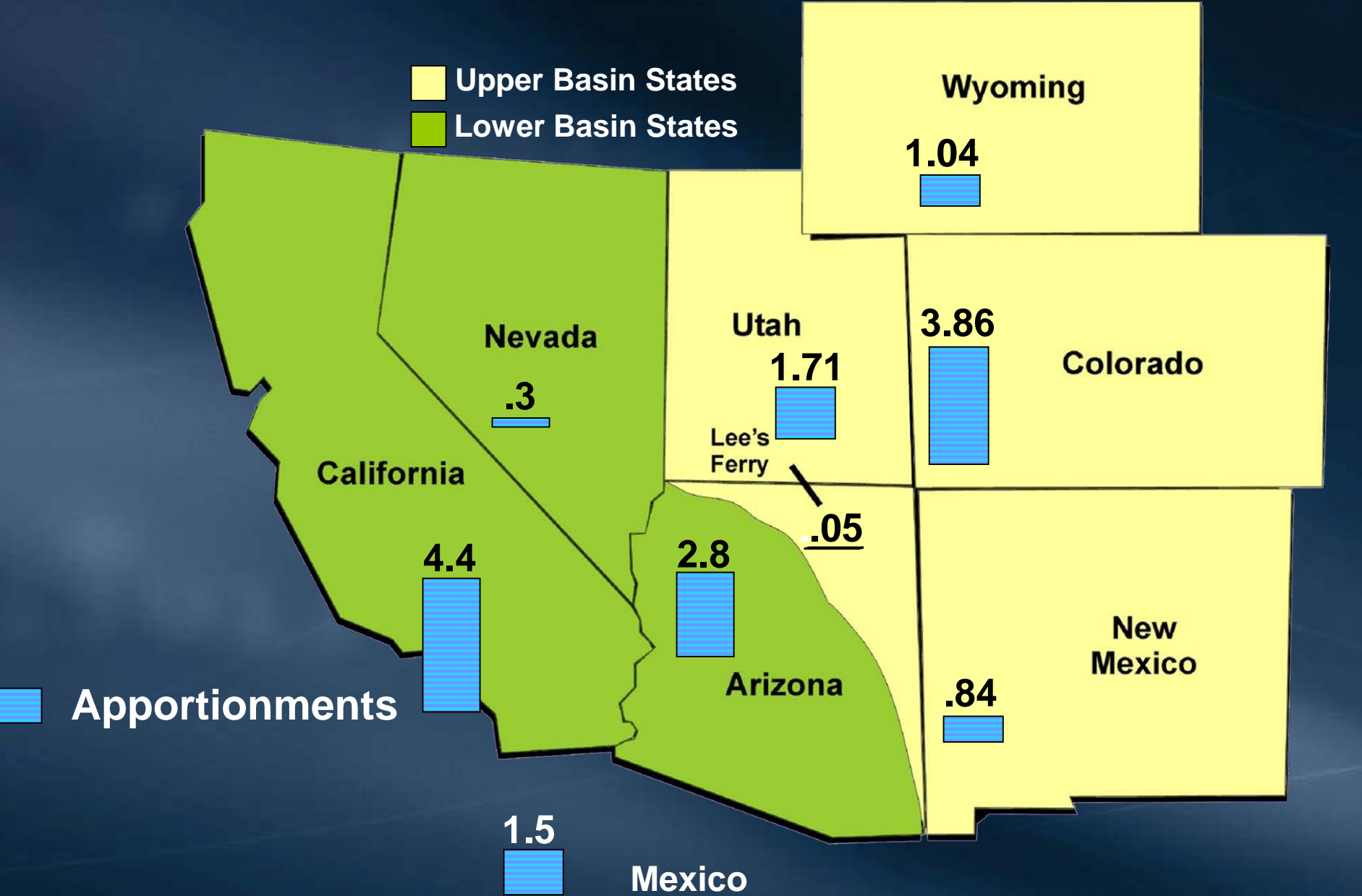
Upper Basin	7.5 mafy
Lower Basin	7.5 mafy + 1.0 mafy
Mexico	1.5 mafy
Total	17.5 mafy







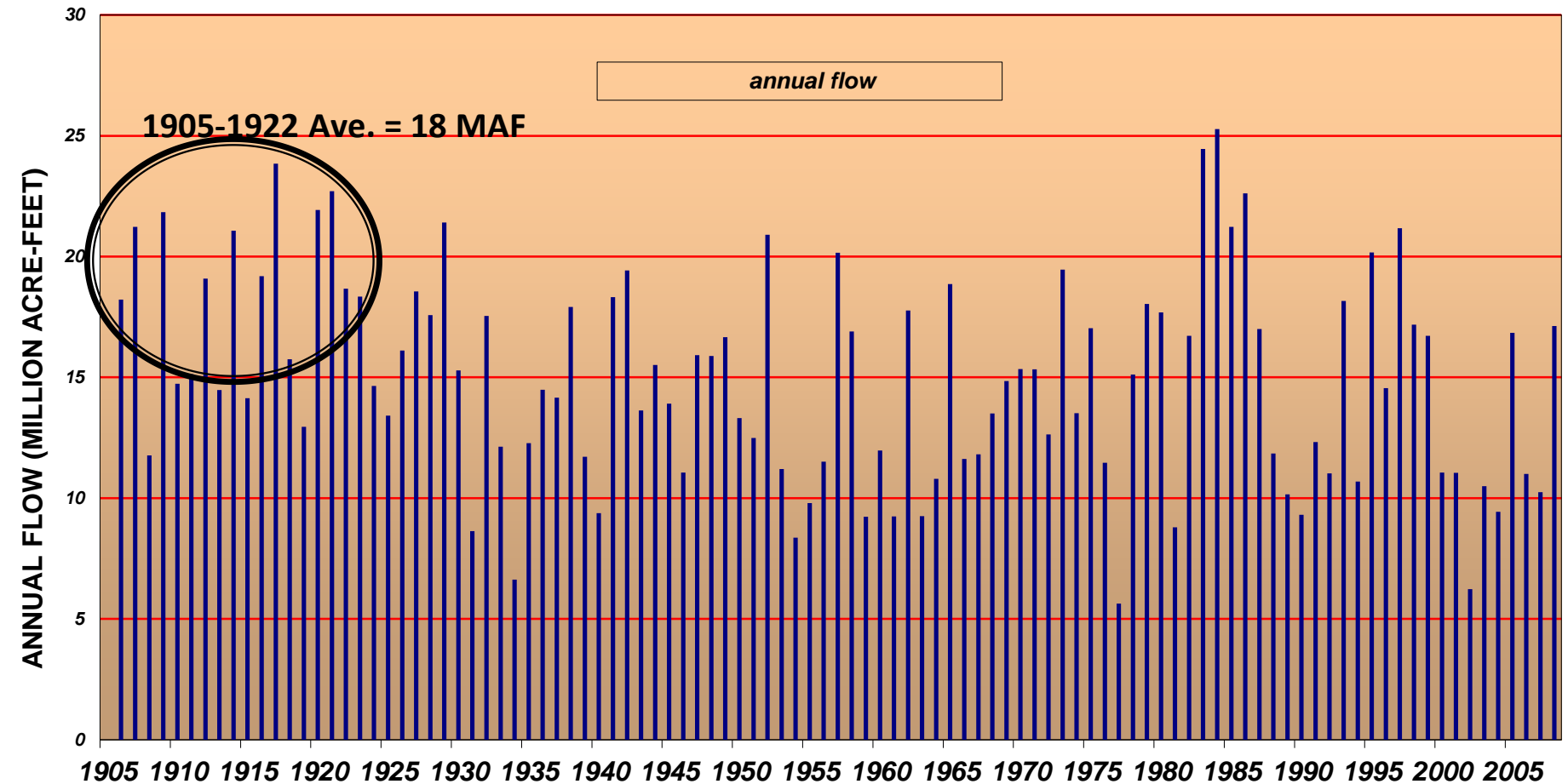
# Colorado River Apportionments (Million acre-feet)



# COLORADO RIVER NATURAL FLOW (AT LEE'S FERRY)

1906-2008

103 Year Average = 15.0 MAF

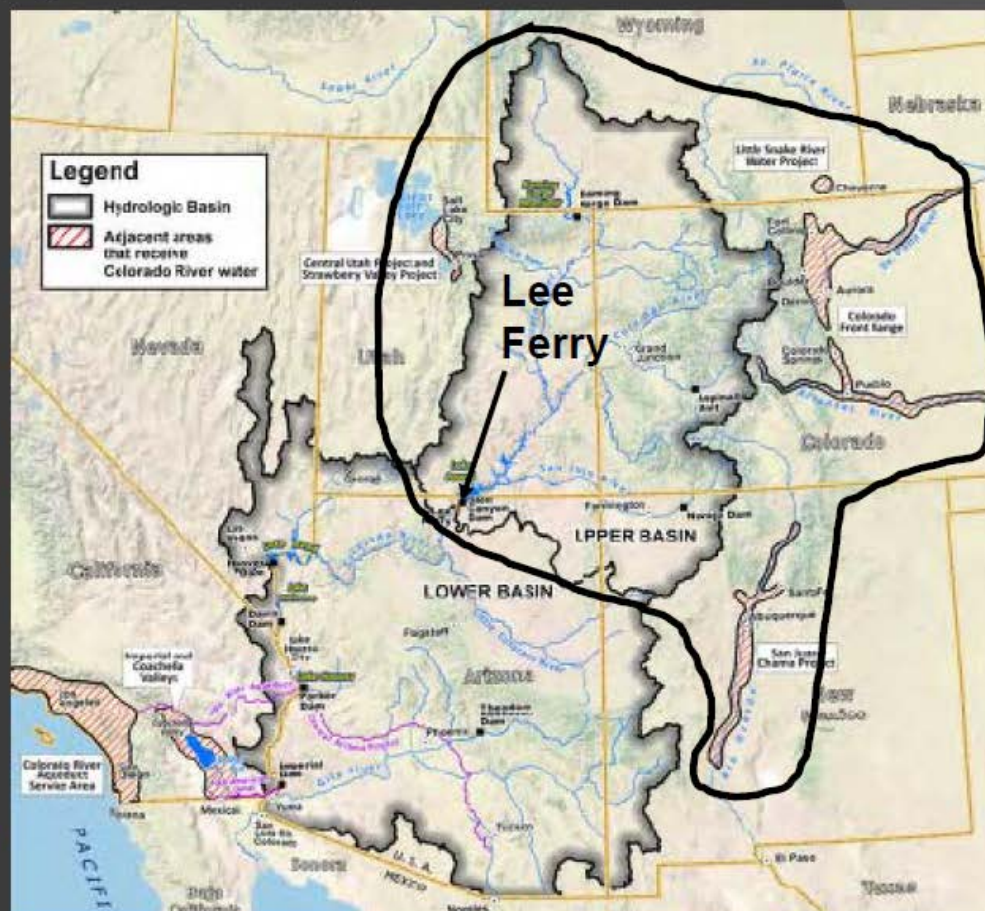


# Colorado River Basin Water Use

## Upper Basin

### Depletion of Flow at Lee Ferry\*

	(kaf)
Wyoming	382
Colorado	2,268
New Mexico	413
Utah	908
Arizona	36
Subtotal Uses	4,007
Reservoir Evaporation	491
<b>Total Depletions</b>	<b>4,498</b>

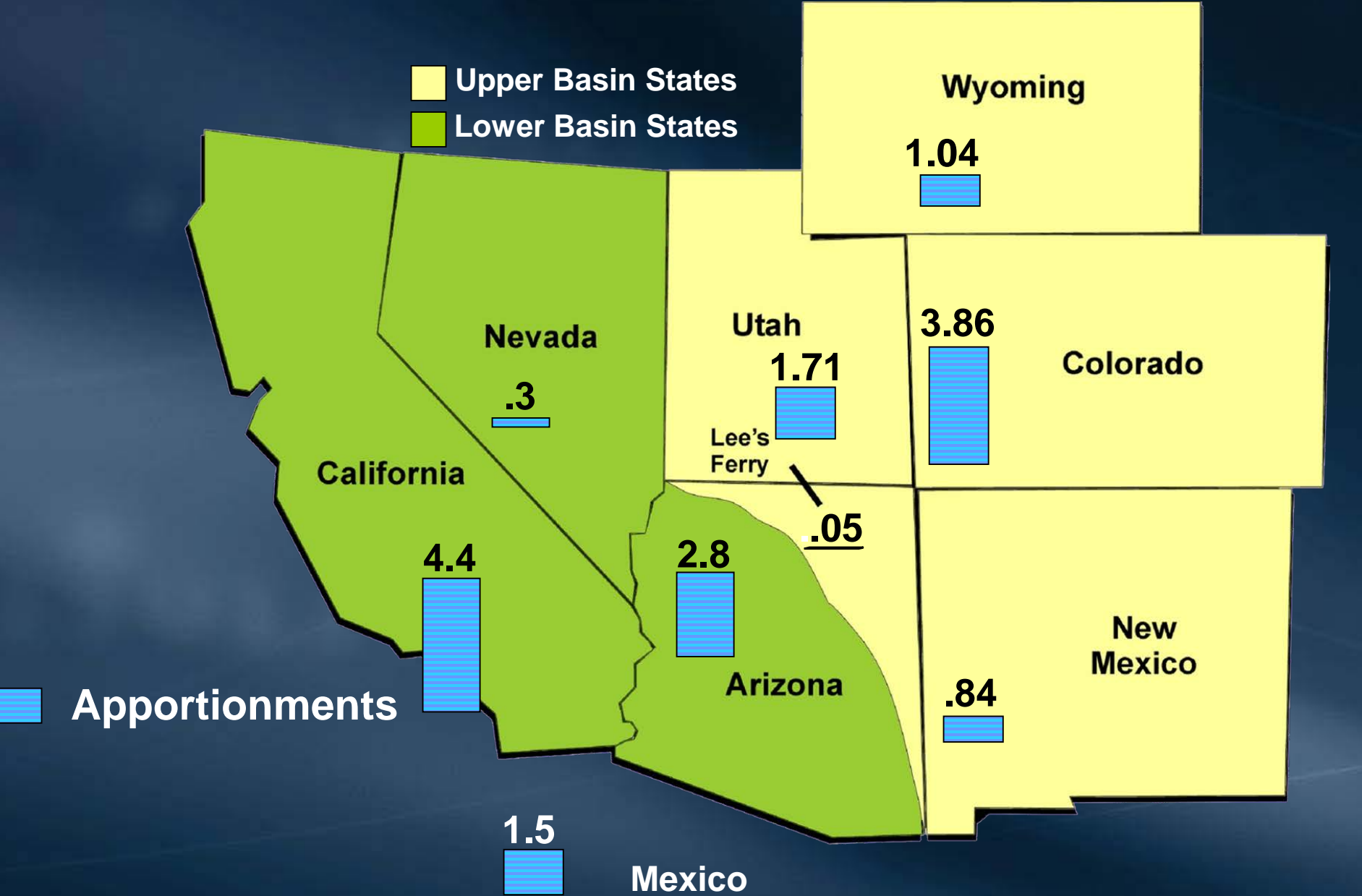




# Upper Basin Water Budget

Natural Runoff into Powell	15 MAF
Lake Powell Evaporation	0.75 MAF
Compact Release	7.5 MAF
Mexico Treaty Release	0.75 MAF
Total Losses/Delivery	-9 MAF
<b>Amount Available for UB Use</b>	<b>6 MAF</b>

# Colorado River Apportionments (Million acre-feet)



# Colorado River Basin Geography

## Gila River

- 23% of Basin area
- 2.1 maf natural annual runoff
- Flow rarely reaches Colorado River
  - 200,000 cfs 1916
  - 28,000 cfs 1993





# Colorado River Basin

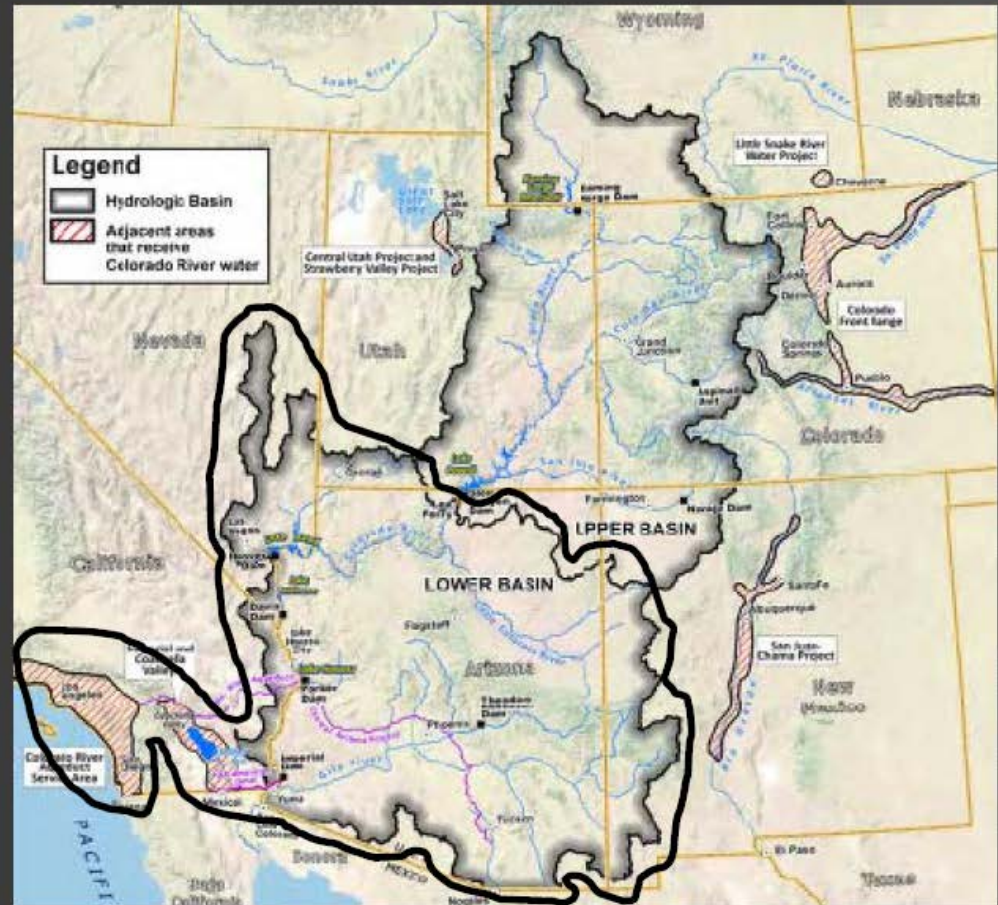
## Lower Basin

### Consumptive Use from the Mainstream\*

	(kaf)
Arizona	2,786
California	4,384
Nevada	271
<b>Total</b>	<b>7,441</b>

### Tributary Use†

Arizona	1,933
Nevada	102
New Mexico	28
Utah	124
<b>Total</b>	<b>2,187</b>



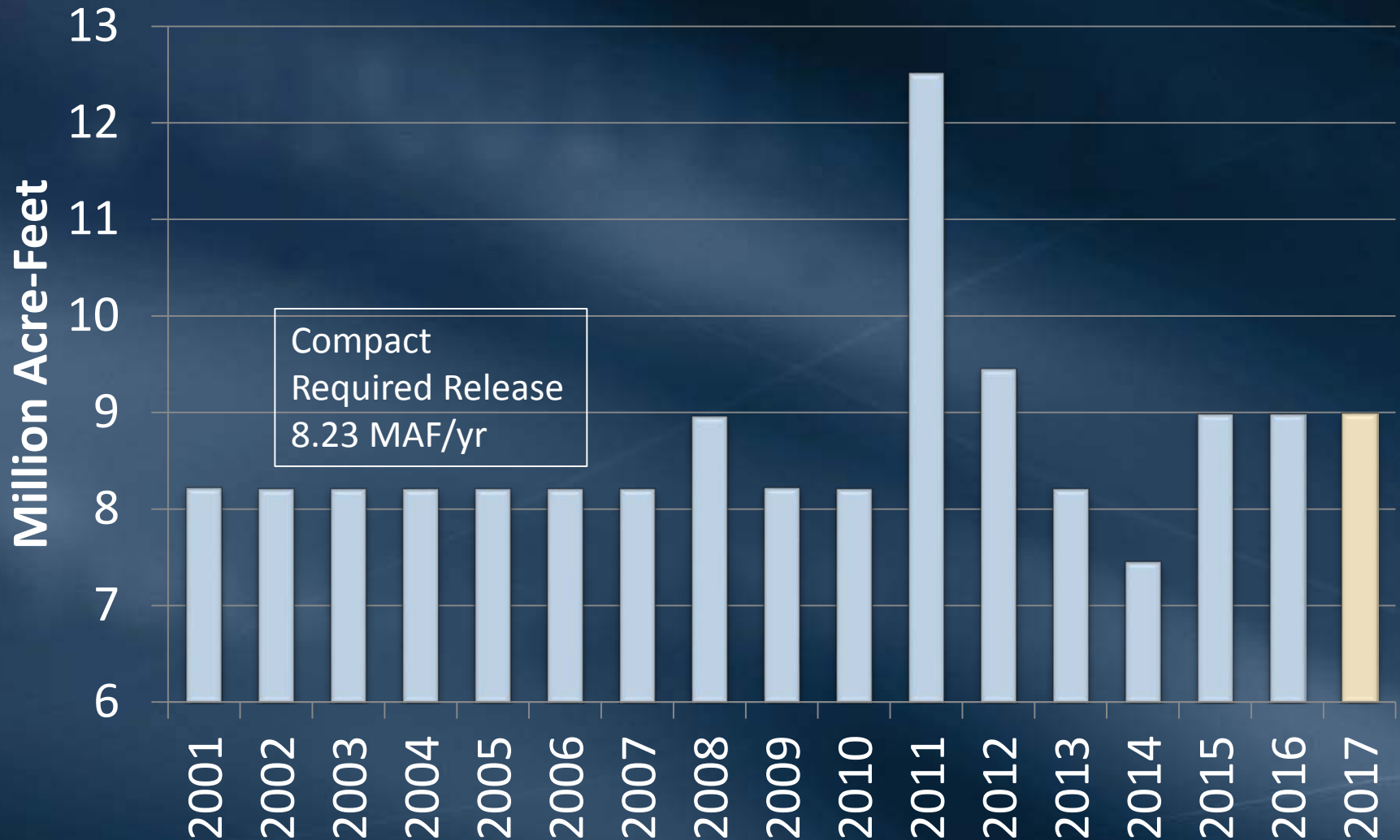
\*Average 2006 - 2010

†Average 2001 - 2005

# Lake Mead Normal Water Budget

Lake Mead Imbalance	
Upper Basin Compact Release	8.25 MAF
Side Inflow above Mead	0.75 MAF
Total Inflow	9.0 MAF
Lower Basin Mainstem Use	-7.5 MAF
Mexico Delivery	-1.5 MAF
Lake Mead Evap/River Losses	-1.2 MAF
Total Outflow	-10.2 MAF
<b>Imbalance</b>	<b>-1.2 MAF</b>

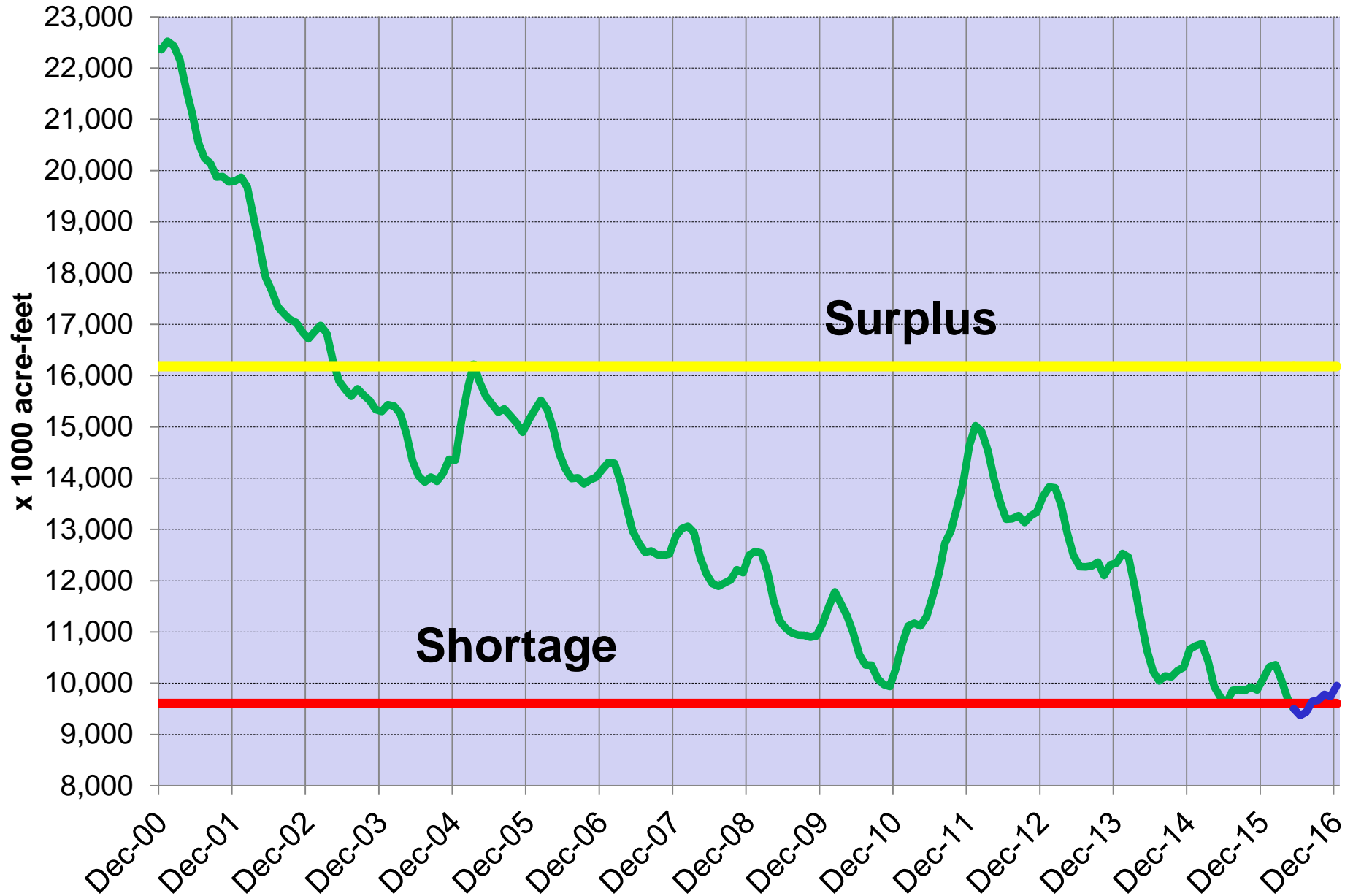
# Lake Powell Releases 2001 - 2017



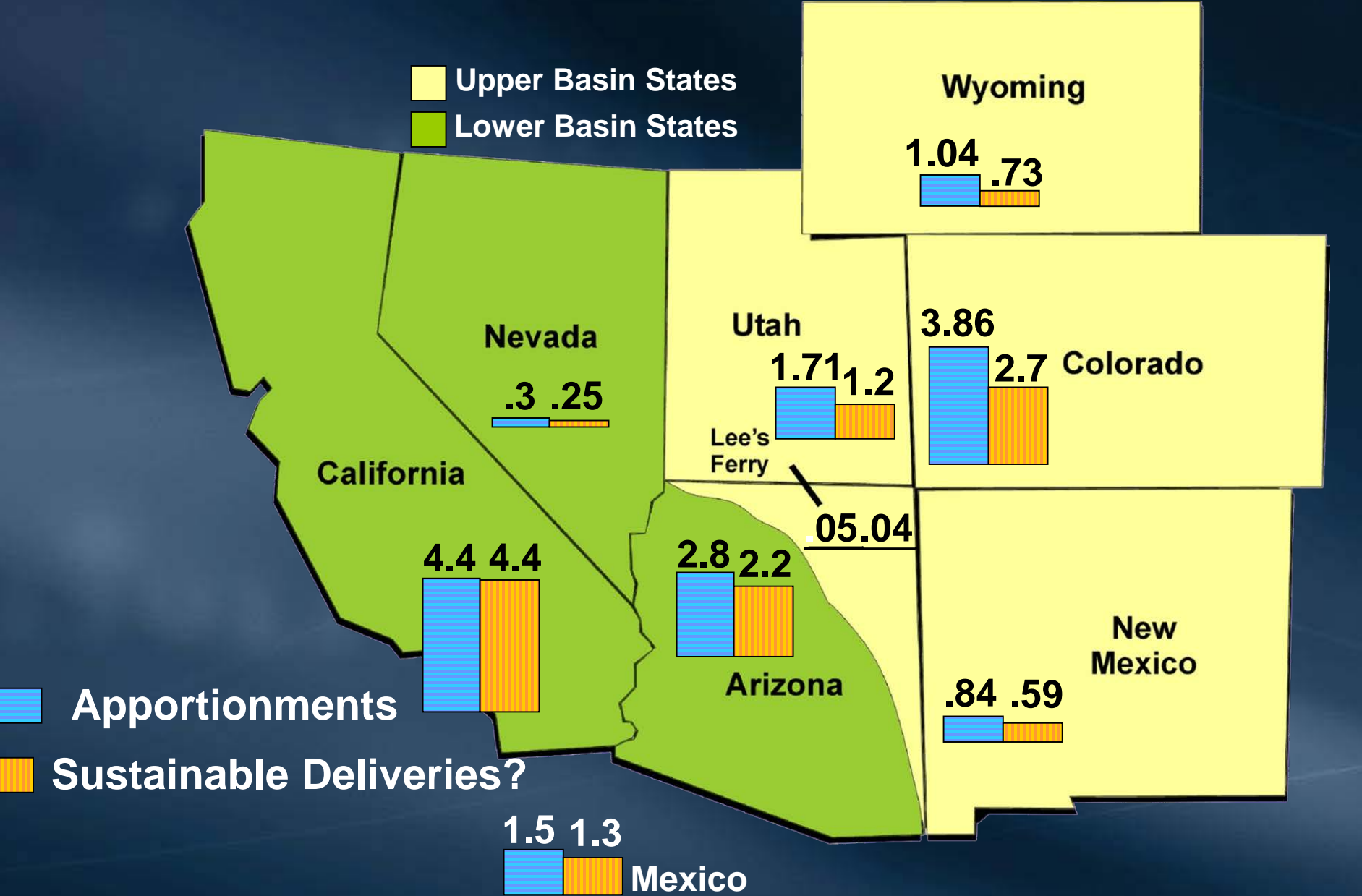


# Lake Mead Storage

## 2000 – 2016, Actual and Projected



# Colorado River Apportionments (Million acre-feet)





# California Service Areas

NEVADA

Lake Mead

Hoover Dam

Colorado River

Lake Mohave

Davis Dam

ARIZONA

Lake Havasu

Parker Dam

Colorado River Aqueduct

Palo Verde I.D.

Coachella Valley W.D.

Coachella Canal

Senator Wash Reservoir

Imperial Dam

Yuma Project

Los Angeles Aqueduct

California Aqueduct

CALIFORNIA

MWD

PACIFIC OCEAN

Salton Sea

All American Canal

UNITED STATES  
MEXICO



# Quantification Settlement Agreement

## Quantified Water Budgets

	<u>maf</u>
PVID	
Yuma Project	0.42 (Average)
IID	3.10
CVWD	0.33
<u>MWD *</u>	<u>0.55</u>
<b>Total</b>	<b>4.40</b>

\* Amount fluctuates based on PVID/Yuma Project use, unused IID and CVWD water

# Steps Towards Sustainability



# Increase Urban Water Use Efficiency

Recycling



Desalination



Groundwater  
Recovery



Conservation





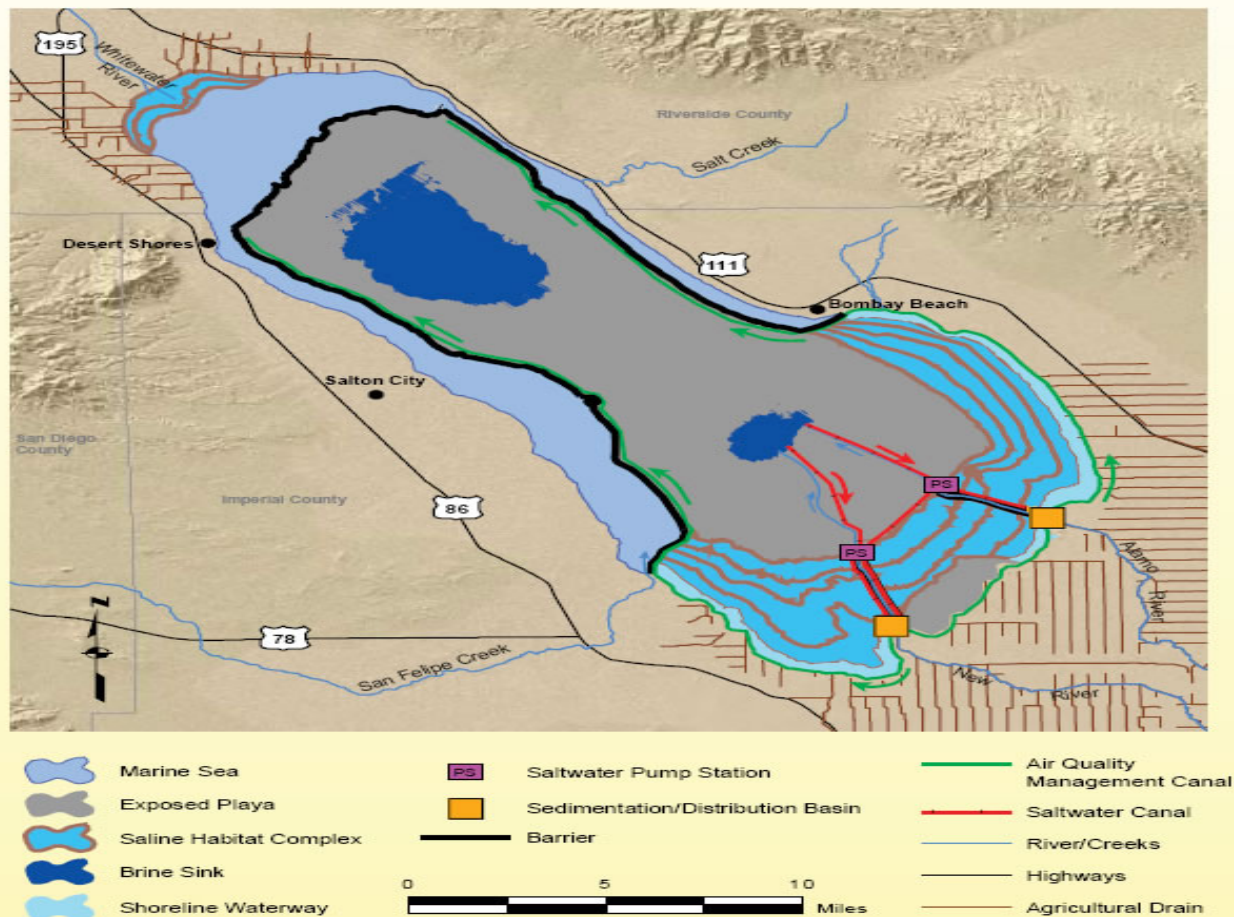
# California 4.4 Plan Example

Implement Agricultural Conservation Measures  
with IID



# Downside of Agricultural Efficiency: Downstream Impacts

Figure 6  
Preferred Alternative



# California 4.4 Plan Example

Line the All-American, Coachella Canals





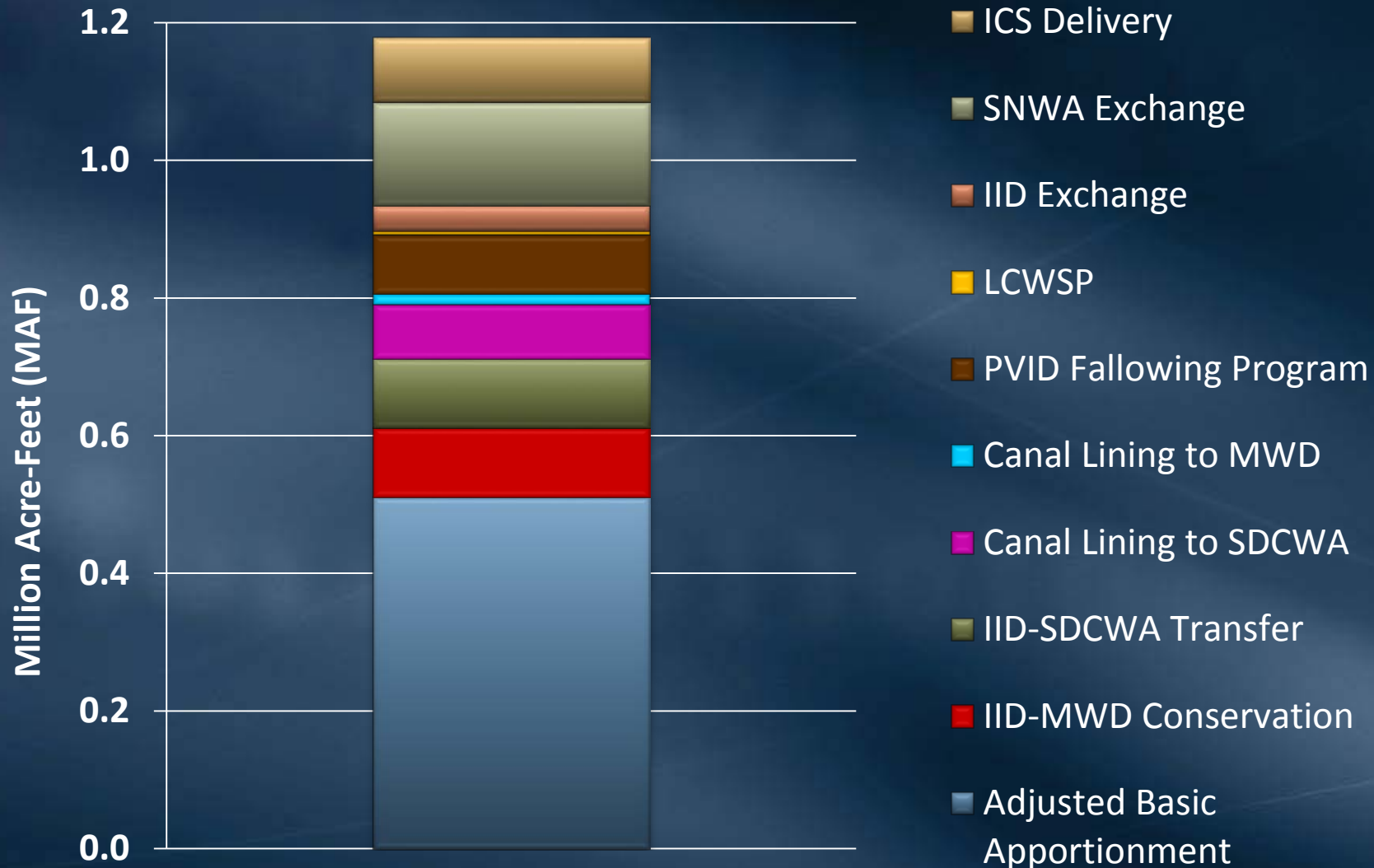
# California 4.4 Plan Example

Incentivize PVID Farmers to Not Grow Crops

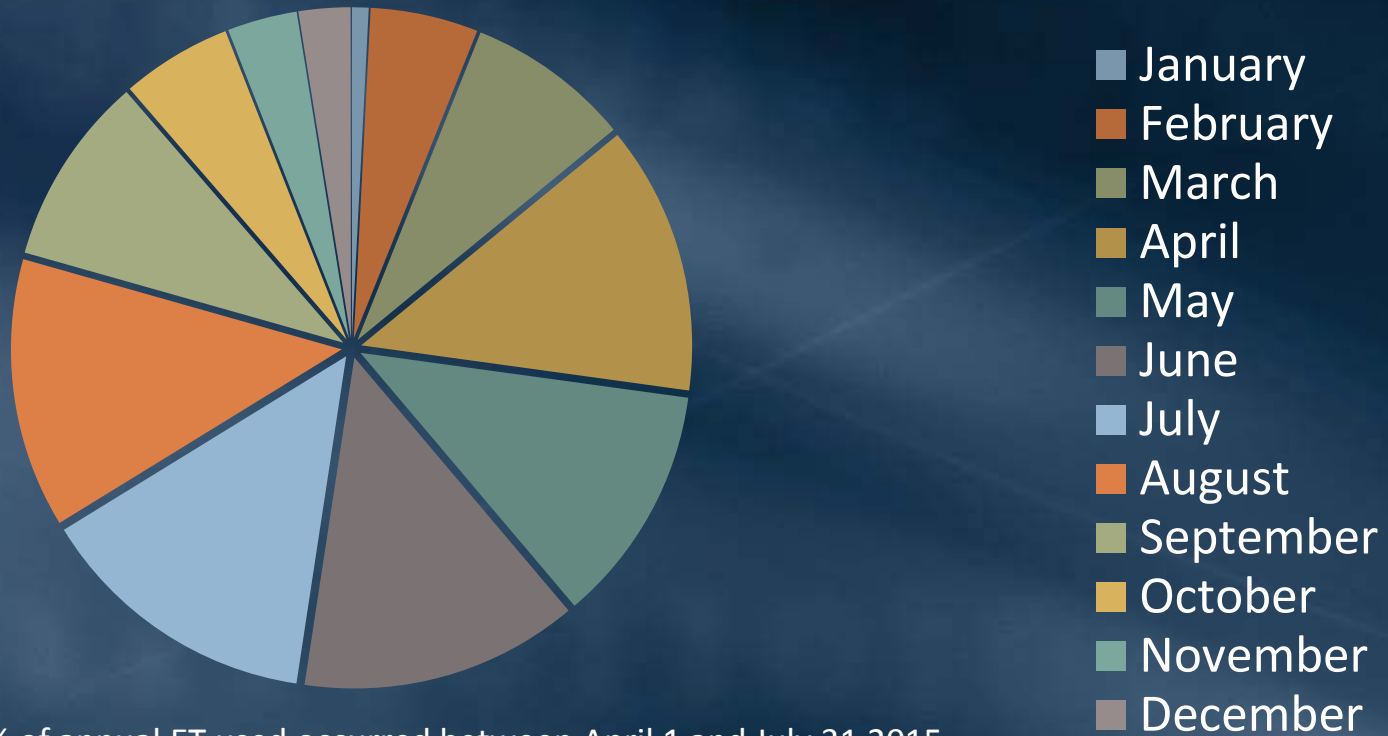


# 2015 Colorado River Aqueduct Supplies

1.18 MAF Net Diversion



# New Initiatives: Bard Pilot Seasonal Following Program



52% of annual ET used occurred between April 1 and July 31 2015

## Monthly Evapotranspiration for Bard Water District



# Lake Mead: Redefining what is “full”...



# Summary

- The long-term challenges facing the Colorado River are not drought, but over-allocation
- Interstate cooperation is needed to address these challenges
- Solutions should also consider potential consequences of water conservation



**Bill Hasencamp**

213-217- 6520

[whasencamp@mwdh2o.com](mailto:whasencamp@mwdh2o.com)