

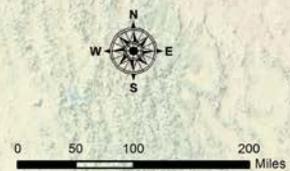
Emergency Drought Contingency Planning in the Upper Colorado River Basin

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River Commissioner for New Mexico**

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New Mexico Interstate Stream Commission

October 27, 2016



Colorado River Basin

1922 Colorado River Compact

- Seven Basin States
- Created Upper and Lower Basins
- Apportioned 7.5 million acre-feet to each
- Flow requirement at Lee Ferry

Colorado River Basin

1948 Upper Colorado River Basin Compact

- Colorado, Utah, Wyoming and New Mexico
- Apportioned 11.25 % of available consumptive use to New Mexico (642,000 acre-feet)
- New Mexico's apportionment is much larger than it would have been otherwise due to the water rights of the Navajo and Jicarilla tribes

Colorado River Basin Water Use

- 40 million people (municipal and industrial); including 22 tribes
- 5.5 million acres of irrigated lands
- 4.2 megawatts of hydropower
- 15 National Park Service properties
- Countless recreational opportunities and benefits

Economic Benefits Entire Basin (2014)

- \$1.4 trillion in economic activity
- \$871 billion in labor income
- 16 million job-years

Source: Arizona State University, The Economic Importance of the Colorado River to the Basin Region, 2014

Colorado River Basin Water Use

New Mexico

- 1.5 million people (municipal and industrial); including 2 tribes (Navajo and Jicarilla Nations)
- 140,000 acres of irrigated lands
- San Juan Generating Station (PNM) and Four Corners Power Plant (APS)
- Recreational opportunities
 - Flat water sports and boating – Navajo Reservoir
 - World-class cold water trout fishery – Navajo Dam
 - Rafting – San Juan and Animas Rivers

Economic Benefits New Mexico (2014)

- \$60 billion in economic activity
- \$34 billion in labor income
- 772,000 job-years

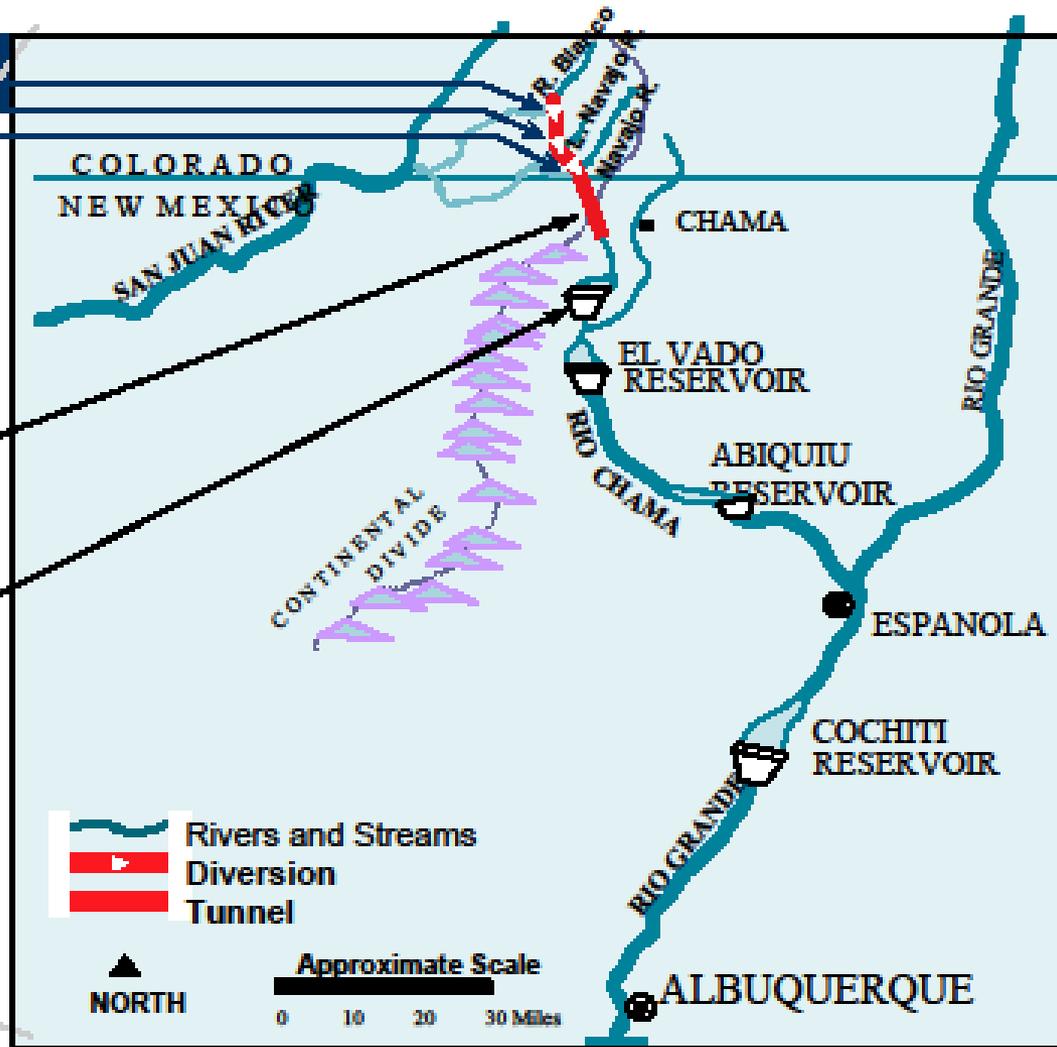
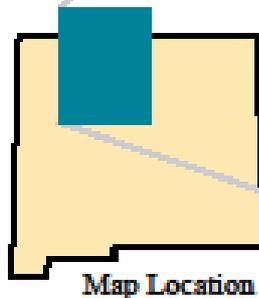
Source: Arizona State University, The Economic Importance of the Colorado River to the Basin Region, 2014

San Juan-Chama Project

DIVERSIONS

26 MILES OF
TUNNELS

HERON
RESERVOIR



San Juan-Chama Project Water Users

- Albuquerque-Bernalillo County Water Utility Authority
- Middle Rio Grande Conservancy District
- Jicarilla Apache Nation
- Cochiti Reservoir Recreation Pool
- City of Santa Fe
- County of Santa Fe
- Pueblo of Ohkay Owingeh
- Taos Pueblo
- El Prado

San Juan-Chama Project Water Users

- County of Los Alamos
- City of Espanola
- Town of Belen
- Village of Los Lunas
- Village of Taos
- Town of Bernalillo
- Town of Red River
- Village of Taos Ski Valley
- Pueblos of Nambe, Pojoaque, Tesuque and San Ildefonso

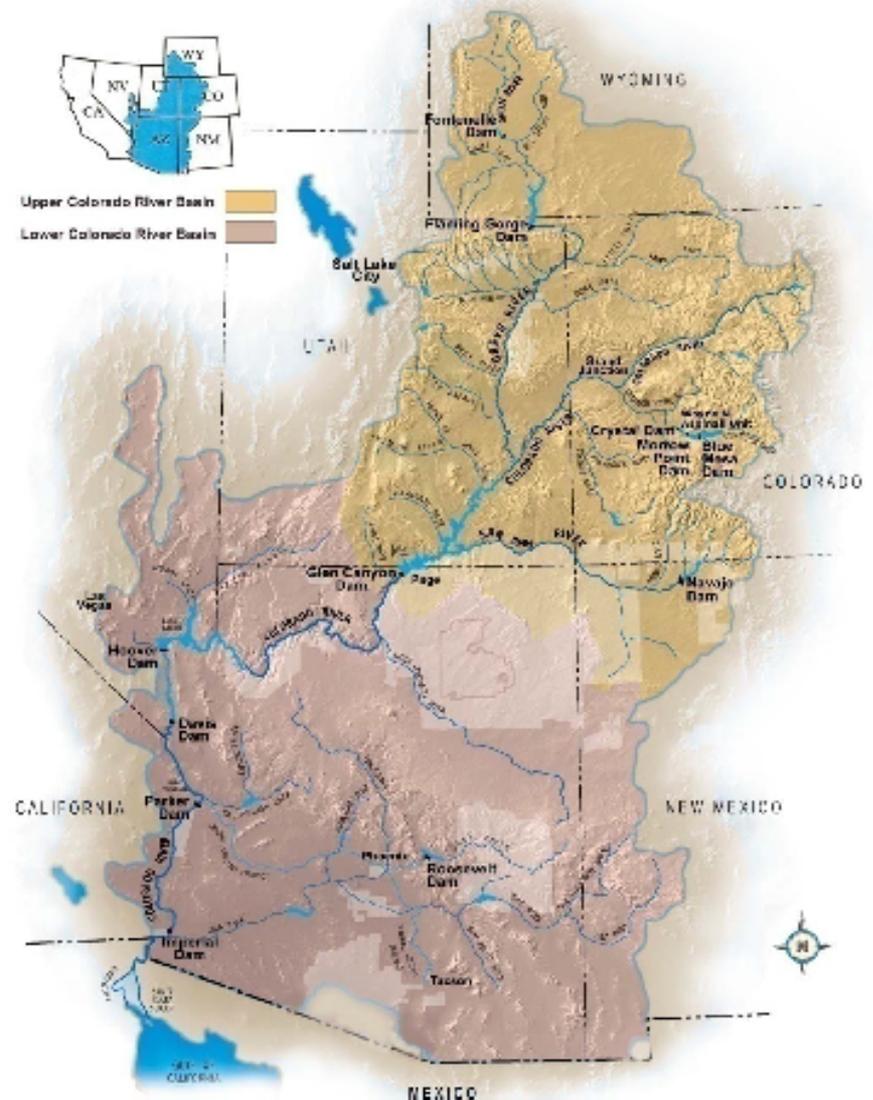
New Mexico's Compact Allocation is Fully Apportioned

- San Juan-Chama Project
- Navajo Nation Water Rights Settlement
- Jicarilla-Apache Nation Water Rights Settlement
- PNM and APS Power Plants
- Municipalities: Farmington, Bloomfield, Aztec, etc.
- San Juan Water Commission
- Hammond Conservancy District
- Ditch associations and private irrigators

Colorado River Basin Hydrology

- 16.5 million acre-feet (maf) allocated annually
- 14.9 maf average annual “natural” inflow into Lake Powell over past 105 years
- 13 to 14.5 maf of consumptive use annually
- 60 maf of storage
- Inflows are highly variable year-to-year

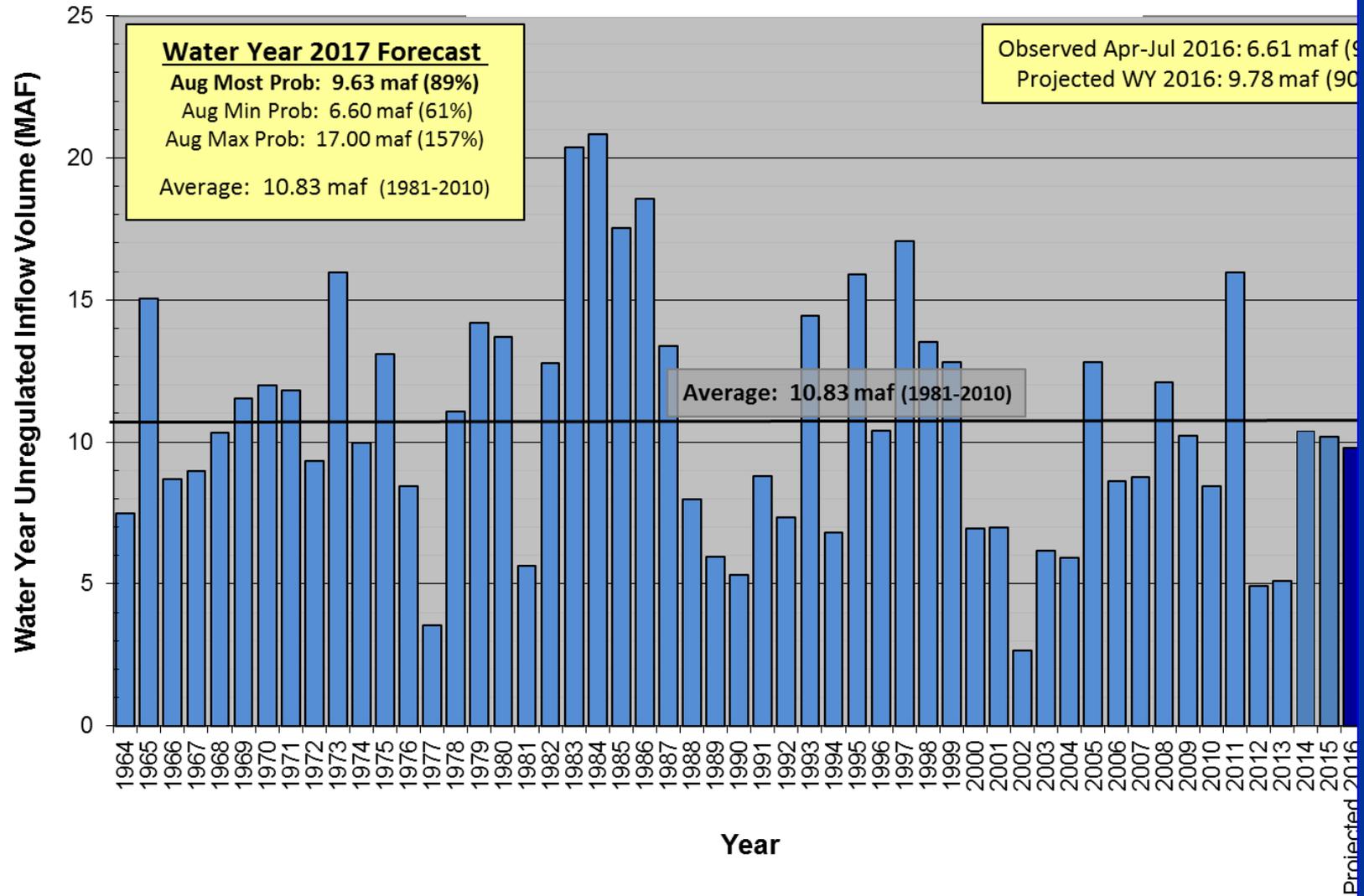
Colorado River Basin



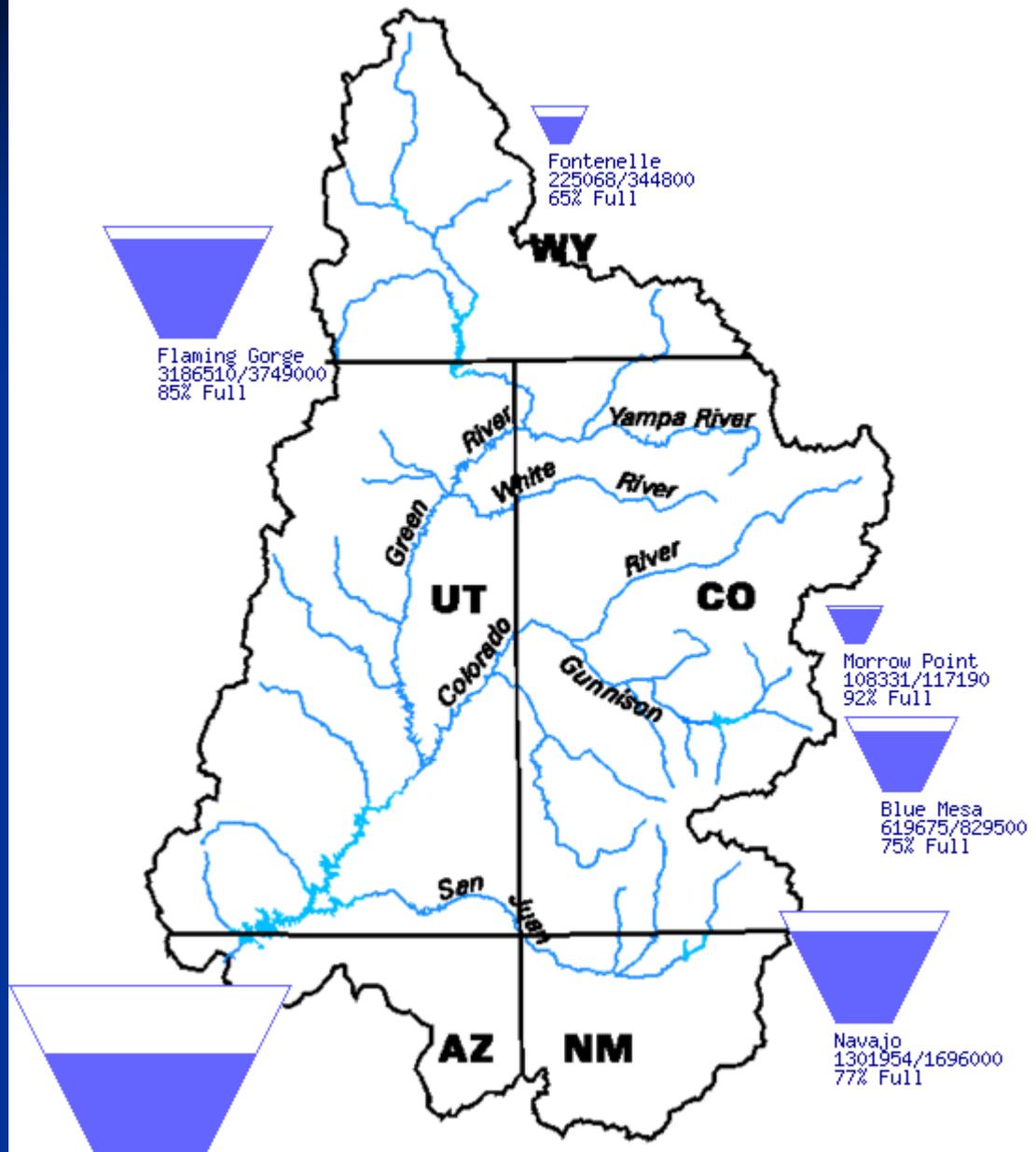
Colorado River Basin

RESERVOIR	LOCATION	RIVER	CAPACITY (af)	CURRENT (af)
ASPINALL UNIT	CO	GUNNISON	1,084,000	750,000
FLAMING GORGE	WY-UT	GREEN	3,750,000	3,190,000
NAVAJO	NM-CO	SAN JUAN	1,700,000	1,300,000
LAKE POWELL	UT-AZ	COLORADO	26,200,000	12,730,000
LAKE MEAD	NV	COLORADO	27,600,000	9,620,000

Lake Powell Unregulated Inflow



Upper Colorado River Drainage Basin



Drainage Area 279,300 Square Kilometers



Implications of Critically Low Reservoir Levels

- Some projections show that if the current drought continues or worsens, there is a possibility that the level of Lakes Powell and Lake Mead could drop below critical elevations.
- If critical elevations are breached, the system faces threats to drinking water supply, irrigation, power production, environmental resource preservation and overall sustainability.

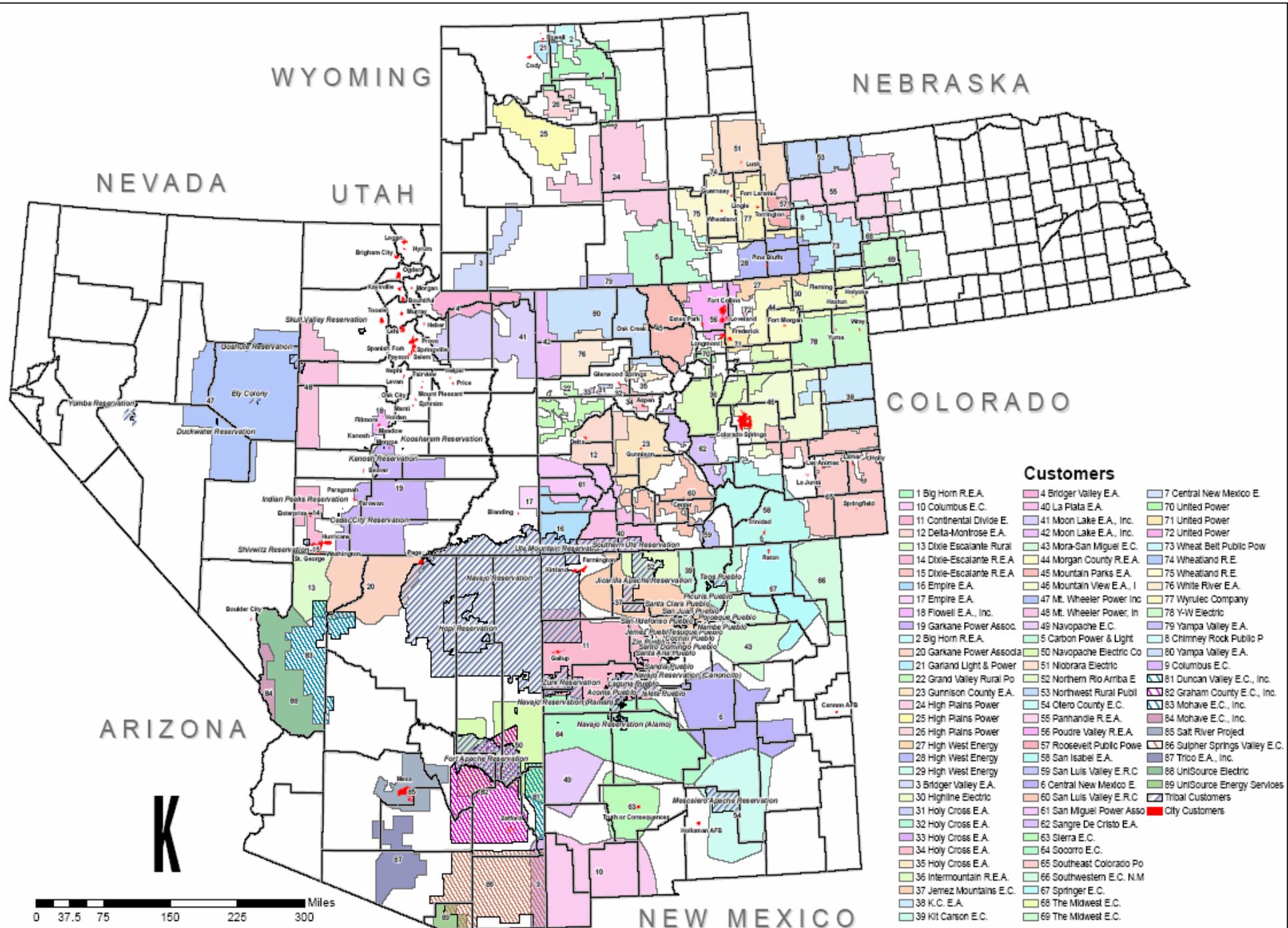
Implications of Critically Low Reservoir Levels

- Specifically:
 - Lake Mead could drop below intakes that supply two million people in Las Vegas metro area
 - Lake Powell could drop below the level required to generate hydropower
 - Compliance with the 1922 Colorado River Compact by the Upper Basin (including New Mexico) could be jeopardized
 - Potential federal takeover of Upper Basin system

Implications of Critically Low Reservoir Levels

Specifically for New Mexico:

- Water supplies for the San Juan-Chama Project and other federal projects could be jeopardized
- Many New Mexicans rely on hydropower generated at Lake Powell
- Colorado River water users in New Mexico rely on the environmental compliance and O&M paid for by hydropower revenues generated in the Upper Basin



WYOMING

NEBRASKA

NEVADA

UTAH

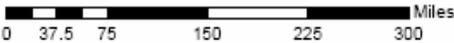
COLORADO

ARIZONA

NEW MEXICO

Customers

- 1 Big Horn R.E.A.
- 2 Big Horn R.E.A.
- 3 Bridger Valley E.A.
- 4 Bridger Valley E.A.
- 5 Carbon Power & Light
- 6 Central New Mexico E.
- 7 Central New Mexico E.
- 8 Chimney Rock Public P
- 9 Columbus E.C.
- 10 Columbus E.C.
- 11 Continental Divide E.
- 12 Delta-Montrose E.A.
- 13 Dixie Escalante Rural
- 14 Dixie-Escalante R.E.A.
- 15 Dixie-Escalante R.E.A.
- 16 Empire E.A.
- 17 Empire E.A.
- 18 Flower E.A., Inc.
- 19 Garkane Power Assoc.
- 20 Garkane Power Assoc.
- 21 Garland Light & Power
- 22 Grand Valley Rural Po
- 23 Gunnison County E.A.
- 24 High Plains Power
- 25 High Plains Power
- 26 High Plains Power
- 27 High West Energy
- 28 High West Energy
- 29 High West Energy
- 30 Highline Electric
- 31 Holy Cross E.A.
- 32 Holy Cross E.A.
- 33 Holy Cross E.A.
- 34 Holy Cross E.A.
- 35 Holy Cross E.A.
- 36 Intermountain R.E.A.
- 37 Jemez Mountains E.C.
- 38 K.C. E.A.
- 39 Kit Carson E.C.
- 40 La Plata E.A.
- 41 Moon Lake E.A., Inc.
- 42 Moon Lake E.A., Inc.
- 43 Mora-San Miguel E.C.
- 44 Morgan County R.E.A.
- 45 Mountain Parks E.A.
- 46 Mountain View E.A., I
- 47 M. Wheeler Power Inc
- 48 M. Wheeler Power, In
- 49 Navapaho E.C.
- 50 Navapaho Electric Co
- 51 Niobrara Electric
- 52 Northern Rio Arriba E
- 53 Northwest Rural Publ
- 54 Otero County E.C.
- 55 Panhandle R.E.A.
- 56 Poudre Valley R.E.A.
- 57 Roosevelt Public Powe
- 58 San Isabel E.A.
- 59 San Luis Valley E.R.C
- 60 San Luis Valley E.R.C
- 61 San Miguel Power Asso
- 62 Sangre De Cristo E.A.
- 63 Sierra E.C.
- 64 Socorro E.C.
- 65 Southeast Colorado Po
- 66 Southwestern E.C. N.M
- 67 Springer E.C.
- 68 The Midwest E.C.
- 69 The Midwest E.C.
- 70 United Power
- 71 United Power
- 72 United Power
- 73 Wheat Belt Public Pow
- 74 Wheatland R.E.
- 75 Wheatland R.E.
- 76 White River E.A.
- 77 Wyrulec Company
- 78 Y-W Electric
- 79 Yampa Valley E.A.
- 80 Yampa Valley E.A.
- 81 Duncan Valley E.C., Inc.
- 82 Graham County E.C., Inc.
- 83 Mohave E.C., Inc.
- 84 Mohave E.C., Inc.
- 85 Salt River Project
- 86 Supter Springs Valley E.C.
- 87 Trio E.A., Inc.
- 88 UniSource Electric
- 89 UniSource Energy Services
- 90 Tribal Customers
- City Customers



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Contingency Planning

- Impetus
 - Worst case modeling in 2013
 - Critically low Lakes Mead and Powell levels
- By request of the Secretary of the Interior
- Separate plans being prepared by the Upper and Lower Basins
- Includes discussions with the Republic of Mexico

Contingency Planning

Lower Basin

- CA, AZ and NV developing Lower Basin Plan in coordination with DOI (Bureau of Reclamation)
- Goal: Development of additional tools in Lower Basin to address critical Lake Mead elevations
- Negotiations ongoing
- Lower Basin plan may be finalized as early as January 2017

Contingency Planning

Upper Basin

- Consists of three distinct parts:
 - Extended operations of Colorado River Storage Project reservoirs
 - Demand management
 - Snowpack augmentation

Extended Operations

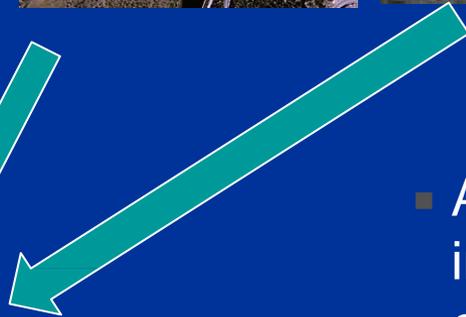
Navajo Reservoir



Flaming Gorge Reservoir



Blue Mesa Reservoir



- Agree on triggers and operations to implement under emergency conditions to maintain minimum power pool elevation at Lake Powell
- By conserving water (temporarily) in Lake Powell or moving water available from upper CRSP facilities.



Lake Powell

Demand Management

- Evaluate alternatives to facilitate temporary, voluntary, and compensated reductions in consumptive use through willing seller/willing buyer arrangements
- Examples - temporary or rotational fallowing, municipal conservation, interruptible supply agreements, deficit irrigation of crop land, system efficiencies, conservation, etc.



Snowpack Augmentation

- Established programs in six western states
- Major ten year pilot study in Wyoming concluded that additional snowpack in the amount of 5 to 15 percent per seedable cases is possible.
- The 2012 Colorado River Basin Water Supply and Demand Study estimated that cloud seeding six major runoff-producing areas could produce between 1.1 and 1.8 million acre-feet per year, at a cost ranging from \$30 to \$60 per acre-foot.

