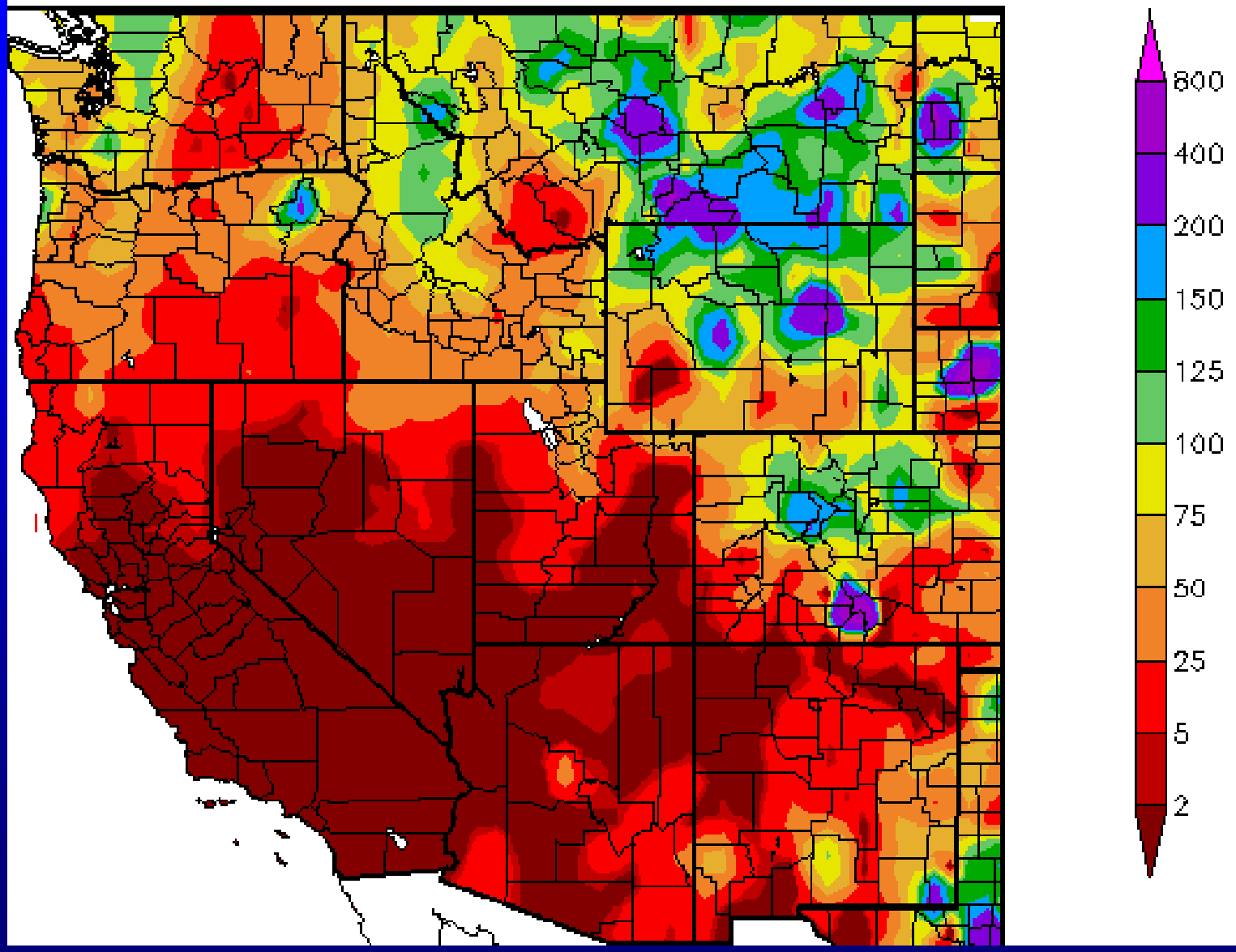
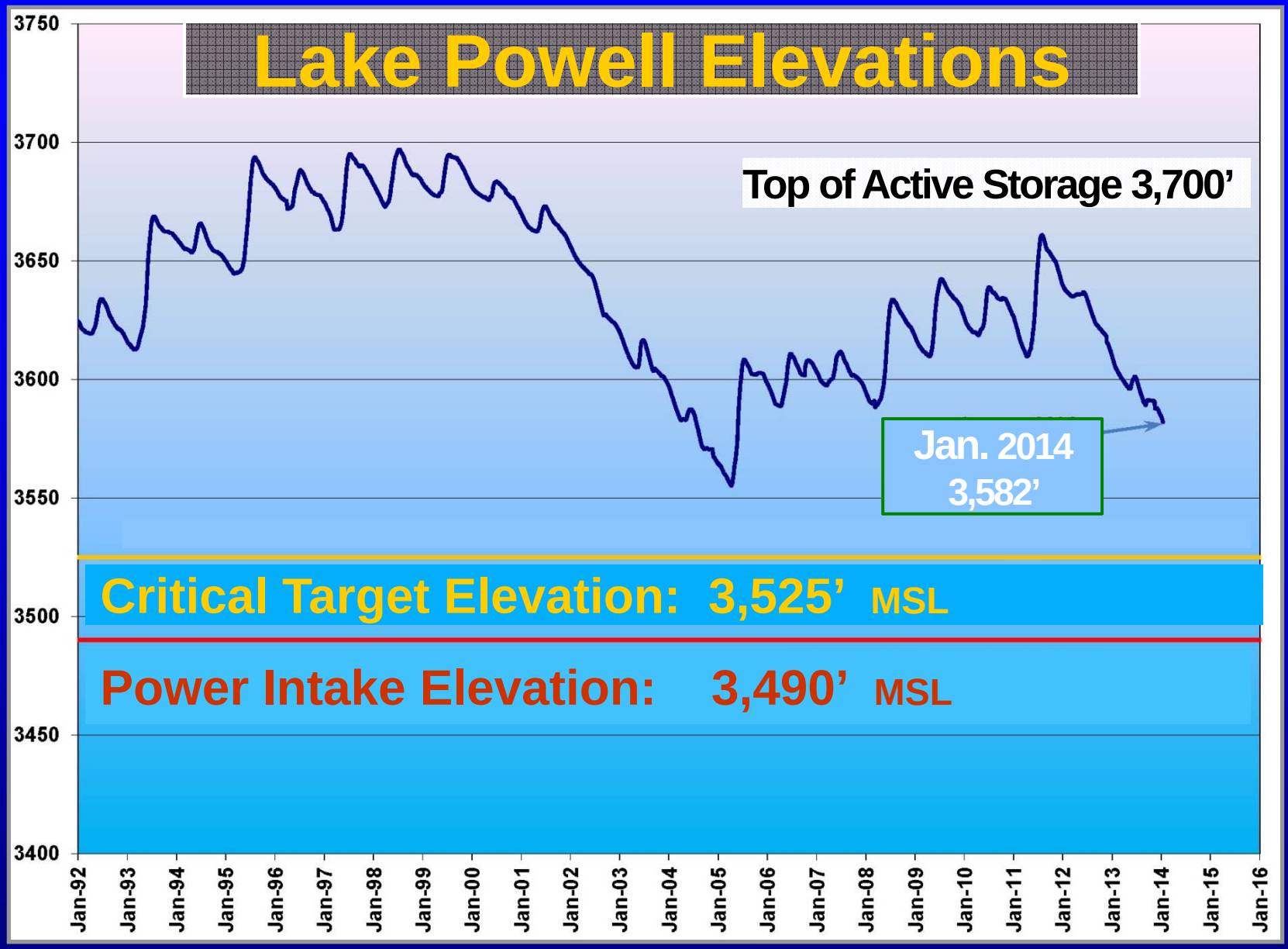
Near Term Risks: Options to Address Declining Reservoirs

Colorado River – Committed Collaboration

Eric Kuhn, General Manager
Colorado River District
Protecting Western Colorado Water Since 1937

Percent of Normal Precipitation (%)
12/21/2013 – 1/19/2014





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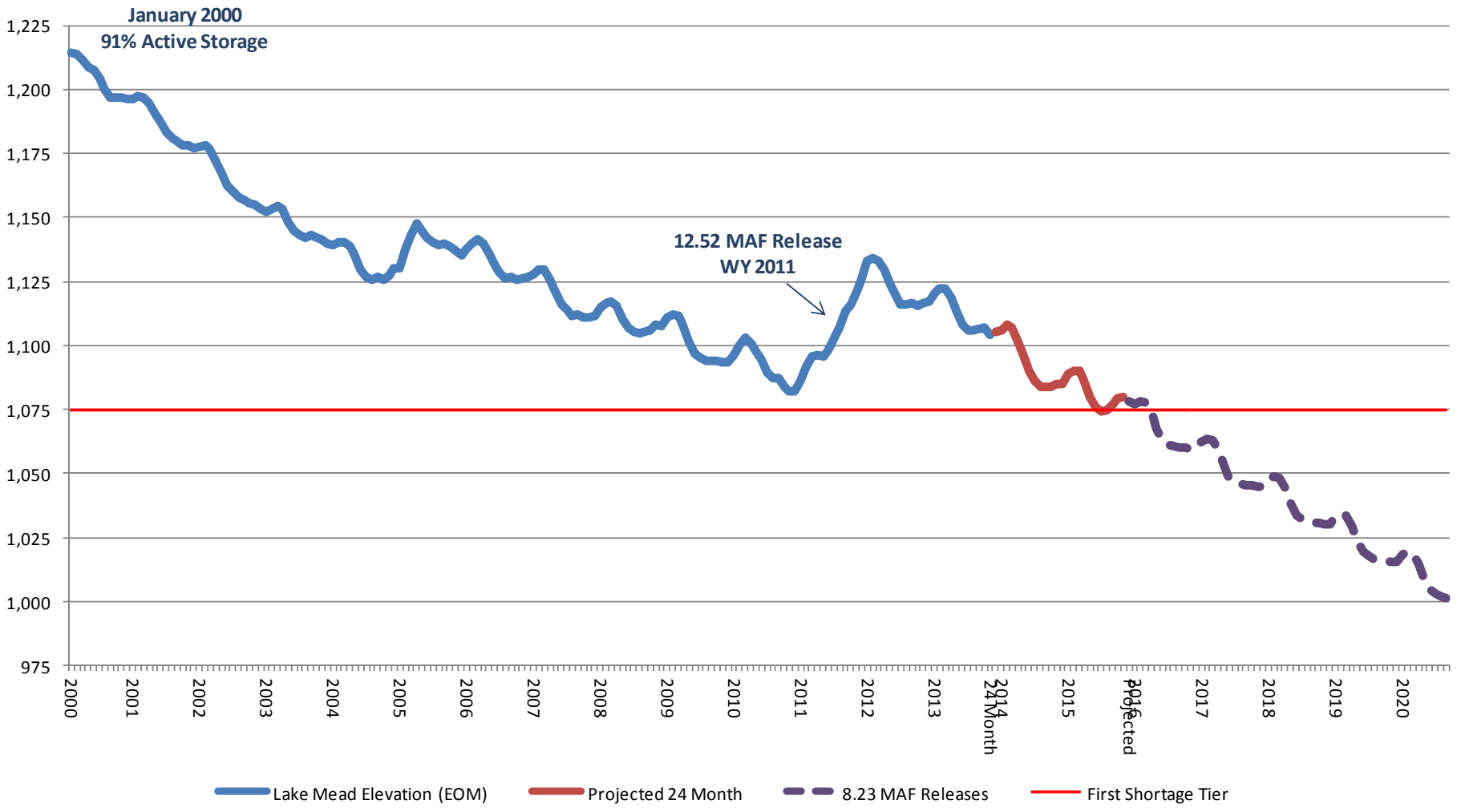
Lake Mead Elevation Since 2000



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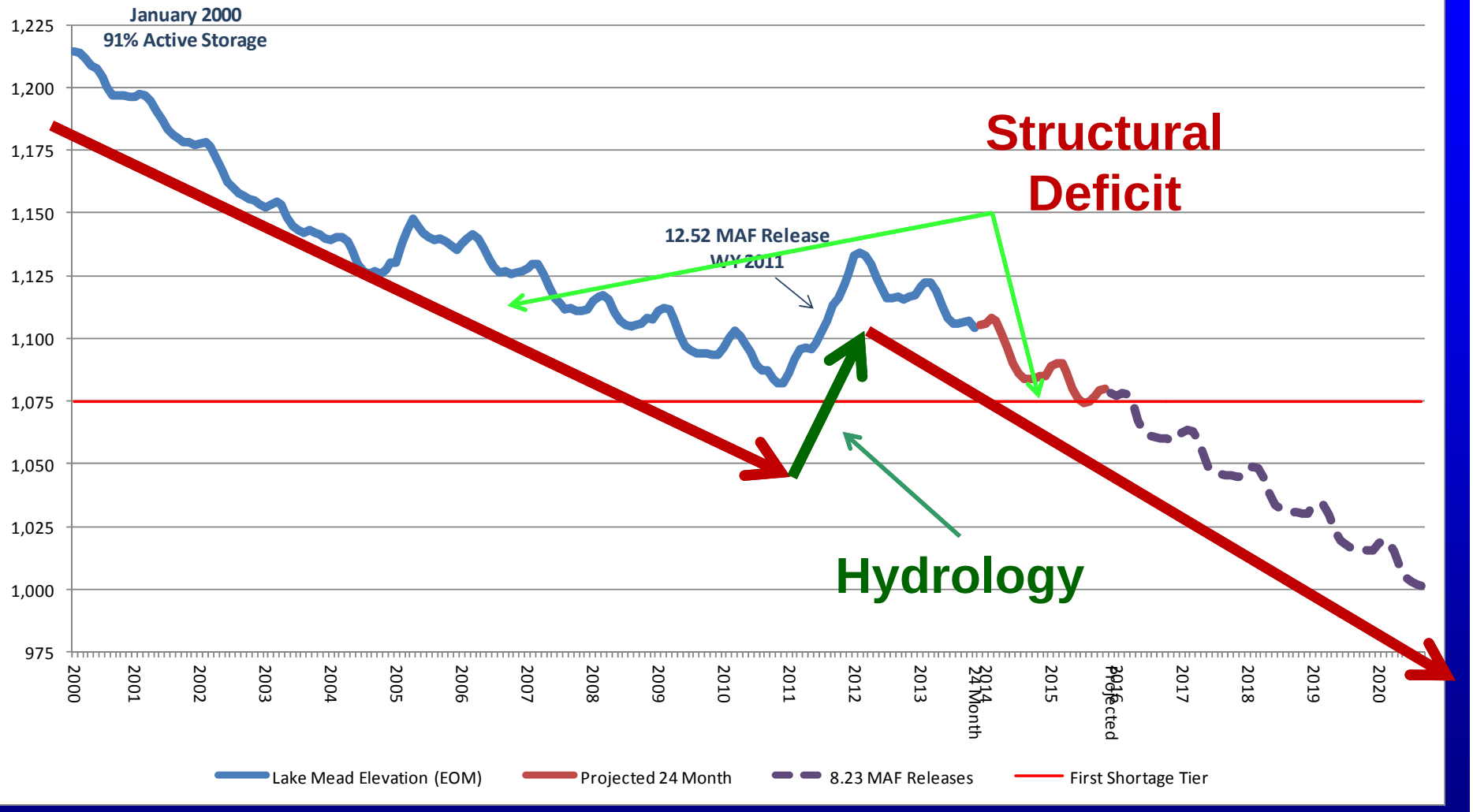
Graph courtesy of CAP

Lake Mead Elevation Since 2000



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Graph courtesy of CAP

Water Budget at Lake Mead

- Inflow = 9.0 maf
  (release from Powell + side inflows)
- Outflow = - 9.6 maf
  (AZ, CA, NV, and Mexico delivery
  + downstream regulation and gains/losses)
- Mead evaporation losses = - 0.6 maf
- Balance = - 1.2 maf

Given basic apportionments in the Lower Basin, the allotment to Mexico, and an 8.23 maf release from Lake Powell, Lake Mead storage declines about 12 feet each year

RECLAMATION

Collision Course

- **Lower Basin depends on equalization releases from Lake Powell to sustain level of Lake Mead**
- **Upper Basin wants to maximize storage in Lake Powell to protect existing and planned uses**
- **Under the 2007 Guidelines, the equalization elevation goes up every year**
  - **By 2026, equalization will only occur when Lake Powell is at 3666' (approx. 80% full)**
- **Unless there is a concerted effort to "bend the curve," it will be very difficult to reach agreement on new guidelines**

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Supply (Hydrology) Stress Test

- Assume 1988-2007 hydrology follows 2000-2013 drought
- 2000-2013 12.2 MAF @ Lee Ferry
- 1988-2007 13.1 MAF @ Lee Ferry
- Combined 34 yrs 12.7 MAF @ Lee Ferry
- Includes 21 yrs of 11.7 MAF @ Lee Ferry

aka VERY DRY (like the mid 1100's)

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Stressing the System necessitates cooperative Contingency Planning

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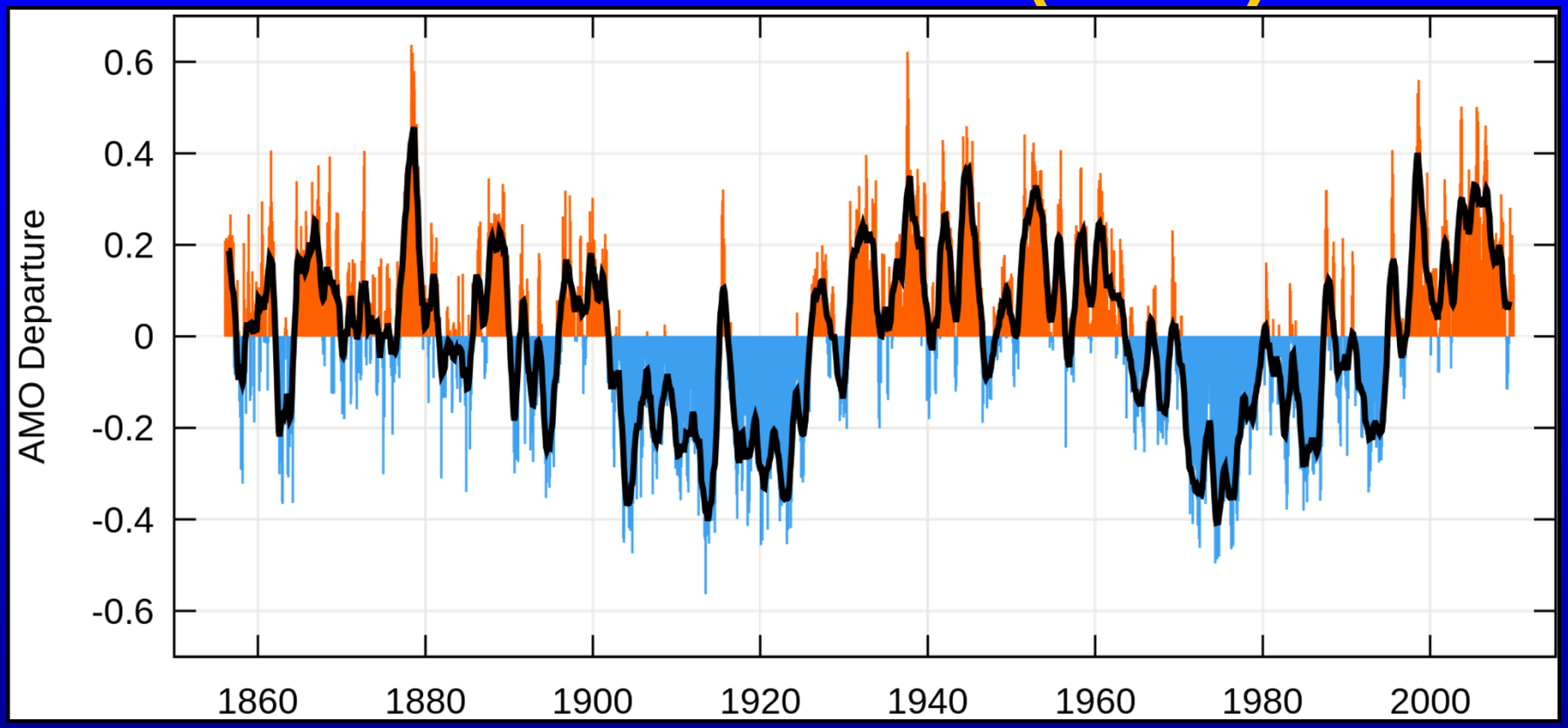
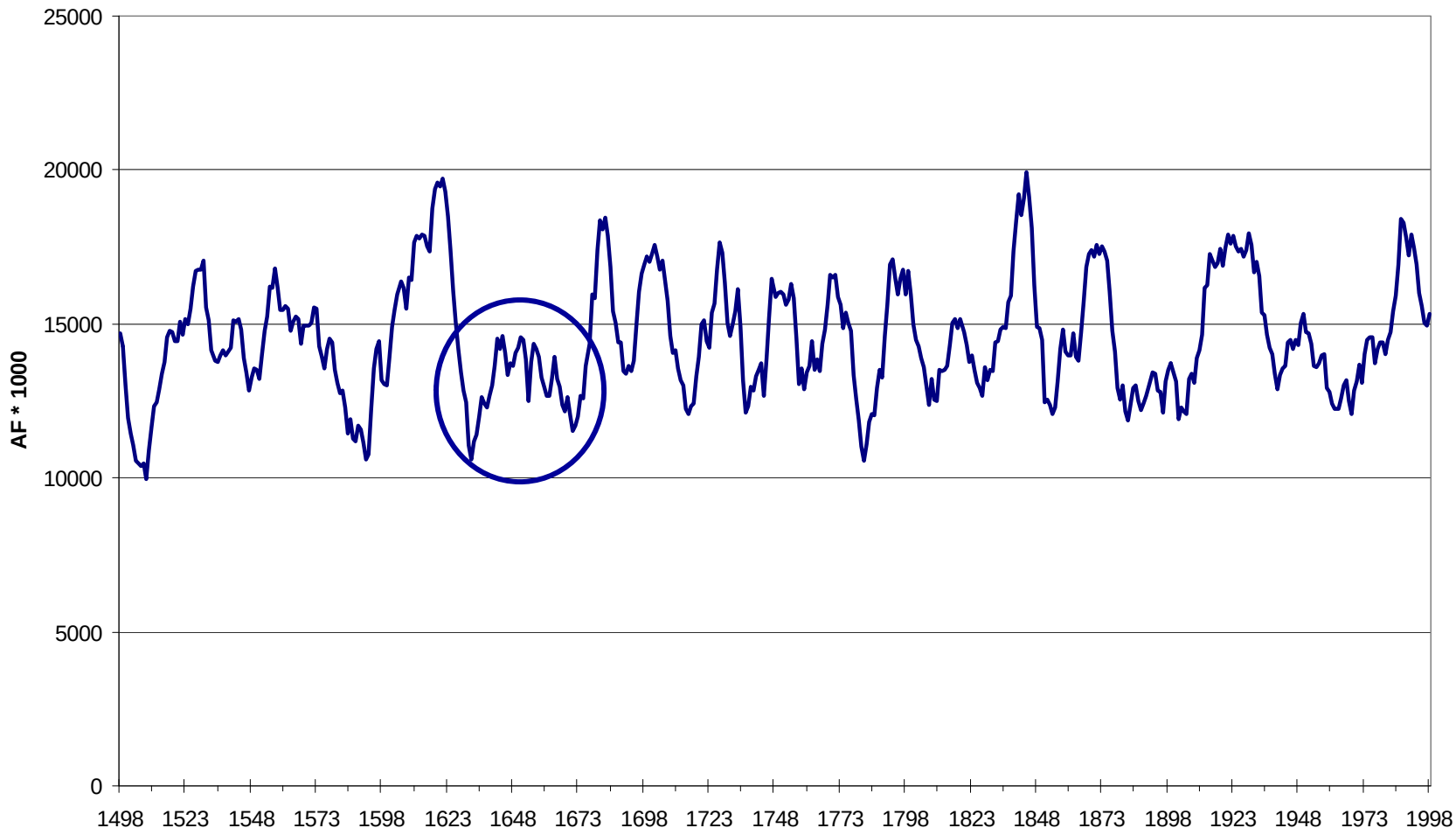
Monthly Values for the Atlantic Multidecadal Oscillation (AMO) Index



Lee Ferry NF ave. 13.2 MAF/yr when AMO is warm

Lee Ferry NF ave. 16.2 MAF/yr when AMO is cool

In 1965 Royce Tipton noted that from 1930-1964 the UB could develop about 4.8MAF/yr (2.5 MAF for Colorado)



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Possible Actions

- Status Quo – hope for wet years
- Action Alternatives:
  - Decrease uses (voluntary demand mgmt. approach)
  - Improve System Efficiency
  - Re-operate Upper Basin reservoirs

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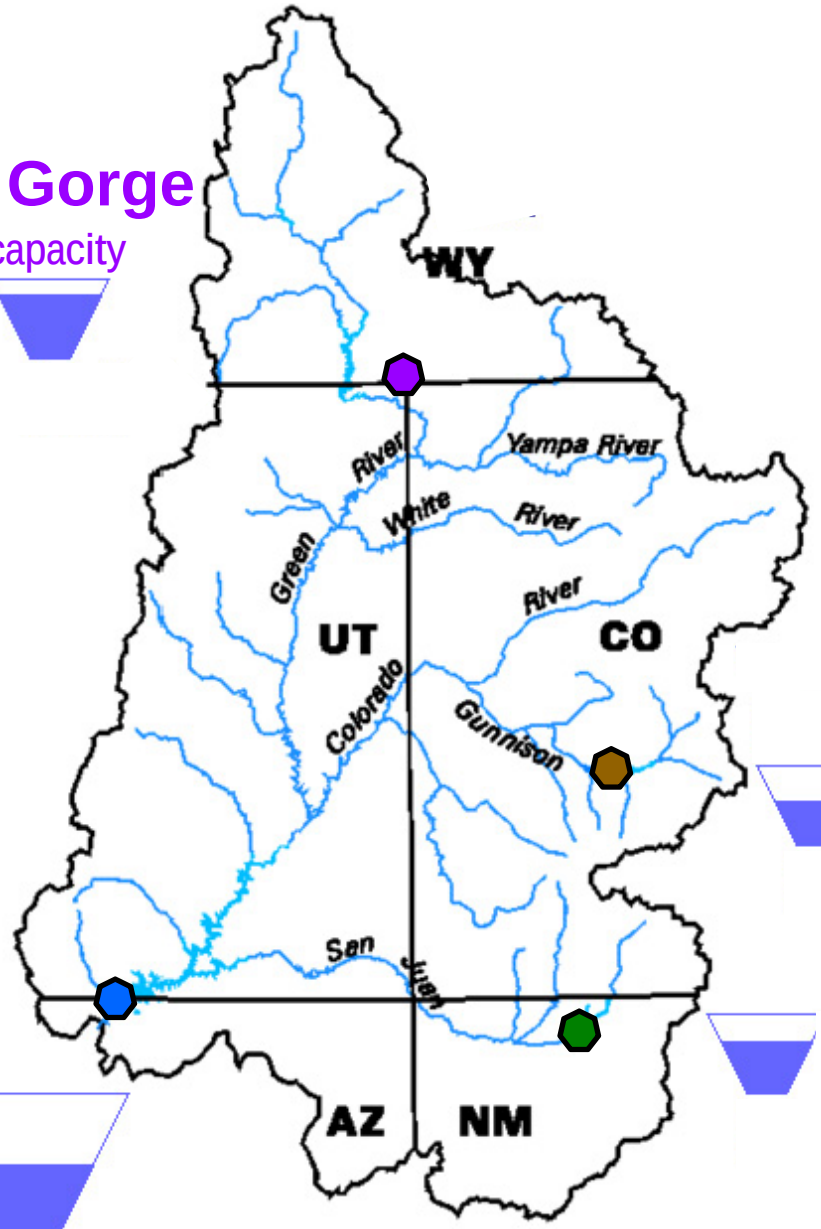
Colorado River Storage Project Units (CRSP)

Flaming Gorge
3.7MAF active capacity
76% full

CRSP Act of 1956 authorized construction of facilities for long-term regulation and development of Colorado River water resources



Aspinall Unit:
Blue Mesa, Morrow Point & Crystal Res.

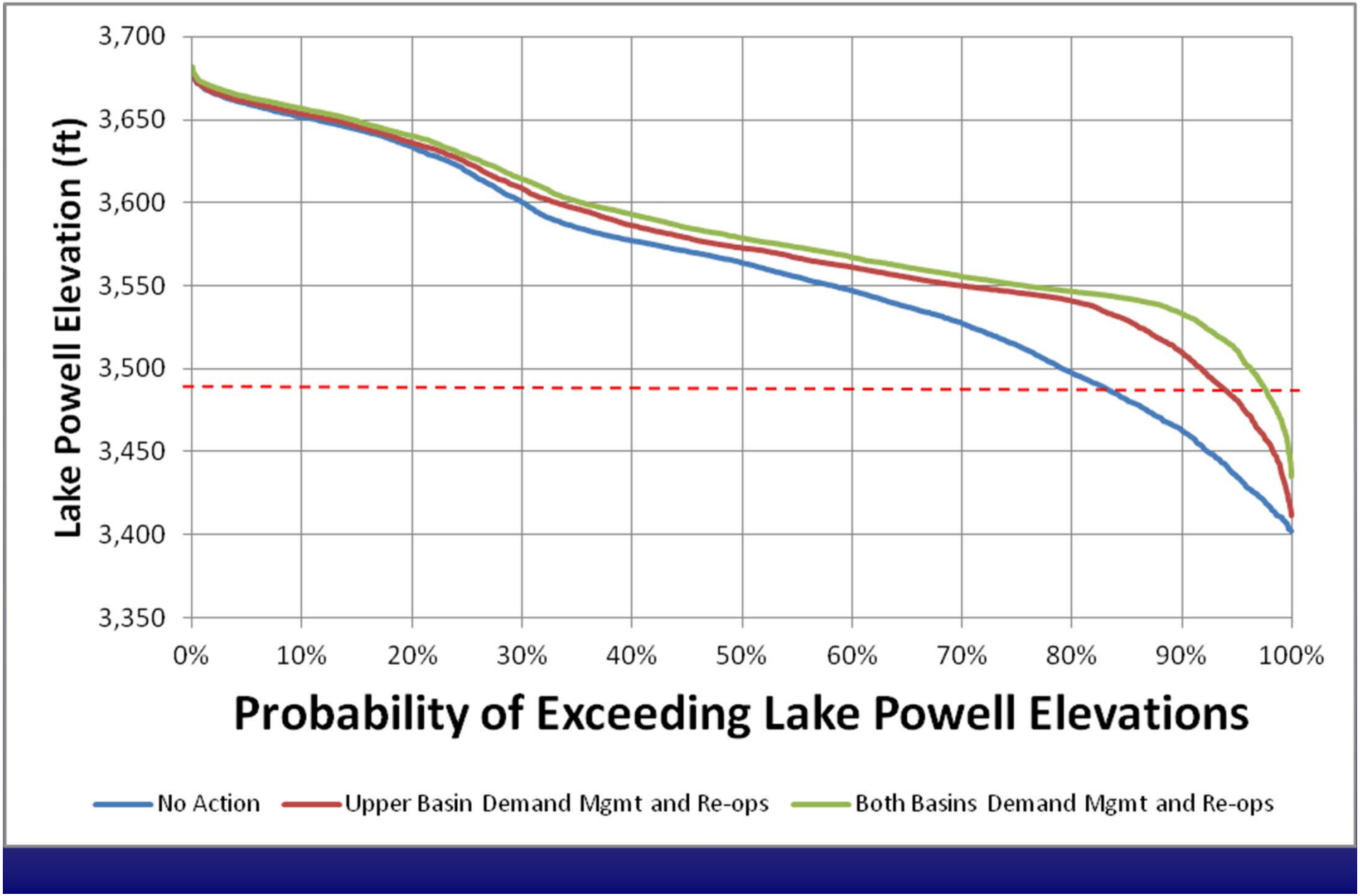
Blue Mesa
0.84MAF active capacity
46% full

Navajo
1.7 MAF active capacity
57% full

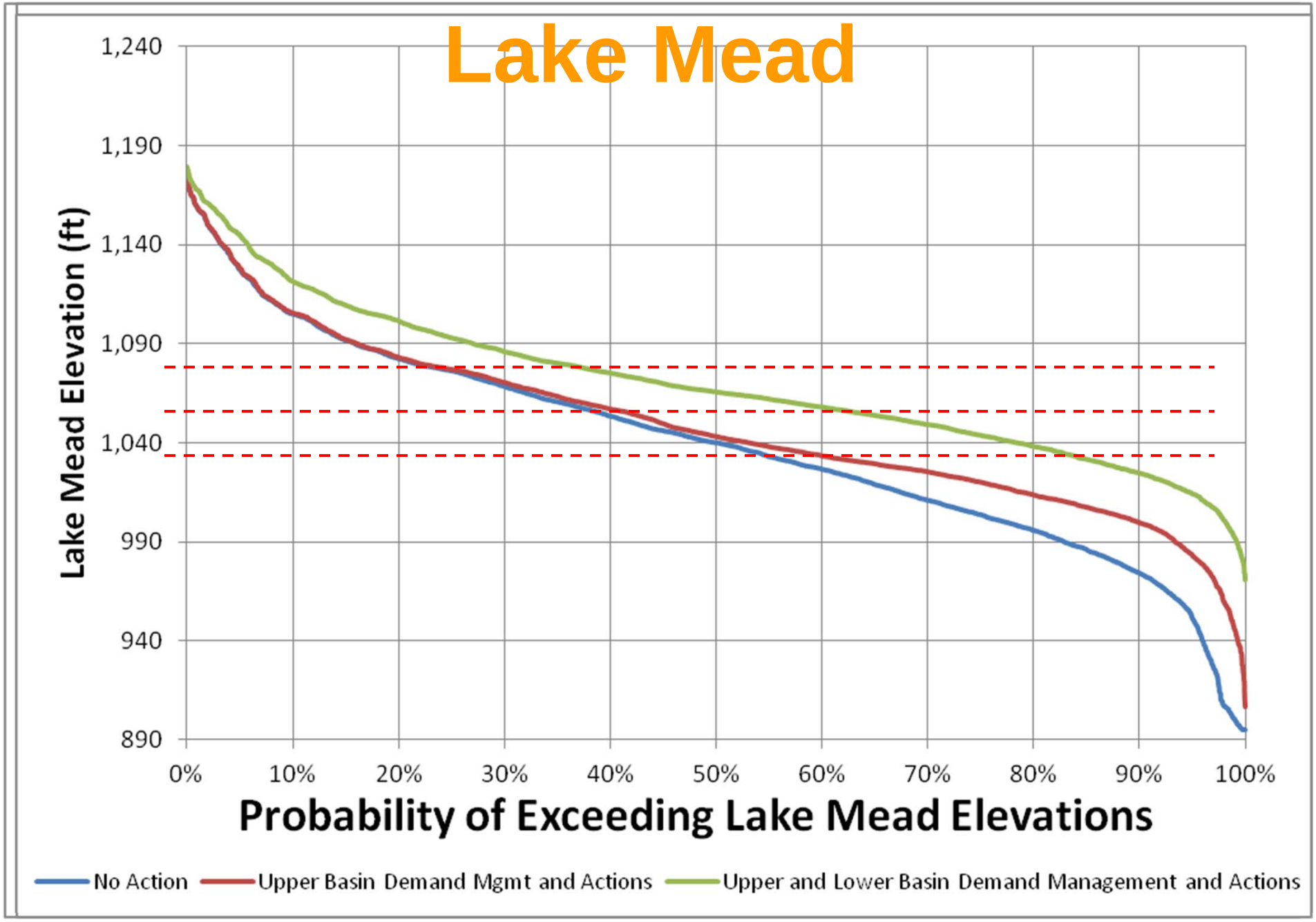
Lake Powell 26 MAF active capacity **41% full**

SOURCE: USBR UPPER COLORADO REGION STORAGE LEVELS AS OF 1/14/14

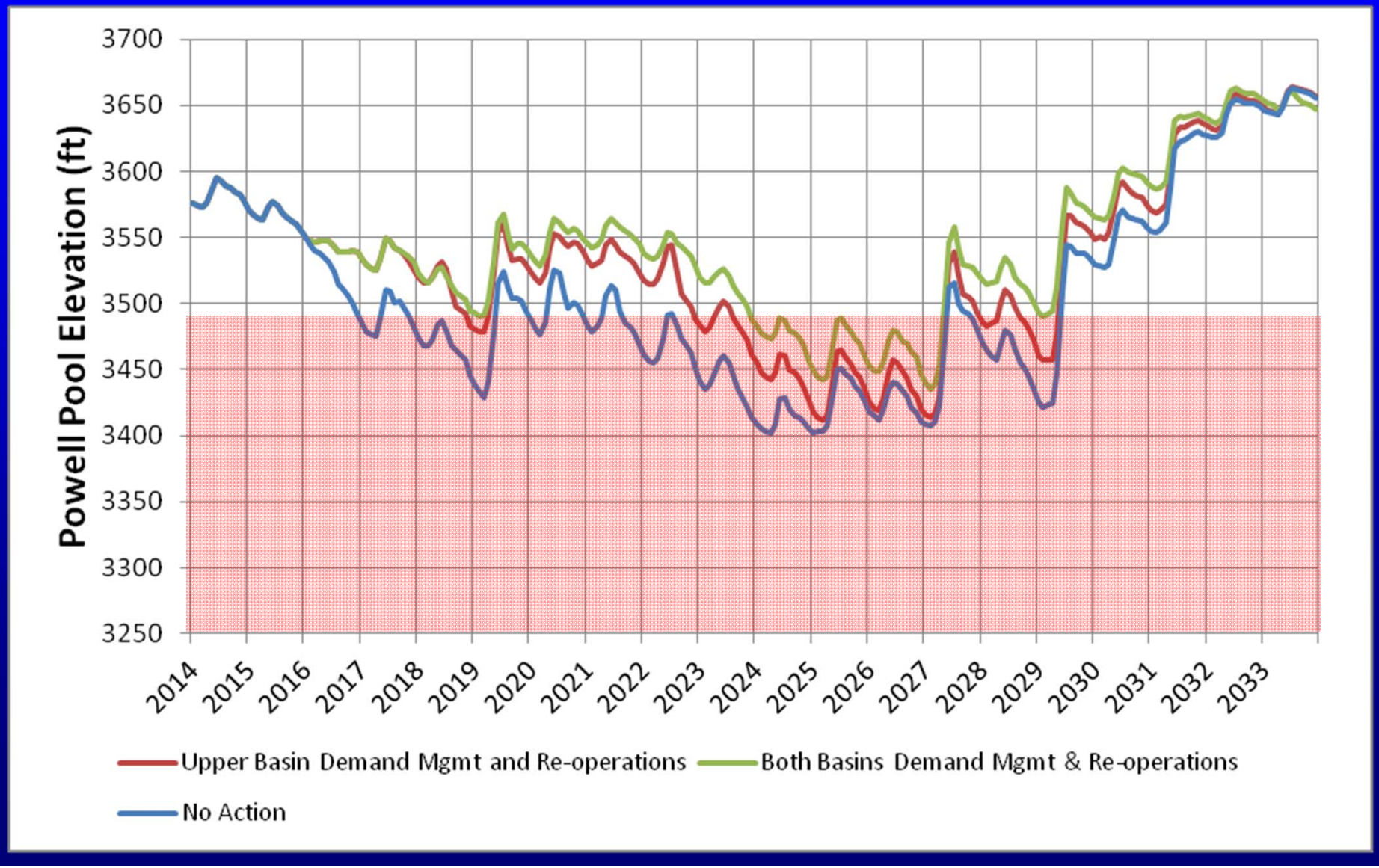
Lake Powell


3,700
3,650
3,600
3,550
3,500
3,450
3,400
3,350
Lake Powell Elevation (ft)
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Probability of Exceeding Lake Powell Elevations
No Action
Upper Basin Demand Mgmt and Re-ops
Both Basins Demand Mgmt and Re-ops

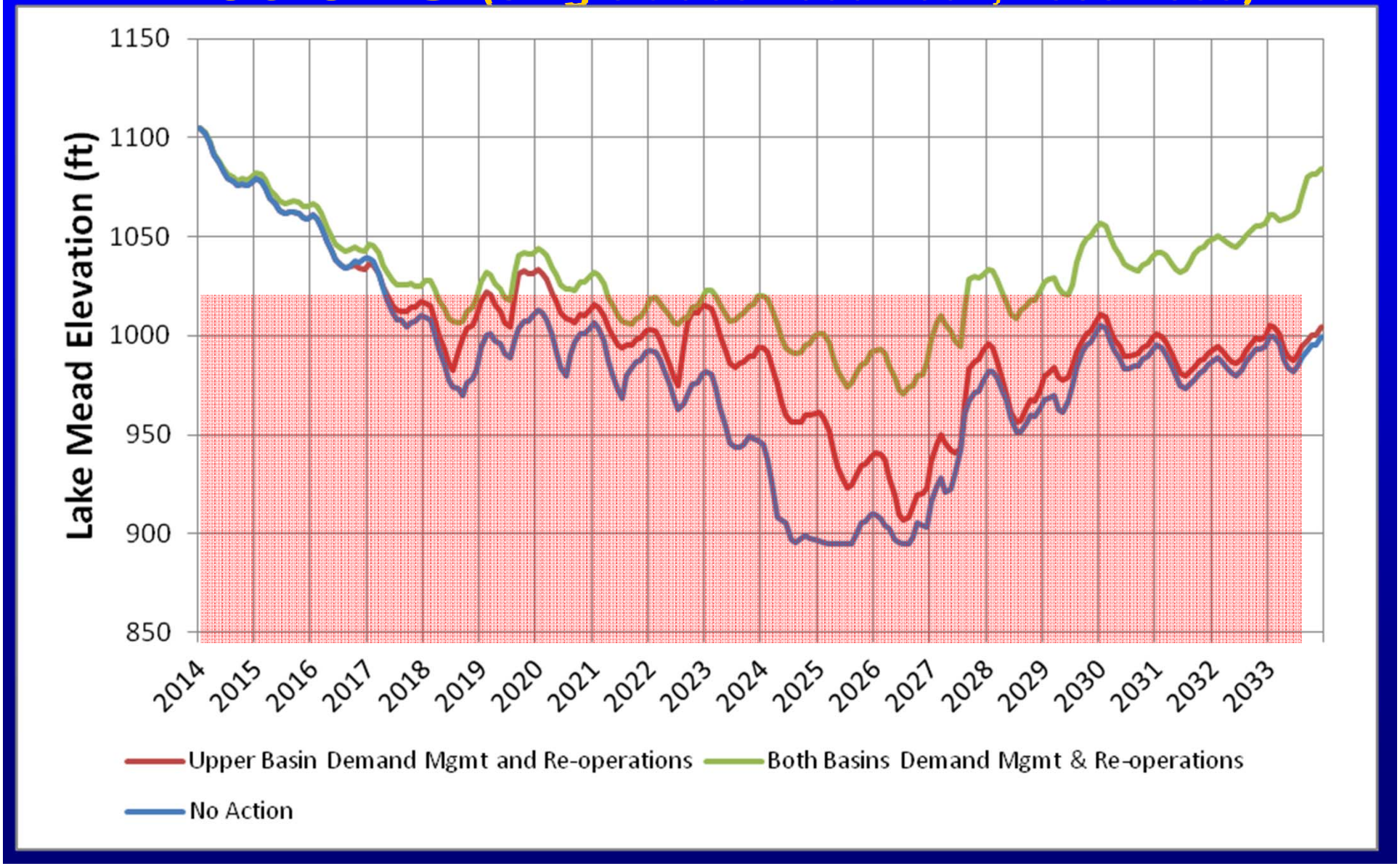
Lake Mead


1,240
1,190
1,140
1,090
1,040
990
940
890
Lake Mead Elevation (ft)
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Probability of Exceeding Lake Mead Elevations
No Action
Upper Basin Demand Mgmt and Actions
Upper and Lower Basin Demand Management and Actions

Lake Powell - Demand Mgmt & Re-Operations (single trace 2000-2007; 1988-1999)



Lake Mead - Demand Mgmt Actions (single trace 2000-2007; 1988-1999)



“Bending the Curve”

- Requires significantly reducing or eliminating the structural deficit in the Lower Basin
- Benefits accrue to both Upper and Lower Basins
- Ultimately, there are only three ways to slow the decline of Upper and Lower Basin reservoirs:
  - Reduce system losses
  - Reduce demand
  - Augment supply

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Collaboration Required

- Strong history within the basin of working together to reach agreement when needed
  - 2001 Interim Surplus Guidelines
  - 2007 Interim Guidelines
  - Minute 319
- Creative models developed to fund projects
  - Brock Reservoir
  - YDP pilot run
- Collaborative, consensus solutions are better than those imposed by administrative, legislative or judicial fiat

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Take Away Summary

1. Results are preliminary
2. Based upon contingency planning, not a prediction of future
3. All planning honors "Law of the River"
4. Not easy, will require further modeling, evaluation and outreach
5. Continued cooperation toward **BASIN-WIDE** contingency planning essential

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From the Draft CWP

“the past may not always be a Good Predictor of the future”

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