July 23, 2014

Addressing Declining Elevations in Lake Mead

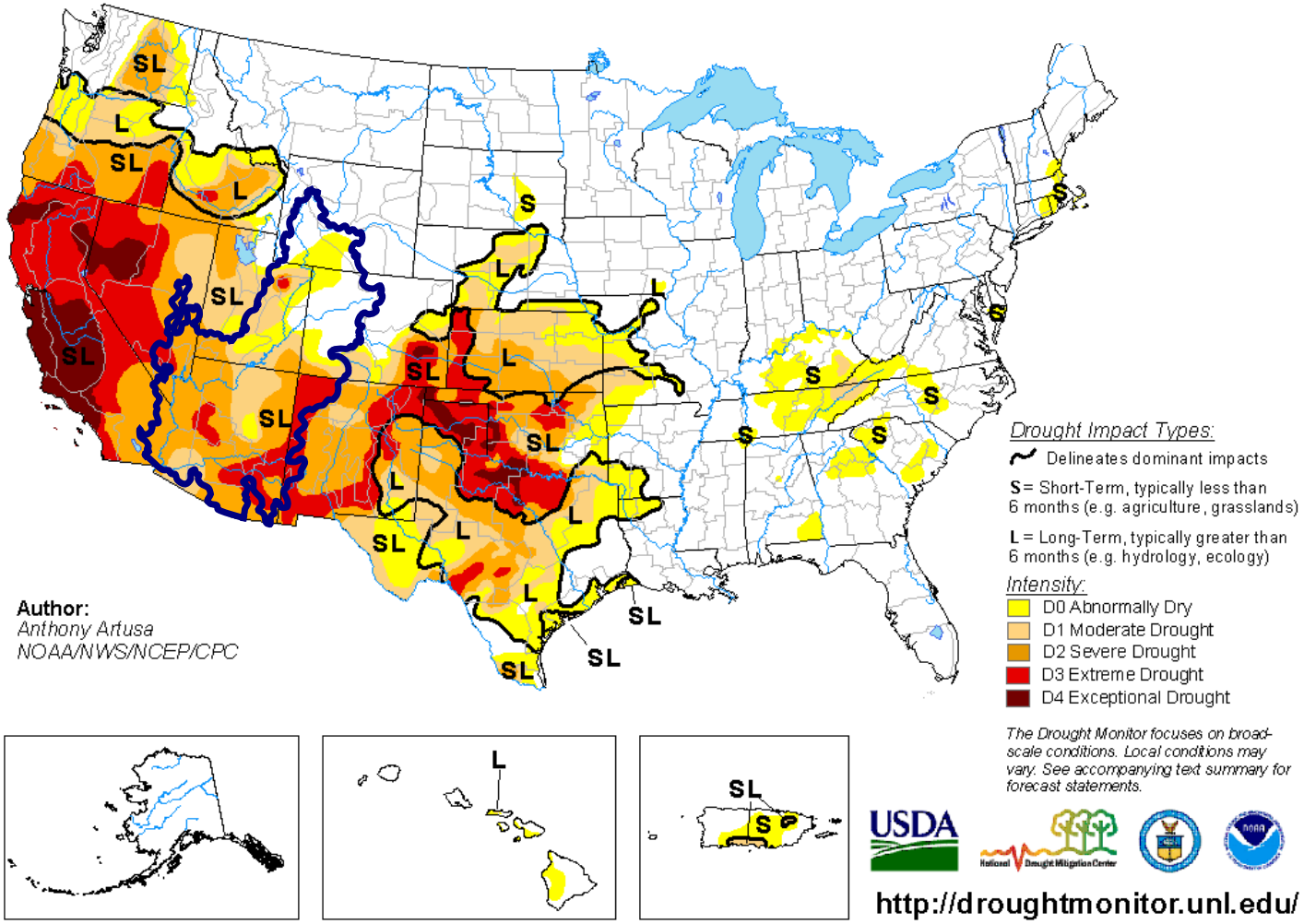
Meeting Topics

- **Drought update**
- **Attribute finalization**
- **Interbasin Cooperation**
- **Intake Pumping Station No. 3**

Drought Update

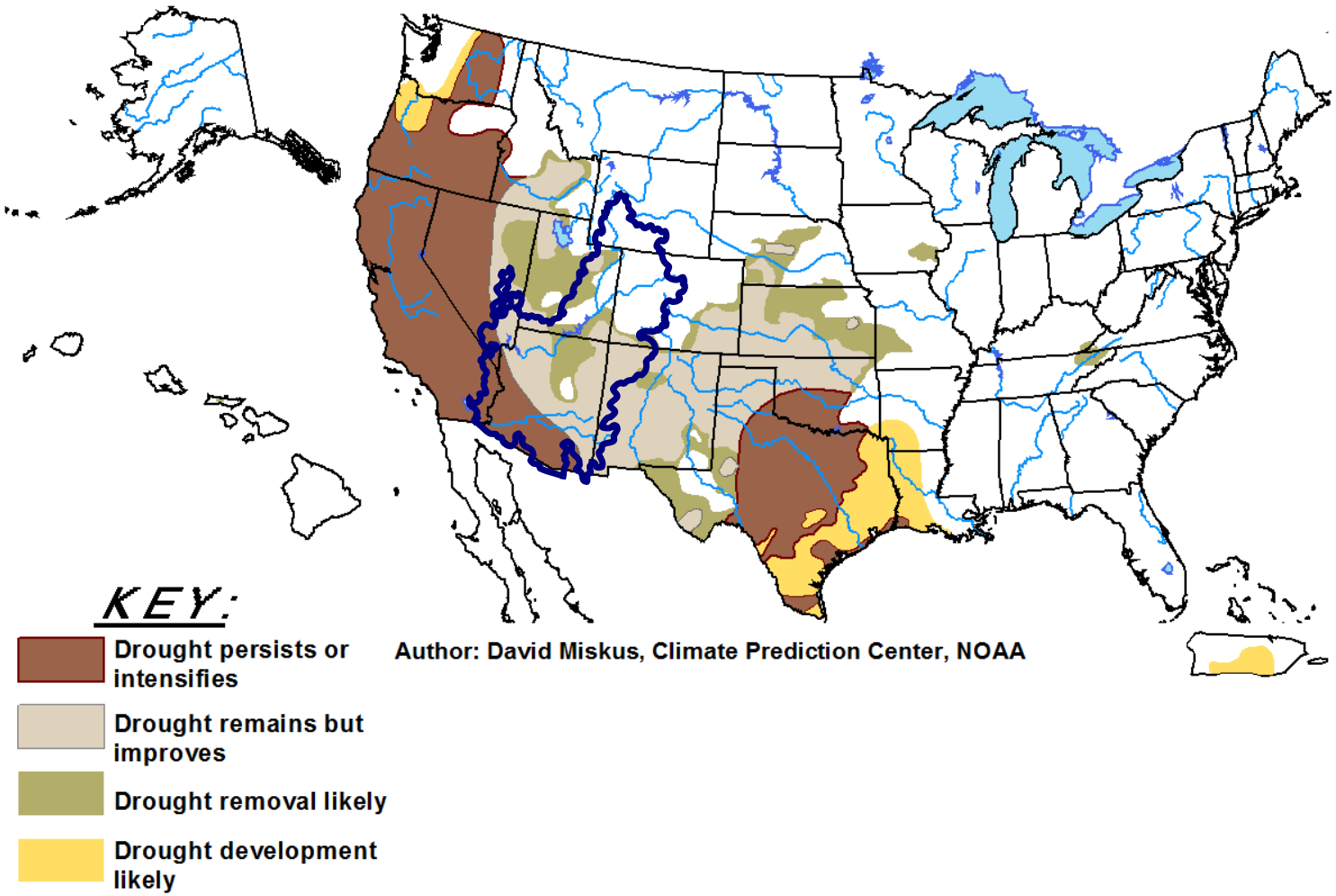
Drought Monitor

(July 8, 2014)



Drought Outlook

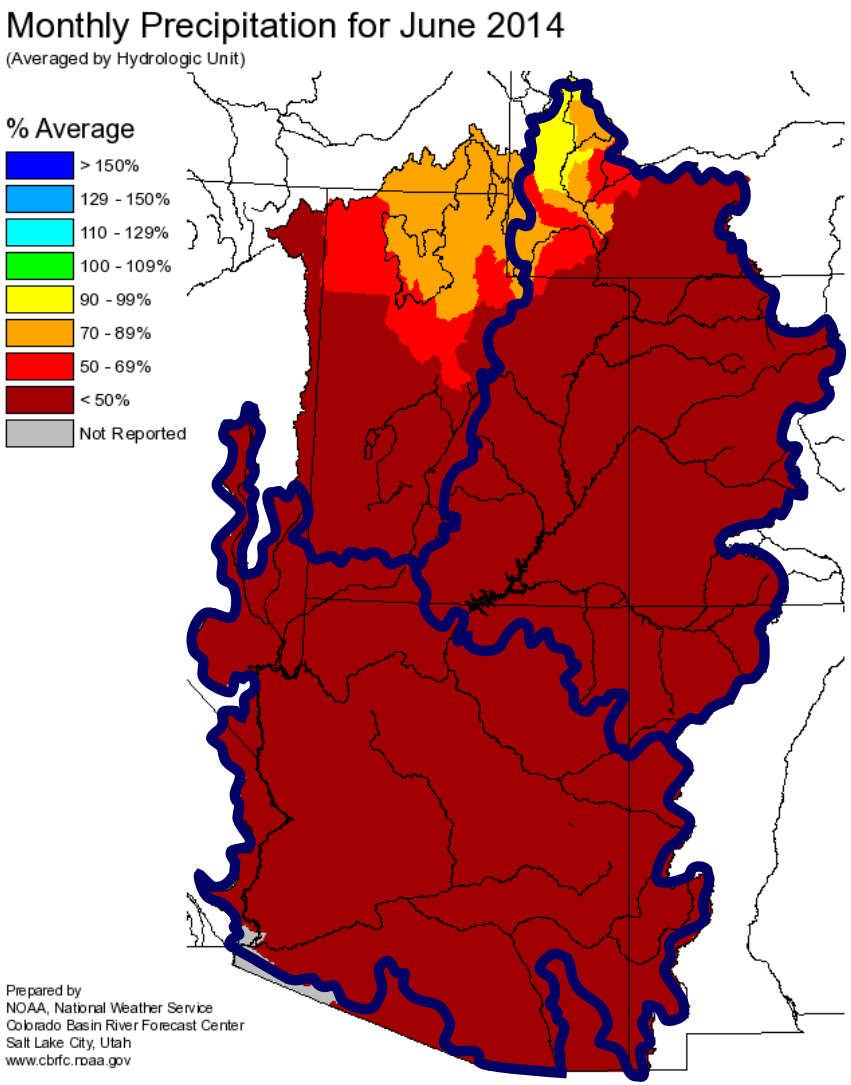
(Valid June – September 2014)



Source: National Oceanic Atmospheric Administration and the U.S. Department of Commerce

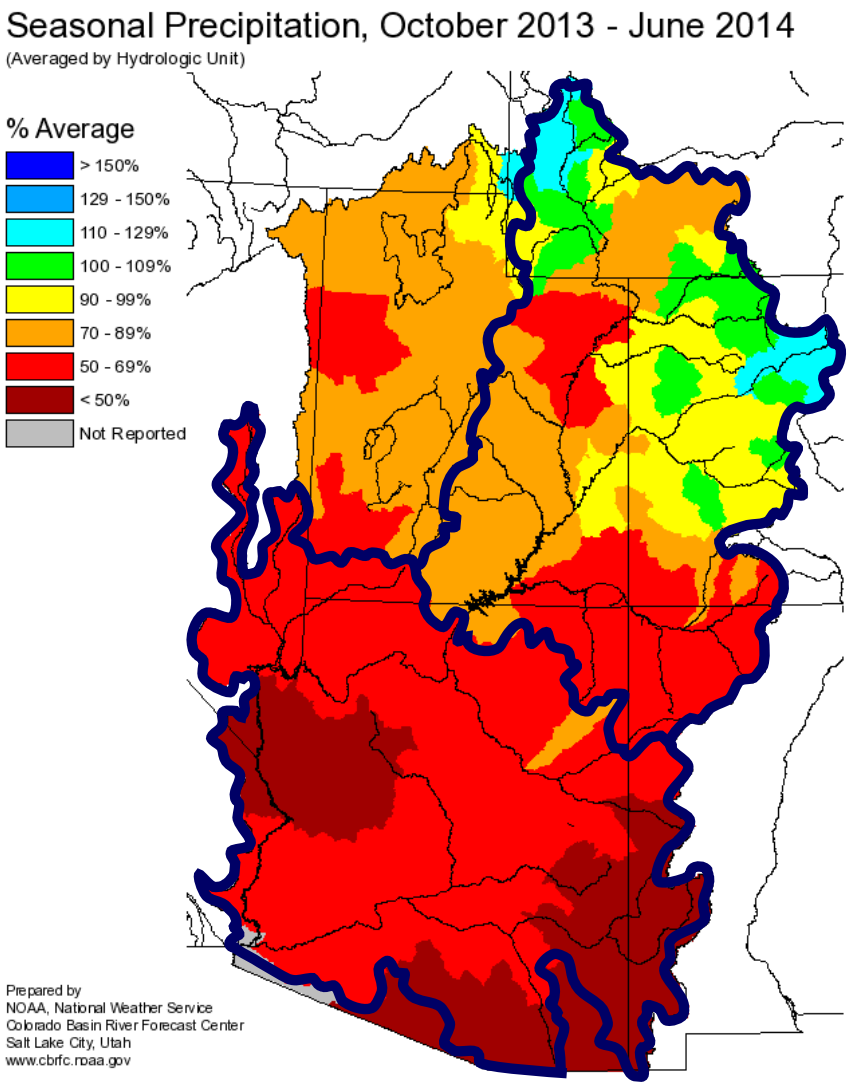
Colorado River Basin Conditions

June 2014 precipitation:
30% of average



Colorado River Basin Conditions

- **June inflow to Lake Powell:** 114% of average
- **Snow Pack:** N/A
- **Water Year 2014 Precipitation:** 97% of average
- **Forecasted Water Year 2014 Inflow to Lake Powell:** 95% of average

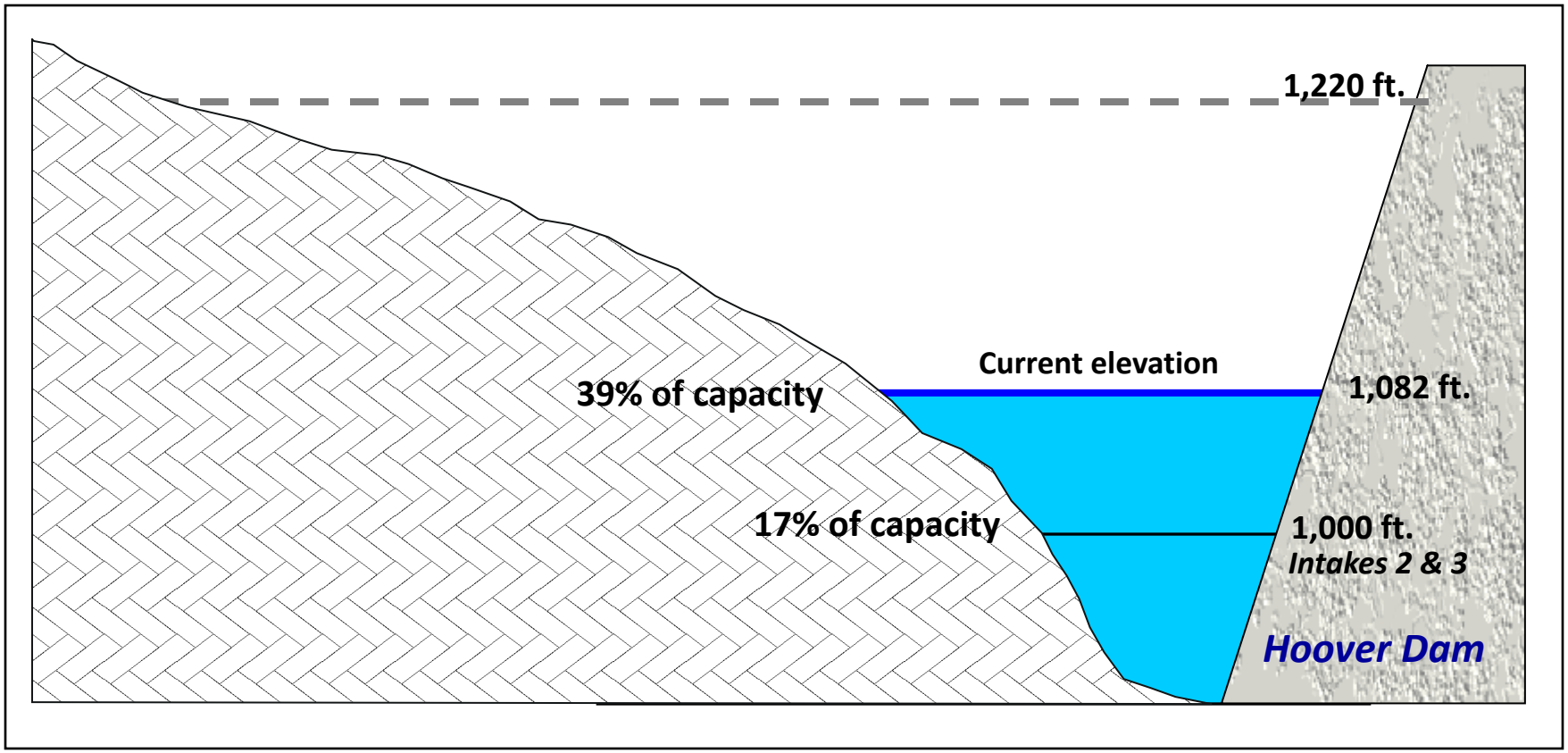


Precipitation and Inflow Forecast (Lake Powell)

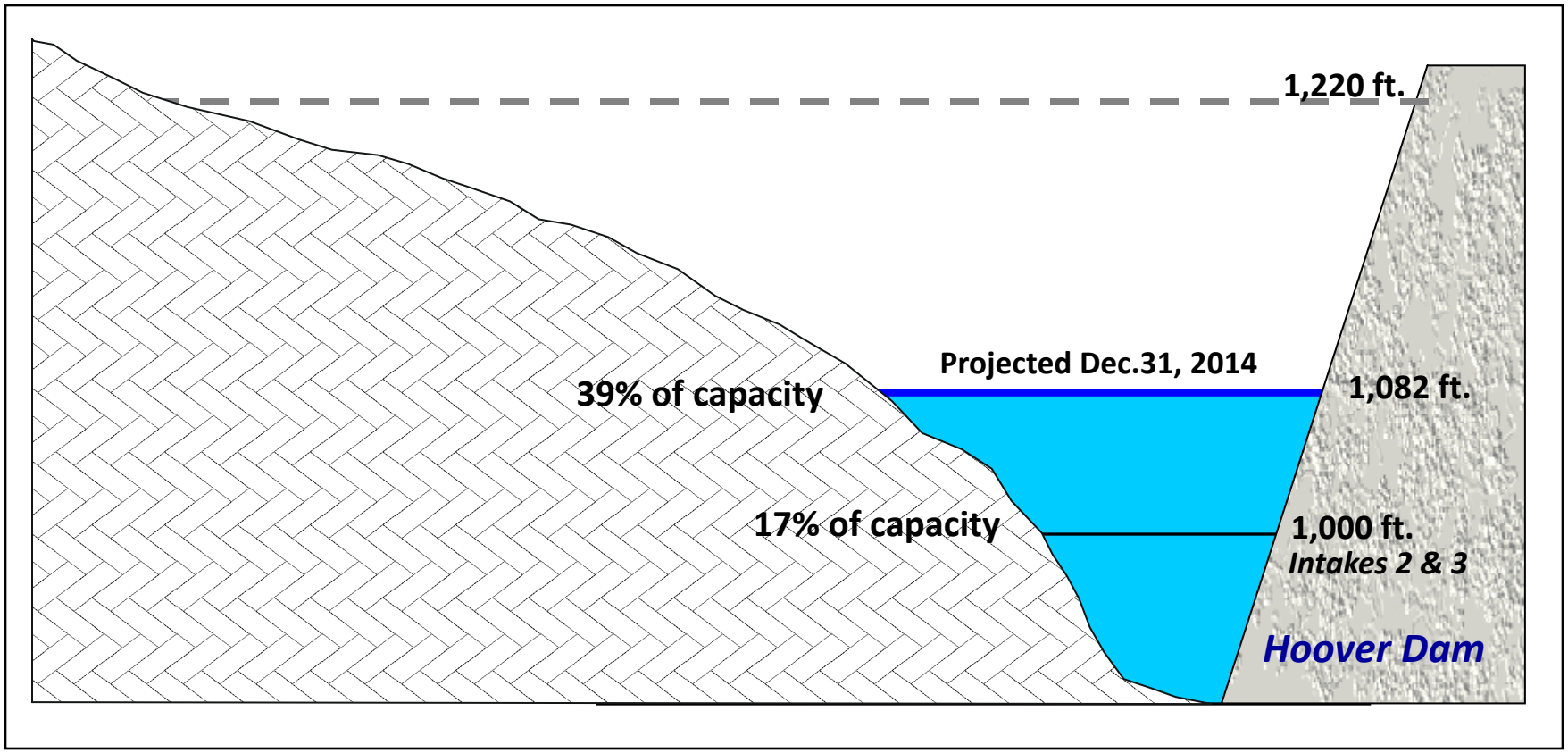
	2013 Water Year		2014 Water Year	
Month	Actual Precipitation	Inflows Forecast	Actual Precipitation	Inflows Forecast
Jan	72%	61%	96%	93%
Feb	78%	54%	102%	96%
Mar	76%	49%	103%	105%
Apr	78%	42%	103%	103%
May	80%	45%	101%	100%
Jun	77%	44%	97%	95%
Jul	80%	41%		
Aug	81%	40%		
Sept	90%	46%		
Actual	91%	47%		

Source: Bureau of Reclamation, Lower Colorado Water Supply Reports

Lake Mead Elevation: *Current*



Lake Mead Elevation: *Projected*



Attribute Development

Review: Importance of Attributes

- **Help to establish criteria against which alternatives can be compared**
- **Must be easy to understand**
- **Are non-redundant**
- **Can be measured**
- **Concise in number**

Committee-Suggested Attributes

- ✓ Reliability (Ability to maintain health and safety of users)
- ✓ Public Awareness
- E Economic sustainability
- $ Efficiency and cost savings (does it leverage technology?)
- $ Costs Cost efficiency or Cost effectiveness
- ✓ Impacts to quality of life
- Awareness of the impact of "crying wolf," but recognizing real effects
- Time needed to implement Minimize implementation risk
- ✓ Equitable
- Regional collaboration / collaborative approach to solutions
- Gives the assurance that the risk is minimized
- E How is potential economic development affected?
- $ Rate impacts

Attributes Refinement

Attribute	Comments	Potential Measures
Reliability	Is "Gives the assurance that risk is minimized" addressed from a hydrologic perspective?	Resilience to hydrologic variability of Colorado River: Score 1 if no change from current condition, 5 if independent of river hydrology Resilience to climate change: Score 1 if high susceptibility to climate change, 5 if no impact from climate change Probability of shortage Amount of shortage

Attributes Refinement

Attribute	Comments	Potential Measures
Cost efficiency or Cost effectiveness		Net present value Unit cost, e.g. $ per acre foot Rate impact

Attributes Refinement

Attribute	Comments	Potential Measures
Impacts to quality of life	Does this mean to allow a variety of uses of water if done so in an efficient manner (e.g. for swimming pools, landscape)?	Score of 1 to 5: 1 restricts existing consumptive water use, 5 allows water efficient consumptive water use

Attributes Refinement

Attribute	Comments	Potential Measures
Equitable	Does this mean fairness in allocation of water among customer types	Score of 1 to 5: 1 if strong differences, 5 if no difference

Attributes Refinement

Attribute	Comments	Potential Measures
Economic sustainability How potential economic development is affected	Does this mean to provide for water efficient economic growth?	Score of 1 to 5: 1 does not allow any new consumptive use, 5 if allows new, water efficient consumptive use

Attributes Refinement

Attribute	Comments	Potential Measures
Minimize implementation risk	Is "Gives the assurance that risk is minimized" addressed from an implementation perspective? Combined with Reliability, is it fully addressed?	Years required to implement Score of 1 to 5: 1 if highly complex regulatory/technical/public process, 5 if not complex Score of 1 to 5: 1 if multi-state and/or federal cooperation unlikely, 5 if multi-state and/or federal cooperation not required

Attributes Refinement

Attribute	Comments	Potential Measures
Regional collaboration / collaborative approach to solutions	Why or what about this is important, e.g. is it viewed as a path to lower cost solutions, is it inherently virtuous, etc.	

Attributes Refinement

Attribute	Comments	Potential Measures
Awareness of the impact of "crying wolf," but recognizing real effects	Is this incorporated with the measures for economic sustainability and impacts to quality of life?	

Committee Finding (June 2014)

The current level of risk for Lake Mead dropping below 1,000 feet from ongoing drought and climate change projections is unacceptable for the community.

Potential Alternatives

- **Additional conservation**
- **Interstate cooperation**
- **Facilities**
- **Supplies**

Options to Protect Lake Mead Elevations: *Interbasin Cooperation*

System Conservation
Federal Assistance
Desalination
Weather Modification
Voluntary Reductions

System Conservation

Option Overview

- Funds projects throughout the Colorado River Basin that reduce Colorado River demands or create additional system water
- Benefits system as a whole: no funding partner receives additional water rights
- Shared risk and responsibility among funding partners

Implementation Issues

- Requires commitments from partners – Southern Nevada cannot implement alone

Costs

- $100 - $500 per acre foot (depending on project)

System Conservation – Potential Options

Potential Options

- Agricultural conservation
- Agricultural land fallowing
- Reducing conveyance losses (canal lining projects)
- Municipal conservation
- Reducing system losses (occurring as bypass flows or water ordered, but not delivered)

System Conservation – Details

Option Overview

Pilot Program: Determine to what extent System Conservation is cost-effective and feasible to mitigate drought impacts

- **Water savings not accrued to any single entity, but rather to improve system storage**
- **Activities will occur in both basins**
- **Shared risk and responsibility among all parties**

Parties to agreement: Bureau of Reclamation, Central Arizona Water Conservation District, Metropolitan Water District of Southern California, Denver Water, and SNWA

Funding Commitments: $11 million total ($3 million from the Bureau of Reclamation, $2 million from each utility)

Federal funding assistance is being sought to from the USDA's Regional Conservation Partnership Program to fund programs in the Lower Basin.

Federal Assistance: Emergency Drought Relief Act (S. 2198)

Option Overview

- Federal bill designed to increase water elevations in the Colorado River Basin's major reservoirs
- Bill directs the Secretary of the Interior to fund or participate in pilot projects to increase water storage in Lake Mead

Implementation Issues

- Needs to pass the House of Representatives

Desalination - Brackish

Option Overview

- Desalinating salty groundwater supplies
- Projects are limited to relatively small local projects by municipal water providers in Southern California and operation of the Yuma Desalting Plant

Costs

$600 - $700 per acre-feet

Implementation Issues

- Requires willing participants
- Environmental concerns
- Permitting and implementation timelines exceed 5 years

Desalination – Pacific Ocean

Option Overview

- Desalinating ocean water supplies in California, Mexico and the Gulf of California

Costs

$1,600 - $2,600 per acre-feet, assuming the costs were related to an exchange of water rather than conveyance

Implementation Issues

- Technical feasibility undetermined for large-scale desalination facilities
- Environmental impacts
- High energy requirements
- Permitting and implementation timelines often exceed 20 years before any water can be utilized

Weather Modification

Option Overview

- Cloud seeding to increase snowfall in mountain regions

Costs

$20 - $30 per acre-feet

Implementation Issues

- Appropriate storms to seed occur less frequently in drought years
- Significant uncertainty related to the quantity of yield over time

Voluntary Reductions

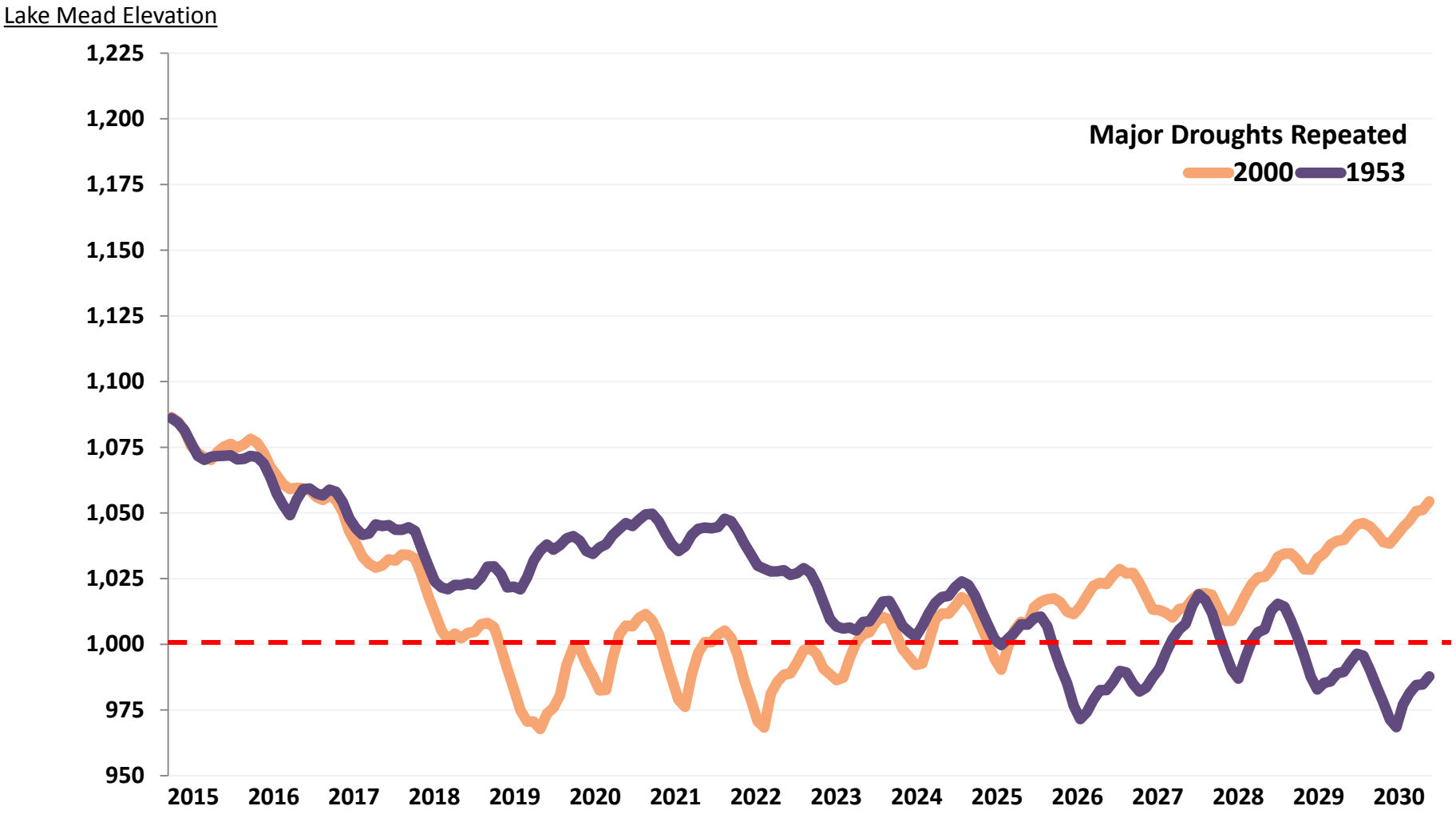
Option Overview

- Agreed-upon, voluntary reductions from some or all Colorado River water users
- Water savings benefit system as a whole

Implementation Issues

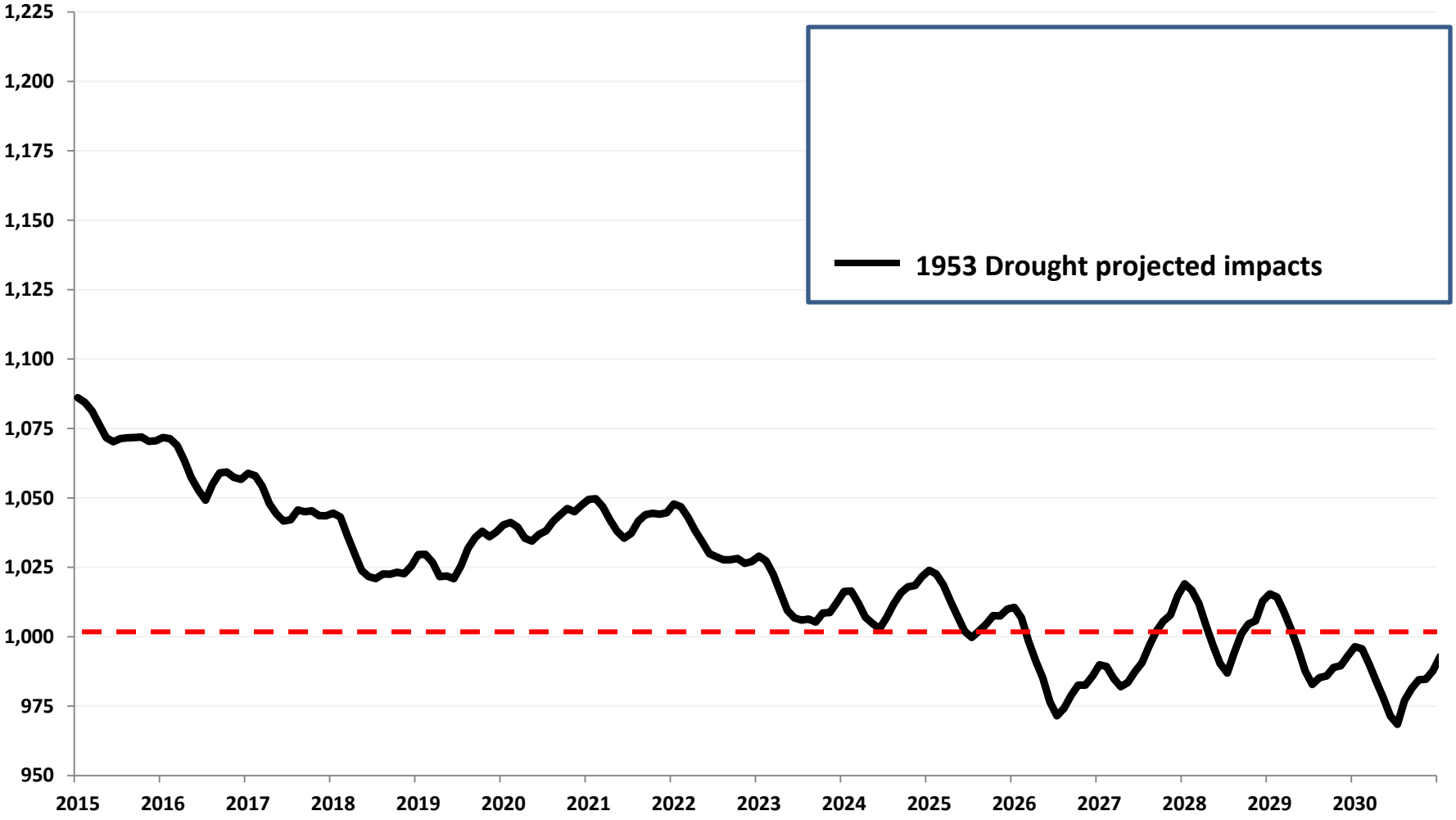
- Requires willing participants
- Reliability and enforceability
- Political feasibility

Representation of Ongoing Drought



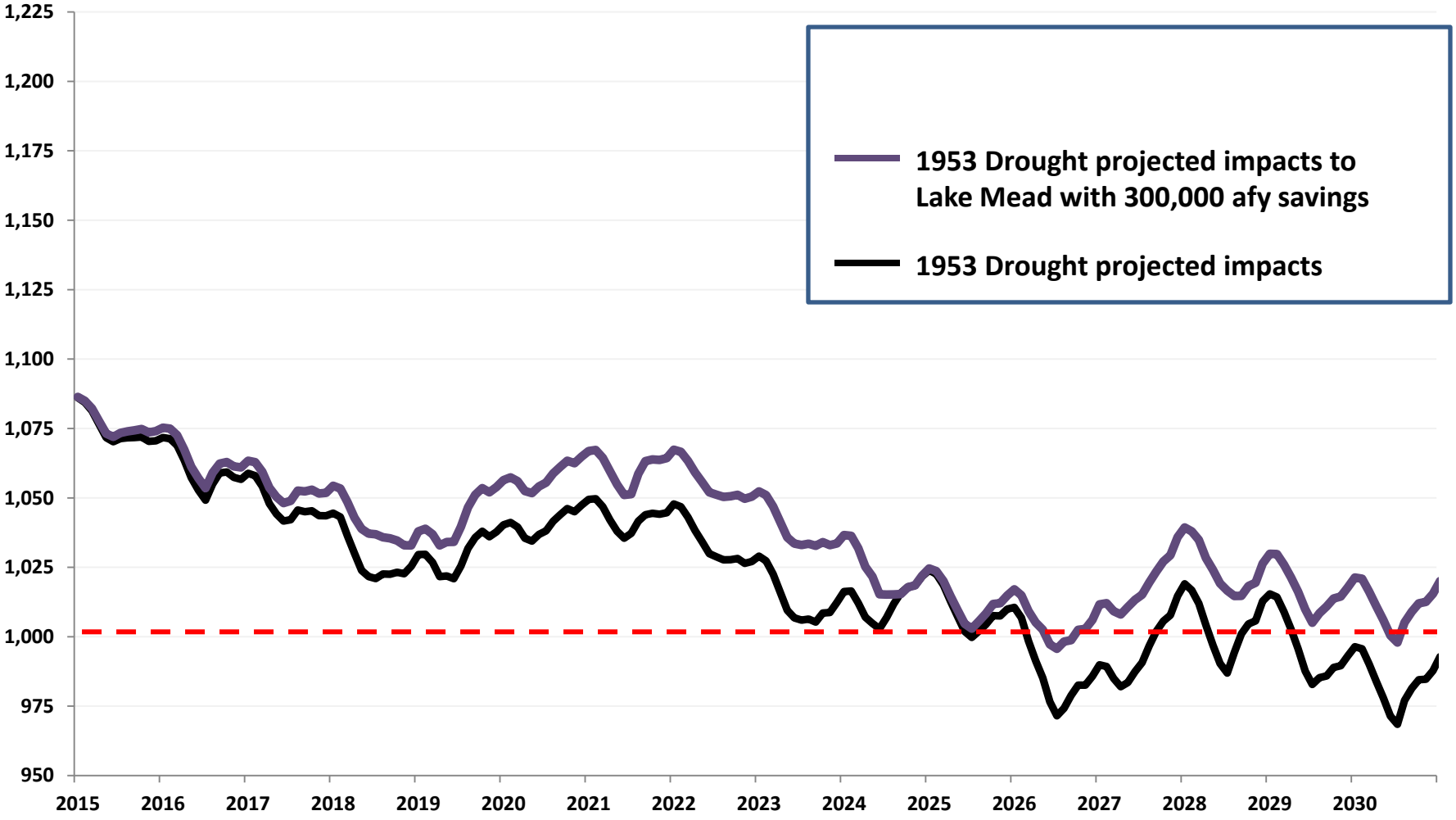
1953 Drought: Modeled Continuations

Lake Mead Elevations



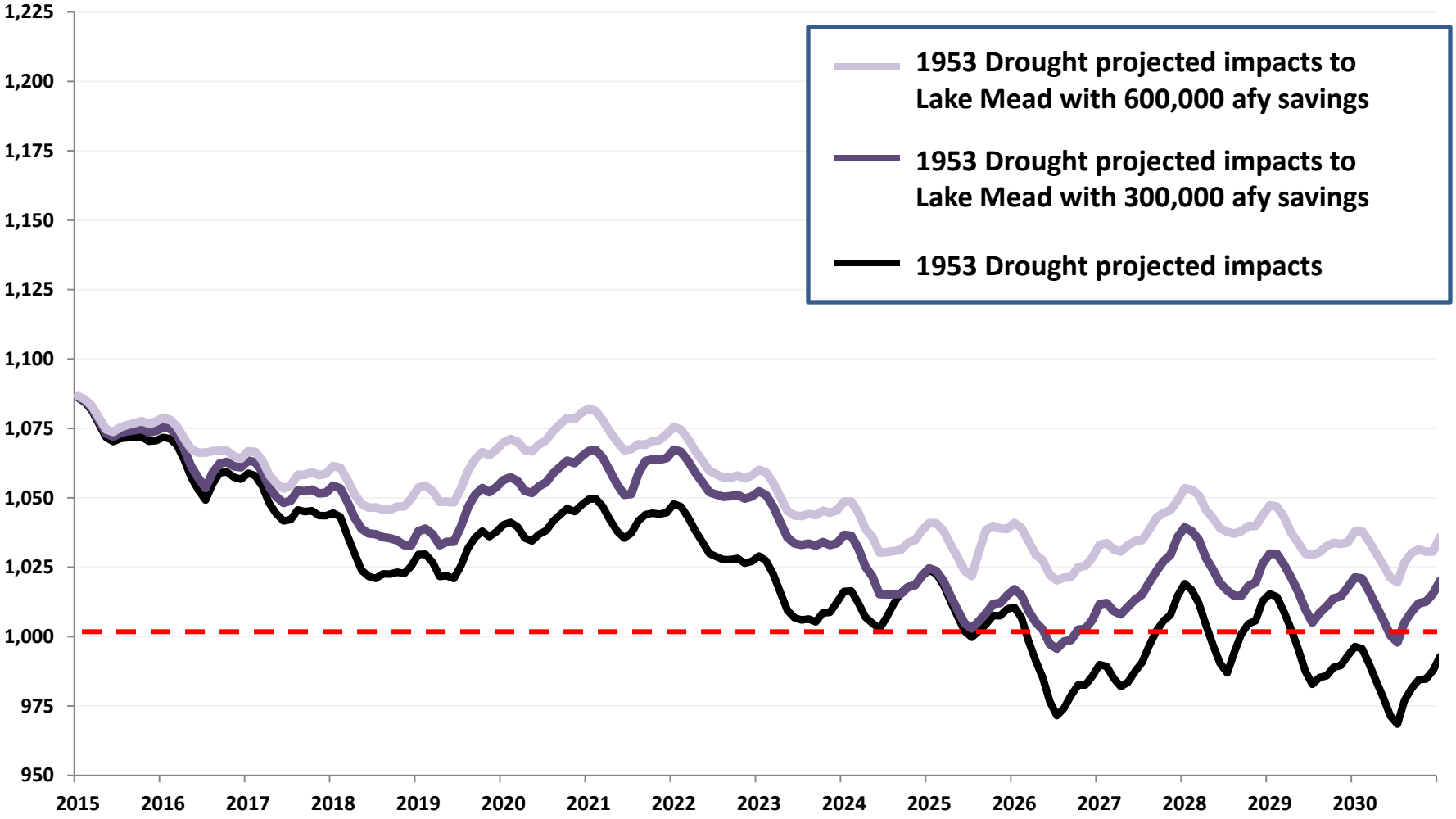
1953 Drought: Modeled Continuations

Lake Mead Elevations



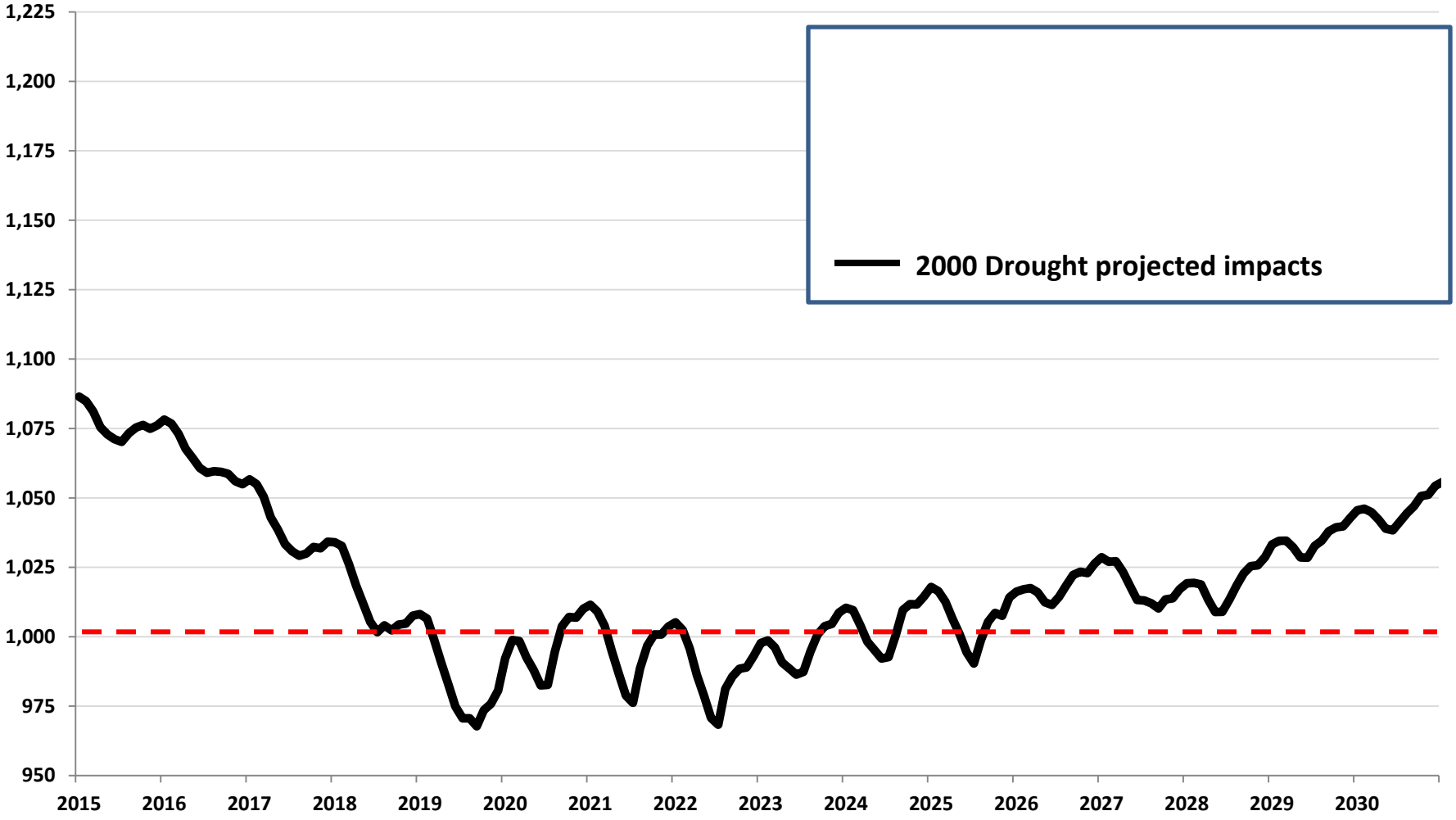
1953 Drought: Modeled Continuations

Lake Mead Elevations



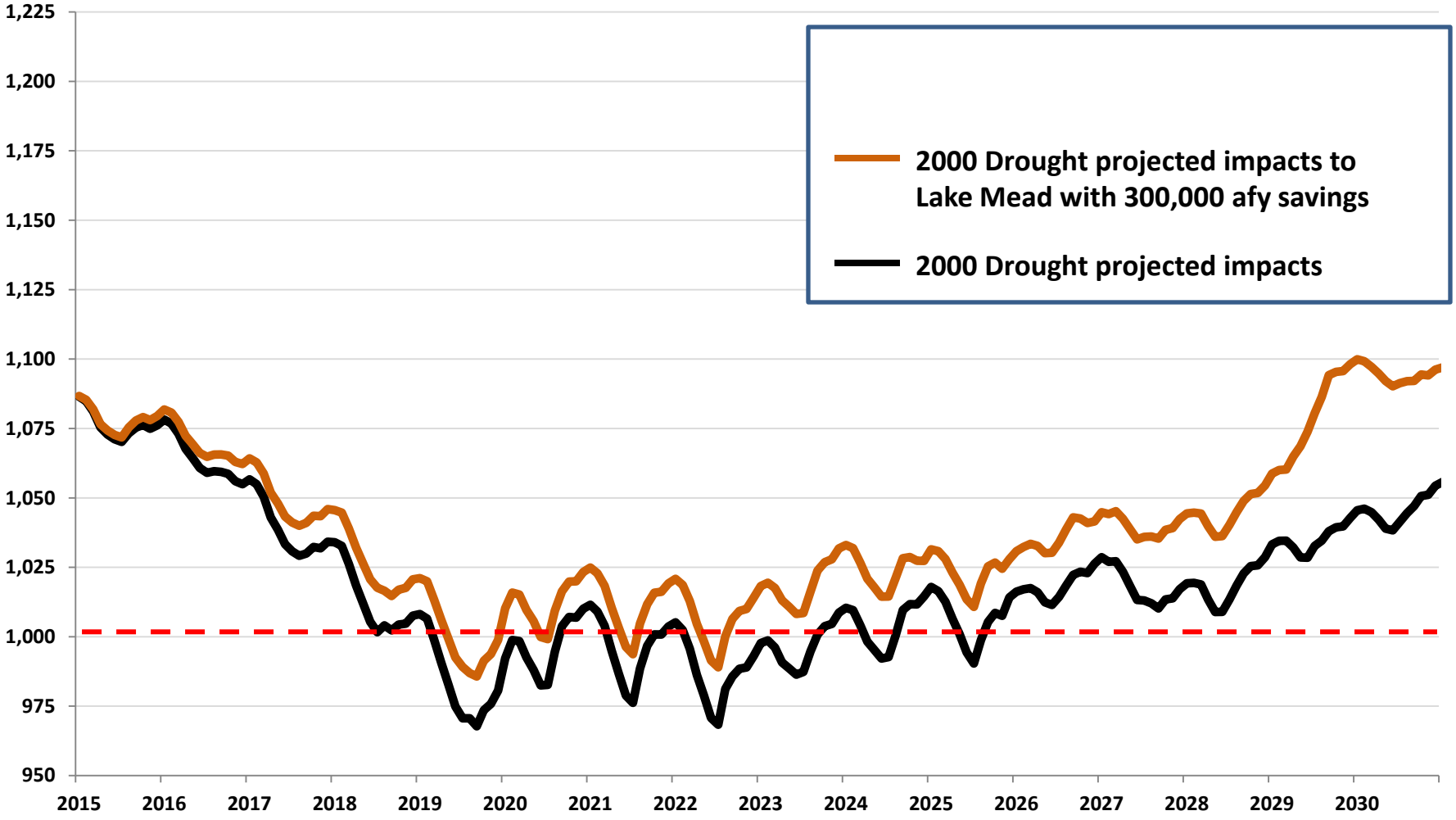
2000 Drought: Modeled Continuations

Lake Mead Elevations



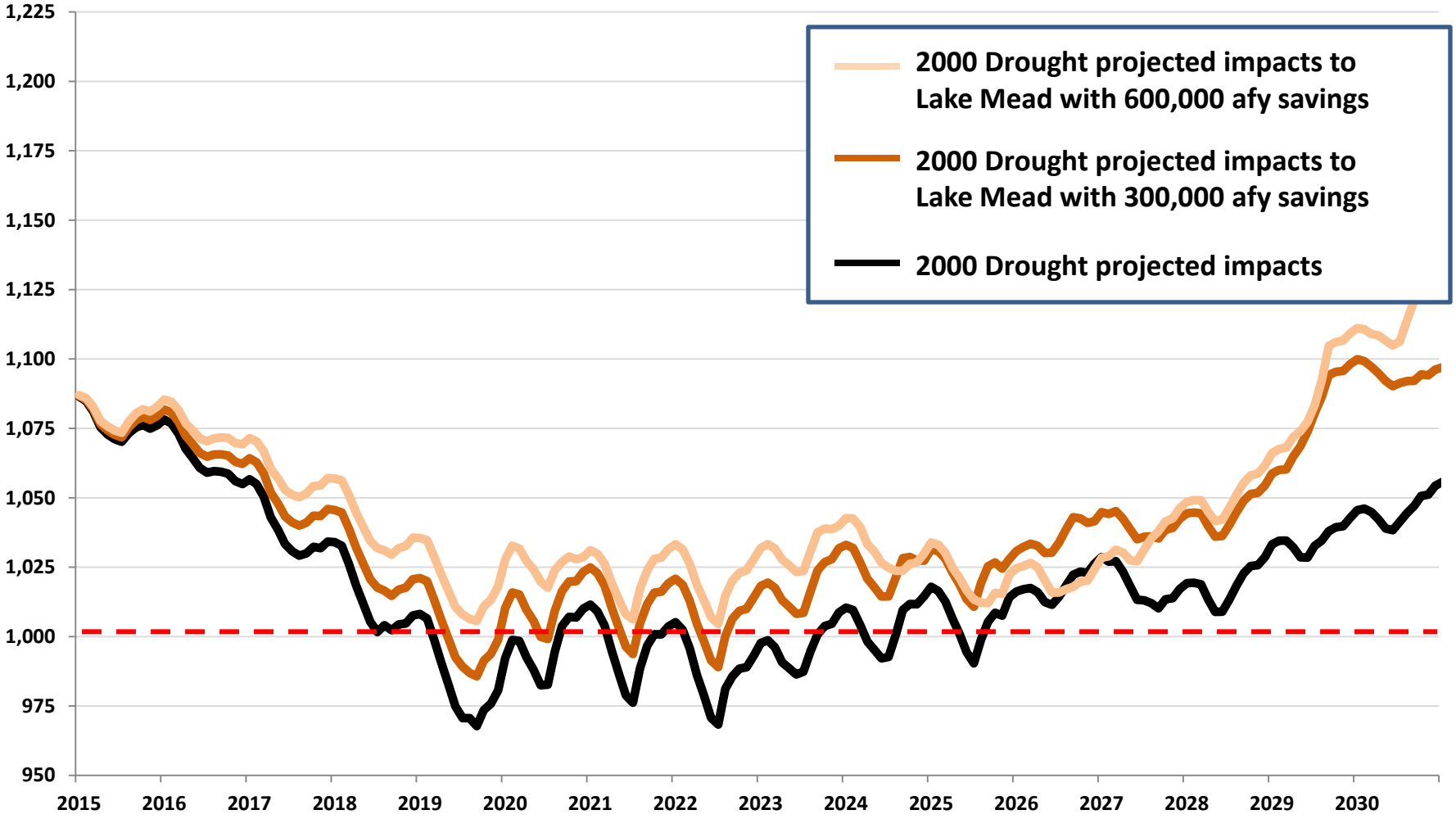
2000 Drought: Modeled Continuations

Lake Mead Elevations



2000 Drought: Modeled Continuations

Lake Mead Elevations



Intake Pumping Station No. 3

Intake Pumping Station No. 3

Option Overview

- Intake Pumping Station to pump from Intake No. 3
- Allows SNWA to pump water below elevation 1,000 feet (study evaluates a pumping elevation at 875 feet)
- Preserves pumping capacity for Southern Nevada
- Provides a backup pumping station if Intake No. 1 and Intake No 2 are inoperable due to low lake levels
- Does not provide a new source of water; only protects access to Lake Mead

Costs

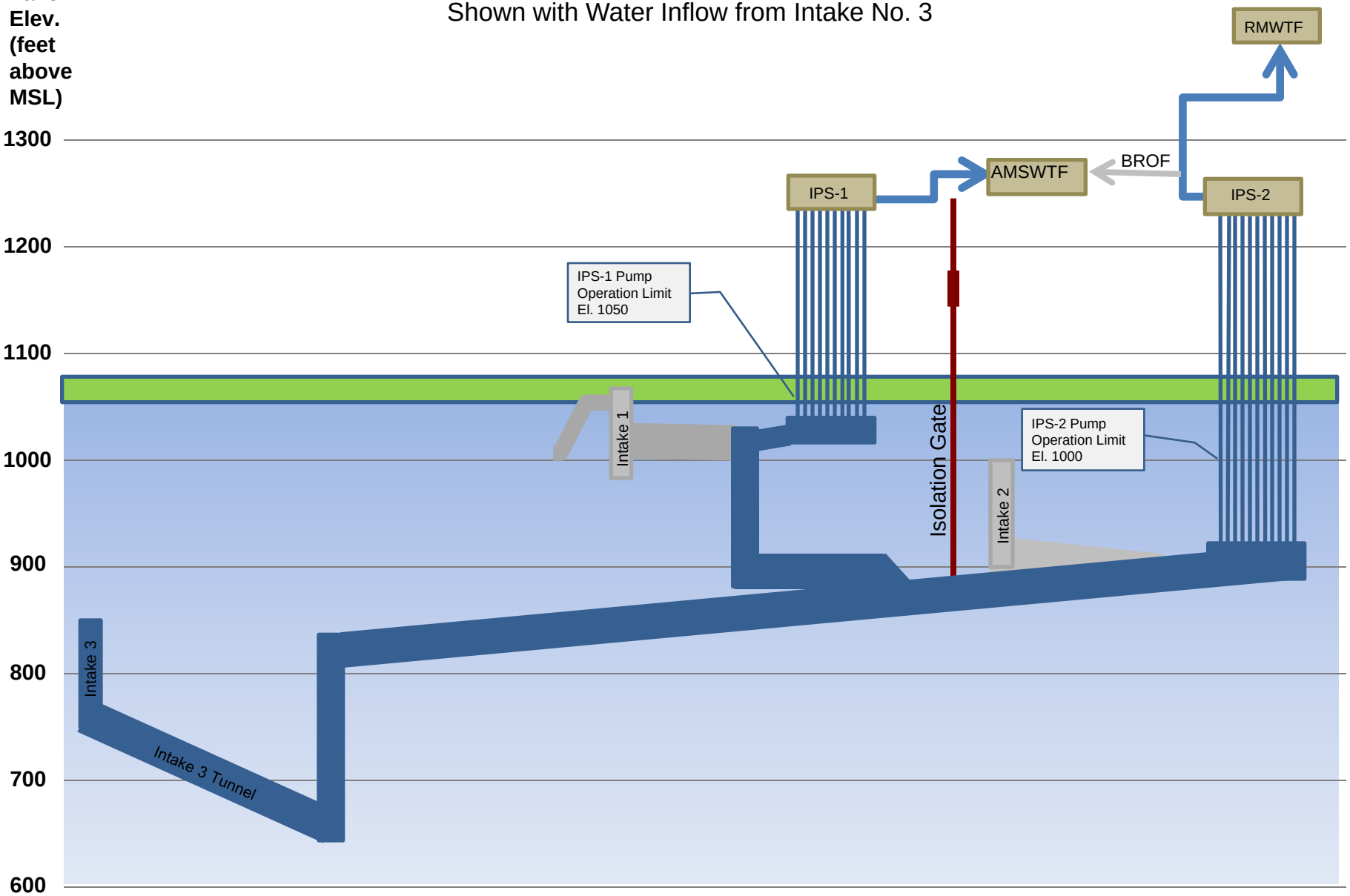
- Estimated costs: $350 - $550 million for 900 MGD capacity

Implementation Issues

- Technically challenging
- Design and construction lead-time (1.5-2 years of design, 4-6.5 years of construction)
- Cost / funding

SNWA Lake Mead Intake Systems

Shown with Water Inflow from Intake No. 3



Intake Pumping Station No. 3

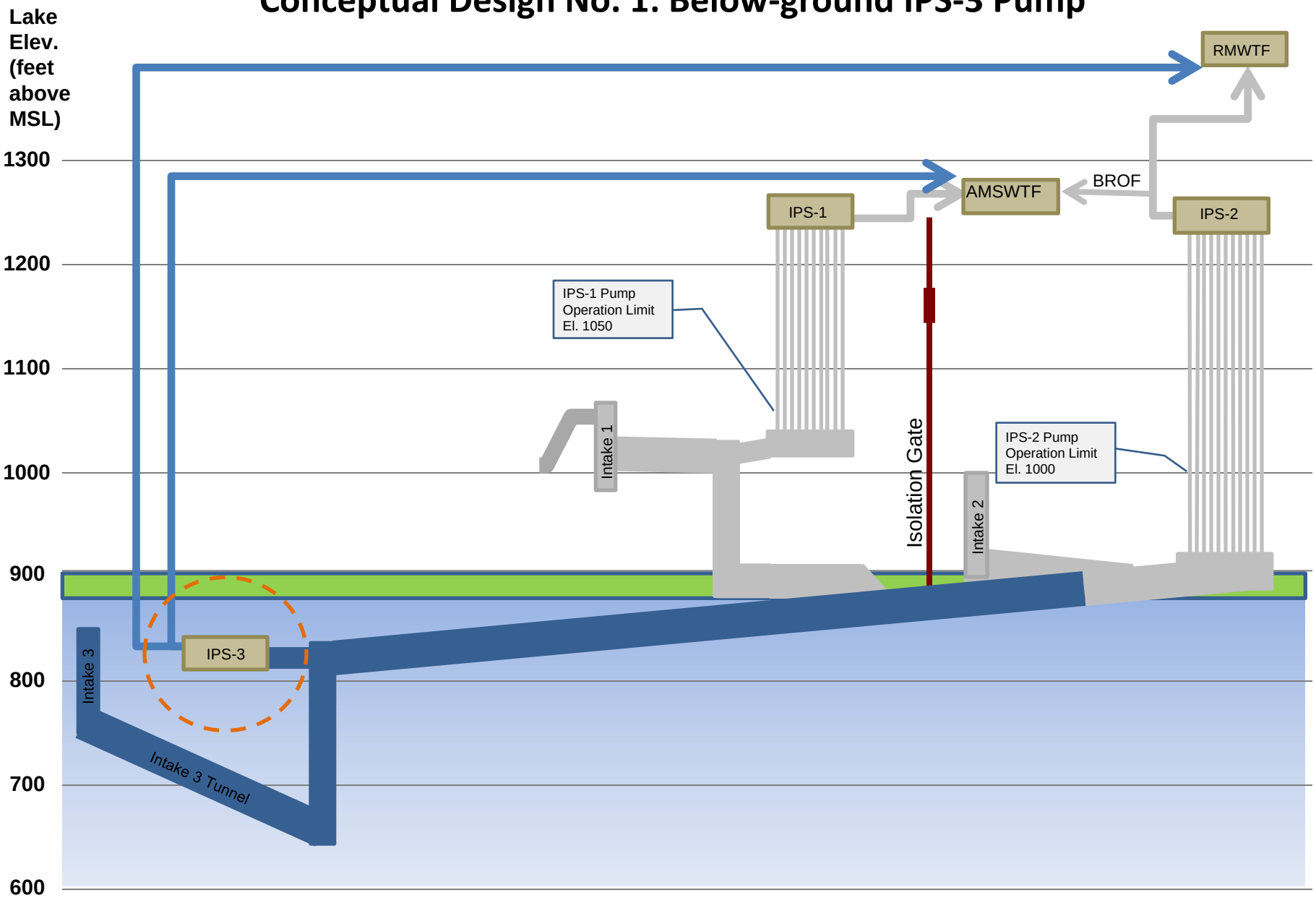
Technical Considerations

- **High volume pumping of 600 million gallons per day (MGD) to Alfred Merritt Smith Water Treatment Facility – 400 ft. lift and 300 MGD to Booster Pumping Station No. 1– 600 ft.**
- **Significant power requirements – infrastructure and loads**
- **Some options have higher power requirements than others based on pump design**
- **Discharge line requirements**

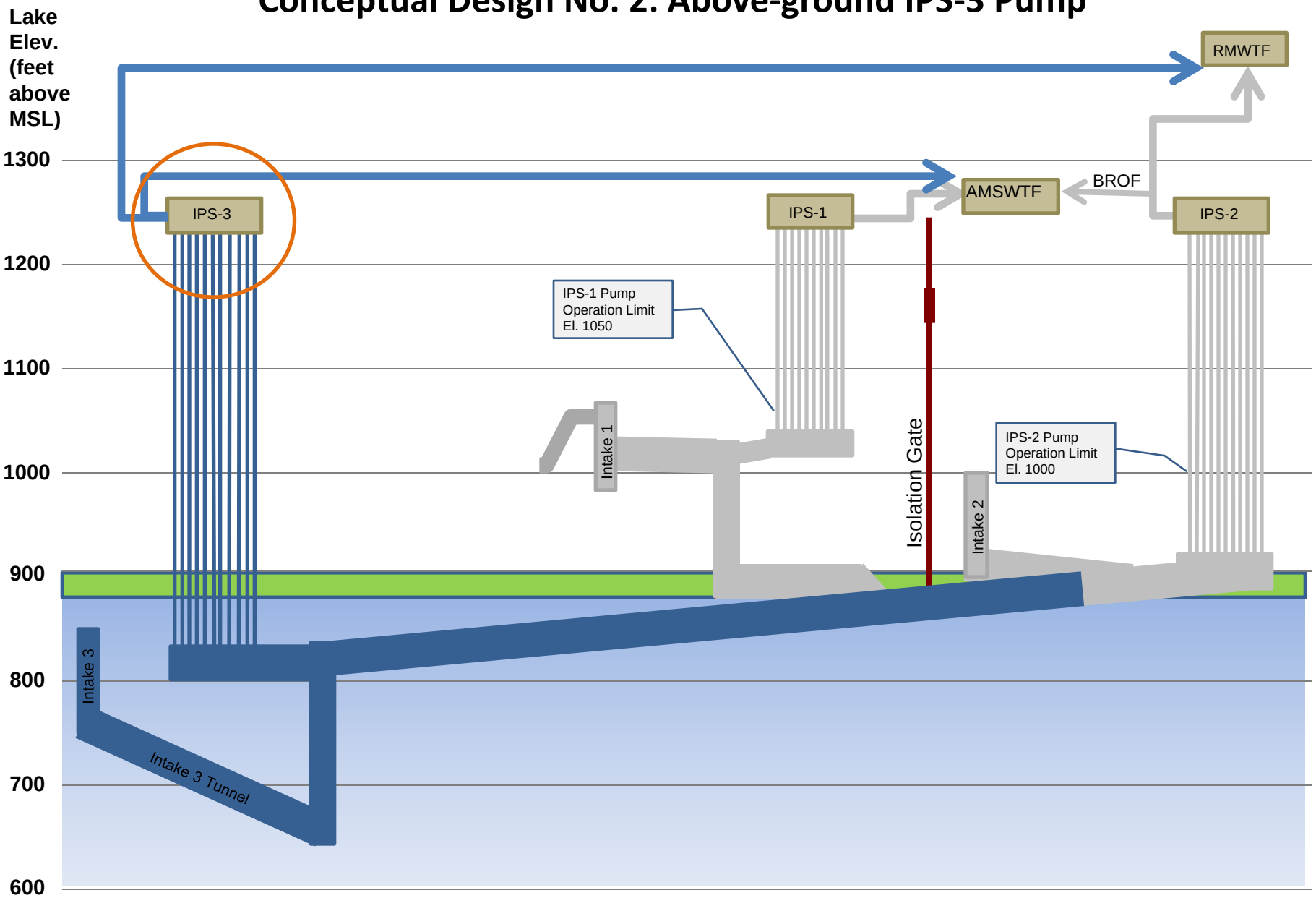
Cost Considerations

- **More flexibility and/or capacity = higher costs**

Conceptual Design No. 1: Below-ground IPS-3 Pump



Conceptual Design No. 2: Above-ground IPS-3 Pump

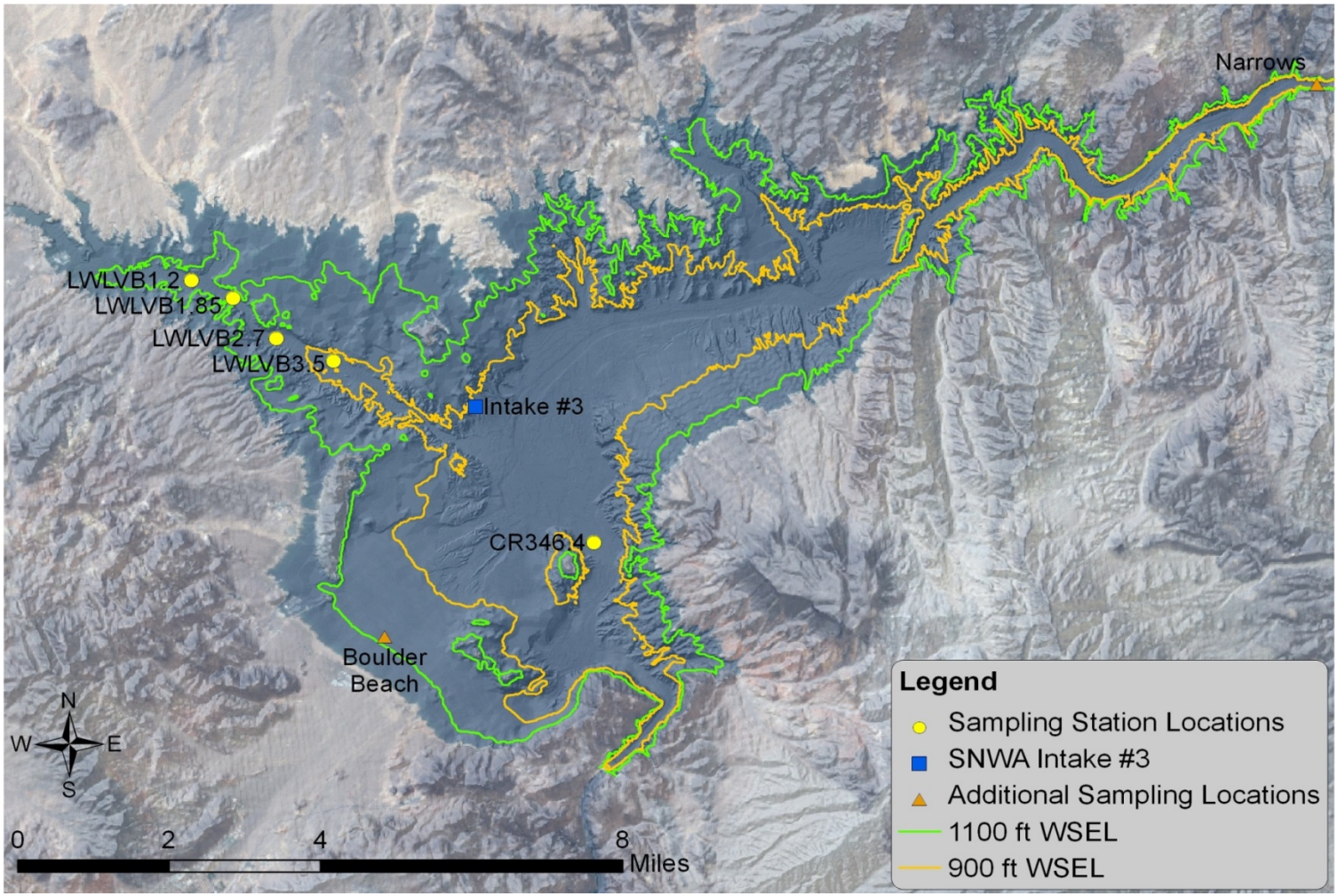


Intake Pumping Station No. 3

Intake Pumping Station No. 3 –Evaluation

- **Expected to be complete in August**
- **Evaluation will detail the associated risks and options available for design/construction**
- **Evaluation will also provide rough cost estimates for decision-making purposes**
- **These results will be shared at the September IRPAC meeting**

Water Quality Challenges



Lake Mead at elevations 1,100 feet and 900 feet.

Water Quality Challenges

Declining Lake Elevations: Water Quality Concerns

Warmer water temperatures

- **Chlorine residual levels**
- **Disinfection by-product formation**

Turbidity

- **Potential for higher general turbidity levels**
- **Concern regarding storm events**

Higher effluent and urban runoff percentage, and potential algal impact

Water Quality Challenges

Declining Lake Elevations: Potential Treatment Modifications

- **Conversion to a conventional facility with sedimentation basins**
- **Membrane filtration**
- **Carbon treatment**
- **Chloramination for distribution system residual**

Now What?

- **Questions?**
- **What else is needed?**
- **What other information is required?**

Upcoming Meetings

No meeting in August

September 10

October 15

November 5

December 3

SOUTHERN NEVADA WATER AUTHORITY®