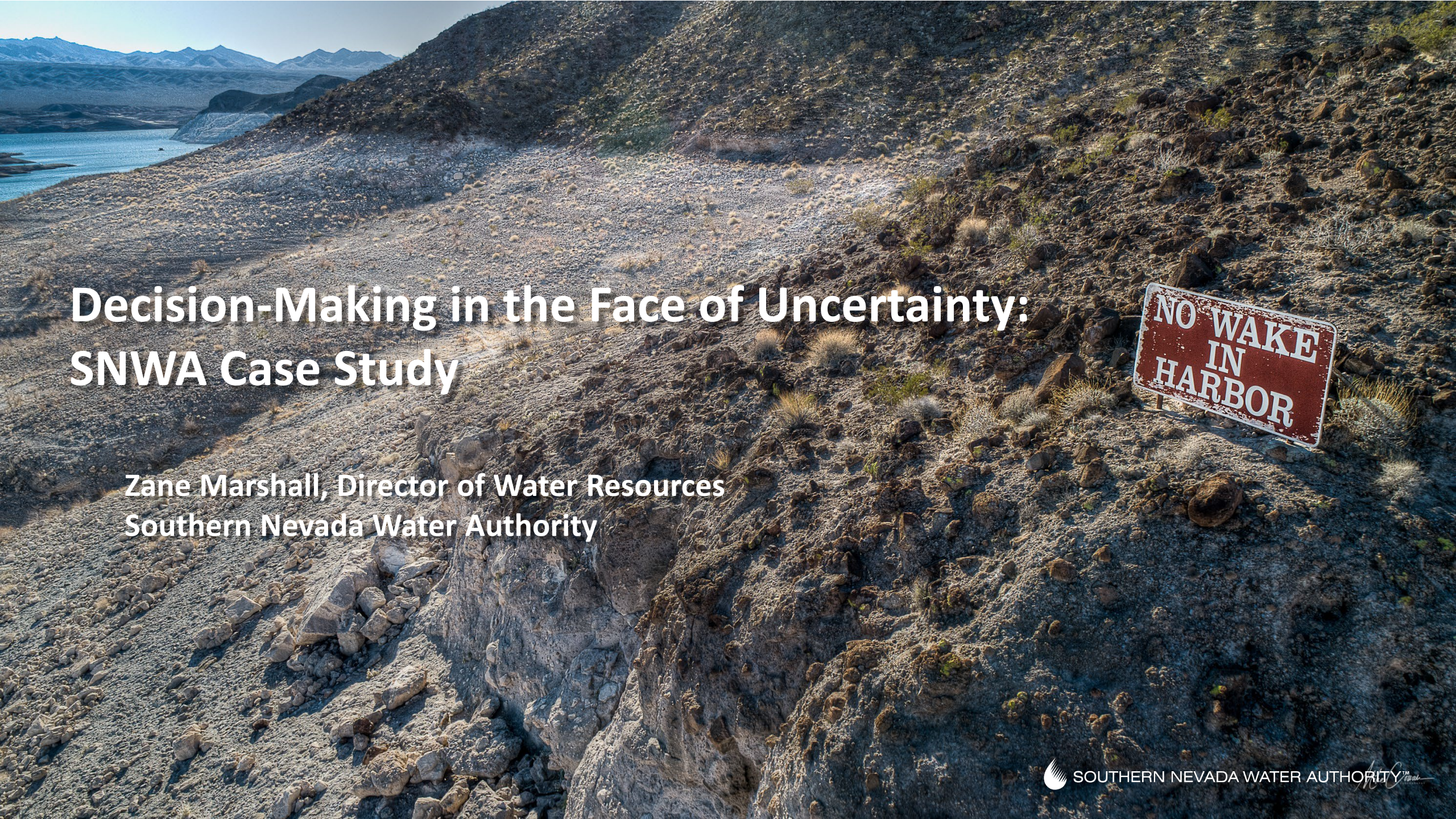

Decision-Making in the Face of Uncertainty: SNWA Case Study

Zane Marshall, Director of Water Resources
Southern Nevada Water Authority

SOUTHERN NEVADA WATER AUTHORITY™

ABOUT US

SOUTHERN NEVADA WATER AUTHORITY™

The SNWA was formed in 1991 to manage Southern Nevada's water resource needs on a regional basis.

The SNWA has spent **decades** ensuring the reliability of water supplies for Southern Nevada

INFRASTRUCTURE
Constructing major facilities & asset management

RESOURCE PLANNING
Working with partners & developing comprehensive plans to manage supplies

WATER BANKING
Storing water supplies for the future

CONSERVATION
Incentives, programs, regulation & pricing

OUR WATER SUPPLY

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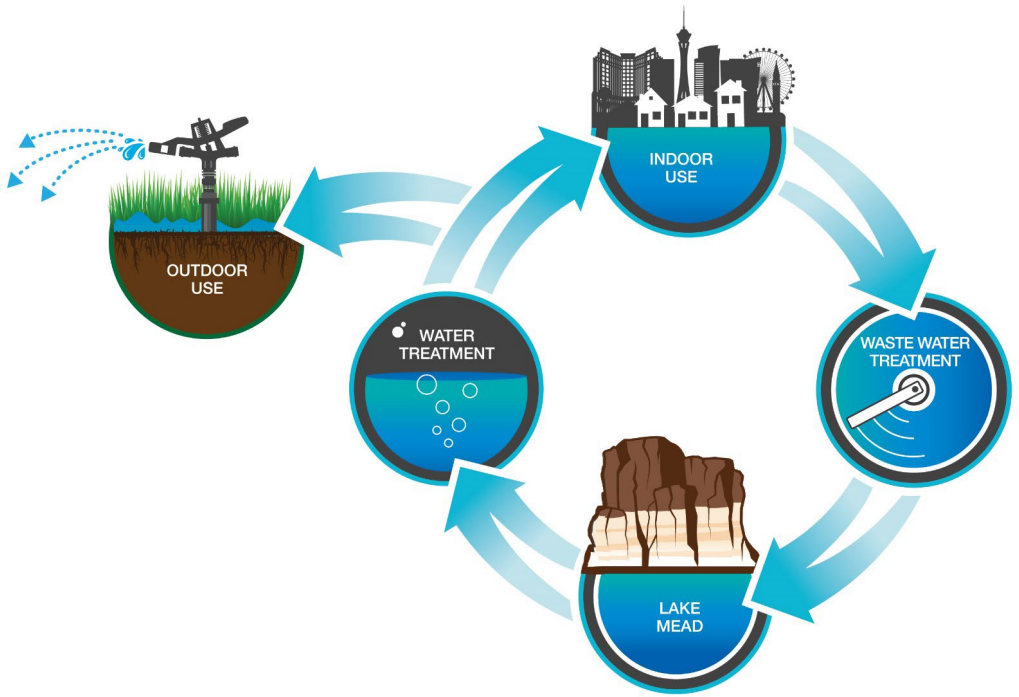
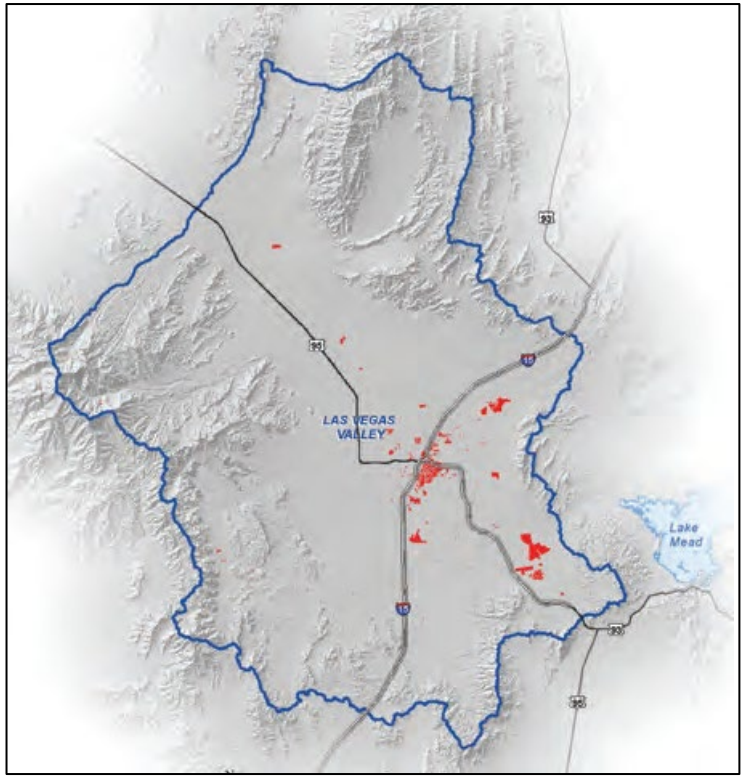
Southern Nevada relies on the Colorado River for about 90 percent of our resource supply.



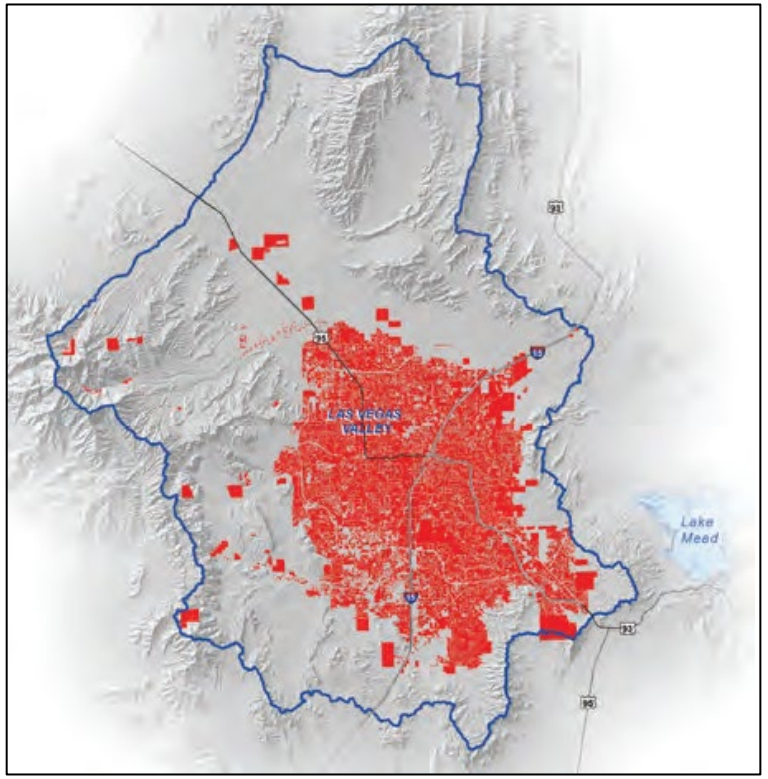
A PERIOD OF CHANGE

SOUTHERN NEVADA WATER AUTHORITY™

Our community has experienced profound change over a relatively short period of time…



1950



2020

A PERIOD OF CHANGE

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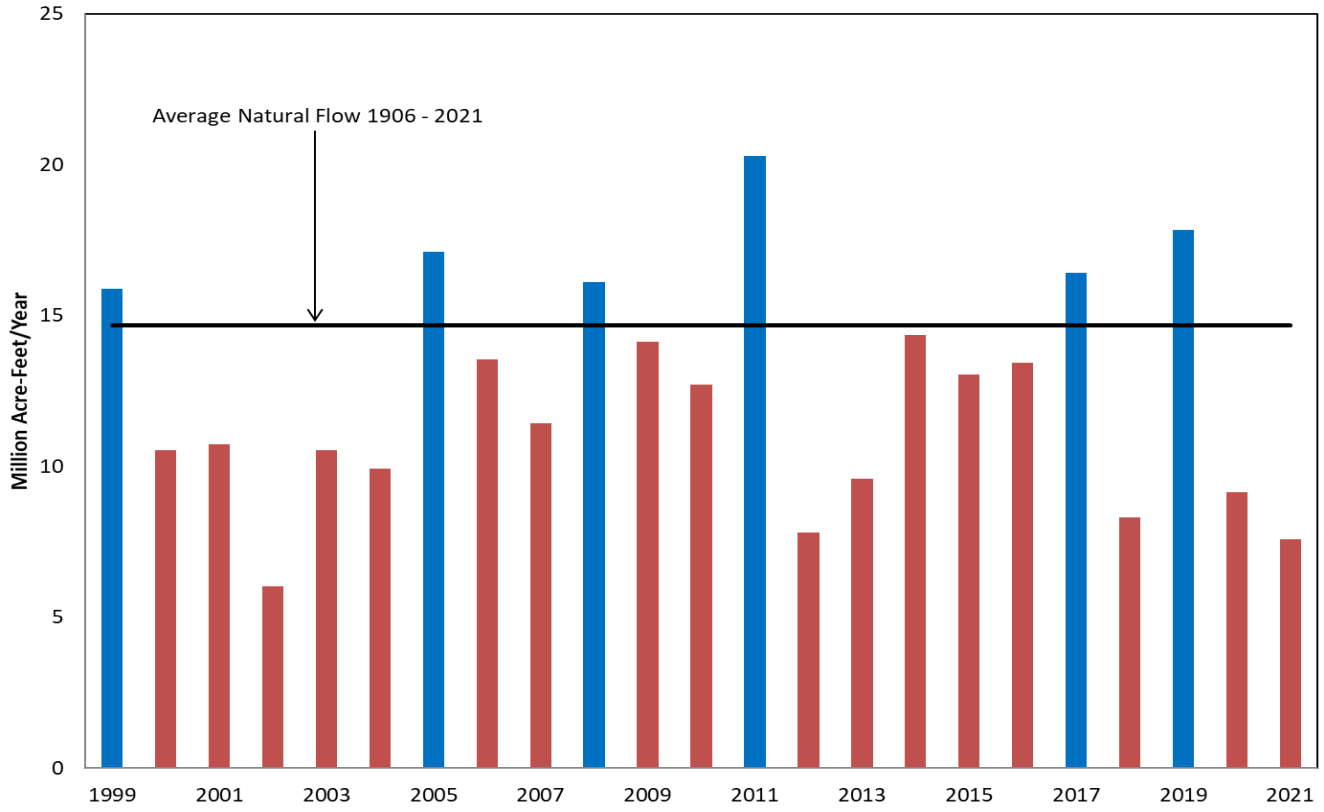
Our water supply situation has also changed significantly due to drought and climate change…



A PERIOD OF CHANGE

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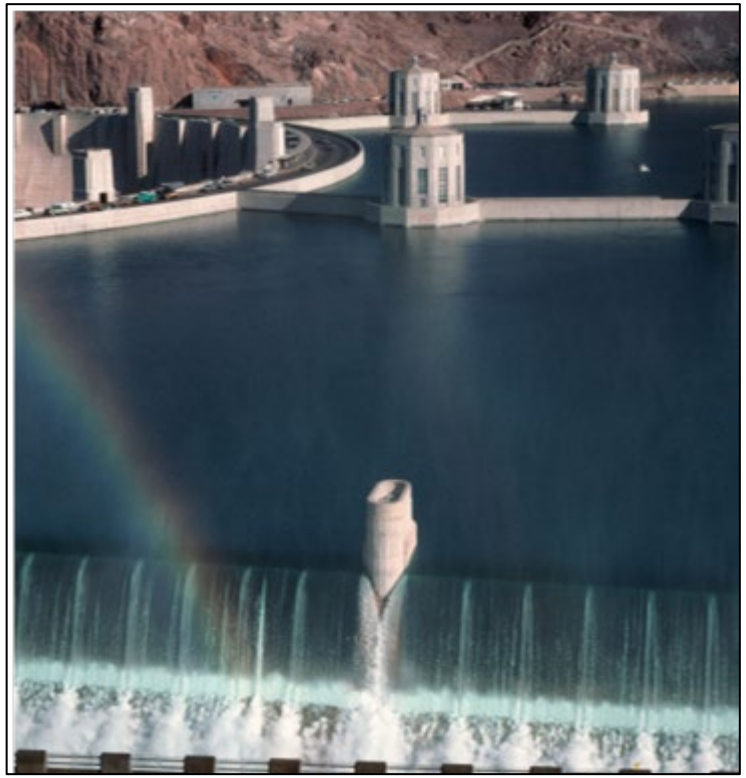
Reduced inflows and overallocation of the river's flows have resulted in rapidly declining water levels in major reservoirs.



1983

2021

Colorado River at Lake Mead, Hoover Dam

A PERIOD OF CHANGE

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"Colorado River, Lifeline of the West, Sees Historic Water Shortage Declaration"

-KNPR Headline, August 22, 2021

SNWA Lake Mead Intake No. 1, May 2022

A PERIOD OF CHANGE

SOUTHERN NEVADA WATER AUTHORITY™

The SNWA has responded to changing conditions through proactive planning and adaptive management.

Community-based planning processes have informed SNWA planning efforts related to:

- **Water Resources**
- **Water Facilities**
- **Conservation**
- **Funding**

PLANNING FOR UNCERTAINTY

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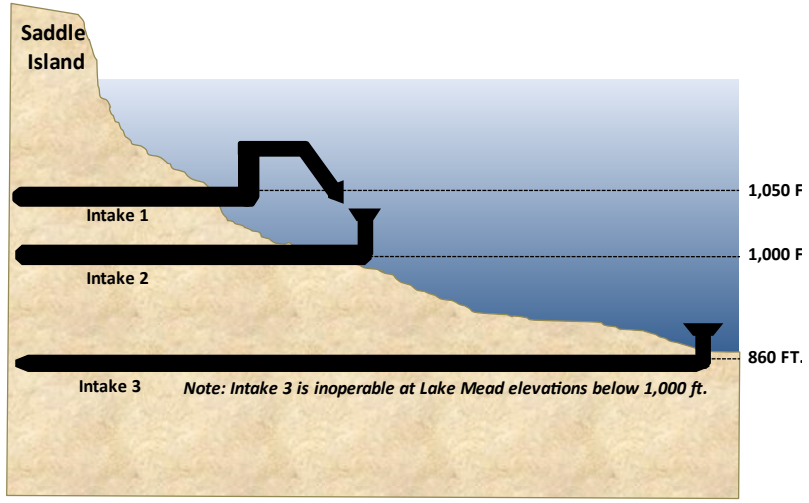
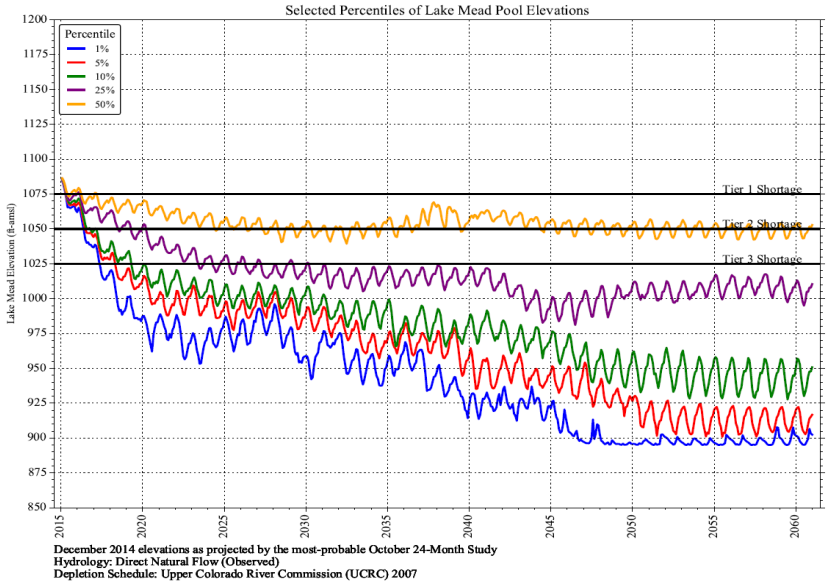
2014 IRPAC Committee Finding: *"The risk of Lake Mead's elevation falling below 1,000 feet is not acceptable to our community due to the potential impacts on water delivery and resource availability."*

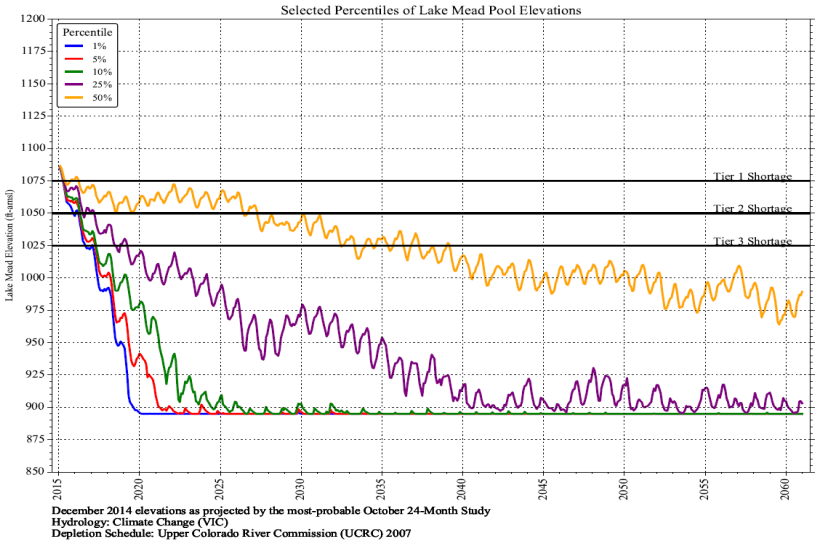
Lake Mead Intake Profile (2014)



Observed Hydrology*



Climate Change Hydrology



** As presented to IRPAC in 2014, conditions have changed.*

PLANNING FOR UNCERTAINTY

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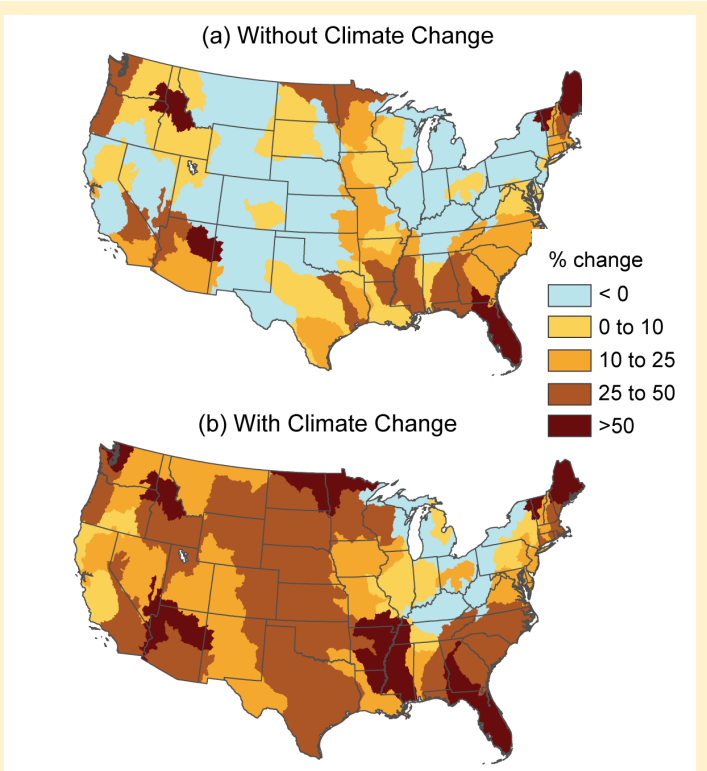
Climate change is expected to have a lasting effect on water supply and demand, both locally and regionally.

Water Supply Impacts

- Large declines to snowpack & decreased precipitation
- Decreased soil moisture & increased evaporation
- Stronger, more frequent & potentially longer droughts
- Regional aridification

Water Demand Impacts

- Higher plant water needs due to increased evapotranspiration
- Increased water demands for evaporative cooling
- Increased demands for pools & water features/evaporation



Projected Changes in Water Withdrawals (2005 – 2060)

Source: Third National Climate Assessment.

PLANNING FOR UNCERTAINTY

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The SNWA reviews and updates its Water Resource Plan annually. Planning scenarios represent Southern Nevada's future water resource needs under variable supply and demand conditions.

Key Considerations:

- **The potential impact of continued drought and climate change on water resource availability, particularly or Colorado River Supplies.**

- **The potential impact of economic conditions, climate change and water use patterns on long-term demands.**

SUPPLY CONSIDERATIONS

SOUTHERN NEVADA WATER AUTHORITY™

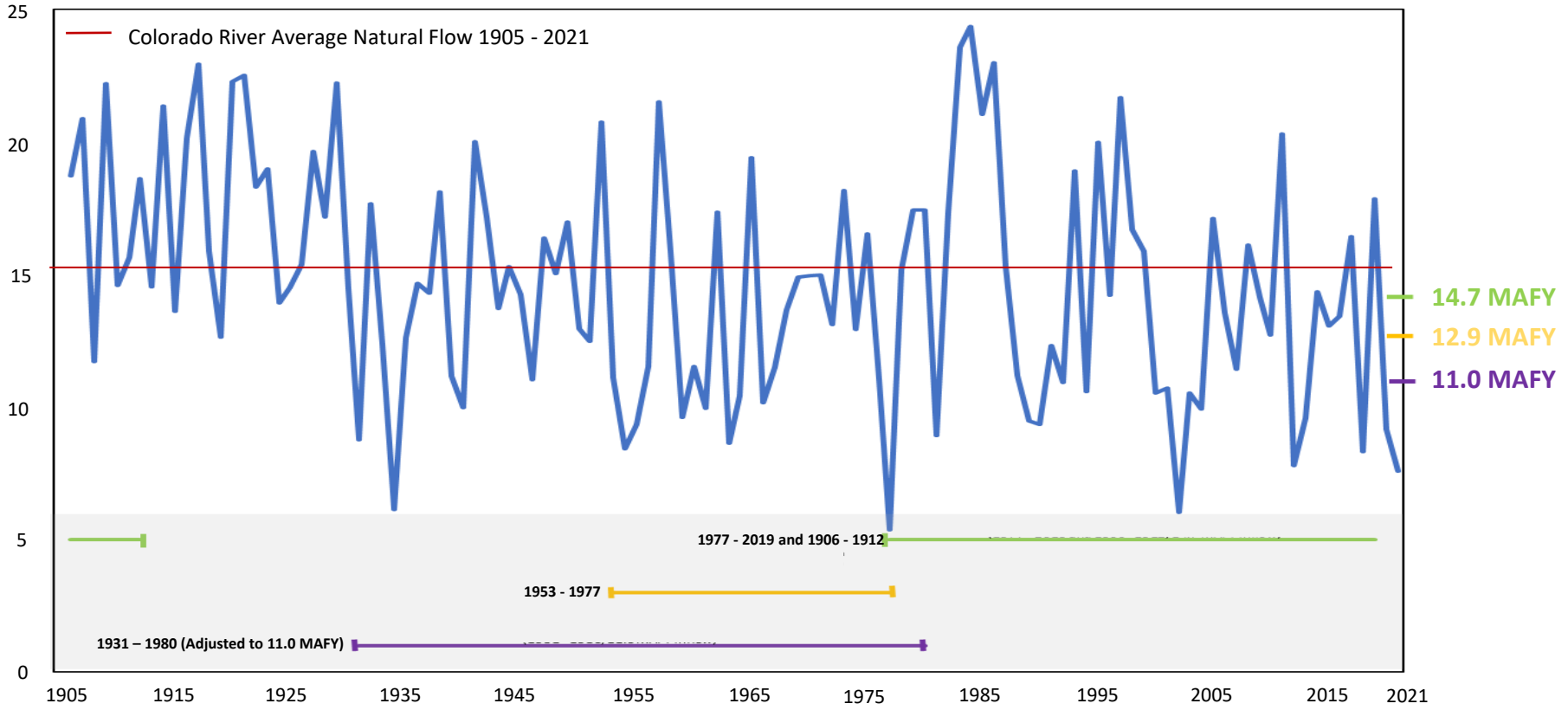
The SNWA considers variable hydrology for Colorado River supplies, bracketing the range of anticipated conditions.

SUPPLY INPUTS

14.7 MAFY Inflow
More optimistic than current conditions.

12.9 MAFY Inflow
Slightly more optimistic than current conditions

11.0 MFAY Inflow
Less optimistic than current conditions



DEMAND CONSIDERATIONS

SOUTHERN NEVADA WATER AUTHORITY™

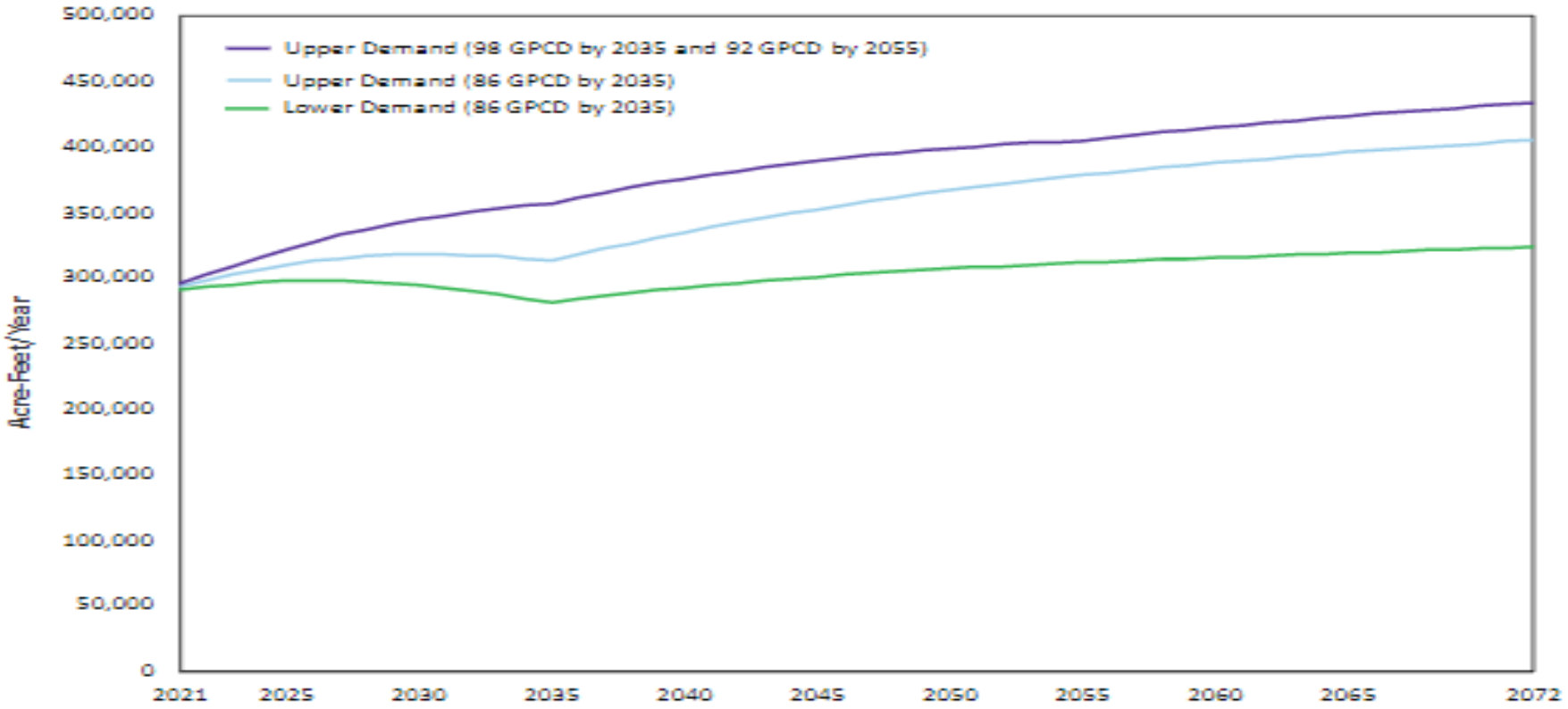
The SNWA considers three water demand projections that bracket uncertainties associated with growth and conservation progress.

DEMAND INPUTS

Upper Demand
98 GPCD in 2035

Upper Demand
86 GPCD in 2035

Lower Demand
86 GPCD in 2035



PLANNING FOR UNCERTAINTY

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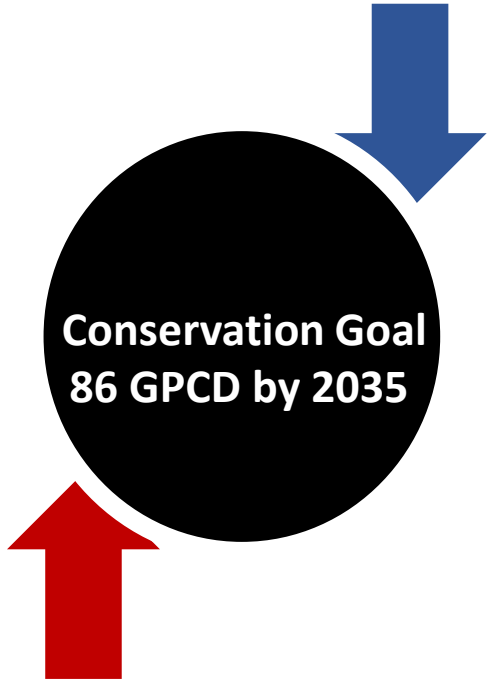
We will have to work harder to reach our conservation goal with upward pressure from climate change and system age.

Climate Change & Aging System

Increasing consumptive water demands due to warmer temperatures, drier soils lower precipitation, and increased system loss due to aging infrastructure.



Adaptive Management

Significant additional effort will be required to reduce consumptive water use to meet our conservation goal and maximize the availability of water supplies.

PLANNING FOR UNCERTAINTY

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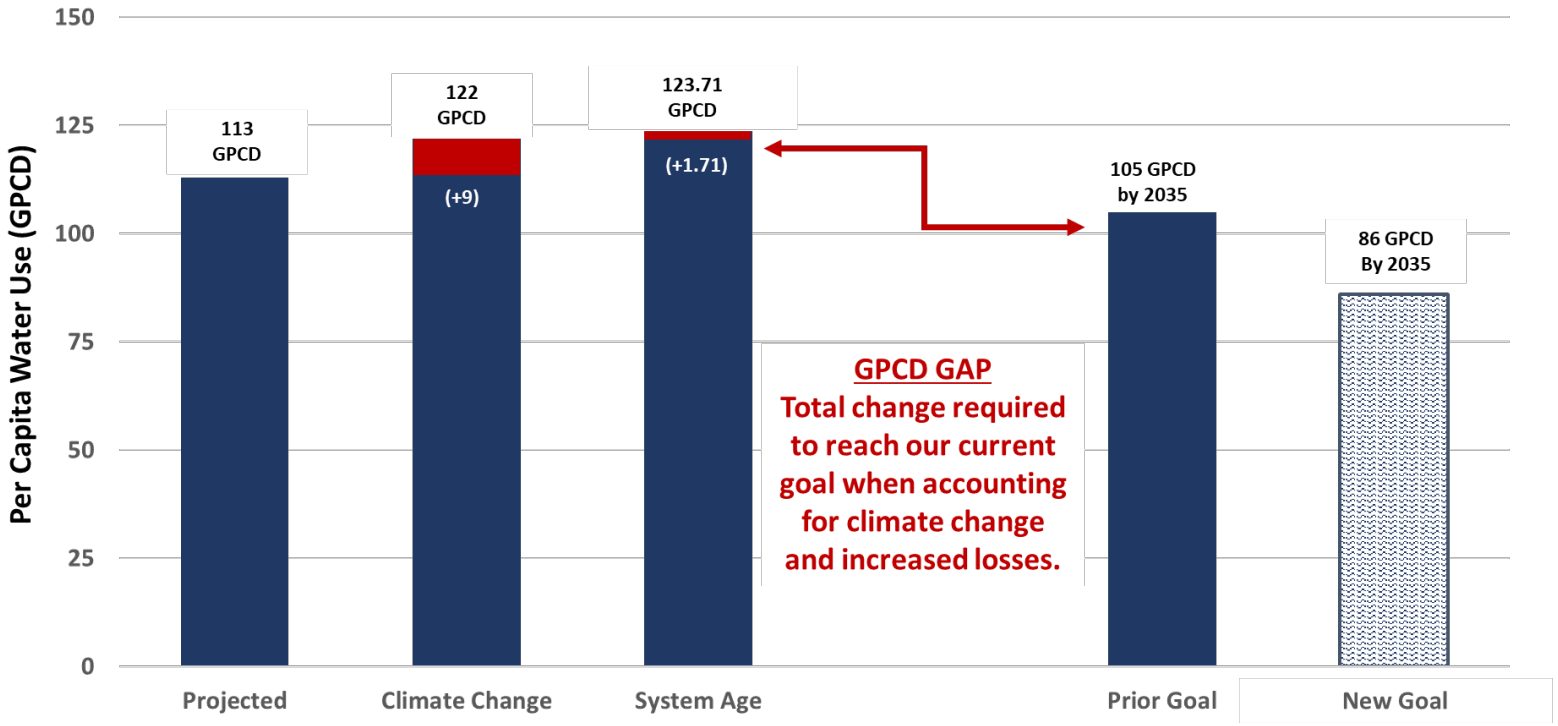
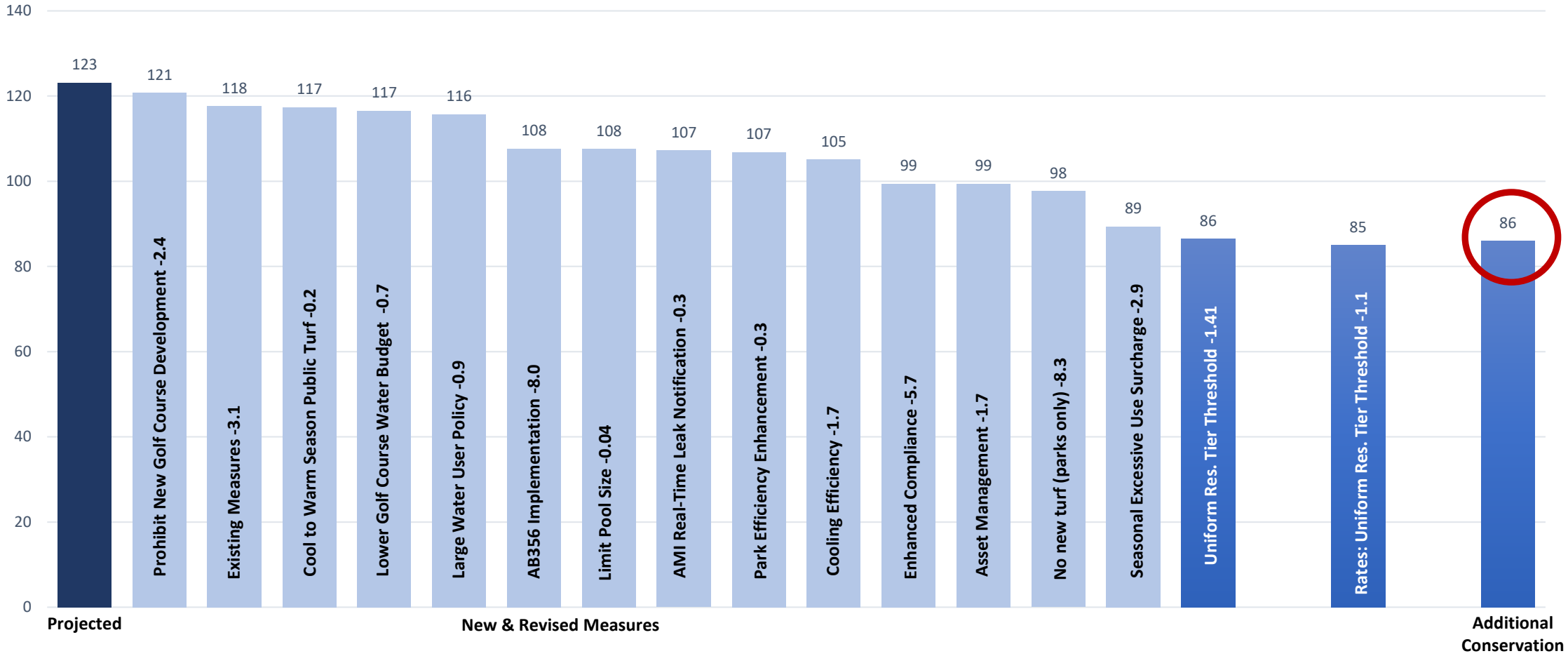
The SNWA considers the potential impact of climate change and system age on future water demands.



PLANNING FOR UNCERTAINTY

SOUTHERN NEVADA WATER AUTHORITY™

We've identified actions needed to achieve our conservation goal and are working to implement changes.



Estimated GPCD water savings in 2035 based on a population served of 2.9 million; Initial projected assumes upward pressure from climate change.

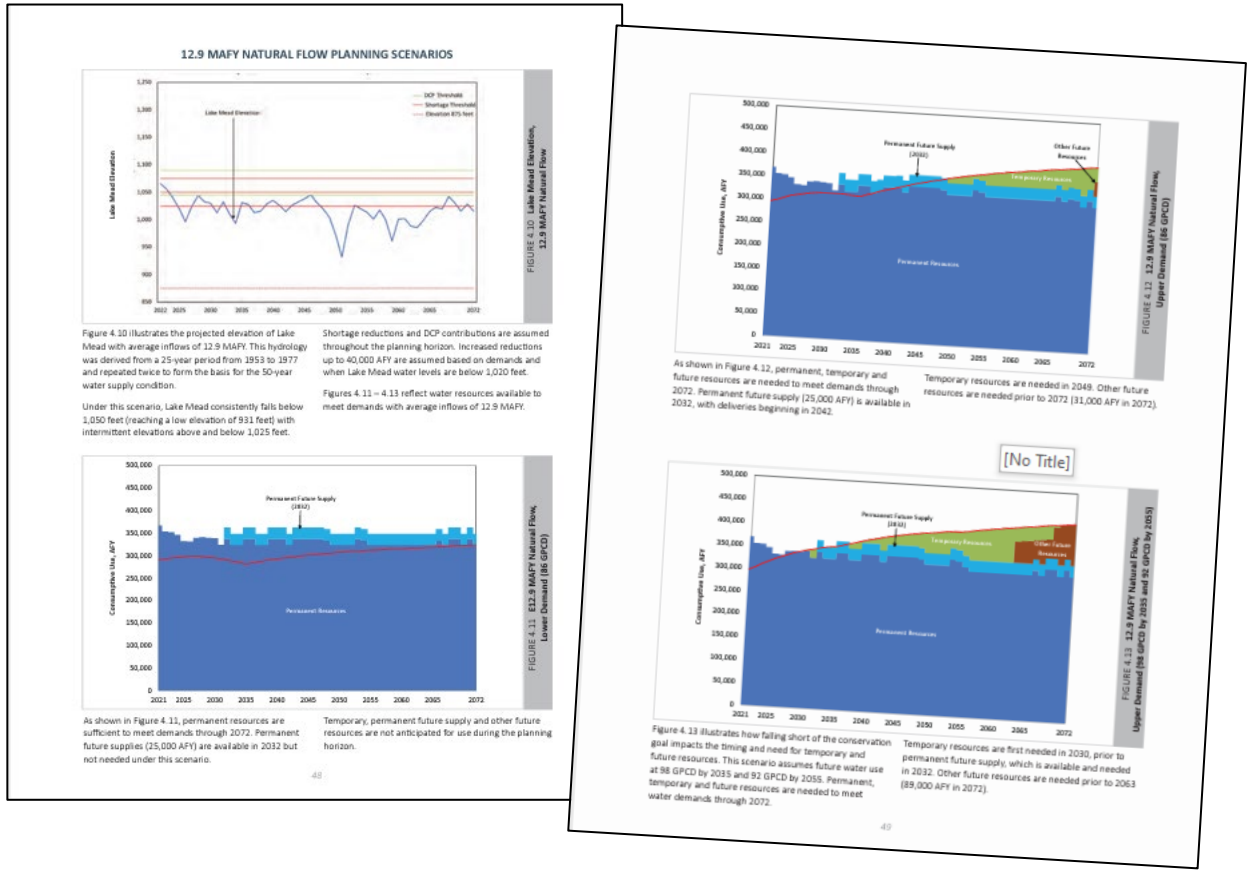
PLANNING FOR UNCERTAINTY

SOUTHERN NEVADA WATER AUTHORITY™

Supply and demand assumptions are incorporated into planning scenarios that are included in our Water Resource Plan.

Water Resource Plan:

- Reviewed and updated annually
- Covers a 50-year planning horizon
- Demonstrates how we plan to meet future needs, even if conditions change significantly over time



12.9 MAFY NATURAL FLOW PLANNING SCENARIOS

FIGURE 4.10 Lake Mead Elevations, 12.9 MAFY Natural Flow

Figure 4.10 illustrates the projected elevation of Lake Mead with average inflows of 12.9 MAFY. This hydrology was derived from a 25-year period from 1953 to 1977 and repeated twice to form the basis for the 50-year water supply condition.

Under this scenario, Lake Mead consistently falls below 1,050 feet (reaching a low elevation of 931 feet) with intermittent elevations above and below 1,025 feet.

Shortage reductions and DCP contributions are assumed throughout the planning horizon. Increased reductions up to 40,000 AFY are assumed based on demands and when Lake Mead water levels are below 1,020 feet.

Figures 4.11 – 4.13 reflect water resources available to meet demands with average inflows of 12.9 MAFY.

FIGURE 4.11 12.9 MAFY Natural Flow, Lower Demand (86 GPCD)

As shown in Figure 4.11, permanent resources are sufficient to meet demands through 2072. Permanent future supplies (25,000 AFY) are available in 2032 but not needed under this scenario.

Temporary, permanent future supply and other future resources are not anticipated for use during the planning horizon.

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FIGURE 4.12 12.9 MAFY Natural Flow, Upper Demand (86 GPCD)

As shown in Figure 4.12, permanent, temporary and future resources are needed to meet demands through 2072. Permanent future supply (25,000 AFY) is available in 2032, with deliveries beginning in 2042.

Temporary resources are needed in 2049. Other future resources are needed prior to 2072 (31,000 AFY in 2072).

[No Title]

FIGURE 4.13 12.9 MAFY Natural Flow, Upper Demand (98 GPCD by 2035 and 92 GPCD by 2055)

Figure 4.13 illustrates how falling short of the conservation goal impacts the timing and need for temporary and future resources. This scenario assumes future water use at 98 GPCD by 2035 and 92 GPCD by 2055. Permanent, temporary and future resources are needed to meet water demands through 2072.

Temporary resources are first needed in 2030, prior to permanent future supply, which is available and needed in 2032. Other future resources are needed prior to 2063 (89,000 AFY in 2072).

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