

# Serving Southern Nevada's Water Needs in a Sustainable, Adaptive, and Responsible Manner

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SOUTHERN NEVADA WATER AUTHORITY



**SNWA is a not-for-profit agency created in 1991**

**Water Service**

- **2 million residents (2 out of 3 Nevadans)**
- **42 million annual visitors**

**Southern Nevada's Economic Output**

- **\$93 billion annual GDP**
- **> 2/3 of State GDP**

**The SNWA is a not-for-profit agency created in 1991 to provide a safe, reliable water supply for Southern Nevada.**



**WATER SUPPLY  
PLANNING**

Developing and managing regional water supplies



**CONSERVATION**

Incentives, Programs, Regulation and Pricing



**WATER  
QUALITY**

Maintaining and protecting water quality



**INFRASTRUCTURE**

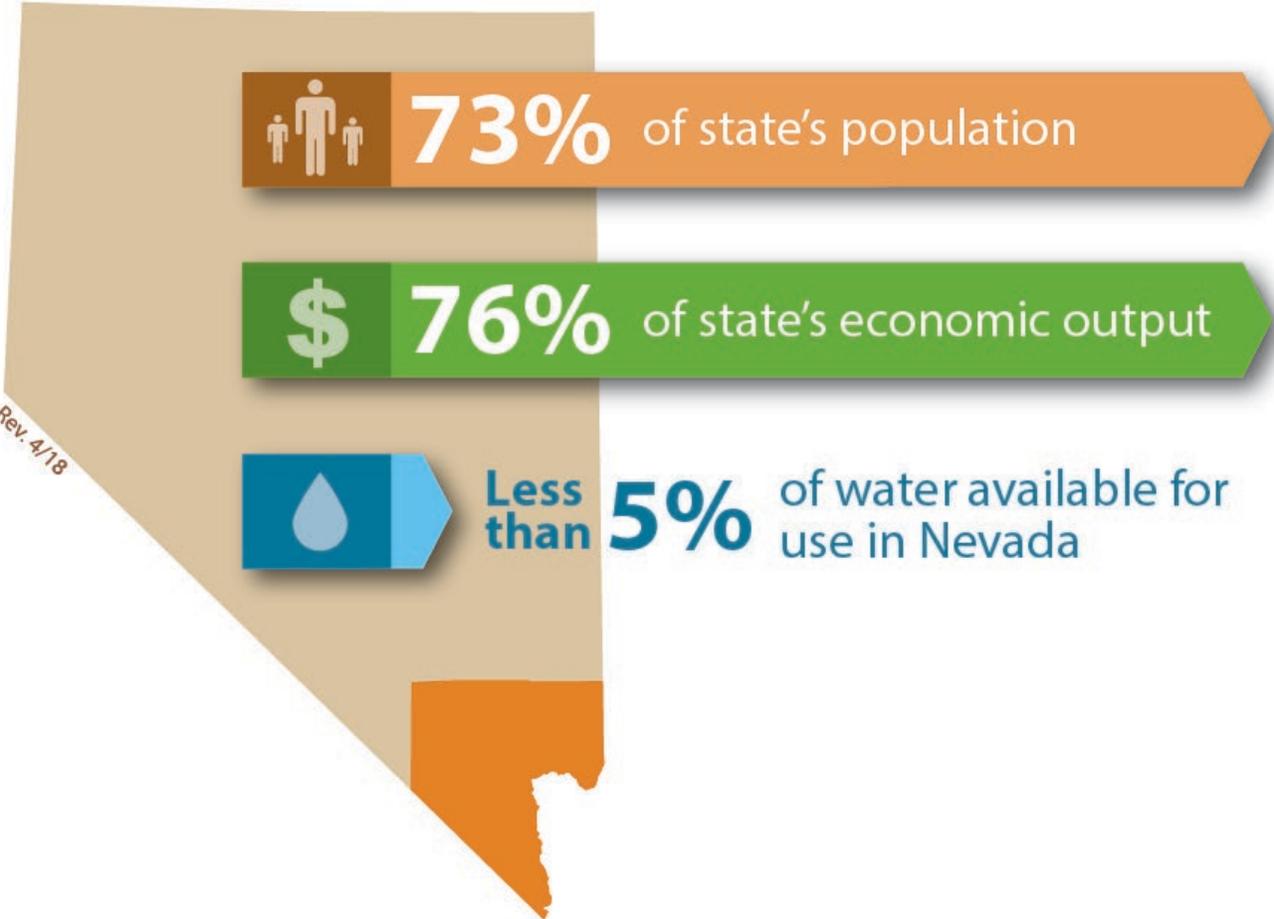
Building and operating major facilities



**STEWARDSHIP**

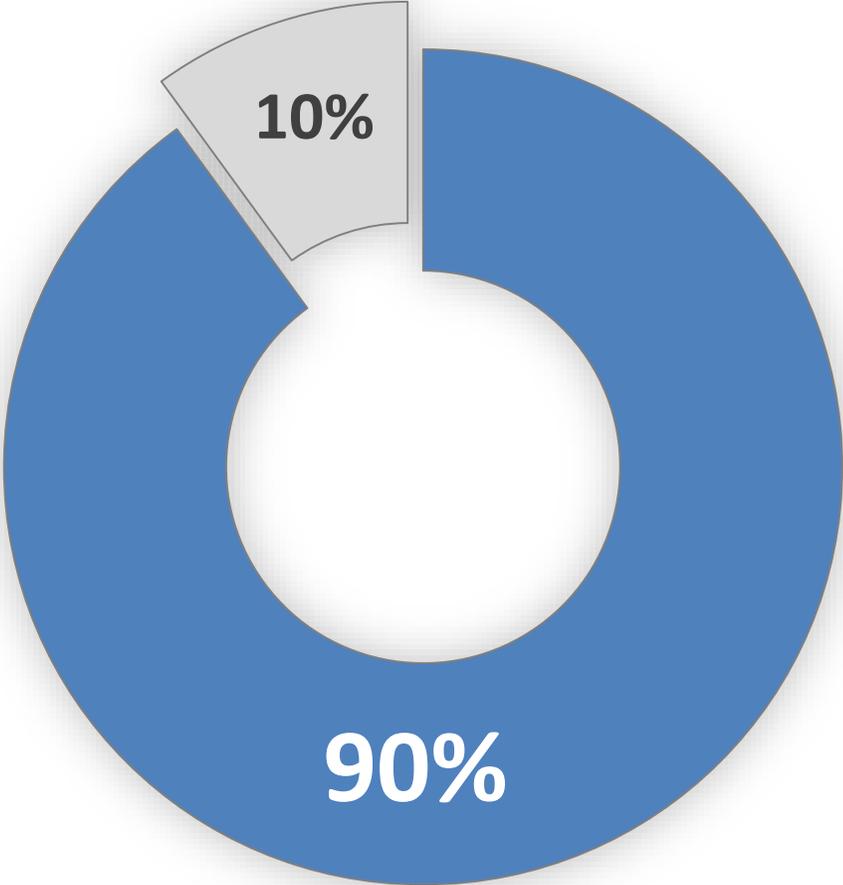
Protecting environmental resources

# WATER USE



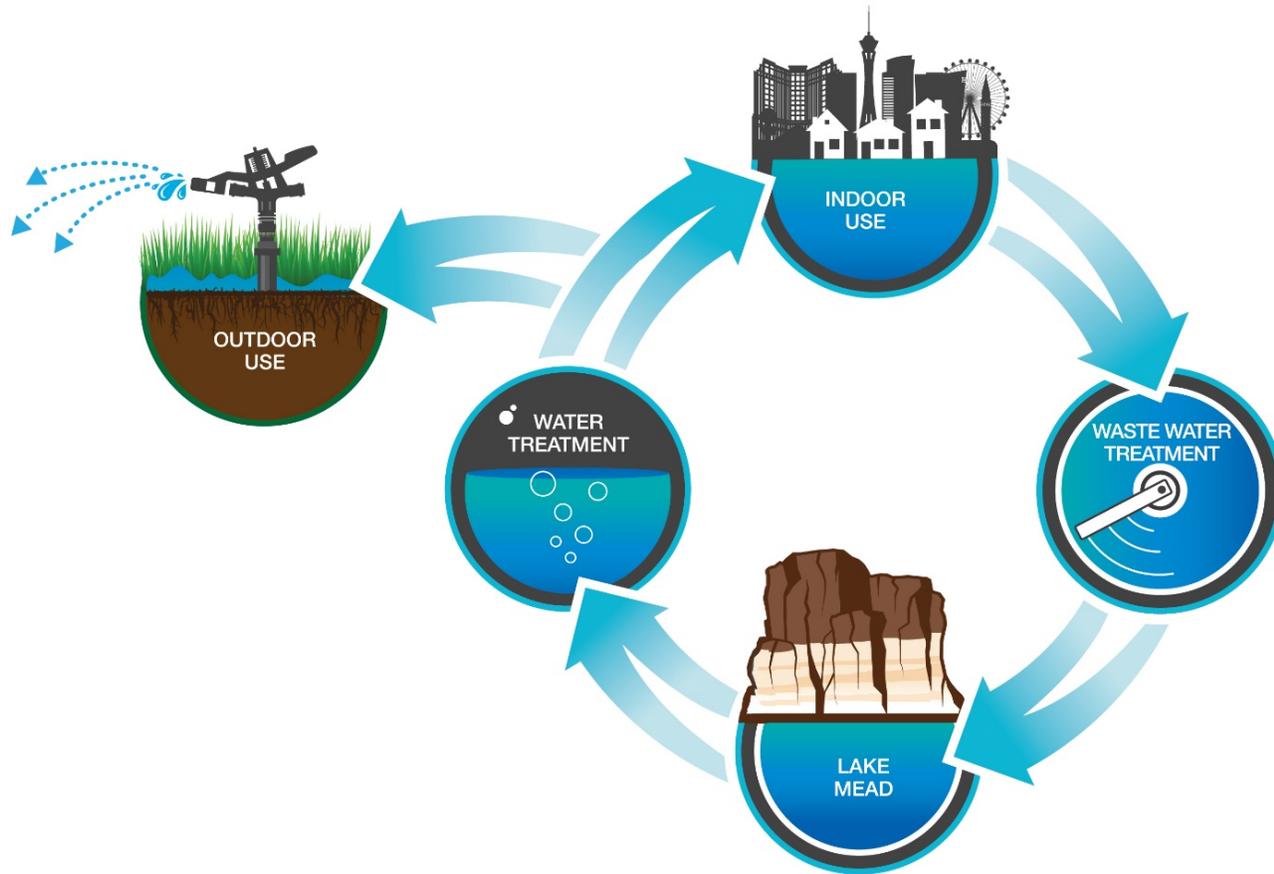
# WATER USE

**Southern Nevada is nearly fully reliant on the Colorado River to meet the community's water demands.**



■ Colorado River ■ Other

# RETURN FLOW CREDITS



## Water Use

### Colorado River

Diversions	443 kaf
Returns	<u>- 223 kaf</u>
CU	220 kaf

### Local Groundwater

LVVWD	44 kaf
NLV	<u>+ 5 kaf</u>
Total	49 kaf

Note: data are approximates

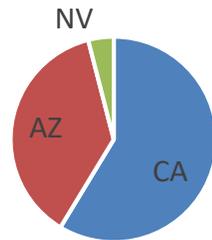
## Colorado River Return Flows - Las Vegas Wash

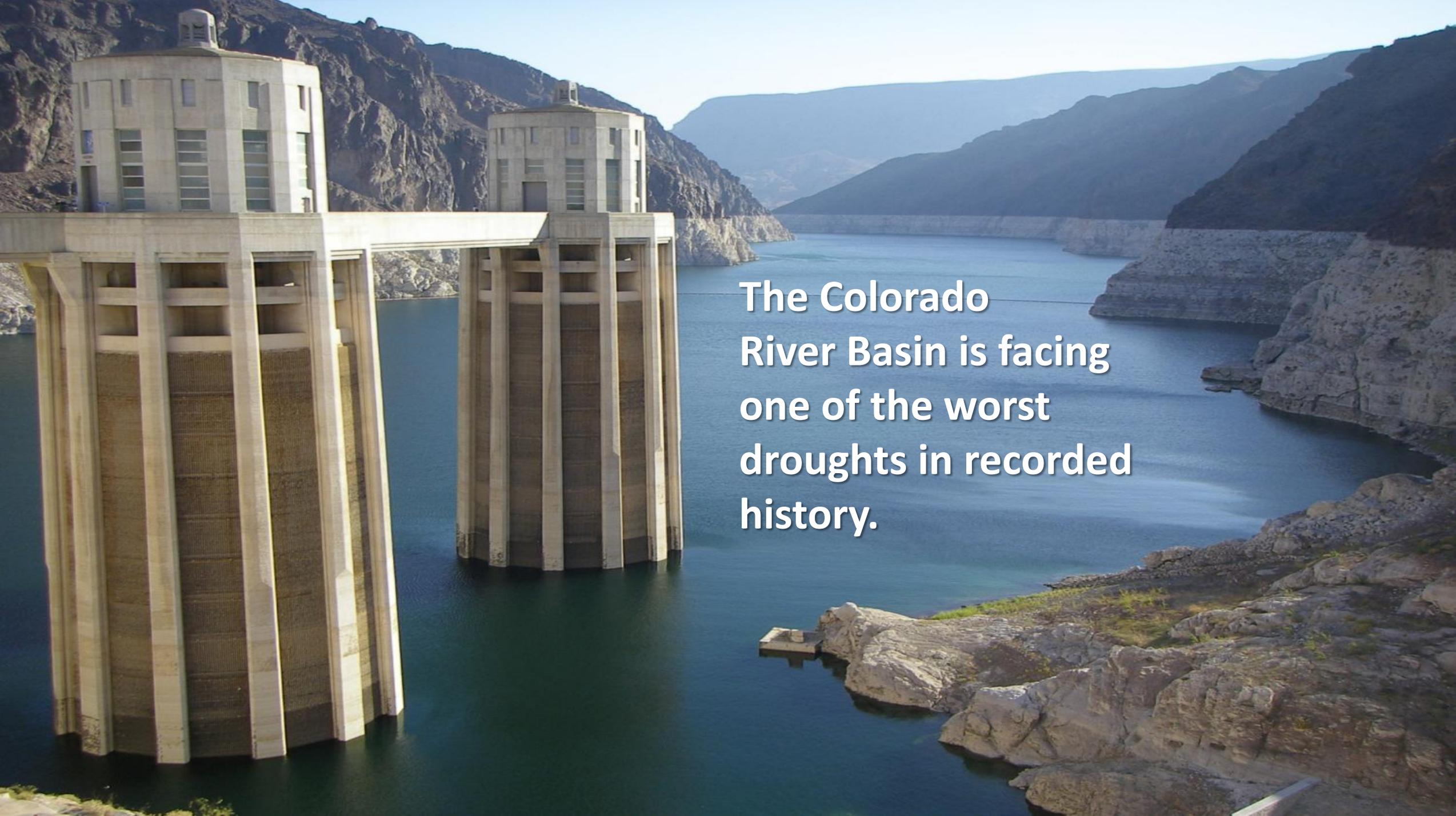


# THE COLORADO RIVER | A Shared Resource

- > 1,450 miles, crossing 7 states and 2 countries
- > 40 million domestic and industrial users
- Irrigates nearly 5.5 million acres
- 7.5 maf to the Lower Basin shared among:

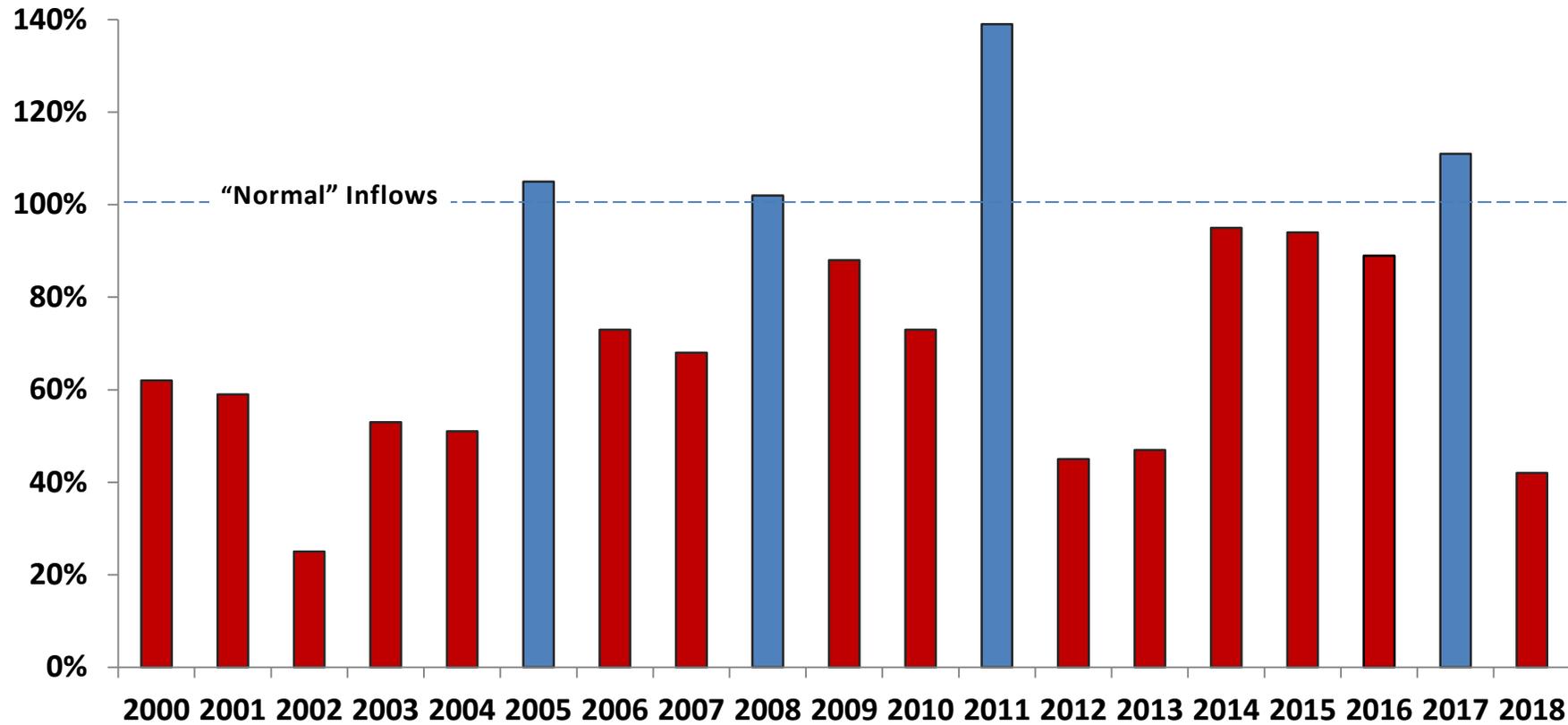
- California (4.4)
- Arizona (2.8)
- Nevada (0.3)



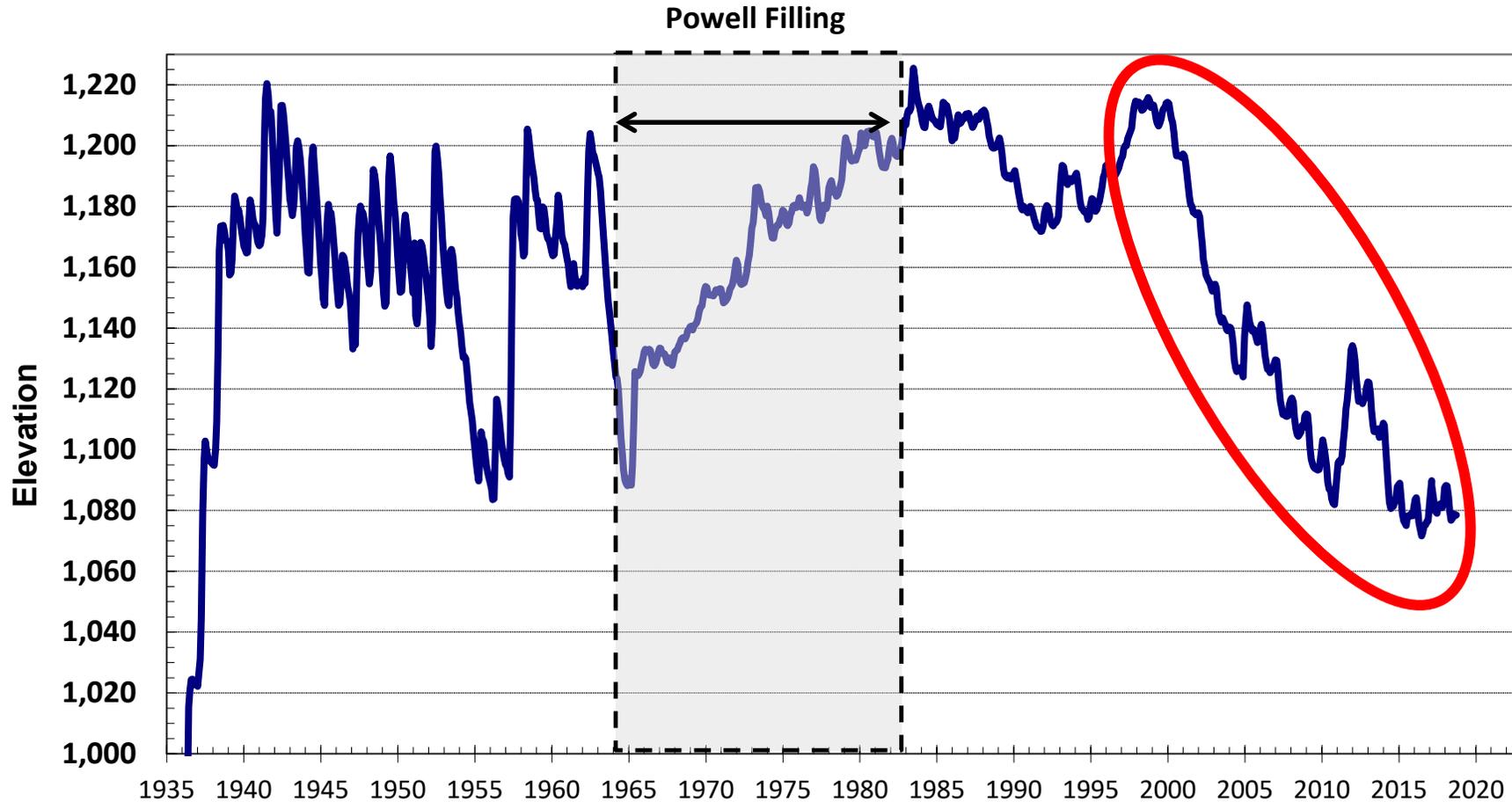


The Colorado River Basin is facing one of the worst droughts in recorded history.

# Lake Powell's annual inflows continue to be below normal.

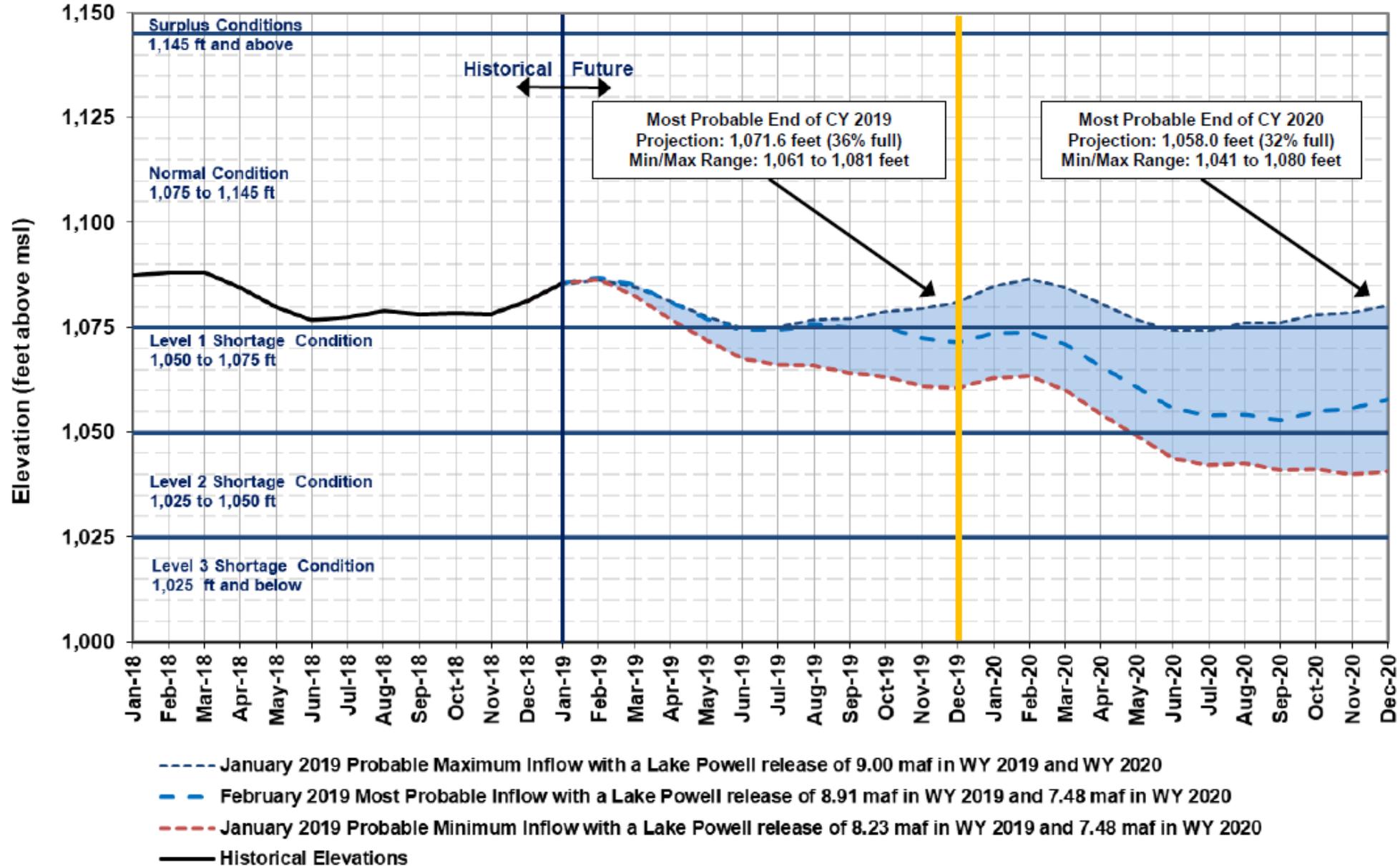


**As a result, Lake Mead water elevations have declined more than 120 feet during the past 19 years.**



# Lake Mead End of Month Elevations

Projections from the January and February 2019 24-Month Study Inflow Scenarios



Courtesy of the Bureau of Reclamation

# CONSERVATION



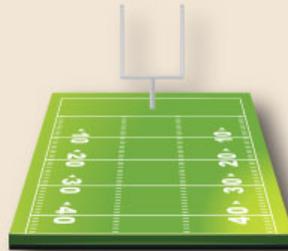
## WATER SMART LANDSCAPES PROGRAM FACTS

**185 MILLION**

Square feet of grass that has been removed since the WSL program began in 1999

### THAT'S EQUIVALENT TO:

Enough grass to cover more than



**3,210**  
FOOTBALL FIELDS

OR

Rolling an 18" wide strip of sod



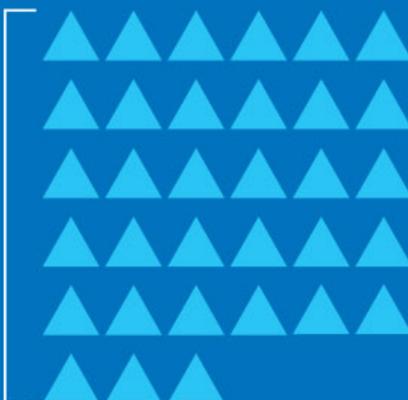
**94%**  
AROUND THE EARTH

**119 BILLION**

Gallons of water saved to date.

That's enough water to fill the Luxor Hotel Pyramid

**330**  
TIMES



Rev. 2/18

# CONSERVATION

Despite population gains, water use has declined since 2002.

Southern Nevada  
**POPULATION**



Per Capita  
**WATER USE**

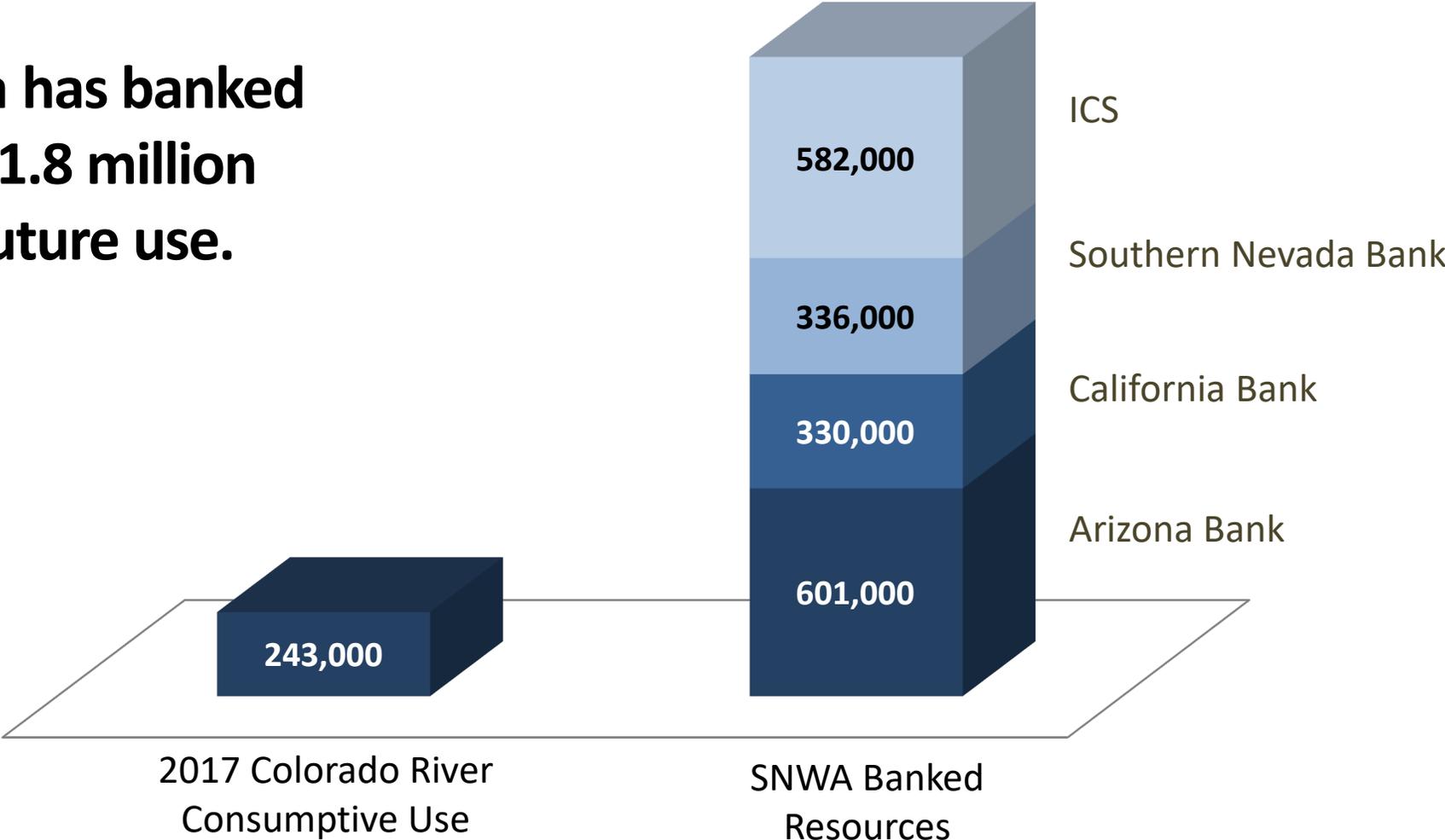


Colorado River Water  
**CONSUMPTION**



# WATER BANKING

**Southern Nevada has banked approximately 1.8 million acre-feet for future use.**



# INTENTIONALLY CREATED SURPLUS

## **Tributary Conservation and Imported**

- Muddy and Virgin Rivers, Coyote Springs Valley (25-40 kafy)

## **Extraordinary Conservation (125 kaf)**

## **System Efficiency**

- Brock Reservoir (400 kaf)
- Yuma Desalting Plant (3 kaf)

## **Binational (24 kaf)**

*Note: supplies are estimated*



Virgin River, Nevada

# COLLABORATION

**The Colorado River Basin states continue to cooperatively address river issues:**

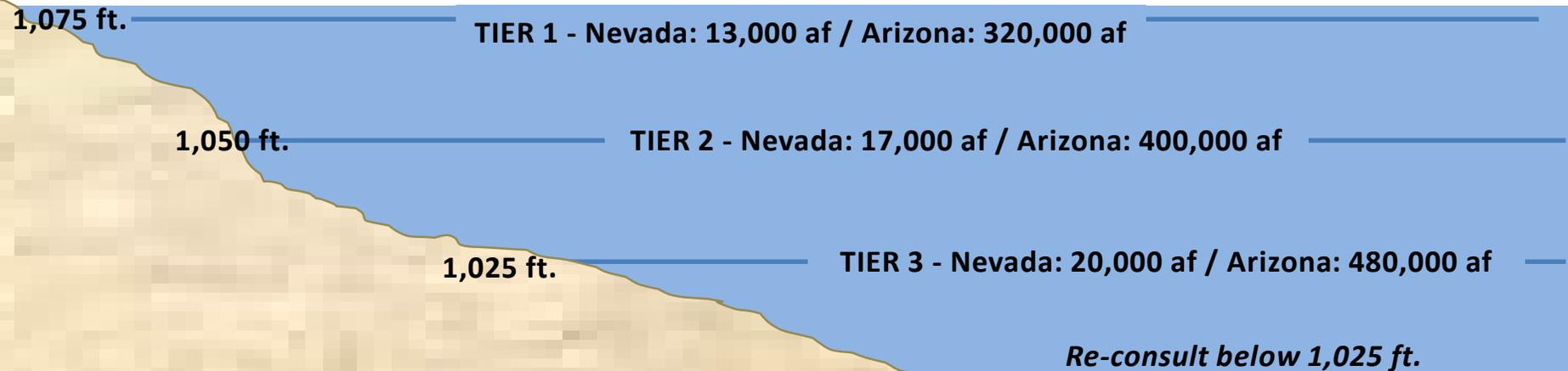
- Coordinated reservoir operations
- Shortages (timing and quantity)
- Intentionally Created Surplus
- Weather modification
- Colorado River Basin Study
- System Conservation Pilot Program
- Drought Response MOU



# COLLABORATION

The Basin States developed a framework to manage shortages, utilizing Lake Mead water elevations as triggers.

## Nevada/Arizona's share of Colorado River shortages



# **System Conservation Pilot Program**

**(est. July 2014)**

## **What it is:**

- Voluntary program to reduce consumptive use

## **What it does:**

- Benefits system as a whole: no funding partner receives additional water

## **Funding:**

- Partners - Reclamation, MWD, CAP, SNWA, and Denver Water
- Third Party Contributors
- \$36 million

## **Conservation:**

- >210 kaf

# Drought Response MOU

(est. December 2014)

## What it is:

- Agreement among Lower Basin and federal partners to increase storage in Lake Mead by 1.5 to 3 maf between 2014 and 2019

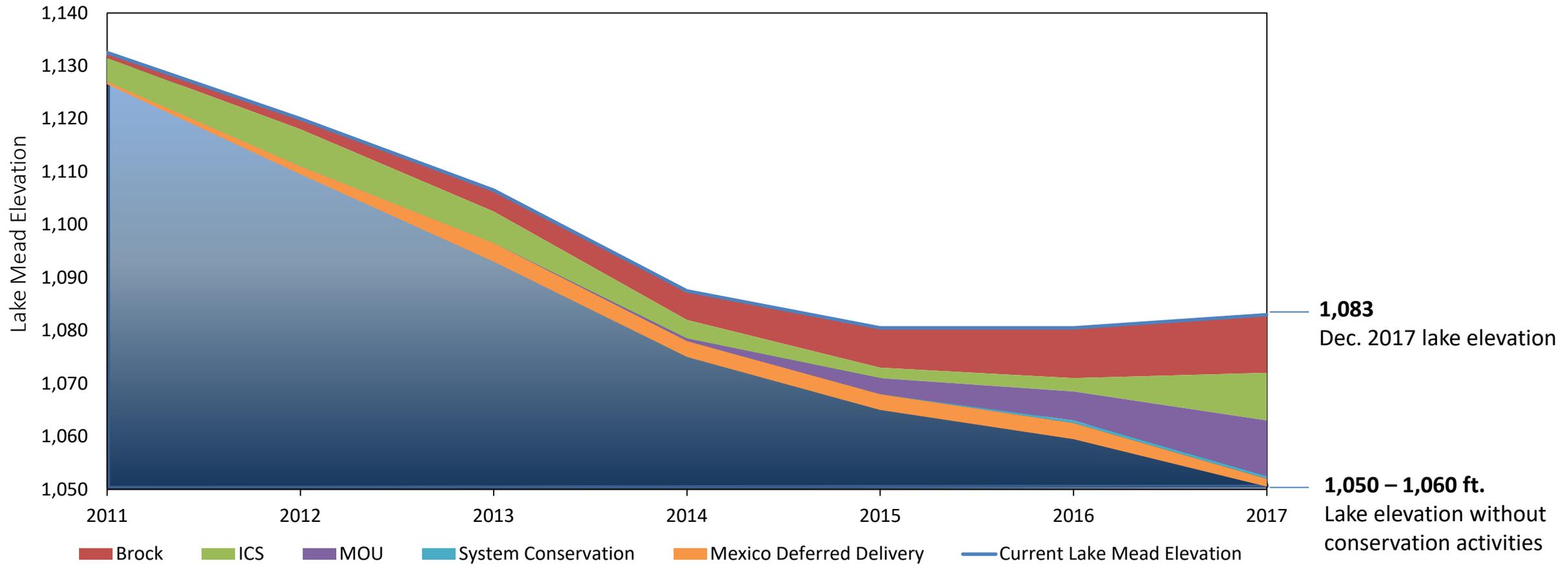
## What it does:

- Establishes “Protection Volumes”
- Additional drought response actions if Lake Mead’s elevation is below 1,060 feet at end of year

## Protection Volumes:

- |               |                 |
|---------------|-----------------|
| • SNWA        | 45 kaf          |
| • CAWCD       | 345 kaf         |
| • MWD         | 300 kaf         |
| • Reclamation | <u>+ 50 kaf</u> |
|               | 740 kaf         |

# IMPACT ON LAKE MEAD



# CLIMATE AND HYDROLOGY WORK GROUP

**Volunteer group of more than a dozen federal, state, and local water management agencies and other ad-hoc participants**

## **Common goals:**

- **Advance scientific understanding to improve the accuracy of hydrological forecasts and projections**
- **Enhance the performance of predictive tools**
- **Better understand the uncertainty related to future supply and demand conditions in the Colorado River Basin**

**Recognized the need for an up-to-date assessment of the state of knowledge in the Colorado River Basin – “State of the Science” report**

# STATE OF THE SCIENCE REPORT TOPICS

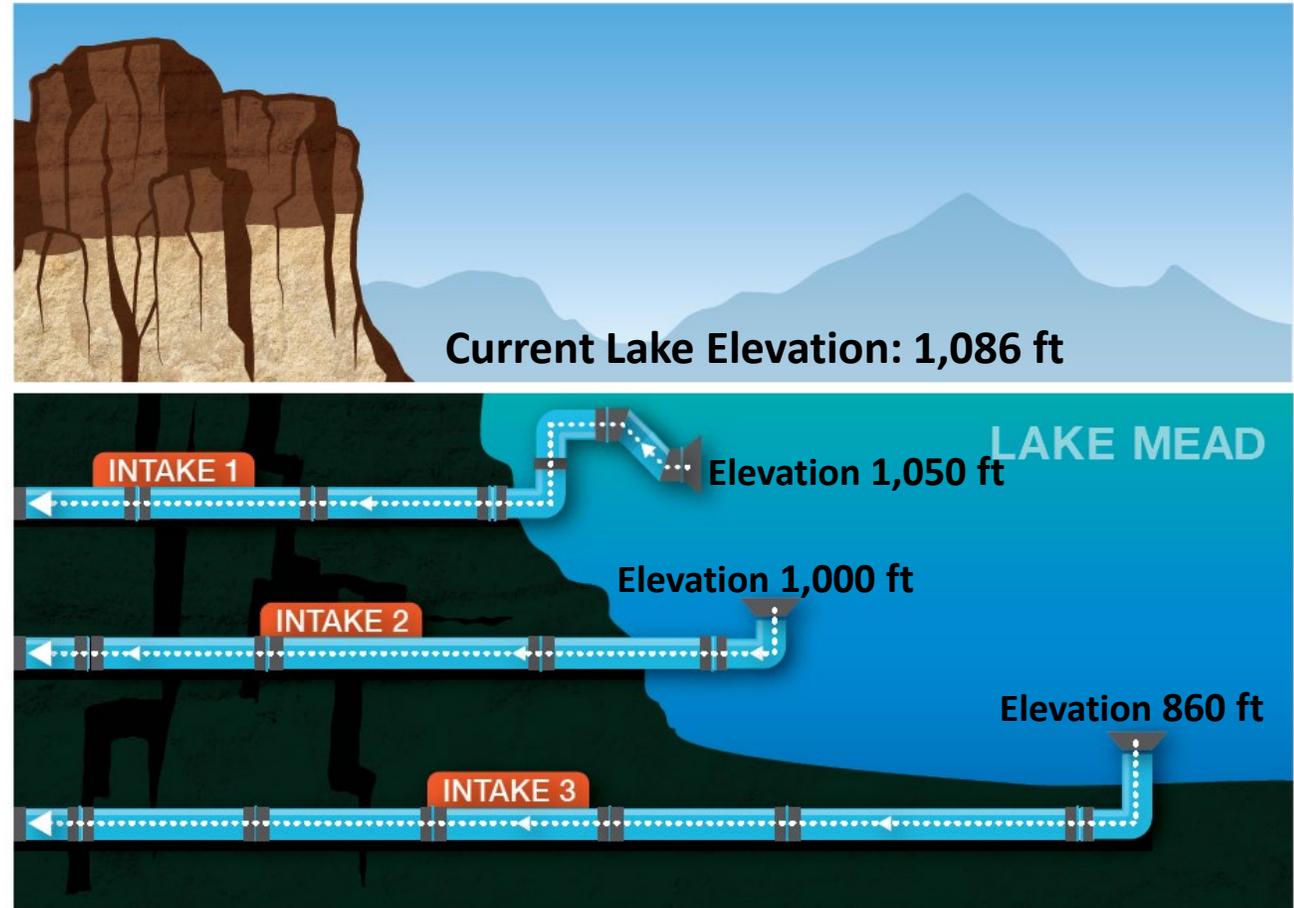
- **Climatic and hydrologic processes and variables that drive streamflow outcomes**
- **Advances in hydrologic forecasts, climate and hydrology projections, and climate downscaling techniques and approaches**
- **Advances in observation techniques and observing systems necessary for hydrologic forecasts and climate and hydrology projections**
- **Evaluation of the level of certainty of the state of knowledge, including the identification of crucial gaps and weaknesses in the state of knowledge**

# REPORT IMPLEMENTATION

- **Jointly funded by able and willing coalition**
- **Project management by SNWA**
- **Prepared by Western Water Assessment in collaboration with a network of individual and institutional experts**
- **Expected completion by the end of 2019**

# NEW INFRASTRUCTURE

In 2008, construction began on Lake Mead Intake No. 3, which accesses water at the deepest part of Lake Mead.



# INTAKE NO. 3

**Intake No. 3 ensures system capacity and protects customers from water quality issues.**

**Operations began September 2015.**

Project details:

- 2.5 mile tunnel underneath Lake Mead
- Approximately 2,400 concrete rings—each weighing more than 32 tons—used to line tunnel
- Elevation 860 feet
- Cost: \$817 million



## A COMPLICATED CONNECTION

After three miles and almost three years of digging, the Southern Nevada Water Authority's massive tunnel boring machine hit its intended target Tuesday, when it successfully broke through into a concrete intake structure placed at the bottom of Lake Mead in 2012.

**3** As the TBM moves forward, the 20-foot diameter pipe is built one 6-foot-long ring at a time behind the shielded portion of the machine.

APPROXIMATE LAKE LEVEL 1,085 FEET\*

**4** Stabilizers on each side of the TBM press against the rock to prevent the machine from rolling. The front portion of the machine actually pushes off against the assembled pipe rings to mine and advance the TBM.

**1** Powered by electric motors that produce a combined 7,700 horsepower, the cutter head turns and grinds against the rock using an array of disks made from a special alloy.

**2** Rock and dirt sheared away by the disks is collected by scoops on the cutter head and dropped onto a conveyor system inside the machine. The conveyor belt carries the material through the machine and along the tunnel to the bottom of the access shaft. From there, it is lifted to the surface in giant buckets.

**5** The reinforced concrete segments used to make each pipe ring are brought forward by a segment feeder.

**6** An erector lifts the pipe segments and places them in position. Each pipe ring is made up of five segments, each weighing about 6,000 pounds, and a 4,000-pound keystone.

Setting the pipe segments is controlled manually

**Intake No. 3**  
Elevation 860 feet

Saddle Island

Surface facilities

Alfred Merritt Smith and River Mountains water treatment facilities

**Intake No. 1**  
Elevation 1,050 feet  
Installed in 1971,  
modified in 2004

**Intake No. 2**  
Elevation 1,000 feet  
Installed in 2000

ACCESS SHAFT  
600 FEET



3 MILES

## BORING MACHINE

Attached to the main body of the tunnel boring machine is a mobile factory that contains the conveyor and slurry systems to move pulverized rock out of the tunnel and the systems that provide power, water and clean air to the machine and its crew. All of it rides within the newly completed pipe behind the TBM.



APPROXIMATELY 600 FEET

Boring machine head, shown in above diagram

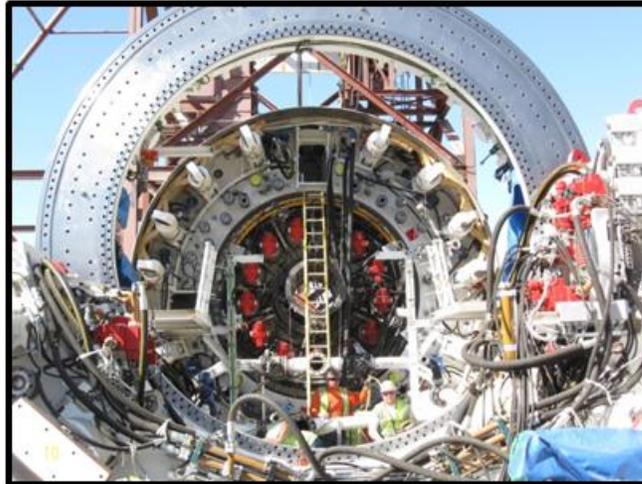
SOURCE: Southern Nevada Water Authority

\*All elevations are above sea level.

# INTAKE NO. 3



**Muck Conveyor System**



**Tunnel Boring Machine Assembly**



**Intake Tunnel**



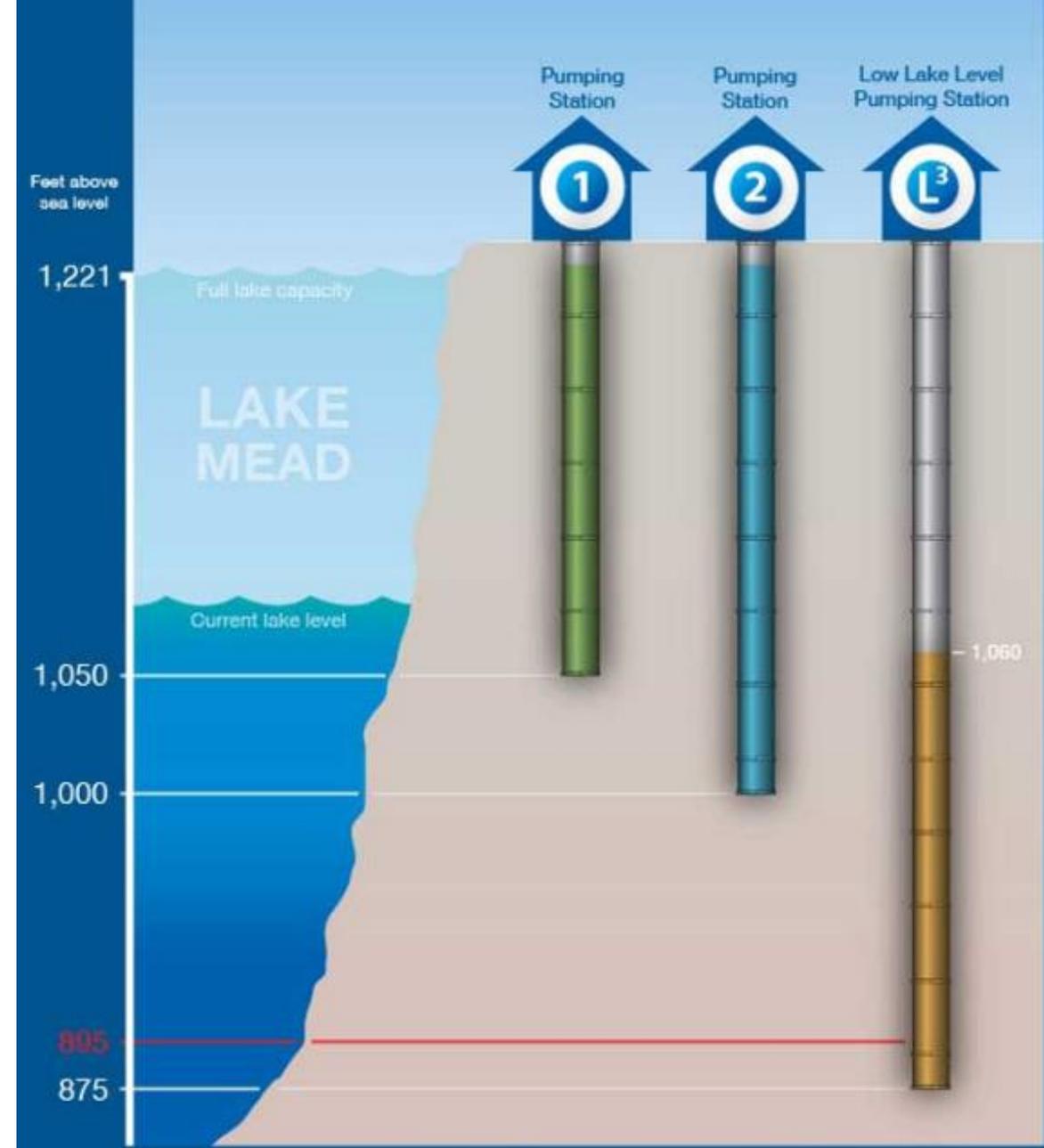
**Intake Structure**



**Starter Tunnel**

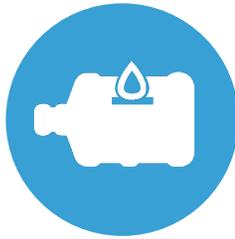
# L3PS

- Citizens Advisory Committee recommendation
- Will ensure water deliveries down to 875 ft.
- Replacement capacity of 900 mgd
- Estimated cost: \$650M
- Operational in 2020





Southern Nevada has spent **decades** preparing for drought to ensure the reliability of water supplies for Southern Nevada



### **WATER BANKING**

Storing water supplies for the future



### **RESOURCE PLANNING**

Working with partners & developing comprehensive plans to manage supplies



### **CONSERVATION**

Incentives, programs, regulation & pricing



### **INFRASTRUCTURE**

Constructing major facilities and asset management



SOUTHERN NEVADA WATER AUTHORITY®