Climate Change & America's Infrastructure

Colorado River Water Resources

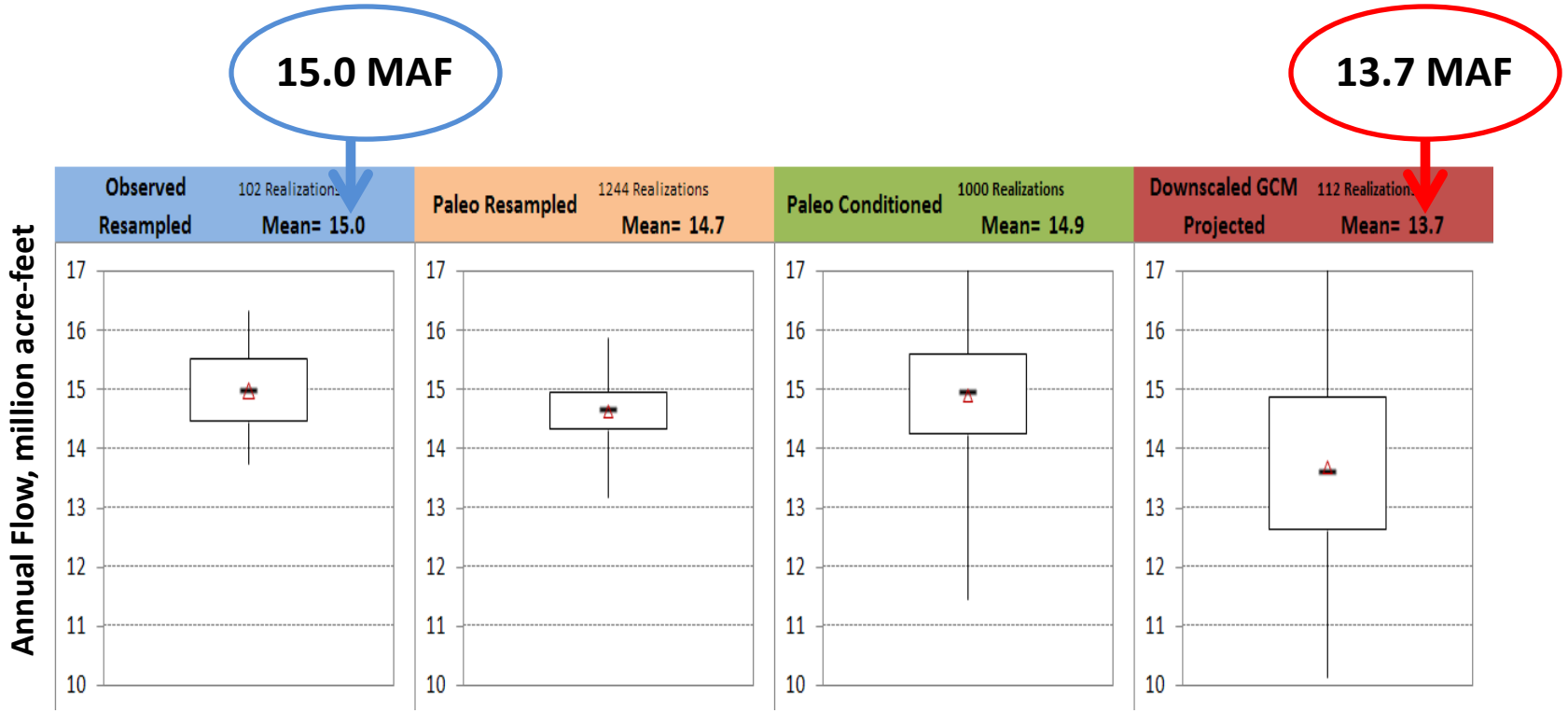
January 29, 2013

Summary

- **Basin Study's Climate Change Hydrology – Planning for the Worst Case**

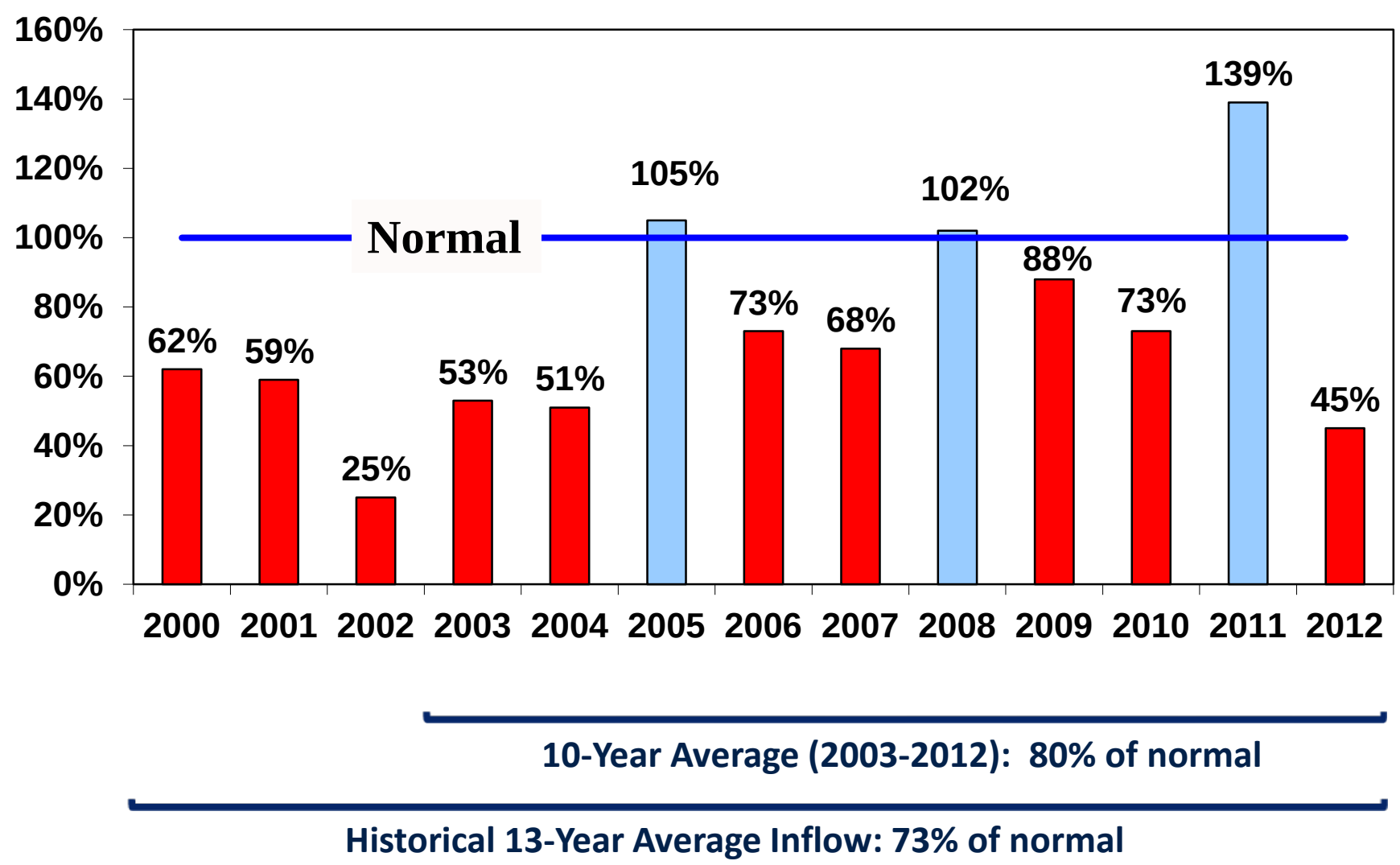
- **Southern Nevada Water Authority's Response to Drought/Climate Change**

Projections of Natural Flow at Lees Ferry



- The Downscaled GCM Projected scenario indicates higher variability and a mean less than other scenarios, ~ 9% less than the observed record by 2060.

Historical Lake Powell Annual Inflows



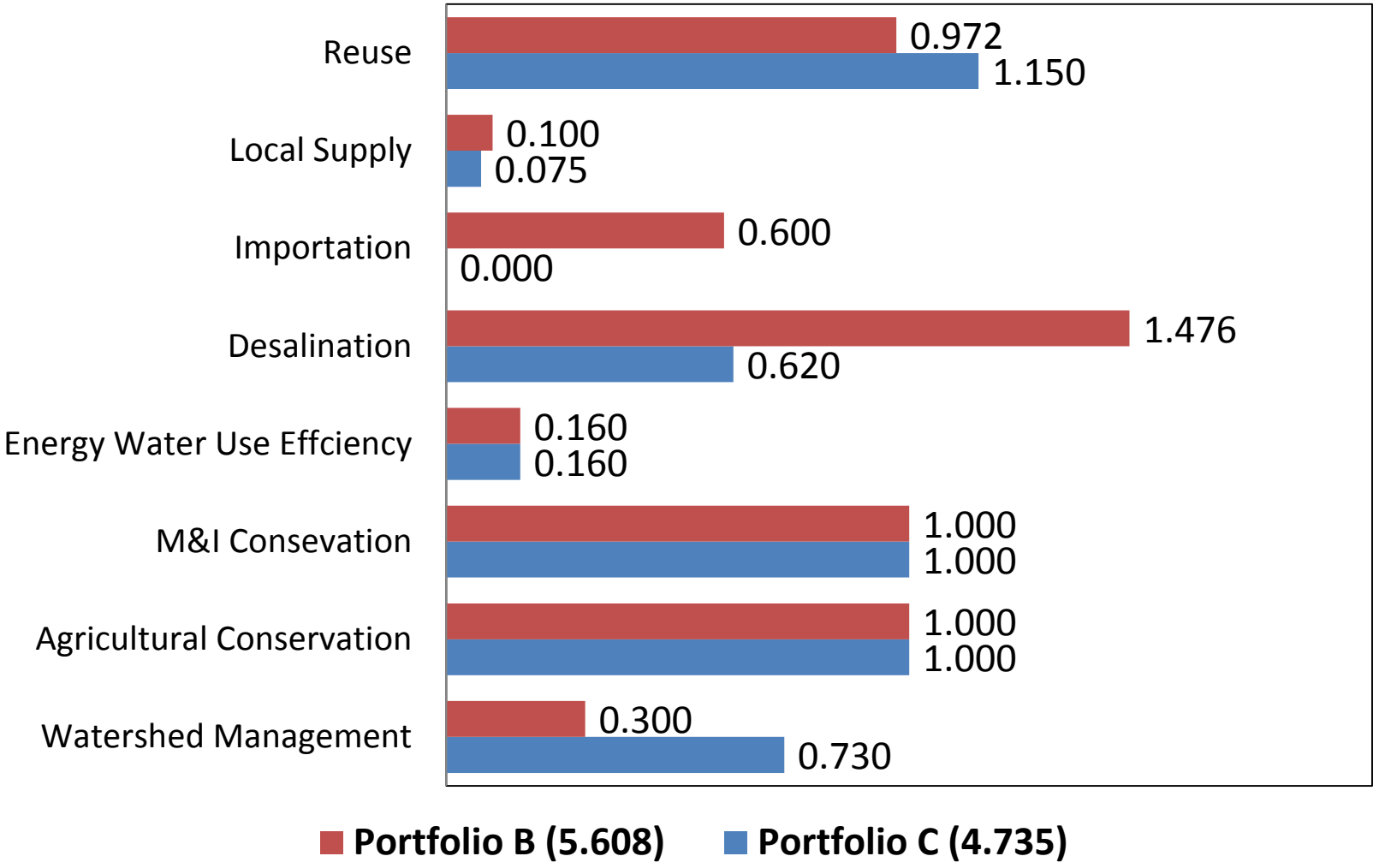
Future Colorado River Water Supply and Demand

- **Median supply and demand imbalance in 2060 is 3.2 million acre-feet / year**

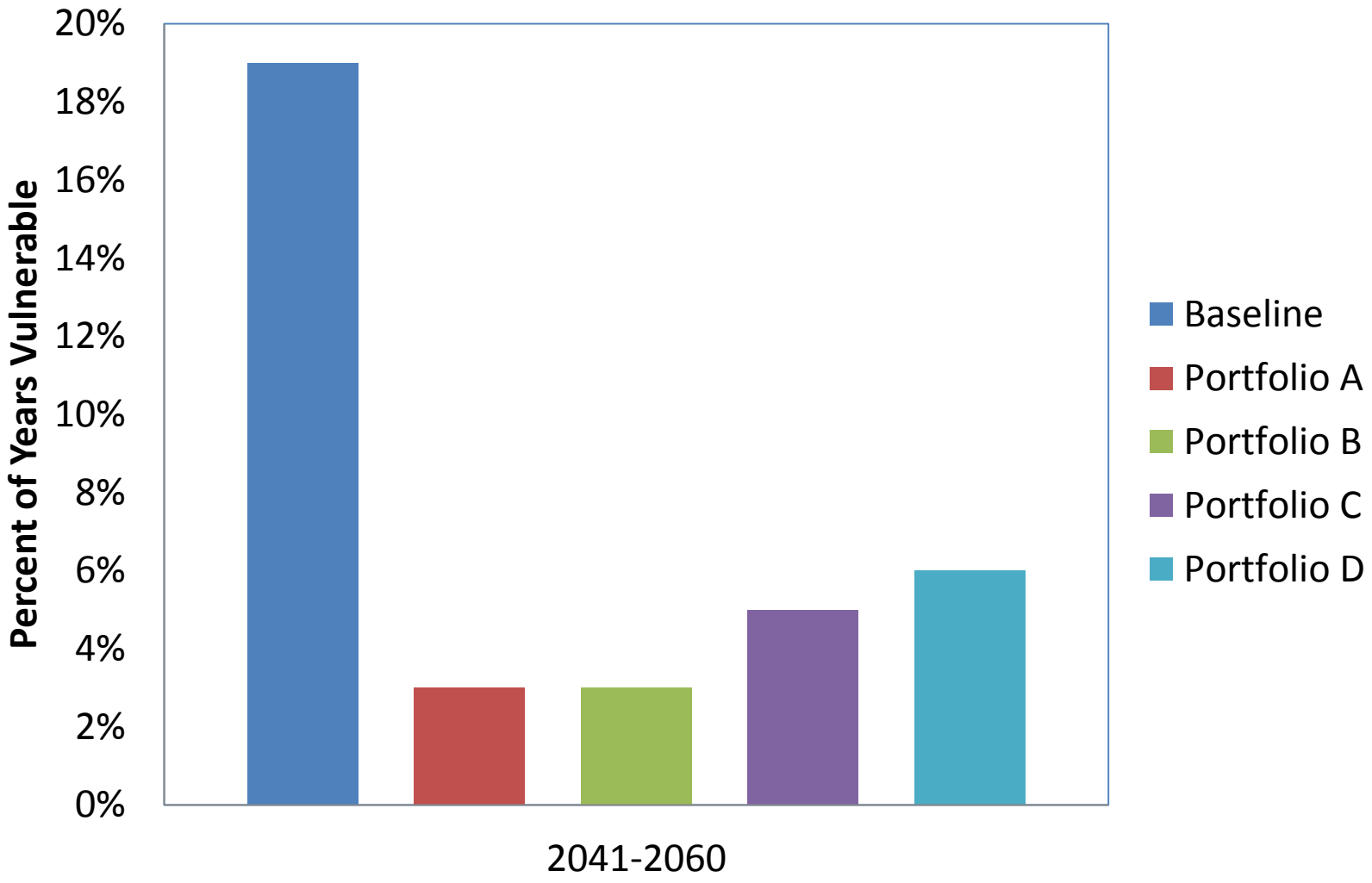
- **The range of supply and demand imbalances ranges from 0 to nearly 8 million acre-feet / year**

Portfolio Profile

Resource Options and Volumes in Million Acre-Feet

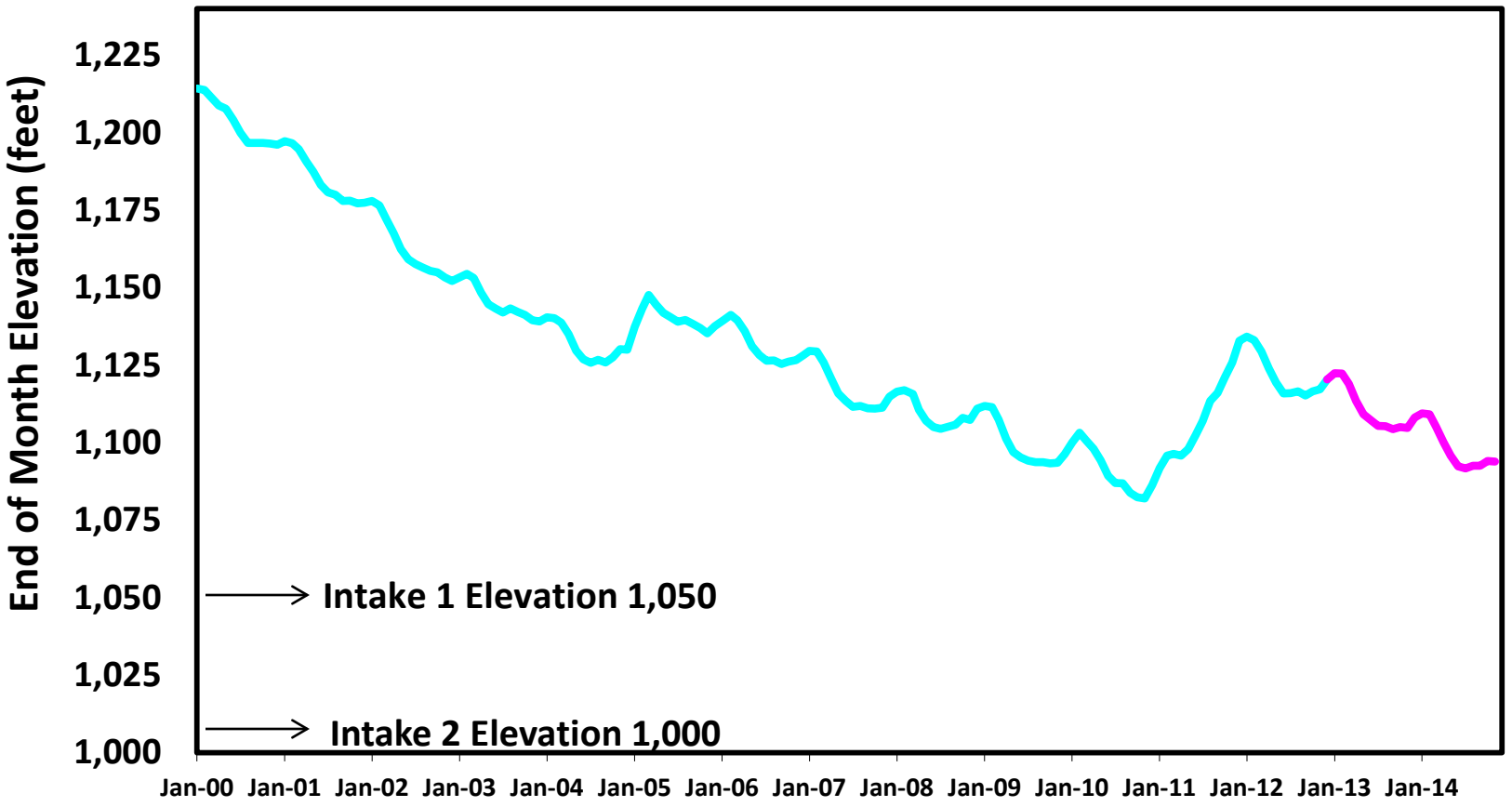


Lake Mead Pool Elevation Below 1,000 feet



Lake Mead Elevations

(Historical and Forecasted)



Source: Bureau of Reclamation, January 2013

Addressing Infrastructure

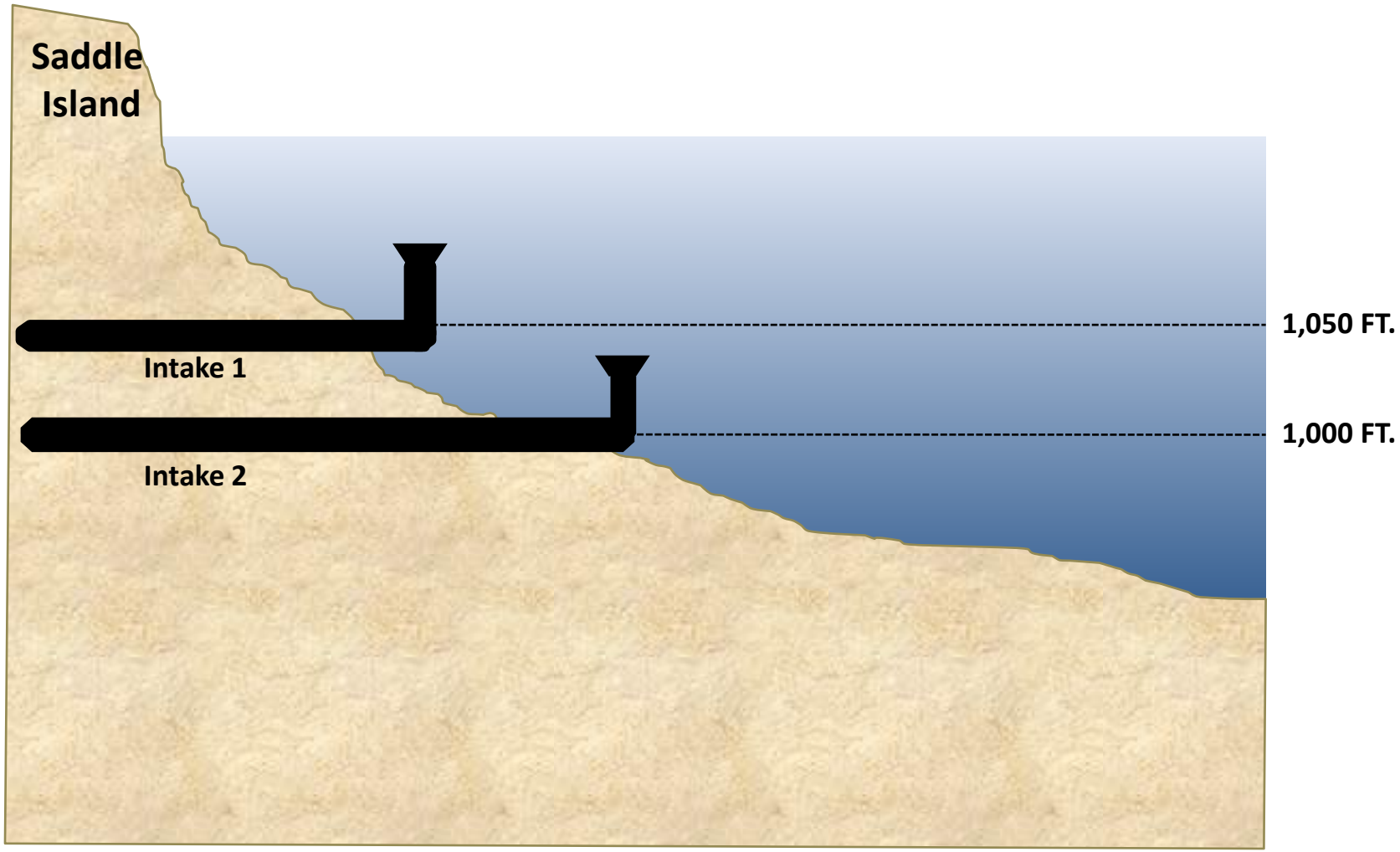
INFRASTRUCTURE:

Existing infrastructure required improvements to protect Southern Nevada from drought impact of lower Lake Mead water levels.

- **Modifications were required to extend Intake No. 1 to maintain access to best water quality. (2004)**
- **An additional intake in Lake Mead was necessary to protect against potential loss of Intake No. 1. (2005)**
- **Additional capacity was needed at Intake No. 2's pumping station to temporarily defer construction of a third pumping station. (2006)**

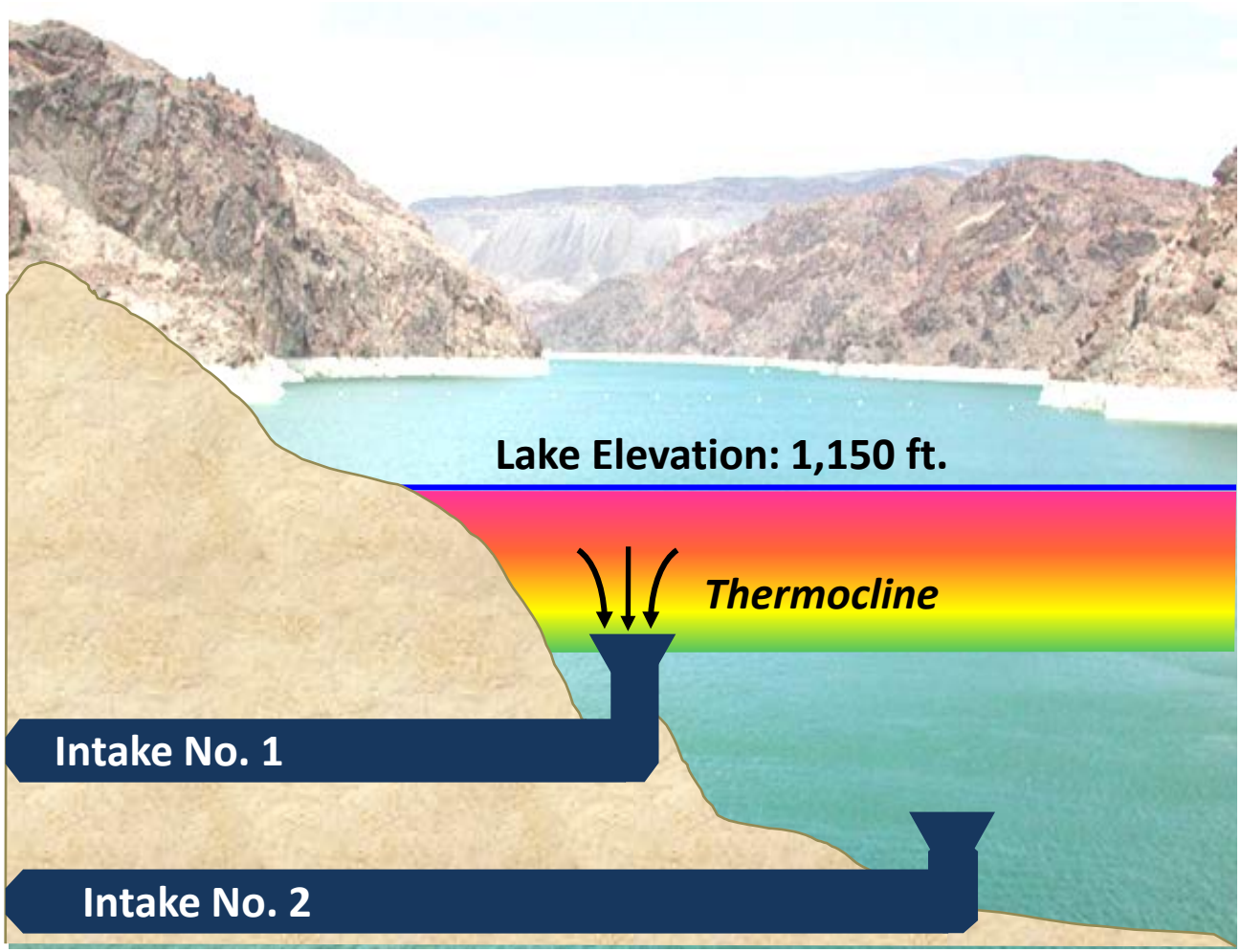
Addressing Infrastructure

Lake Mead Intake Profile (2002)



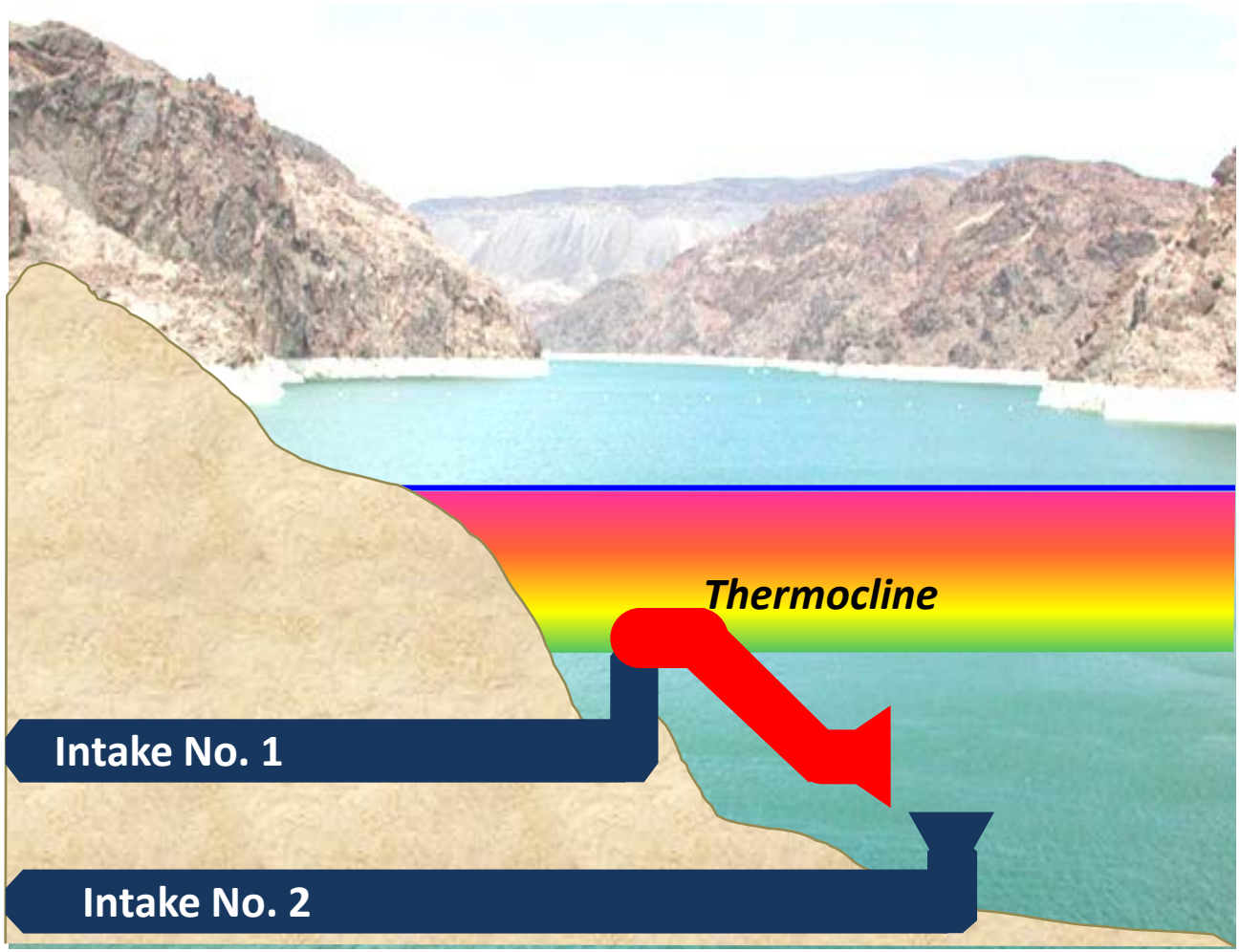
Addressing Infrastructure

Intake Extension



Addressing Infrastructure

Intake Extension - 2004



Addressing Infrastructure

Higher capacity pumps were installed at Intake Pumping Station No. 2.

- **Expanded Intake No. 2 pumping capacity**
- **Protected Southern Nevada from service interruptions for the short term in the event Intake Pumping Station No. 1 was unavailable due to low lake levels.**

Addressing Infrastructure

Drought was the catalyst for the SNWA to explore the need for an additional intake in Lake Mead.

Drought

- **Lake Mead levels were continuing their rapid decline**
- **Access to best water quality deep in Lake Mead was impaired by declining lake levels**

Demands

- **Both intakes are needed to reliably satisfy water demands in the long term**
- **The pumping capacity of Intake No. 1 would have to be replaced to if lake levels continued to decline**

Addressing Infrastructure

Continued

Regulations / Treatment

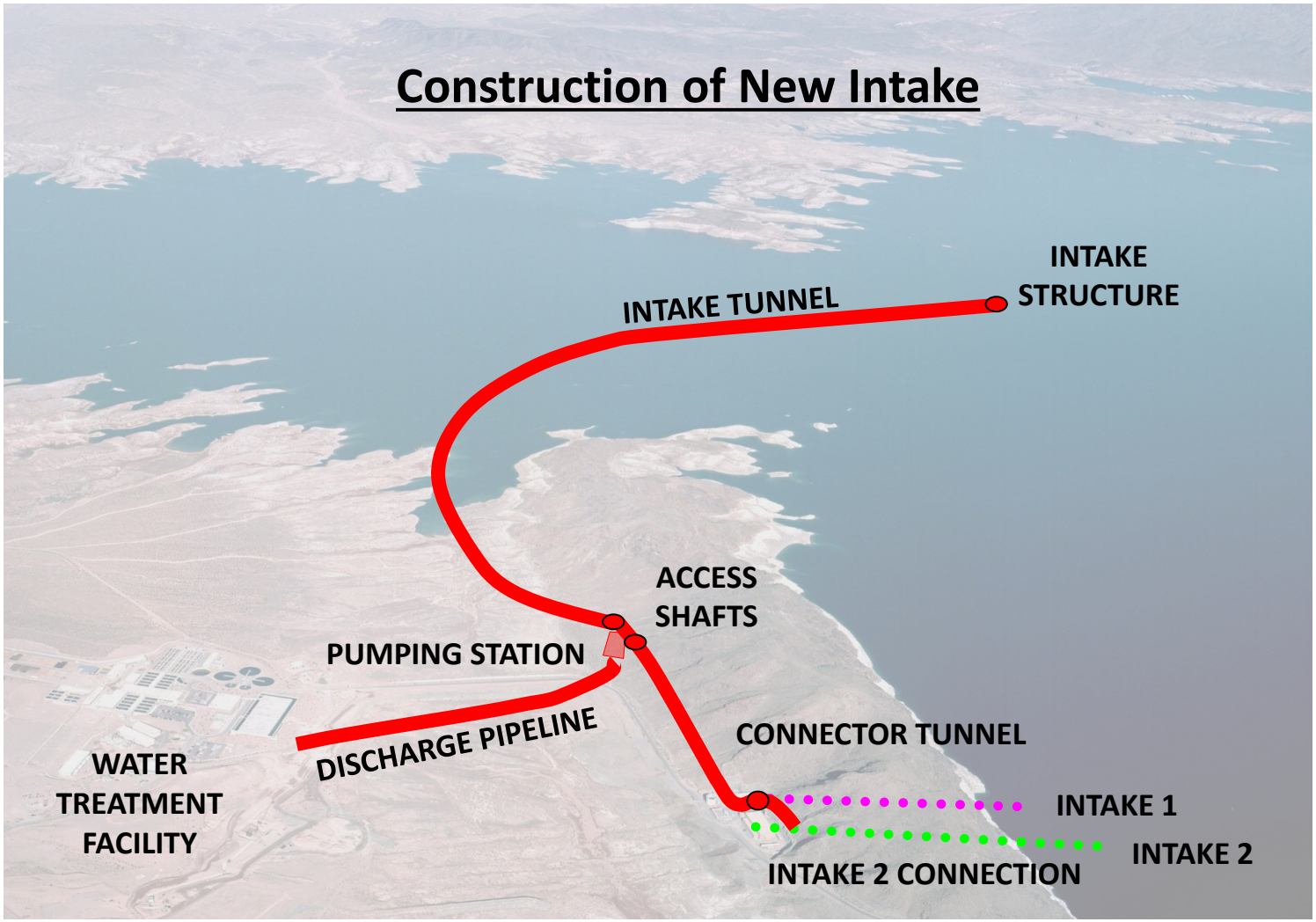
- **Water quality regulations were becoming more difficult to meet, especially with declining lake levels**
- **Constructing water treatment process improvements could have been more expensive than constructing a new intake to avoid the need for treatment improvements**
- **Additional treatment process could cost $85 million in annual operating costs on top of the capital cost**

Addressing Infrastructure

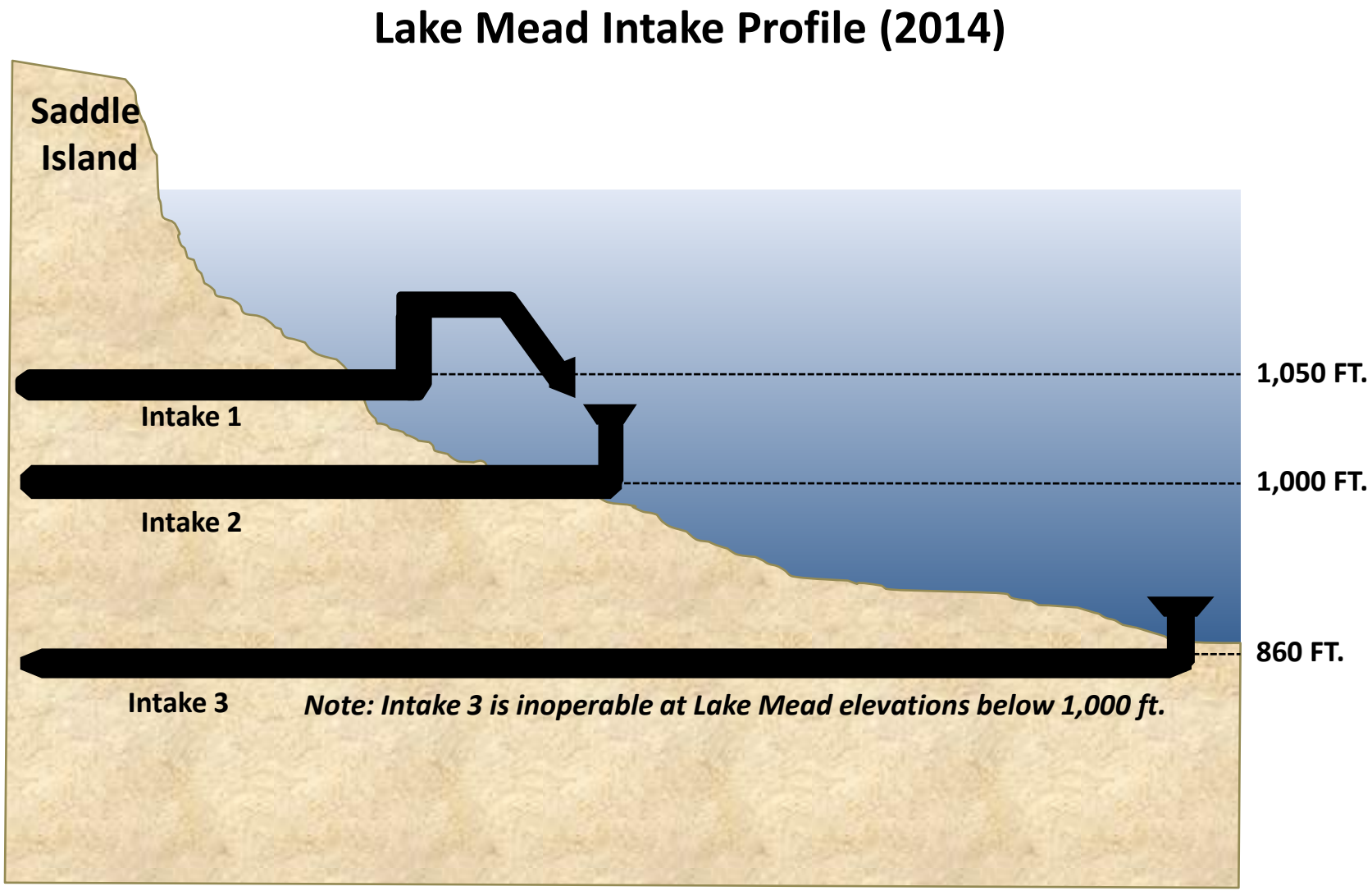
In 2005, the decision was made to construct a third intake.

- **Meets both water quality and pumping capacity objectives**
- **Reduces treatment costs**
- **Preserves the ability to pump water at lower lake levels**
- **Provides operational flexibility for changing conditions**
- **Does not increase the total amount of water available to Southern Nevada**

Addressing Infrastructure



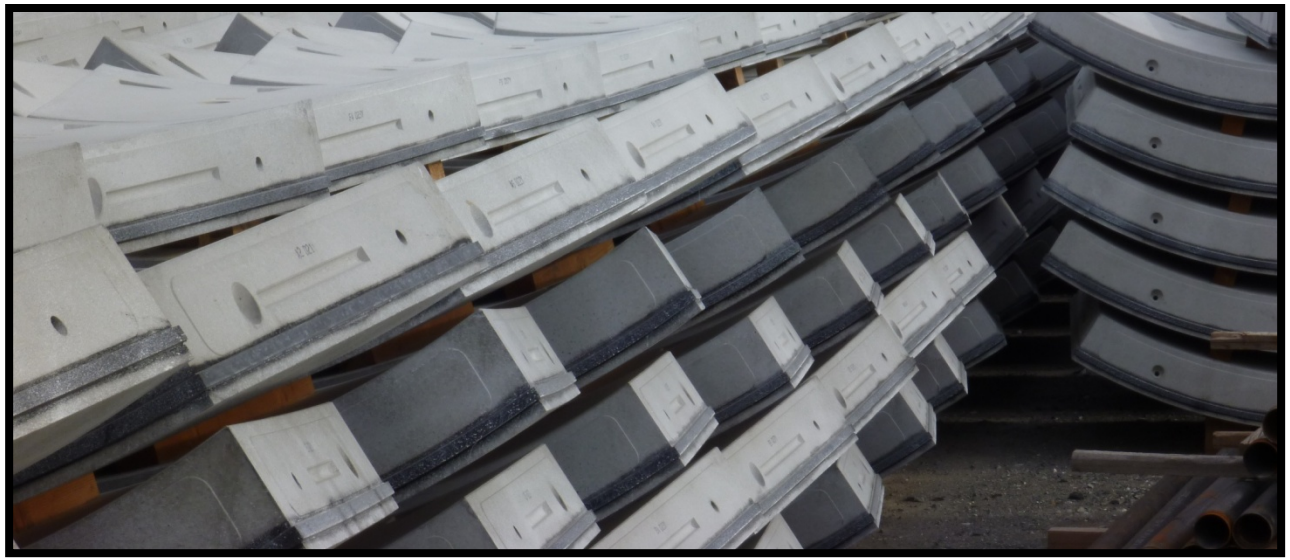
Addressing Infrastructure



Intake No. 3: Connector Tunnel

Intake No. 3: Starter Tunnel

Intake No. 3: Concrete Liners



Intake No. 3: Intake Structure Fabrication

Intake No. 3: Assembled Intake Structure

Intake No. 3: Structure Lowering

Intake Structure Installation

February and
March 2012

Total Tremie Concrete = 11,300 cy

Intake No. 3: Tremie Concrete Placement

Intake No. 3: Tremie Concrete Placement

SOUTHERN NEVADA WATER AUTHORITY