The Colorado River

*then, now & the future*

Kay Brothers

April 8, 2014
Colorado River – Historical Flow

Recorded History

Tree Ring Studies

4-year Moving Average
Linear Trend

Millions of Acre-feet

SNWA 4/04
Colorado River – Historical Flow

The Gulf millions of years ago…
Colorado River – Historical Flow

The lake to the north dries up....

At times, the river flowed north to the Salton Basin...
Colorado River – Historical Flow

At times, it flowed south to the Gulf...

Formation of the Salton Sea, 1905
Colorado River – Historical Flow

Early 1500’s

1840 - 1870
1500’s – Early Exploration

Francisco Vasquez de Coronado

Coronado travels West in search of Gold

…But what I am sure of is that there is not any gold nor any other metal in all that country.”
Las Vegas – 1840’s

John C. Freemont maps the West.

After his maps are published, hundreds of travelers come through the Las Vegas Springs and use it as a campsite because of its water.
1869

John Wesley Powell explores the Colorado River

"We have an unknown distance yet to run, an unknown river to explore."
Colorado River Historic Flows

Millions of Acre-feet

SNWA 4/04

1905
Historical Lake Powell Annual Inflows
Las Vegas – 1905

Las Vegas is founded on May 15, 1905

In these early years and lasting for the next several decades, the community viewed its supply of artesian groundwater as virtually “inexhaustible.”
Historical Lake Powell Annual Inflows

Provisional data, subject to change

Estimated values for 2011-2013
Work begins on Hoover Dam

1930’s
Land Use – 1950

40,000+ residents
7,000 developed acres
“The population of the Southwestern United States has increased by approximately 1,500% over the last 90 years, while the population of the United States as a whole has grown by just 225%.”

<table>
<thead>
<tr>
<th>State</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arizona</td>
<td>2,880%</td>
</tr>
<tr>
<td>Maricopa County</td>
<td>10,275%</td>
</tr>
<tr>
<td>Nevada</td>
<td>2,840%</td>
</tr>
<tr>
<td>Clark County</td>
<td>22,480%</td>
</tr>
</tbody>
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Historical Lake Powell Annual Inflows

Provisional data, subject to change

Estimated values for 2011-2013
Land Use – 2008

2 Million residents
162,773 Developed Acres
Colorado River Historic Flows

1583 – 1587 & 1590 – 1594
66% of Normal

2000 - 2004
50% of Normal
Clark County Population
Historical Lake Powell Annual Inflows

2000-2013 *Natural Flow* 12.16 million acre-feet or 82% of average

10-Year Average (2004-2013): 79% of normal

Historical 14-Year Average Inflow: 71% of normal
Colorado River Basin Water Supply and Demand Study

- Purpose
  - Assess future water supply and demand imbalances over the next 50 years
  - Assess risks to Basin resources
  - Develop and evaluate opportunities for resolving imbalances and to mitigate impacts to resources
- A planning study – will not result in any decisions, but will provide the technical foundation for future activities
Colorado River Basin Water Supply and Demand Study

Historical Supply and Use

- Water Supply (10-year Running Average)
- Water Use (10-year Running Average)

Projected Future Supply and Demand

- Projected Water Demand
- Projected Water Supply (10-year Running Average)
Projections of Natural Flow at Lees Ferry

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Annual Flow, million acre-feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observed Resampled</td>
<td>Mean = 15.0</td>
</tr>
<tr>
<td>Paleo Resampled</td>
<td>Mean = 14.7</td>
</tr>
<tr>
<td>Paleo Conditioned</td>
<td>Mean = 14.9</td>
</tr>
<tr>
<td>Downscaled GCM Projected</td>
<td>Mean = 13.7</td>
</tr>
</tbody>
</table>

- 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

2000 – 2008: Natural Flow 11.8 Million Acre-Feet or 79% of Average

10-Year Average (2003-2012): 80% of normal

Historical 13-Year Average Inflow: 73% of normal
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
Next Steps

Additional Conservation and Reuse

Regional Solutions
  • Weather Modification

Augmentation
  • Feasibility Studies

Discussions
  • “What happens when Lake Mead Reaches 1,025?”

Future Planning Using Tools Developed for the Basin Study
Southern Nevada Water Authority