Securing Future Water Supplies in the Great Salt Lake Watershed

Presentation Prepared By Jeff Salt
LEVELS OF LAKES IN BONNEVILLE BASIN

- Bonneville Level
- Provo Level
- Great Salt Lake Level
- Little Valley Cycle
- Bonneville Cycle
- Bonneville Flood

Years Before Present:
- 600,000
- 100,000
- 20,000
- 14,500
Tree rings are indicators of climate variability throughout the watershed region.
Great Salt Lake is a dynamic system. The lake elevation has changed dramatically during recorded history.
Recent variability in lake levels.

- **Historic High - 1986**
  - 4,212 feet above sea level
  - 2,300 square miles

- **Average**
  - 4,202 feet above sea level
  - 1,730 square miles

- **Historic Low - 1963**
  - 4,191 feet above sea level
  - 937 square miles
“I wish to make it clear to you, there is not sufficient water to irrigate all the lands which could be irrigated, and only a small portion can be irrigated.... I tell you, gentlemen, you are piling up a heritage of conflict!”

John Wesley Powell - speech to Los Angeles International Irrigation Conference (1893)
We’ll make the desert bloom!
Utah Total Population
1900 to 2060
2010 Census Population: 2,763,885
Water development will require investment in large-scale storage, treatment and delivery infrastructure.
Population growth will require increased water treatment.
Population growth will require job creation and increased production of goods.
Population growth and urbanization will result in increased nonpoint pollution.
Population growth will result in development of critical lands.
Water development will impact recreational uses.
Water development will impact recreational uses.
Fundamental Concepts

• Climate change is not new to the watershed, and will continue to affect security of future water supplies.

• Our available water supply is limited and variable.

• There is a limit to how much growth can be supported by available water supplies.

• There are significant environmental impacts associated with the development of water supplies.

• Future development of water resources will become increasingly complex and expensive and contentious.

Photo courtesy, Gary Crandall
Fundamental Positions

• Determining the carrying capacity of the watershed should be the highest priority activity for creating a long-range water plan.

• Utah’s long-range water plans should not be based on the approach of developing water supplies to meet a particular level of population growth; instead, population growth should be managed to meet the availability of water resources and the carrying capacity of the watershed.
Fundamental Positions

• The potential impacts of climate change on available water supplies must be acknowledged and incorporated into long-range plans.

• The watershed infrastructure must be maintained and not depleted (i.e. minimum in-stream flows, conservation pools for reservoirs and the Great Salt Lake, limitations on groundwater extractions).

• Long-range water plans and strategies must also consider water quality.
Fundamental Positions

• Conservation alone will not ensure adequate water supplies into the future. Other policies and regulations must be established to increase efficiency of essential uses and discourage frivolous uses (i.e. realistic pricing, real enforcement of policies and regulations, changes in water laws).

• Long-range water plans must consider and limit environmental impacts.
Fundamental Positions

• Education programs are an essential component of a sustainable long-range water strategy.

• Funding for the development, maintenance and improvement of water storage, treatment and delivery systems will be needed to ensure adequate water resources in the future.

• Wildlife habitat and populations must be considered in long-range water plans and strategies.
CLIMATE CHANGE AND SALT LAKE CITY’S WATER RESOURCES

How Science is Informing Salt Lake City’s Water Resource Decisions

Laura Briefer
Water Resources Manager
Salt Lake City Department of Public Utilities
Salt Lake City’s Water Resource Management

• Public water supplier to 345,000 people
• Stormwater and sewer service to 185,000 people
• Manage built and natural infrastructure
Salt Lake City Climate Challenges

- Precipitation change or uncertainty
- Snowpack decrease
- Earlier runoff timing
- Water quality degradation
- Water quantity degradation
- Increase in water demand
- Flooding

"Serving Our Community, Protecting Our Environment"
Infuse Decision-Making with Applied Climate Science and Research

- **Decision Context**
  - Information about the environment
  - Models and projections
  - Costs and revenues
  - Personal and community values
  - Uncertainty

- **Decision support PROCESSES include...**
  - Framework for decision-making
  - Co-production of knowledge
  - Assessments of impacts and vulnerabilities
  - Boundary processes to link scientists and decision makers

- **Decision support TOOLS include...**
  - Scenarios and scenario planning
  - Data management and visualization
  - Comparative tradeoff methods
  - Integrated assessment models
  - Data management systems

- **Effective Decision-Making**
  - **Process Outcomes:** Strengthen relationships and build trust among participants
  - **Decision Outcomes:** Consensus about problems, objectives, and options for action

- **Short-term outcomes include...**
  - More relevant information
  - Insights
  - Assessment of significance of uncertainties
  - Clearer tradeoffs
  - Stronger accountability
Affected and Cross-Cutting Decisions

- Water supply sources
- Water rights
- Land use
- Watershed management
- Capital improvements
- Regulatory
- Water rates
- Budget priorities
Decision Criteria

Risk (and perception)
Social equity
Cost and benefit
Time-frame
Public values
Political feasibility
Boundary Activities

- Integrate public policy decisions and scientific information
- Western Water Assessment – one of eleven NOAA RISAs.
- Western Adaptation Alliance
- Carpe Diem West
- Salt Lake Regional Climate Network
Identify Vulnerabilities to Inform Decisions

• Use modeling techniques to develop stream flow and water demand change scenarios

• Work with Western Water Assessment, University of Utah, Colorado Basin River Forecast Center
Salt Lake City Supply and Demand Model

Supply and Demand with Increasing Temperature

4ck ave right
Average Use
4ck +5F
4ck +10F
future use?
Science + Decision Making = Iterative Process

- Integrated water management model for Salt Lake Area
- Snowpack studies for the Wasatch Mountains
- Dendrochronology study
- iUtah - National Science Foundation
- Energy-water nexus
Selected References


• Carpe Diem West Information: [www.carpediemwest.org](http://www.carpediemwest.org)

• iUtah Information: [http://iutahepscor.org](http://iutahepscor.org)


• NOAA Cooperative Institutes/RISA Programs: [http://cpo.noaa.gov/Partnerships/CooperativeInstitutes.aspx](http://cpo.noaa.gov/Partnerships/CooperativeInstitutes.aspx)

• Western Water Assessment Information: [http://wwa.colorado.edu/](http://wwa.colorado.edu/)
Questions/Discussion