Basin Report: Colorado River

The Colorado River Basin is located in the southwestern United States and occupies an area of approximately 250,000 square miles. The Colorado River is approximately 1,400 miles long and originates along the Continental Divide in Rocky Mountain National Park in Colorado and ends where it meets the Gulf of California in Mexico. The Colorado River is a critical resource in the West because seven states (Arizona, California, Colorado, Nevada, New Mexico, Utah and Wyoming) depend on it for water supply, hydropower production, flood control, recreation, fish and wildlife habitat and other benefits. The United States also has a delivery obligation to Mexico for some of the Colorado River waters pursuant to a 1944 Treaty with Mexico. The principal demand for water in the Colorado River Basin arises from agriculture; from 70 to 80% of all water resources are used to irrigate agricultural lands.

Future Changes in Climate and Hydrology

Reclamation's 2011 SECURE Water Act Report identifies climate challenges the Colorado River Basin could likely face:

- On average, Colorado River Basin temperature is projected to increase by 5–6 °F during the 21st century, with slightly larger increases projected in the upper Colorado Basin.
- Precipitation is projected to increase by 2.1% in the upper basin while declining by 1.6% in the lower basin by 2050.
- Mean annual runoff is projected to decrease by 8.5% by 2050.
- Warmer conditions will likely transition snowfall to rainfall, producing more December–March runoff and less April–July runoff.

Future Impacts for Water and Environmental Resources

Historical and projected climate changes have potential impacts for the basin:

- Spring and early summer runoff reductions could translate into a drop in water supply for meeting irrigation demands and adversely impacting hydropower operations at smaller reservoirs. Lake Mead and Lake Powell are large enough to dampen inflow fluctuations reducing the impacts to hydropower operations.
- Increased winter runoff may require infrastructure modification or flood control rule changes to preserve flood protection, which could further reduce warm season water supplies.
- Warmer conditions might result in increased stress on fisheries, shifts in species geographic ranges, increased water demands for instream ecosystems and thermoelectric power production, increased power demands for municipal uses – including cooling – and increased likelihood of invasive species infestations. Endangered species issues might be exacerbated.

- Warming could also lead to significant reservoir evaporation, increased agricultural water demands and losses during water conveyance and irrigation.

Adequate and safe water supplies are fundamental to the health, economy and ecology of the United States and global climate change poses a significant challenge to the protection of these resources. Reclamation is taking a leading role in assessing risks to Western U.S. water resources and is dedicated to mitigate risks to ensure long-term water resource sustainability. To this end, Reclamation is refining these preliminary results through a detailed basin study in the Colorado River Basin under its WaterSMART program.

Where opportunities exist, Reclamation has begun adaptation actions in response to climate stresses as well as land use, population growth, invasive species and others. These activities include extending water supplies, water conservation, hydropower production, planning for future operations and supporting rural water development. For example, a 2010-2011 Pilot Run of the Yuma Desalting Plant increased water supplies in the Lower Colorado River Basin through conservation by an estimated 29,000 acre-feet, enough to supply as many as 150,000 people for one year. At Hoover Dam, new wide head range turbines are being installed that will allow more efficient power generation over a wider range of lake levels than existing turbines. Finally, the Department of the Interior High Priority Goal for Climate includes activities of the Landscape Conservation Cooperatives and Climate Science Centers, assessing vulnerabilities to the natural and cultural resources management by the Department and activities to adapt to the stresses of climate change.

This fact sheet contains partial information from the SECURE Water Act Section 9503(c) - Reclamation Climate Change and Water 2011, Section 2 - Basin Report: Colorado. The full report may be read online at www.usbr.gov/climate.