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Colorado River System – Planning and Operations During Extended Drought

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SPECIALTY SESSION - EXTENDED ABSTRACT

Keywords: *Colorado River Basin, Water Benefits, cultural and environmental resources, western states power needs*

Today, between 35 and 40 million people rely on the Colorado River and its tributaries for some, if not all, of their municipal water needs. These same water sources irrigate nearly 4.5 million acres (1.8 million hectares) of land within the basin and adjacent areas that receive Colorado River water. The Colorado River and its tributaries also provide essential cultural and economic resources to 22 federally recognized tribes, as well as recreational opportunities and environmental benefits to 11 National Park Service units and seven national wildlife refuges. Additionally, the Colorado River is a vital resource to the United Mexican States (Mexico).
An overview of the Colorado River Basin is depicted in Figure 1.

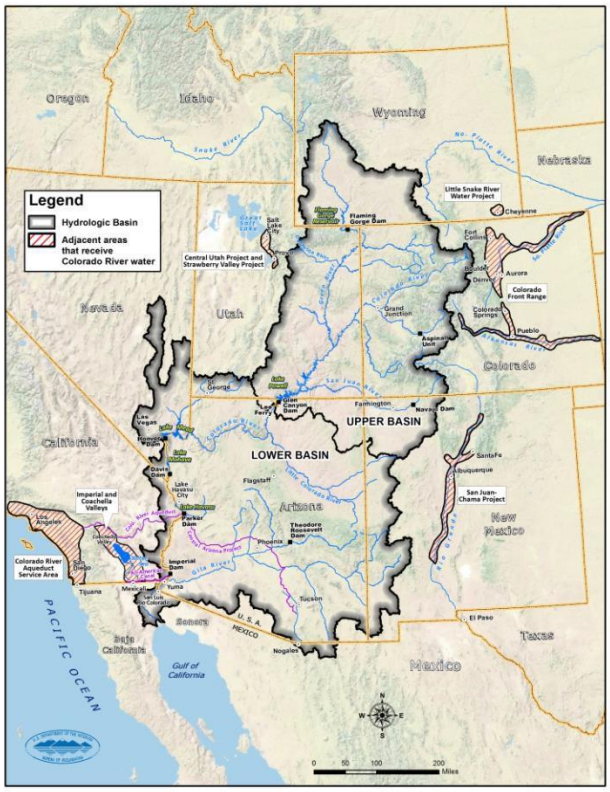

Figure 1. Map of the Colorado River Basin and adjacent areas that receive Colorado River Water.

The Colorado River Basin consists of a system of reservoirs with a total live storage capacity of 60 million acre-feet (maf) [74,000 million cubic meters (mcm)], approximately four times the average annual inflow of 16 maf (19,700 mcm). The two largest reservoirs, Lake Powell in the upper basin and Lake Mead in the lower basin, account for about 83 percent [50 maf (61,700 mcm)] of this storage capacity. In total, hydropower facilities in the basin supply more than 4,200 megawatts (mw) of electrical capacity to assist in meeting the power needs of western states. In the lower basin, the Hoover Dam powerplant generates about four billion kilowatt-hours of hydroelectric power each year for use in Nevada, Arizona, and California.

The natural water supply of the Colorado River Basin is highly variable from year-to-year. The ability to capture water during high flow years and to use this storage in drier years is crucial in helping to meet resource needs during periods of drought. Since 2000, the Colorado River Basin has experienced its worst drought in recorded history. The period from 2000 to 2015 was the driest 16-year period in more than 100 years of record keeping. During this period, storage in Colorado River system reservoirs declined from nearly full to about half of capacity (Figure 2), system storage is currently at its lowest level since the initial filling of Lake Powell in the late-1960s, and Lake Mead is at its lowest elevation since its initial filling in the late-1930s.

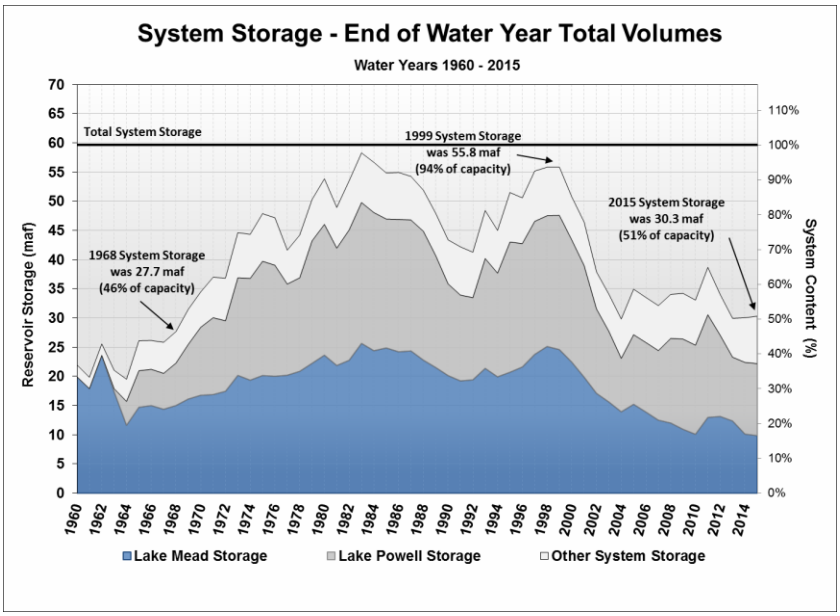

Figure 2. Colorado River Basin system storage, end-of-water year values from 1960 through 2015

As a result of the drought and declining reservoir levels, the first ever shortage condition in the lower Colorado River basin may occur as early as 2017 and powerplant capacity at Hoover Dam has decreased approximately 25 percent (from about 2,080 mw of capacity at full pool to 1,560 mw of capacity at current elevations). To help address these drought impacts, the U.S. Bureau of Reclamation and its stakeholders have been actively involved in several programs to help mitigate the impact of the on-going drought. Examples include the Pilot System Conservation Program, which has resulted in the creation of nearly 70 thousand acre-feet (86.3 mcm) of system water in Lake Powell and Lake Mead; the replacement of five turbines in Hoover Dam with "wide-head" turbines, scheduled to be completed in 2017, that can more efficiently generate hydropower at lower reservoir elevations; and additional drought contingency planning efforts to help maintain Lake Powell and Lake Mead above critical reservoir levels.