



CHANGES IN RIPARIAN VEGETATION IN THE SOUTHWESTERN UNITED STATES: Historical Changes along the Mojave River, California

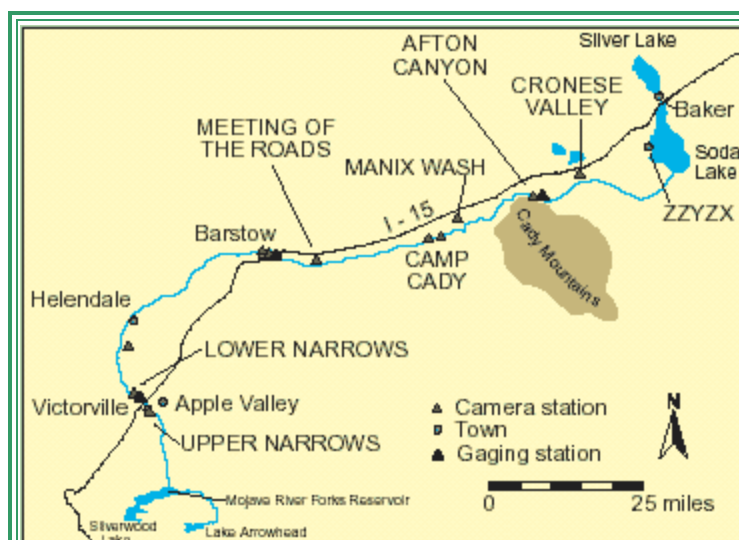
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The alluvial aquifer of the Mojave River is the primary source of water for domestic supplies and irrigation in the western Mojave Desert. The river also supports riparian communities unique to the Mojave Desert ecosystem. North of the front of the Transverse Ranges, perennial flow extends reliably past Lower Narrows and extends past Helendale only during periods of storm runoff. Ground water supplies both domestic and irrigation to water users in the basin, particularly upstream from Upper Narrows and to a lesser extent between Barstow and Camp Cady. A model of the ground-water flow system, recently completed by Stamos and others (2001), confirms that ground-water levels in the basin have been declining steadily in the latter part of the 20th century as previously known from water-level measurements. Ground-water changes are of concern to land management agencies because they have led to decimation or elimination of riparian vegetation in some reaches (Lines, 1999). Some water is imported into the basin to artificially recharge the alluvial aquifer; this water also benefits riparian ecosystems. The purpose of this poster is to present initial findings on long-term changes in riparian vegetation along the Mojave River.

Repeat photography documents long-term changes of riparian species along the Mojave River through the last 137 years. The first photographs of the Mojave River were taken by Richard D'Heureuse, a member of the California Geological Survey expedition of 1863, using a large-format, glass-plate camera. The expedition began in San Bernardino and travelled the Mojave Road from Victorville to the Colorado River. D'Heureuse photographed scenes that included the river and its attributes at Point of Rocks near present-day Helendale, at two sites near Barstow, at the old Camp Cady, at Afton Canyon, and at the site of present day Zzyzx on the west edge of Soda Lake playa.

David Thompson, a hydrologist with the U.S. Geological Survey, worked on issues related to surface and ground water hydrology of the Mojave River in the 1910s and 1920s (Thompson, 1929). He photographed key reaches of the Mojave River, including the Upper and Lower Narrows near Victorville, the reach upstream of Helendale, Barstow, the Yermo area, and the reach between Camp Cady Ranch and Afton Canyon. Historical photography, which was black and white, documents only the larger-stature woody species. In the case of the Mojave River, these species are cottonwood (*Populus fremontii*), Goodding or black willow (*Salix gooddingii*), mesquite (*Prosopis glandulosa* and minor amounts of *P. pubescens*), and non-native tamarisk (*Tamarix ramosissima*). Smaller-stature species that appear in some of the photographs include coyote willow (*Salix exigua*) and seep willow (*Baccharis glutinosa*). As mapped by Lines and Bilhorn (1996), many other woody riparian species exist in the basin, mostly in small amounts. Some notable species include sycamore (*Platanus racemosa*), velvet ash (*Fraxinus velutina*), cattails (*Typha latifolia*), and bulrush (*Scirpus sp.*). Invasive non-native species of note, other than tamarisk, include giant reed (*Arundo donax*), which was observed at Lower Narrows.

INITIAL OBSERVATIONS

Changes in riparian communities along the Mojave River are highly variable, ranging from large increases in biomass of cottonwood trees to complete elimination of riparian species. The largest increases occurred in the area that now is Mojave Narrows Regional Park, upstream of the Upper Narrows between Victorville and Apple Valley. Riparian trees in this reach were mostly Goodding willows in 1917, and now cottonwood dwarfs this species in abundance and stature. Few woody plants were present in the Lower Narrows in 1917, with the exception of coyote willow, but many new cottonwood and sycamore, as well as tamarisk, are now in this reach. South of Helendale, the historical photographs show the riparian corridor in the distance, but it is clear from a comparison of the photographs that cottonwood trees increased in height between 1917 and 2000. At Barstow, native riparian vegetation, which was mostly mesquite, has been replaced by tamarisk. Between Barstow and Camp Cady Ranch, several camera stations could not be relocated because of unstable sand dunes and channel margins, but most of the mesquite and other riparian trees that grew in this reach in 1917 are dead. At Camp Cady Ranch, riparian vegetation increased between 1919 and 2000, although declines upstream and downstream from the camera stations suggest that the vegetation in this reach is in peril. Finally, little riparian vegetation was present in Afton Canyon in 1863, but the few large trees—which likely were cottonwood or Goodding willow—are now gone. Most of the decreases are likely the result of local ground-water pumping; the headwater dams have not had a significant impact on flow in the Mojave River other than to attenuate flood peaks (Lines, 1996).

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