IV. DESCRIPTION OF ACTIONS

A. Interim Surplus Criteria.

The ISC are proposed to define the terms upon which the Secretary may declare the existence of surplus conditions in managing the lower Colorado River for the 15 years after the adoption of an ISC. The criteria must be in accordance with the decree entered March 9, 1964, by the United States Supreme Court in *Arizona v. California*, known as the Decree. The ISC must also be consistent with *Long Range Operating Criteria* which have been developed pursuant to the Colorado River Basin Project Act of 1968 and the Decree. The purpose of adopting the ISC is to afford mainstem users of Colorado River water a greater degree of predictability with respect to the likely existence of surplus conditions on the river in a given year. This increased level of predictability will aid in the planning and operations of those entities that receive Colorado River water pursuant to contracts held with the Secretary.

Pursuant to Article II(B)2 of the Decree, if there exists sufficient water available in a single year for pumping or release from Lake Mead to satisfy annual consumptive use in the States of California, Nevada, and Arizona in excess of 7.5 maf, such water may be determined by the Secretary to be made available as surplus water. The Secretary is authorized, and therefore has discretion, to determine the conditions upon which such water will be made available to the States.

In developing its ISC DEIS, Reclamation considered four alternatives in addition to the No Action (Baseline) Alternative (USBR, 2000). The action alternatives are the Flood Control Alternative, Six-States Alternative, California Alternative, and Shortage Protection Alternative. The amounts of surplus water that would be made available under each alternative in any given year varies. All alternatives were developed in terms of parameters that could be used in a mathematical model used to plan operation of the river system. A baseline condition was established against which the impacts of each of the action alternatives are compared, in order to accommodate the dynamic nature of the No Action Alternative. Each alternative designates specific water elevations or methodologies that have been shown as the water elevation on Lake Mead at which a surplus determination is triggered. The elevations and methodologies to determine a surplus differ among the alternatives. The California and Six-States Alternatives establish various levels (also referred to as tiers) of availability and specify the uses to which surplus water could be delivered as the water surface elevation at Lake Mead decreases to the specified trigger elevation. Table 2 summarizes the elevations that would trigger a determination of surplus for each of the alternatives. For complete descriptions of the alternatives see Appendix B.

Table 2 - Interim Surplus Criteria Alternatives and Lake Mead Trigger Elevations.

DEIS Alternatives	Surplus Trigger Elevation on Lake Mead
No Action - 75R Baseline Condition	75R = 75% Spill Avoidance Strategy under which the trigger rises from 1,194 to 1,196 ft from year 2001 through 2015
Flood Control Alternative	Required flood control releases = surplus conditions
Six States Alternative	3 Tiers (Levels) that trigger surpluses at the following elevations: above the 75R line, 1,145 ft, and 1,125 ft
California Alternative	3 Tiers (Levels) that trigger surpluses at the following elevations: 1,160, 1,116, and 1,098 ft
Shortage Protection Alternative	Trigger elevation determined for each year on maintaining Lake Mead storage to provide Lower Basin normal supply plus the storage necessary to provide an 80% probability of avoiding future shortages.

Reclamation does not identify a preferred alternative in the ISC DEIS. To facilitate consultation with the Fish and Wildlife Service (FWS), the California Alternative described in the ISC DEIS is evaluated as the Proposed Action in this BA. This alternative was selected because it represents the plan that the California Parties have proposed as part of their CA Plan. It also includes a range of water releases between the most conservative (Flood Control) and most liberal (Shortage Protection Alternative). As the EIS alternatives are refined, a preferred alternative is identified, the final EIS is prepared, and a Record of Decision is made, some changes may be made to the proposed action.

Figure 3 is a graph from the ISC DEIS that shows the levels in Lake Mead proposed by the tier elevations of the California Alternative in relation to those defined for the No Action (75R trigger line), and Flood Control Alternatives.

1. No Action (Baseline)

The No Action Alternative represents future annual operating plan determination that would be developed without ISC. Surplus determinations consider such factors as end-of-year system storage, potential runoff conditions, projected water demands of the Basin States and the Secretary's discretion in addressing year-to-year issues. However, the year-to-year variation in the conditions considered by the Secretary in making surplus water determinations makes projections of surplus water availability highly uncertain. As mentioned above, analysis of the hydrologic aspects of the ISC alternatives required use of a computer model that simulates specific operating parameters and constraints. To accommodate use of the No Action alternative in establishing a baseline against which to compare impacts of proposed alternatives, Reclamation selected a specific operating strategy which could be described mathematically in a model. The baseline conditions were developed using a 75R spill avoidance operating strategy. The effect of simulating operation with the 75R operating strategy would be that surplus conditions would be determined when Lake Mead is nearly full. The R strategy was first developed in 1986 for use in distributing surplus water and avoiding spills (USBR, 2000). The strategy assumes a particular percentile historical runoff, along with normal depletion projections, for the next year. The 75R strategy used for the No Action alternative of the ISC DEIS assumes an annual runoff of 18.1 maf. Applying these values to the current reservoir storage, the projected reservoir storage at the end of the next year is calculated. If the calculated space available at the end of the next year is less than the space required by flood control criteria for Lake Mead, then a surplus condition is declared.

2. California Alternative

The California Alternative specifies Lake Mead water surface elevations to be used for an interim period through 2015 for determining the availability of surplus water. The elevation ranges are coupled with uses of surplus water in such a way that, if Lake Mead's surface elevation declines, the permitted uses of surplus water would become more restrictive, thereby reducing deliveries of surplus water. This combination of tiered surplus trigger elevations would limit the use of surplus water to junior priority municipal and industrial (M&I) needs at lower water levels. The trigger elevations for each tier are not static, but are expressed by lines as discussed below (Figure 3). The California Alternative also provides for periodic adjustment of the triggering line elevations in response to changes in Upper Basin water demand projections through calendar year 2015, as described below.

The Lake Mead elevations at which surplus conditions would be determined under the California Alternative are indicated by a series of tiered, sloping lines from the present to 2015. Each tiered line would be coupled with stipulations regarding the purposes for which surplus water may be used at that tier. Each tier is defined as a trigger line that rises gradually year by year through 2015, in recognition of the gradually increasing water demand of the Upper Division States. Each tier under the California Alternative would be subject to adjustment during the interim period based on changes in Upper Basin demand projections or other factors during the five-year reviews or as a result of actual operating experience.

The following sections describe the California Alternative tiers. Notwithstanding the restrictions mentioned in the description of these tiers, when flood control releases are made, any and all beneficial uses would be met, including unlimited off-stream groundwater banking and additional water for Mexico as specified in the Treaty. Further details and use schedules on this alternative can be found in the ISC DEIS.

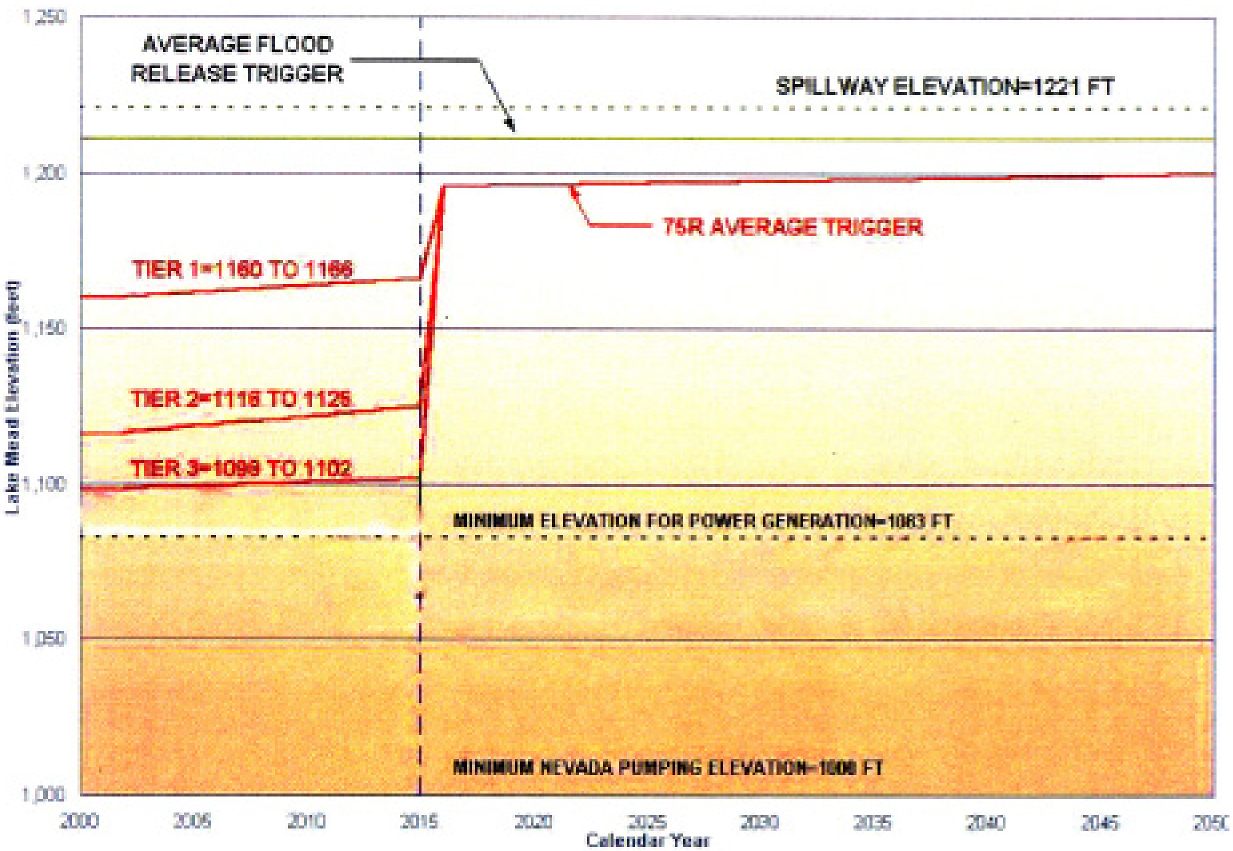

Figure 3. California surplus alternative showing tier elevations for Lake Mead.

- **California Alternative Tier 1** - Lake Mead surplus trigger elevations range from a current elevation of 1,160 feet mean sea level (msl) to 1,166 feet msl in 2015 (based on 1998 Upper Basin demand projections). Lake Mead water surface elevations at or above the Tier 1 trigger line would permit surplus water diversions by the Lower Division States.

- **California Alternative Tier 2** - Lake Mead surplus trigger elevations range from 1,116 feet msl to 1,125 feet msl (based on 1998 Upper Basin demand projections). Lake Mead water surface elevations at or above the Tier 2 line (and below the Tier 1 line) would permit surplus water diversions as outlined in applicable use schedules.

- **California Alternative Tier 3** - Lake Mead surplus trigger elevations range from 1,098 feet msl to 1,102 feet msl (based on Upper Basin demand projections). Lake Mead water surface elevations at or above the Tier 3 line (and below the Tier 2 line) would permit surplus water diversions. When Lake Mead water levels are below the Tier 3 trigger elevation, surplus water would not be made available.

B. Secretarial Implementation Agreements (SIAs).

The SIAs are intended to establish a framework for the Secretary to release Colorado River water in a way that will help California to satisfy its annual water supply needs within its basic annual apportionment (4.4 maf) of Colorado River water. Water deliveries will be made in accordance with the California Plan and its accompanying QSA. Actions covered by the SIAs will be implemented over the next 75 years, with some actions starting as soon as 2002.

When fully implemented, these modifications in Colorado River water delivery will result in a change in point of diversion of up to 400 kaf. Releases would be diverted above Parker Dam from Lake Havasu and would no longer be delivered to and diverted at Imperial Dam. Implementation of actions under the SIAs would result in Reclamation changing the point of delivery of the up to 400 kaf of California's water from Imperial Dam to Lake Havasu, thereby reducing flows between Parker and Imperial Dams by that amount.

A summary of the components of the CA Plan that will require an accounting of effects under the ESA and NEPA are listed in Table 3. The SIA will address these actions by providing a framework for the Secretary to release and deliver Colorado River water in a way that will allow California to satisfy its annual water supply needs within its basic annual apportionment of 4.4 maf of Colorado River water.

Up to 400 kaf of water is subject to a change in point of delivery and diversion and is summarized as follows:

• Priority 3: IID/SDCWA Water Conservation and Transfer	200,000 af
• IID/CVWD/MWD Conservation Program	100,000 af
• All American Canal Lining: For MWD	56,200 af
• Coachella Lining Project: For MWD	21,500 af
• San Luis Rey Water Settlement: water from canal linings	16,000 af
Total:	393,700 af

For purposes of this BA, the total amount of water used in the effect analyses has been rounded up to 400 kaf. However, the total amount of water that could be transferred over the 75 years of the intended actions could be less, depending on the execution and timing of numerous supporting events within California. For example if CVWD retains the 100 kaf of the conservation program water, then none of it would be subject to delivery to MWD at Parker Dam and Lake Havasu.

In terms of the CA Plan, several actions will affect the amount of Colorado River water that will be available to various California entities. The activities, programs, and projects (Tables 3 and 4) that will help to implement the CA Plan are described in Appendix C. Together, Figure 2, Table 3, Table 4 and Appendix C should provide both an overview of the CA Plan and its components with a Federal nexus (SIAs). The Federal actions are a subset of the many actions identified by the CA Plan and QSA to reduce California's use of Colorado River water downward towards its 4.4 maf allocation. The focus of this BA as it relates to the SIAs is a change in the point of delivery of up to 400 kaf of California's Colorado River water from Imperial Dam upstream to Parker Dam. The overall purpose of these actions is to move water presently used in the agricultural areas of the Imperial and Coachella Valley areas into urban areas of the coastal plain of Southern California. In addition the SIA's would provide the basis for moving a portion of the water conserved through lining of the AAC and CC through the CRA as part of the San Luis Rey Indian Settlement.

Table 3 - Secretarial Implementation Agreements Water Transfers

Activity	Quantities of Water Involved
Priority 3 Entitlements: • IID/SDCWA Transfer Project	• 130,000 to 200,000 af to SDCWA; starting 2002 with up to 20,000 af ea subsequent yr for 10 yrs
IID/CVWD/MWD Conservation Program	• Up to 100,000 af to CVWD/MWD

Table 4 - Secretarial Implementation Agreements / Canal Lining Projects

All-American Canal (AAC) Lining	• 56,200 af to MWD
Coachella Canal (CC) Lining	• 21,500 af to MWD
Conserved Water to San Luis Rey Indian Settlement: • AAC Lining • CC Lining	• 11,500 af to San Luis Rey • 4,500 af to San Luis Rey

C. Conservation Measures

Table 5 identifies conservation measures included as part of the proposed action to offset projected impacts to the species and habitat. These measures were developed following the impact analysis.[1]

Table 5. Conservation Measures

Title	Species benefitted	Description
Occupied Southwestern Willow Flycatcher Habitat Monitoring, Restoration and Enhancement	Southwestern Willow Flycatcher	Restore, protect and/or enhance approximately 124 acres of riparian habitat primarily for Southwestern Willow Flycatcher (within 5 years). Monitor 372 acres of existing occupied habitat and restore, protect and/or enhance areas of equal value to those determined to be adversely affected. [2]
Backwater Construction/Restoration	Yuma Clapper Rail, California Black Rail, Razorback Sucker, Bonytail Chub	Construct or restore 62 acres of backwaters.
Razorback Sucker re-introduction	Razorback Sucker	Re-introduce and monitor 20,000 sub-adult Razorback Sucker below Parker Dam
Lake Mead Razorback Sucker Study	Razorback Sucker	Continue on-going study on Lake Mead for an additional 4 years to determine reasons for persistence of a Razorback Sucker population
Bonytail Chub Broodstock Capture	Bonytail Chub	Conduct life history studies on extant bonytail populations in the lower Colorado River.

[1] Specifics of implementing these conservation measures will be developed among the affected entities including project beneficiaries and State and Federal agencies.

[2] This can be accomplished either by direct restoration, or enhancing existing habitat with various management practices such as flooding, creating patches of mixed native/non native vegetation within the areas, fire control, and so forth.

V. ENVIRONMENTAL BASELINE

The environmental baseline for this assessment includes effects of past and ongoing human and natural factors leading to the current status of the species or its habitat and ecosystem (FWS, 1994b). Additional baseline information on species abundance and distribution is provided in Section V.

A. Historic and Present Biological Communities on the Lower Colorado River

1. Historic

Prior to development, the Colorado River flowed unimpeded some 1,700 miles, with a vertical elevation drop of more than 14,000 feet, from its beginnings in the Rocky Mountains to its terminus at the Gulf of California (Ohmart et al., 1988). The Colorado River, in its natural state, was a highly dynamic system. Historically, the seasonal hydrograph and tremendous sediment loads associated with the lower Colorado River were dominating factors driving the physical and biological attributes of the ecosystem. Recorded flows at Yuma ranged from 18 cubic feet/second (cfs) to 250,000 cfs with sediment loads averaging more than 10^8 metric tons per year (USGS, 1973). These flow regimes could affect a portion of the river but rarely disturbed the entire system. Sediment loading occurred in some areas causing degradation of the river channel, aggradation in other reaches, and the shifting of the river channel itself in still others. Riparian, marsh, and aquatic communities had to be adaptive.

The geomorphology of the river helped dictate where soil deposition, degradation, and aggradation occurred. The lower Colorado River was a series of narrow canyons interspersed with wide valleys. Water and sediment moved rapidly through the narrow canyons in all but the most dry years. These rapid, sediment-filled flows prevented the establishment of most riparian plant communities within the canyons. Conversely, once the water and sediment were released from a narrow canyon into one of the broad valleys, soil deposition occurred. The rate of aggradation was dependent on flow rate and sediment loading. It was within these large valleys that native plant communities became established. The riparian belt extended away from the river for up to several miles where the water table was relatively shallow. Sporadic large flows caused the river channel to meander and created or reconnected oxbows and backwaters. At its mouth was an alluvial delta containing vast marshes, riparian forests and backwaters (Ohmart, 1982).

Historically, the lower Colorado River represented a unique aquatic habitat, ranging from a swift-flowing, turbid river during the annual runoff period (May-July) with flows exceeding 100,000 cfs to a gentle meandering river during late fall and winter periods with flows of 5,000 cfs or less (Grinnell, 1914; Carothers and Minckley, 1981). Remarkably high sediment loads accompanied floods and seasonal runoff from the Rocky Mountains. In all but those places where the river breached hard-rock barriers, the bottom continuously shifted as bedload was transported (Minckley, 1979). Where the stream occupied broad alluvial valleys, sediment was deposited and wide, shallow, braided channels developed. As meanders matured, they were cut off to form oxbow lakes and backwaters. Extensive, although transitory, marshes were formed, only to be obliterated by vegetative succession, or more rapidly destroyed by currents and transported sediments during floods (Minckley, 1979). Some of the larger historic backwaters and/or oxbows were persistent enough to be given names, these included Beaver Lake, Lake Su-ta-nah, Duck Lake, Spears Lake, Powell Slough (now part of Topock Marsh), and Lake Tapio. All were located between present day Bullhead City and Topock (Ohmart et al., 1975).

Seasonal flooding resulted in the creation of several distinct communities of plants and animals. High water occurred around June with low flows occurring during the winter months. Riparian communities were in a constant state of succession as the river, on a seasonal basis, was constantly depositing new sediment, shifting its channel, and creating and destroying habitat. Floodplain communities developed in areas that were seasonally, or only intermittently, inundated.

Marsh communities developed in areas prone to extended periods of inundation, and the aquatic community evolved consisting of a main channel with separate or connected oxbows and backwaters. With the exception of the lower Colorado River delta area, historic evidence suggests that backwater marshes that lasted several years seldom were very large along the lower Colorado River. Freeland

(1973) stated that before completion of Parker and Imperial Dams, marshes along the river below Davis Dam were 1,000 acres or less in area.

The hydrology of the river created a series of terraces and bottoms along its route. Grinnell (1914) identified seven river associated communities. Five of these were specifically flood-plain in nature including: 1) Cottonwood-Willow association; 2) Arrowweed association; 3) Quail-bush association; 4) Mesquite association; and 5) Saltbush association. Grinnell discussed two other communities, the River and Tule association (Ohmart et al., 1988). Figure 4 illustrates typical historic floodplain terraces and associated vegetation communities occurring along the lower Colorado River. Figure 5 illustrates a reconstruction of historic native plant community placement and principal species composition from original surveyor notes and plats along the lower Colorado River in 1879[1].

2. Chronology of development along the lower Colorado River

Native American tribes have called the lower Colorado River home for centuries. The first European explorers were Spanish priests and military expeditions whose main goals were obtaining gold, silver, and land for Spain (Ohmart, 1982). Journals left by these early Spanish explorers mainly noted the things of concern to the explorers: the native inhabitants and natural resources of immediate use to the Spanish. From the discovery of the Colorado River in 1540 by Hernando de Alarcon until the acquisition of the lower Colorado River by the United States after the Mexican-American War in 1848, European settlers had little effect on the native habitats found along the Colorado River.

Expeditions conducted by the United States military in the mid-1800s evaluated the region for mineral wealth, navigable waterways, and overland routes to California. Although several of the early explorers believed that the Colorado River had limited value (Ives, 1861), prospectors began to arrive by the mid-1800s. In 1861, silver was discovered at Eldorado Canyon and gold was found at Laguna de la Paz, creating the Colorado River Gold Rush of 1862 (Lingenfelter, 1978).

The Gold Rush fueled the fledgling steamboat trade along the Colorado River. Initially, downed, dried mesquite, cottonwood, and willow were utilized as fuel by the steamboats (Ives, 1861). However, increased river traffic soon utilized all of the available wood debris so crews began cutting down large quantities of cottonwoods, willows, and mesquites. By 1890, most of the large cottonwood-willow stands and mesquite bosques had been cut over (Ohmart et al., 1988; Grinnell, 1914). Natural flood events still enabled regeneration to occur, however.

Major changes to the lower Colorado River ecosystem really began with the advent of large-scale agriculture. European settlers first began diverting water from the Colorado River in 1877 to irrigate agricultural lands in the Palo Verde Valley near Blythe, California. By 1901, water was being diverted for large-scale agriculture in the Imperial Valley via the Alamo Canal at Yuma, Arizona (USBR, 1996). In 1902, the United States Congress passed the Reclamation Act which established the U.S. Reclamation Service. The Reclamation Service began to plan large-scale irrigation projects throughout the west, especially along the lower Colorado River (LaRue, 1916). Additional emphasis was placed on flood control along the lower Colorado River after the floods of 1905-07, which inundated over 330,000 acres and created the Salton Sea after breaching the diversion structure at the head of the Alamo Canal (Ohmart et al., 1988; USBR, 1996). The solution to the growing needs for water, flood control, and power was to build a series of dams along the lower Colorado.

The Laguna Diversion Dam was the first dam completed on the Colorado River in 1909. Water diverted at Laguna Dam and transported through the Yuma Main Canal irrigated 53,000 acres in the Yuma Valley and 14,700 acres in the Reservation Division in California. An additional 3,500 acres of agricultural land was irrigated from water diverted at Laguna Dam and transported to the Gila Valley via

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[1] The General Land Office, now known as the Bureau of Land Management, initiated the original township surveys or cadastral mapping along the river in 1855. Not all the land was surveyed during the same period of time. Figure No.5 shows a reconstruction of the general vegetative types below Blythe, California in 1879 derived by interpreting floral descriptions contained in original field notebooks and then transferring these to the original field plats (Ohmart et. al., 1977 in Importance, Preservation and Management of Riparian Habitat: A Symposium. USDA Forest Service. General Technical Report RM-43)

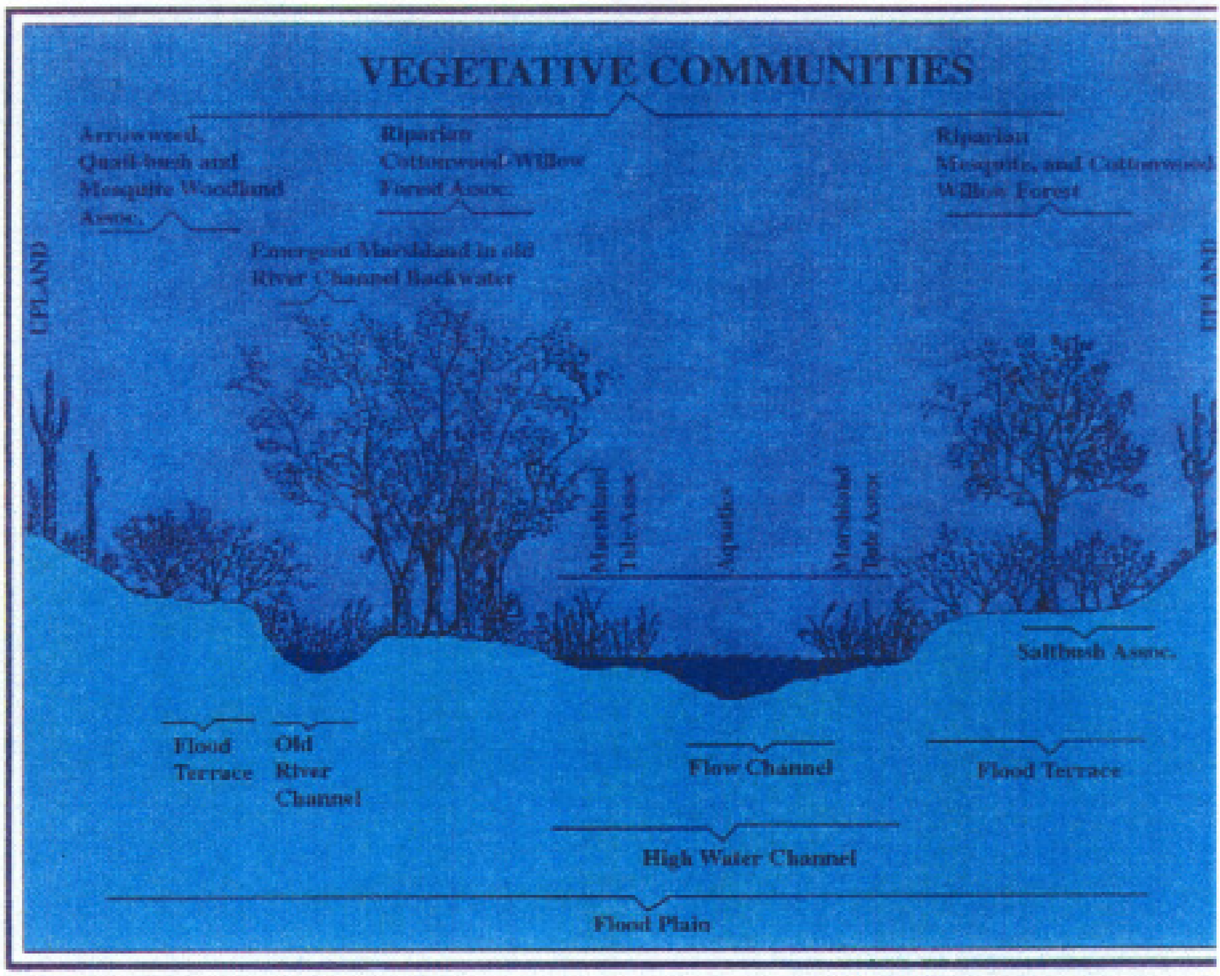

Figure 4. Historic lower Colorado River flood plain and associated vegetation communities