

Hydrology

In this study the same basic hydrologic and river operation criteria have been retained as used in earlier Bureau of Reclamation studies, modified only to accommodate extension of the runoff record through the year 1967 and the addition of 2.0 to 2.5 m.a.f. of desalted water in Lake Mead annually. Such an addition, however, would have appreciable effects. It would increase the water supply for the Lower Basin and, by eliminating the question of Upper Basin responsibility for a portion of the Mexican Treaty delivery, assure the Upper Basin of a greater water supply. Water quality in the Colorado River below Hoover Dam would be measurably improved.

Lower basin water supply.—Without augmentation and with a regulated delivery of 8,250,000 acre-feet annually at Lee Ferry, it is estimated that the average water supply available for consumptive use in the Lower Basin at Lee Ferry would decrease by the year 2030 to 6,830,000 acre-feet and the assured water supply to 6,310,000 acre-feet. With augmentation and with a regulated delivery at Lee Ferry of 7,500,000 acre-feet annually, comparable figures would be 7,730,000 acre-feet average supply and 7,500,000 acre-feet assured supply.

From these figures, it can be seen that the amount of augmentation needed to assure the Lower Basin of 7.5 m.a.f. of consumptive use in the year 2030 would be 1,940,000 acre-feet annually $[(7,500,000 - 6,310,000) + (8,250,000 - 7,500,000)]$. For the basic study of this report, we have rounded this figure to 2,000,000 acre-feet. It, of course, would not all be needed initially but could be staged. Analysis shows the following staging to be appropriate: year 1990, 1.0 m.a.f.; 2000, 0.5 m.a.f.; and 2010, 0.5 m.a.f.

The derivation of 2,000,000 acre-feet as the required magnitude of augmentation to assure 7.5 m.a.f. to the Lower Basin is based on Bureau of Reclamation estimates of future main-stem losses after realization of salvage potentials along the lower Colorado River. There is not full agreement among other Colorado River experts as to the effectiveness of future water salvage measures, and estimates of the amounts of augmentation water required to assure 7.5 m.a.f. consumptive use in the Lower Basin range up to 2.5 m.a.f. While the Bureau of Reclamation believes that its estimate of 2.0 m.a.f. is adequate, this report also presents an alternative study based on the requirement of 2.5 m.a.f. as the necessary amount of augmentation to assure 7.5 m.a.f. of Colorado River water for the Lower Basin States. Under this alternative the following staging of desalting plants would be appropriate: Year 1985, 0.75 m.a.f.; 1990, 0.5 m.a.f.; 1995, 0.75 m.a.f.; 2010, 0.5 m.a.f.

Upper basin water supply.—Based upon past records of Colorado River runoff and operation of the reservoirs of the Colorado River Storage Project, studies show that with delivery of 75.0 m.a.f. of water at Lee Ferry every 10 consecutive years, there would remain but 6.55 m.a.f. for consumptive use annually in the Upper Basin. If the Upper Basin were required to contribute in addition one-half of the water deliveries to Mexico, or 750,000 acre-feet annually, the amount available for consumptive use annually in the Upper Basin would be 5.8 m.a.f.

In connection with the Colorado River Basin Project, the Bureau of Reclamation has previously projected that consumptive use of Colorado River Basin water by the Upper Basin States would reach 5.8 m.a.f. in the year 2030. The Bureau recognized that the potential for use of water by the Upper Basin States is much greater and could occur at a much earlier date. The projections made were judgment values based on a limited water supply. With augmentation of the Colorado River and consequent assurance that the Upper Basin would not be required to contribute to Mexican water deliveries, it could be expected that expansion of Upper Basin depletions would be faster and to a higher ceiling. To reflect this, new projections were made of Upper Basin depletions for this report which are compared with the projections of the 1967 Summary Report in the following tabulation:

[In millions of acre-feet]

Year	Annual upper basin depletions	
	1967 summary report	This report
1975.....	4.220	4.220
1990.....	5.100	5.475
2000.....	5.430	6.180
2030.....	5.800	6.550