Intake, and the Basic Management, Inc.'s (BMI) intake facility for use in the Las Vegas area for domestic purposes by SNWA, BMI and other users.

The diversions by SNWA at its Saddle Island Intake Facilities entail pumping the water from the intake to SNWA's transmission facilities for treatment and further conveyance to the Las Vegas area. The elevation of the original SNWA intake is approximately 1000 feet msl. However, the minimum required Lake Mead water level necessary to operate the pumping units at SNWA's original intake facility is 1050 feet msl. SNWA recently constructed a second pumping plant with an intake elevation of 950 feet msl. The minimum required Lake Mead water level necessary to operate the pumping units at SNWA's second intake facility is 1000 feet msl. The new SNWA intake provides only a portion of the capacity required by SNWA to meet its Lake Mead water supply needs. Therefore, the intake elevation of SNWA's original pumping plant is critical to its ability to divert its full Colorado River water entitlement.

3.3.4.4.2 Historic Lake Mead Water Levels

Figure 3.3-11 presents an overview of the historic annual water levels (annual maximum and minimum) of Lake Mead. As noted in Figure 3.3-11, the annual change in elevations of Lake Mead has ranged from less than ten feet to as much as 75 feet msl. The decrease in the range of the elevations within a year observed after the mid-1960s can be attributed to the regulation provided by Lake Powell.

Historic Lake Mead low water levels have dropped to the minimum rated power elevation (1083 feet msl) of the Hoover Powerplant during two periods (1954 to 1957 and 1965 to 1966). The maximum Lake Mead water surface elevation of approximately 1225.6 feet msl occurred once, in 1983.

Three Lake Mead water surface elevations of interest are shown in Figure 3.3-11. The first elevation is 1221.0 feet msl, the top of the spillway gates. The second elevation is 1083 feet msl, the minimum elevation for the efficient generation of power. The third elevation is 1050 feet msl, the minimum elevation required for the operation of SNWA's original intake facility.

3.3.4.4.3 Baseline Conditions

Under the baseline conditions, the water surface elevation of Lake Mead is projected to fluctuate between full level and decreasingly lower levels during the 50-year period of analysis (2001 to 2050). Figure 3.3-12 illustrates the range of water levels (end of year) by three lines, labeled 90th Percentile, 50th Percentile and 10th Percentile. The 50th percentile line shows the median water level for each future year. The median water level under baseline conditions is shown to decline to

Figure 3.3-11
Historic Lake Mead Water Levels
(Annual Highs and Lows)

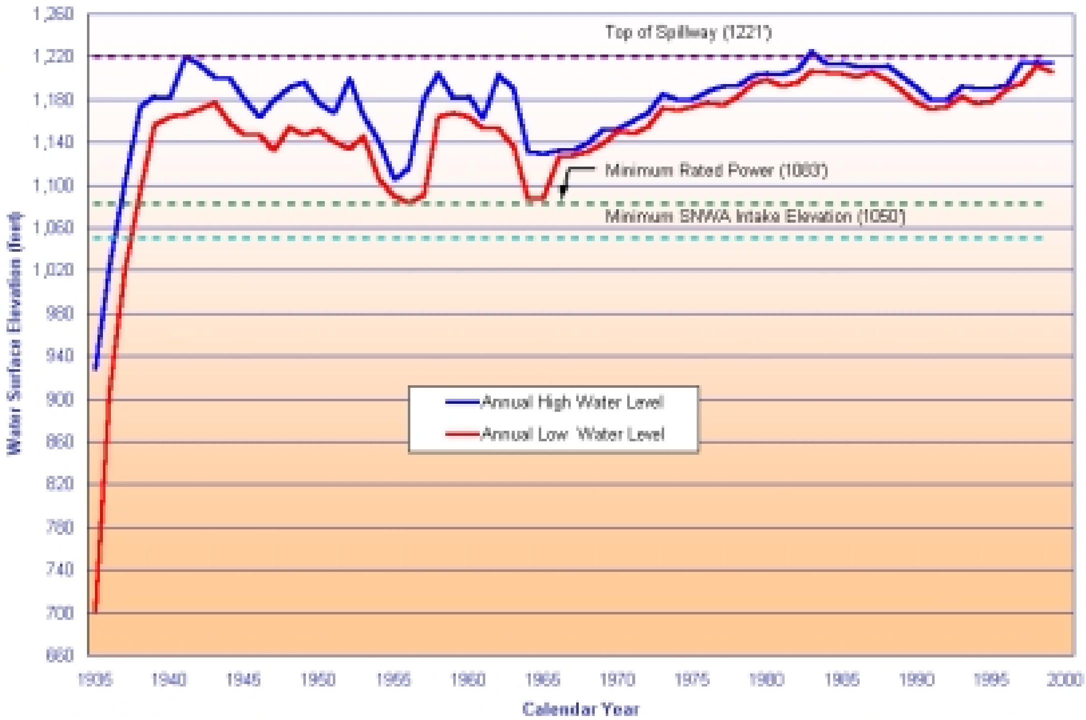
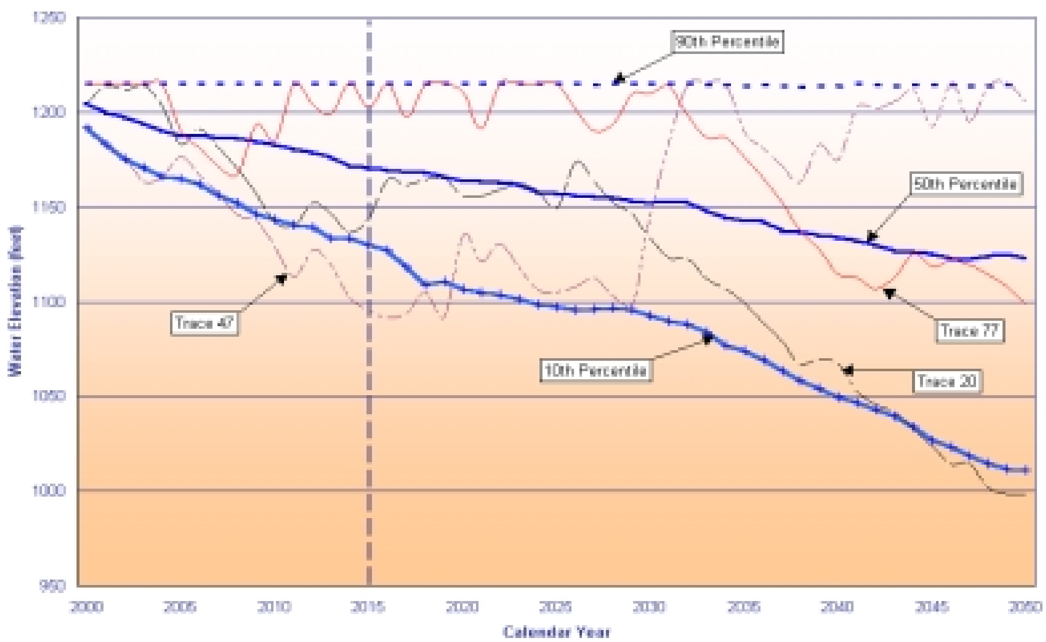


Figure 3.3-12
Lake Mead End-of-Year Water Elevations Under Baseline Conditions
90th, 50th and 10th Percentile Values and Representative Traces



1171 feet msl by 2015 and to 1123 feet msl by 2050. The 10th percentile line shows there is a 10 percent probability that the water level would decline to 1130 feet msl by 2015 and to 1011 feet msl by 2050. It should also be noted that the Lake Mead elevation at the end of the calendar year (November and December) is near the annual high. Conversely, the Lake Mead water level generally reaches its annual low in July.

Three distinct traces are added to Figure 3.3-12 to illustrate what is actually simulated under the various traces and respective hydrologic sequence and also to highlight that the 90th, 50th and 10th percentile lines do not represent actual traces but rather the respective ranking of the data from the 85 traces. The three traces illustrate the variability among the different traces and also illustrate how the reservoir levels could temporarily decline below the 10th percentile line. The trace identified as Trace 20 represents the hydrologic sequence that begins in year 1926. The trace identified as Trace 47 represents the hydrologic sequence that begins in year 1953. The trace identified as Trace 77 represents the hydrologic sequence that begins in year 1983.

In Figure 3.3-12, the 90th and 10th percentile lines show the probable range where 80 percent of future Lake Mead water levels simulated by the model for the baseline conditions would occur. This potential range would increase over time. The highs and lows shown on the three traces would likely be temporary conditions; the reservoir level would tend to fluctuate in the range between the 90th and 10th percentile lines. Neither the timing of water level variations between the highs and the lows, nor the length of time the water level would remain high or low can be predicted. These events would depend on the future variation in basin runoff conditions.

Figure 3.3-13 presents a comparison of the 90th, 50th and 10th percentile lines obtained for the baseline conditions to those obtained for the surplus alternatives. This figure is best used for comparing the relative differences in the general lake level trends that result from the simulation of the baseline conditions and surplus alternatives.

As illustrated in Figure 3.3-13, the Flood Control Alternative is the alternative that could potentially result in the highest Lake Mead water levels. The Shortage Protection Alternative is the alternative that could potentially result in the lowest water levels. The baseline conditions yield slightly lower levels than the Flood Control Alternative, but the differences are very small. The results obtained under the Six States and California alternatives fall between the Flood Control and Shortage Protection alternatives.

Figure 3.3-14 provides a comparison of the frequency that future Lake Mead water elevations under baseline conditions and the surplus alternatives would exceed a lake water elevation of 1200 feet msl. The lines represent the percentage of values greater than or equal to the lake water elevation of 1200 feet msl under the baseline conditions and surplus alternatives. In year 2015, under the baseline conditions, the percentage of

Figure 3.3-13
Lake Mead End-of-Year Water Elevations
Comparison of Surplus Alternatives and Baseline Conditions
90th, 50th and 10th Percentile Values

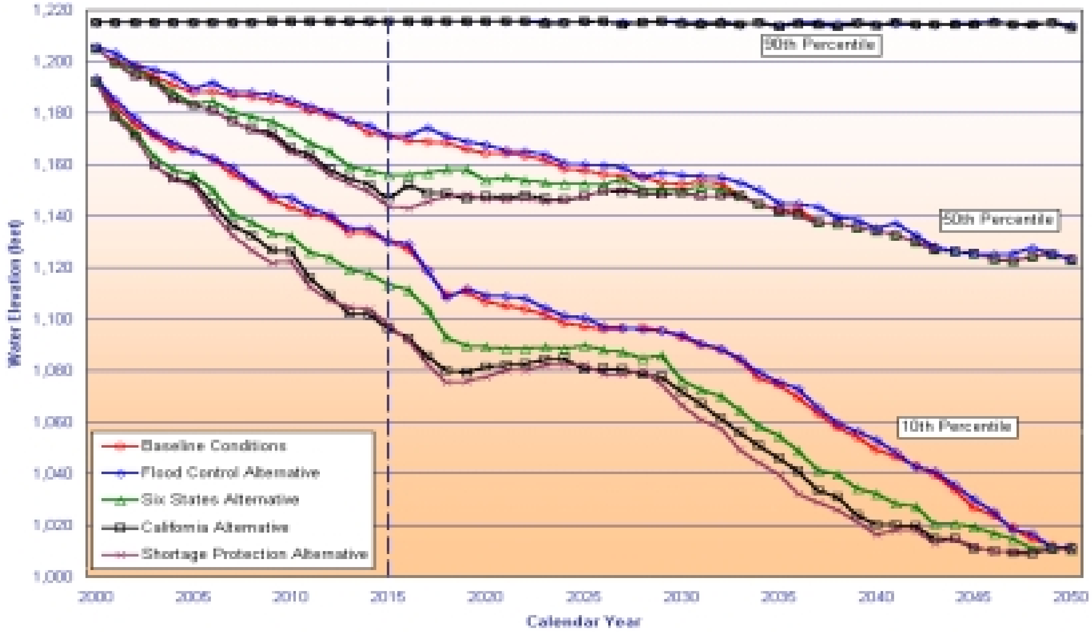
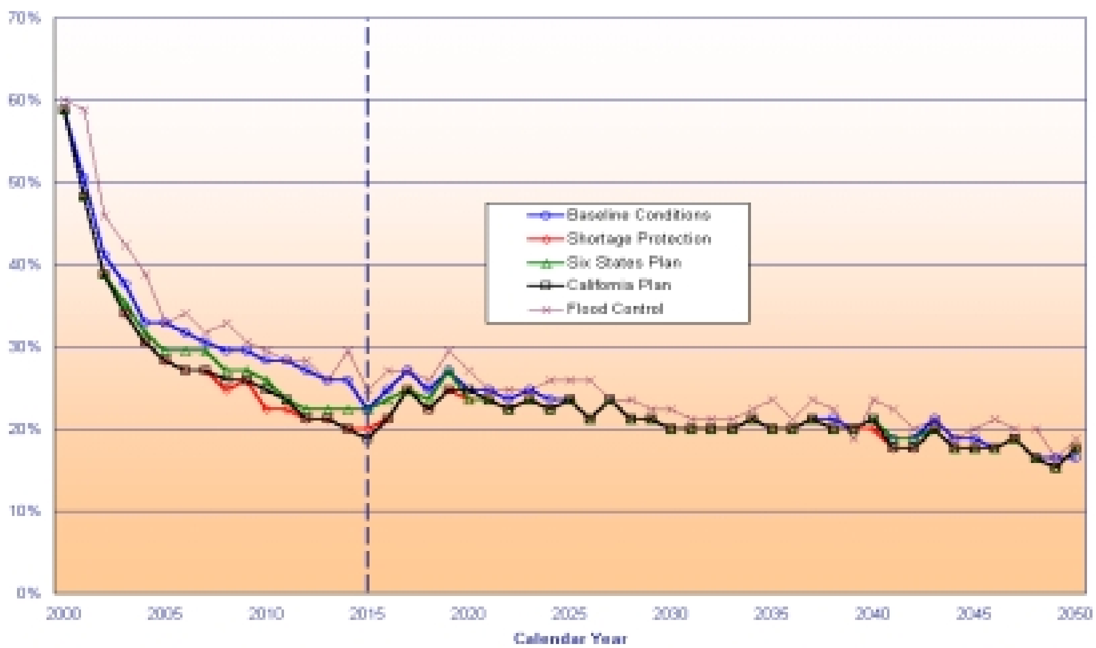


Figure 3.3-14
Lake Mead End-of-Year Water Elevations
Comparison of Surplus Alternatives and Baseline Conditions
Percentage of Values Greater than or Equal to Elevation 1200 Feet



values greater than or equal to elevation 1200 feet msl is 22 percent. In 2050, the percentage of values greater than or equal to elevation 1200 feet msl decreases to 16 percent for the baseline conditions.

Figure 3.3-15 provides a comparison of the frequency that future Lake Mead water elevations under baseline conditions and the surplus alternatives would exceed a lake water elevation of 1083 feet msl. The lines represent the percentage of values greater than or equal to the lake water elevation of 1083 feet msl under the baseline conditions and surplus alternatives. In year 2015, under the baseline conditions, the percentage of values greater than or equal to elevation 1083 feet msl is 100 percent. In 2050, the percentage of values greater than or equal to elevation 1083 feet msl decreases to 74 percent for the baseline conditions.

Figure 3.3-15
Lake Mead End-of-Year Water Elevations
Comparison of Surplus Alternatives to Baseline Conditions
Percentage of Values Greater than or Equal to Elevation 1083 Feet

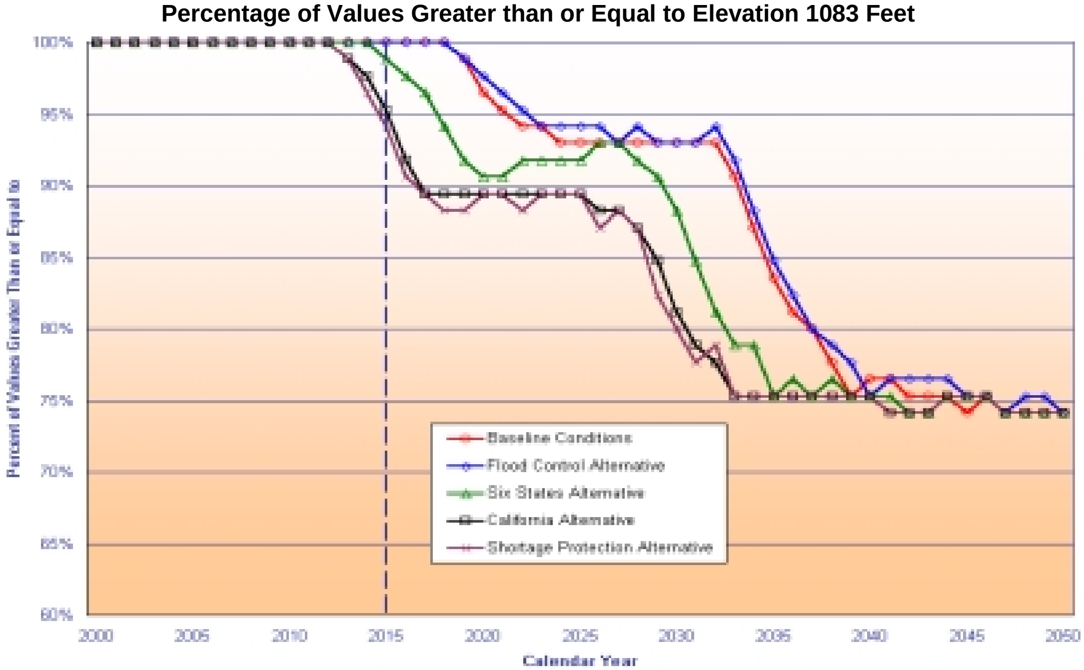


Figure 3.3-16 provides a comparison of the frequency that future Lake Mead water elevations under baseline conditions and the surplus alternatives would exceed a lake water elevation of 1050 feet msl. The lines represent the percentage of values greater than or equal to the lake water elevation of 1050 feet msl under the baseline conditions and surplus alternatives. In year 2015, under the baseline conditions, the percentage of values greater than or equal to elevation 1050 feet msl is 100 percent. In 2050, the percentage of values greater than or equal to elevation 1050 feet msl decreases to 80 percent for the baseline conditions.

Figure 3.3-16
Lake Mead End-of-Year Water Elevations
Comparison of Surplus Alternatives to Baseline Conditions
Percentage of Values Greater than or Equal to Elevation 1050 Feet

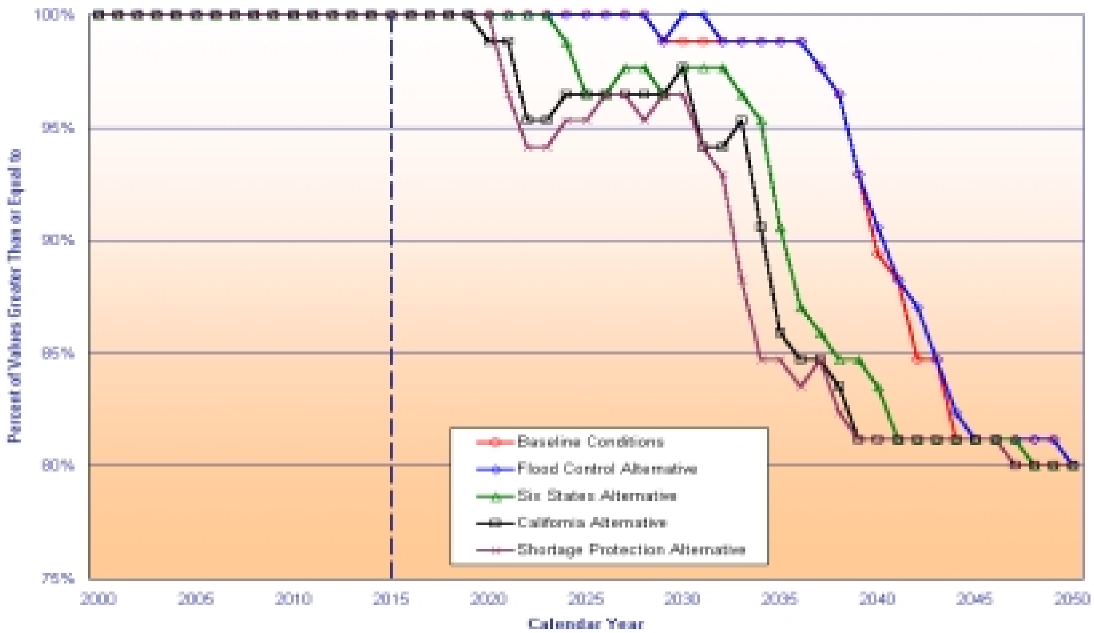


Figure 3.3-17 provides a comparison of the frequency that future Lake Mead water elevations under baseline conditions and the surplus alternatives would exceed a lake water elevation of 1000 feet msl. The lines represent the percentage of values greater than or equal to the lake water elevation of 1000 feet msl under the baseline conditions and surplus alternatives. In year 2015, under the baseline conditions, the percentage of values greater than or equal to elevation 1000 feet msl is 100 percent. In 2050, the percentage of values greater than or equal to elevation 1000 feet msl decreases to 95 percent for the baseline conditions.

3.3.4.4.4 Comparison of Surplus Alternatives to Baseline Conditions

Figure 3.3-13 compared the median and 10th percentile water levels of the surplus alternatives to those of the baseline conditions. As discussed above, under baseline conditions, future Lake Mead water levels at the upper and lower 10th percentiles would likely be temporary and the water level would fluctuate between them in response to multiyear variations in basin runoff conditions. The same would apply to all the surplus alternatives. Median (50th percentile) and 10th percentile values of the surplus alternatives are compared to those of the baseline conditions in Table 3.3-7. The values presented in this table include those for years 2015 and 2050 only.

Figure 3.3-17
Lake Mead End-of-Year Water Elevations
Comparison of Surplus Alternatives to Baseline Conditions
Percentage of Values Greater than or Equal to Elevation 1000 Feet

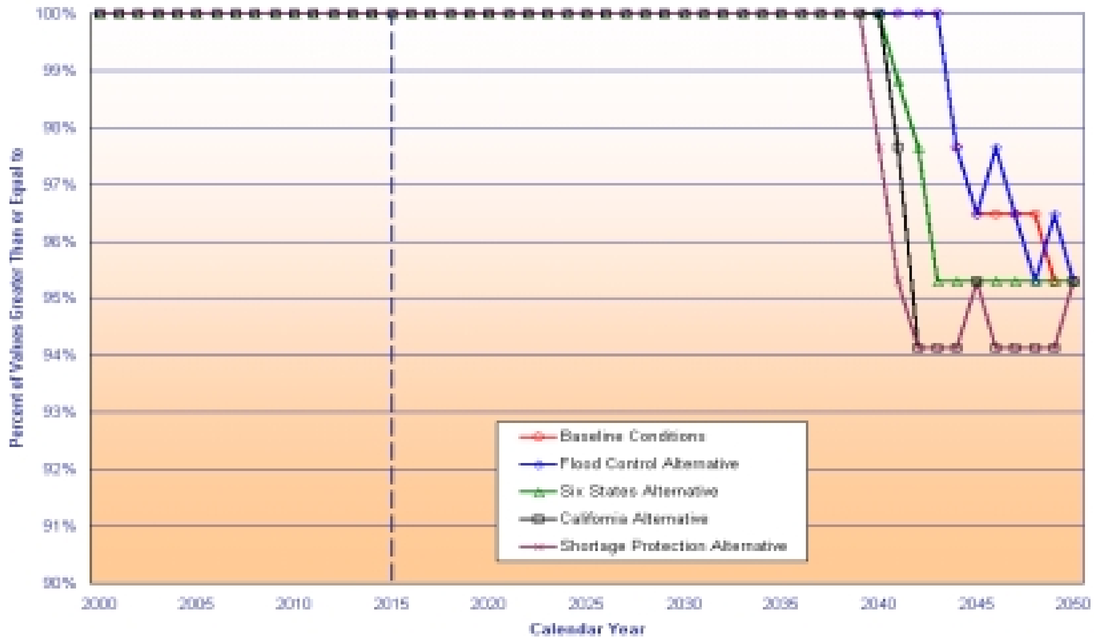


Table 3.3-7
Lake Mead End-of-Year Water Elevations
Comparison of Surplus Alternatives and Baseline Conditions
50th and 10th Percentile Values

Alternative	Year 2015		Year 2050	
	50th Percentile	10th Percentile	50th Percentile	10th Percentile
Baseline Conditions	1171	1130	1123	1011
Flood Control Alternative	1171	1130	1123	1011
Six States Alternative	1156	1113	1123	1010
California Alternative	1147	1096	1123	1010
Shortage Protection Alternative	1144	1098	1123	1010

Figure 3.3-14 compared the percentage of Lake Mead elevations that exceeded 1200 feet msl for the surplus alternatives and baseline conditions. Table 3.3-8 provides a summary of that comparison for years 2015 and 2050.

Table 3.3-8
Lake Mead End-of-Year Water Elevations
Comparison of Surplus Alternatives and Baseline Conditions
Percentage of Values Greater than or Equal to Elevation 1200 Feet

Alternative	Year 2015	Year 2050
Baseline Conditions	22%	16%
Flood Control Alternative	25%	19%
Six States Alternative	22%	18%
California Alternative	19%	18%
Shortage Protection Alternative	20%	18%

Figure 3.3-15 compared the percentage of Lake Mead elevations that exceeded 1083 feet msl for the surplus alternatives and baseline conditions. Table 3.3-9 provides a summary of that comparison for years 2015 and 2050.

Table 3.3-9
Lake Mead End-of-Year Water Elevations
Comparison of Surplus Alternatives and Baseline Conditions
Percentage of Values Greater than or Equal to Elevation 1083 Feet

Alternative	Year 2015	Year 2050
Baseline Conditions	100%	74%
Flood Control Alternative	100%	74%
Six States Alternative	99%	74%
California Alternative	95%	74%
Shortage Protection Alternative	94%	74%

Figure 3.3-16 compared the percentage of Lake Mead elevations that exceeded 1050 feet msl for the surplus alternatives and baseline conditions. Table 3.3-10 provides a summary of that comparison for years 2015 and 2050.

Table 3.3-10
Lake Mead End-of-Year Water Elevations
Comparison of Surplus Alternatives and Baseline Conditions
Percentage of Values Greater than or Equal to Elevation 1050 Feet

Alternative	Year 2015	Year 2050
Baseline Conditions	100%	80%
Flood Control Alternative	100%	80%
Six States Alternative	100%	80%
California Alternative	100%	80%
Shortage Protection Alternative	100%	80%

Figure 3.3-17 compared the percentage of Lake Mead elevations that exceeded 1000 feet msl for the surplus alternatives and baseline conditions. Table 3.3-11 provides a summary of that comparison for years 2015 and 2050.

Table 3.3-11
Lake Mead End-of-Year Water Elevations
Comparison of Surplus Alternatives and Baseline Conditions
Percentage of Values Greater than or Equal to Elevation 1000 Feet

Alternative	Year 2015	Year 2050
Baseline Conditions	100%	95%
Flood Control Alternative	100%	95%
Six States Alternative	100%	95%
California Alternative	100%	95%
Shortage Protection Alternative	100%	95%

3.3.4.5 COMPARISON OF RIVER FLOWS BELOW HOOVER DAM

This section describes the results of the analysis of the simulated Colorado River flows below Hoover Dam. The model of the Colorado River system was used to develop estimates of future flows under baseline conditions and the surplus alternatives. Although the model runs yielded river flow data at various points within this segment of the Colorado River, only data for four specific locations were selected for evaluation. The four river locations were used to represent flows within selected river reaches for purpose of analysis. The river reaches and corresponding river flow locations are listed in Table 3.3-12. The locations of the four river points are shown on Map 3.3-1.

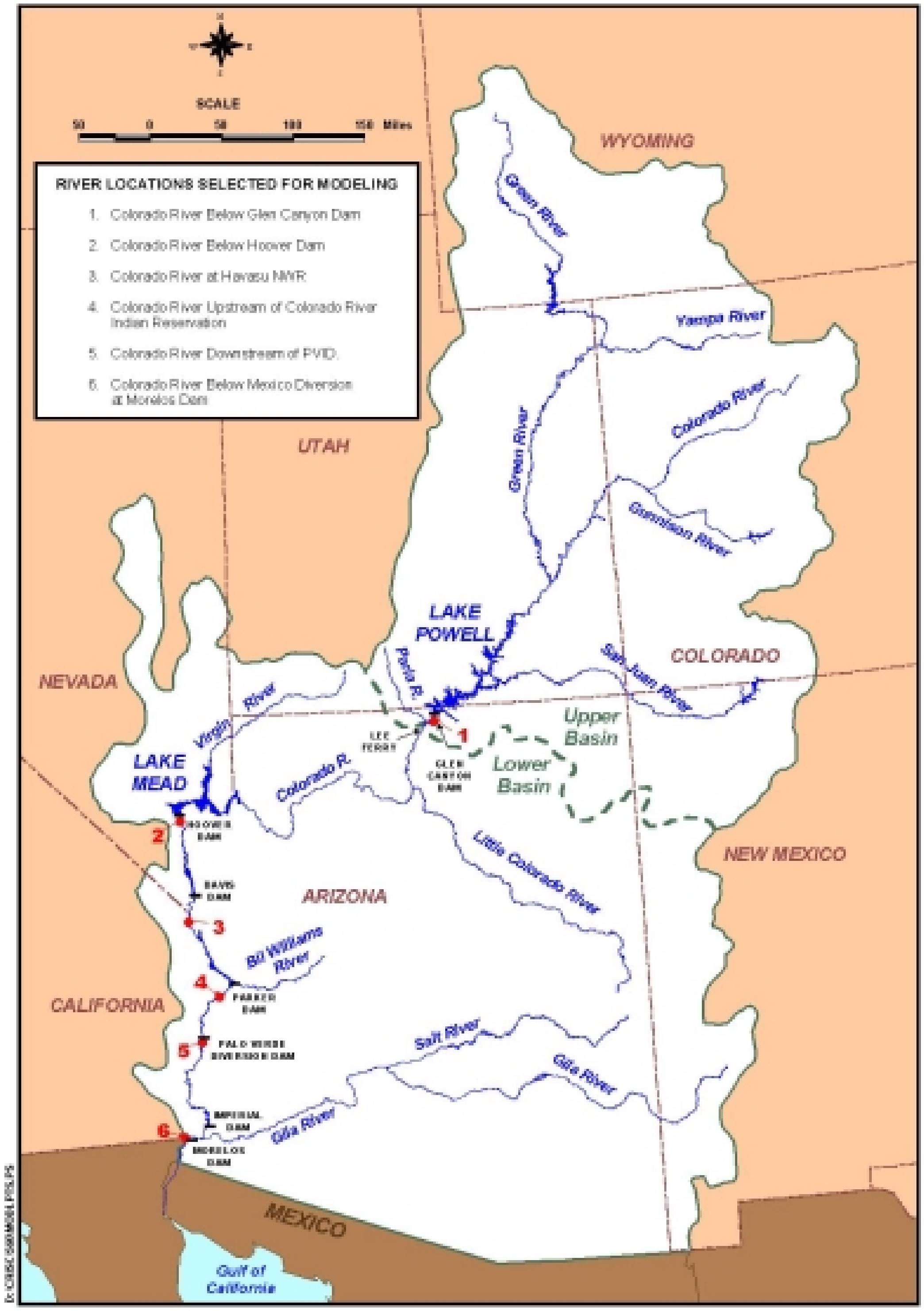
Table 3.3-12
Colorado River Flow Locations Identified for Evaluation

Colorado River Reach	Selected River Flow Locations	
	Description	Approximate River Mile [1]
Between Hoover Dam and Parker Dam	Havasu National Wildlife Refuge (NWR)	242.3
Between Parker Dam and Palo Verde Diversion	Upstream of Colorado River Indian Reservation	180.8
Between Palo Verde Diversion and Imperial Dam	Downstream of Palo Verde Irrigation District (PVID)	133.8
Between Imperial Dam and Morelos Dam	Below the Mexico Diversion at Morelos Dam	23.1

[1] River miles as measured from the southerly international border with Mexico

The analysis of future river flow conditions consisted of a comparison of simulated river flows under the baseline conditions to those of the surplus alternatives. Two types of analysis are provided in the evaluation of river flows. The first evaluates and compares the maximum, minimum, 90th, 50th and 10th percentile values of mean monthly flows under baseline conditions to those of the surplus alternatives. This type of comparison was conducted for the interim surplus criteria period (2001 to 2015). The results of these analyses are presented in tabular format under the

Map 3.3-1
Colorado River Locations Selected for Modeling



discussion of the results for each river segment. The comparison of the mean monthly flows considered the seasonal variations of the flows of the Colorado River. This was achieved by selecting representative months in each of the four seasons. The mean monthly flow of January was used to represent the winter season flow, April was used to represent the spring season flow, July was used to represent the summer season flow, and October was used to represent the fall season flow. The minimum, median and maximum flows of the surplus alternatives are compared to those of the baseline conditions. The second type of analysis is a fixed value cumulative distribution that compares the exceedence frequency of the mean monthly flows (in cfs) that occur within each respective river reach. This type of analysis also considers the seasonal flows using the representative months discussed above. The analysis considers the flows for years 2005, 2015, 2025 and 2050 to evaluate possible changes in flows over time. Only the graphs for year 2015 are presented in this section. The graphs for the other years are presented in Attachment L.

3.3.4.5.1 River Flows Between Hoover Dam and Parker Dam

The river flows between Hoover Dam and Parker Dam result from controlled releases from Hoover Dam and Davis Dam and may include gains from tributaries in this reach of the river as well as return flows. The most significant gains from perennial streams include inflow from the Bill Williams River. However, inflow from the Bill Williams River and other smaller streams is infrequent and concentrated over very short periods of time and, on average, make up less than 1 percent of the total annual flow in this reach of the river.

Seasonal, monthly and daily releases from Hoover Dam reflect the water supply demands of Colorado River water users with diversions located downstream of Hoover Dam. Daily attenuation of flow releases correspond to the rule curves used in the operation of Lake Mohave and Lake Havasu and is generally associated with power production and storage management. The modeling performed for this phase of the DEIS yielded only mean monthly flow data. Therefore, the daily attenuation of flows in downstream reaches was not evaluated.

Figures 3.3-18 (a-d) present a comparison of the representative seasonal flows under baseline conditions to the surplus alternatives. The river location that was modeled for this reach of the river is located immediately downstream of the Havasu NWR.

The section of the Colorado River between Hoover Dam and Parker Dam may experience noticeably higher mean monthly flows (as much as 1,000 cfs) during the 15-year interim surplus criteria period as a result of more frequent surplus deliveries (compared to the baseline conditions). The highest normal flows occur under the Shortage Protection Alternative. However, beyond the 15-year interim surplus

Figure 3.3-18a
Colorado River Seasonal Flows Downstream of Havasu NWR
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Year 2015

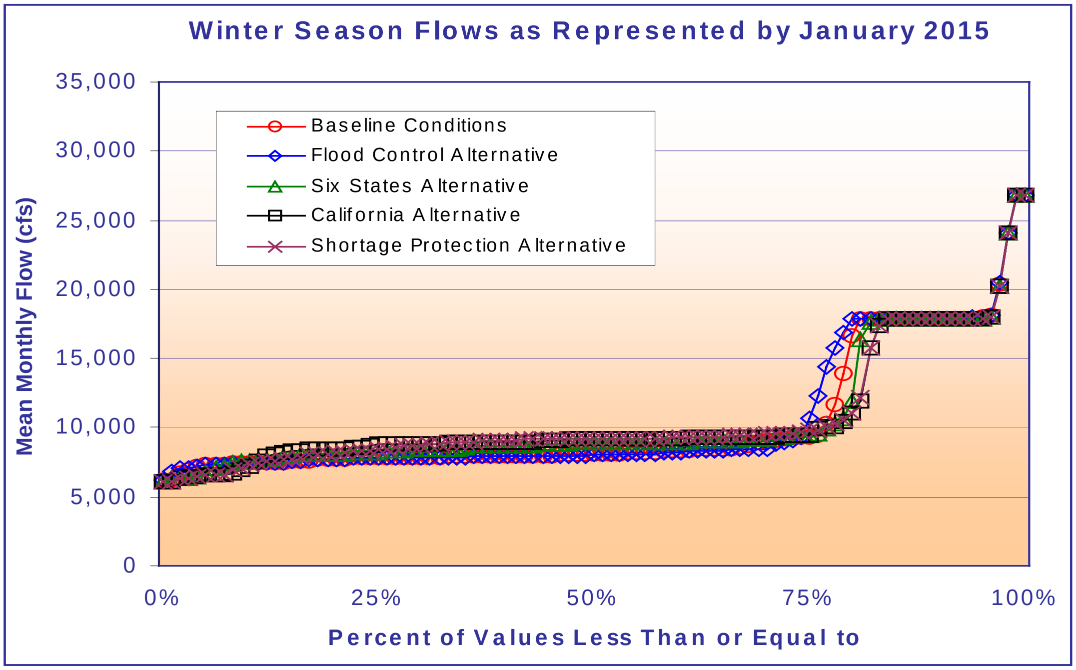


Figure 3.3-18b
Colorado River Seasonal Flows Downstream of Havasu NWR
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Year 2015

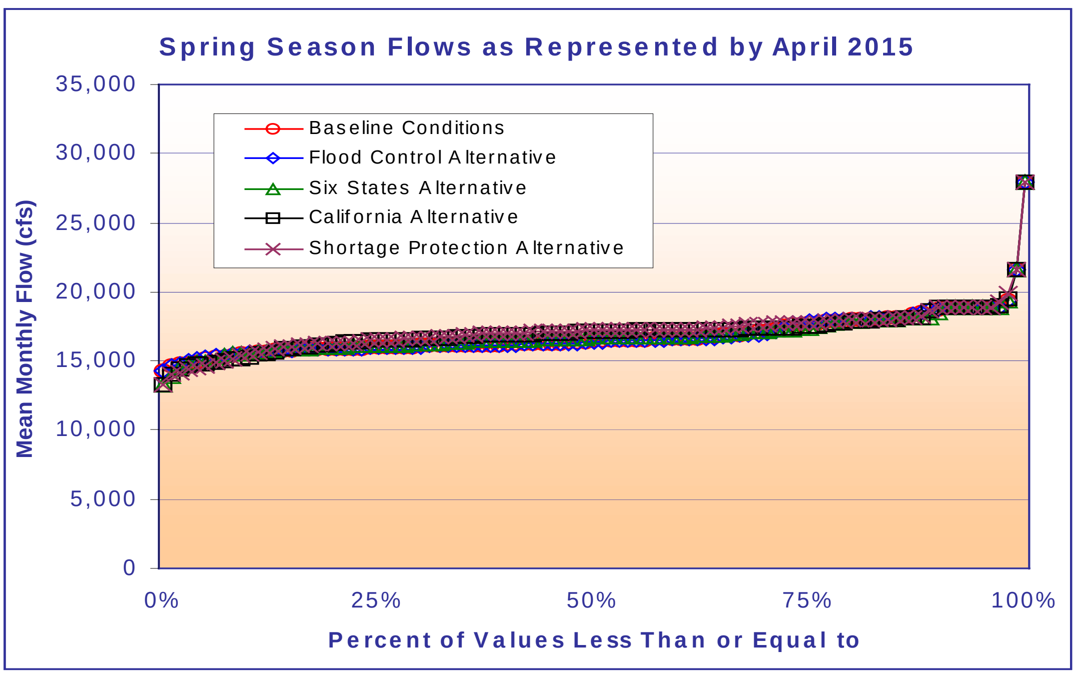


Figure 3.3-18c
Colorado River Seasonal Flows Downstream of Havasu NWR
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Year 2015

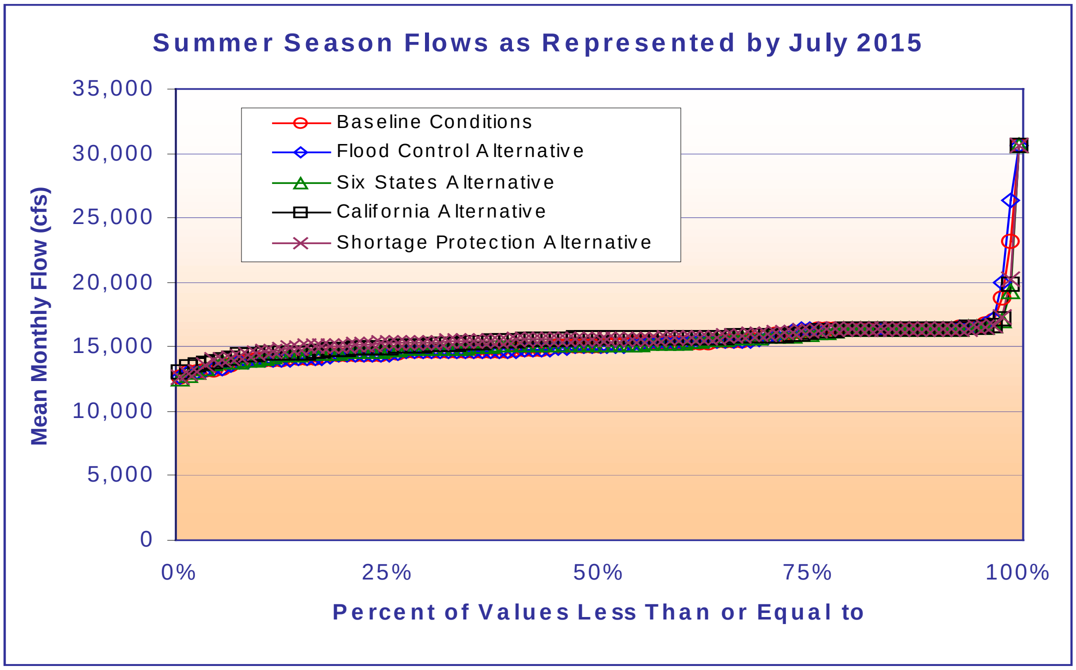
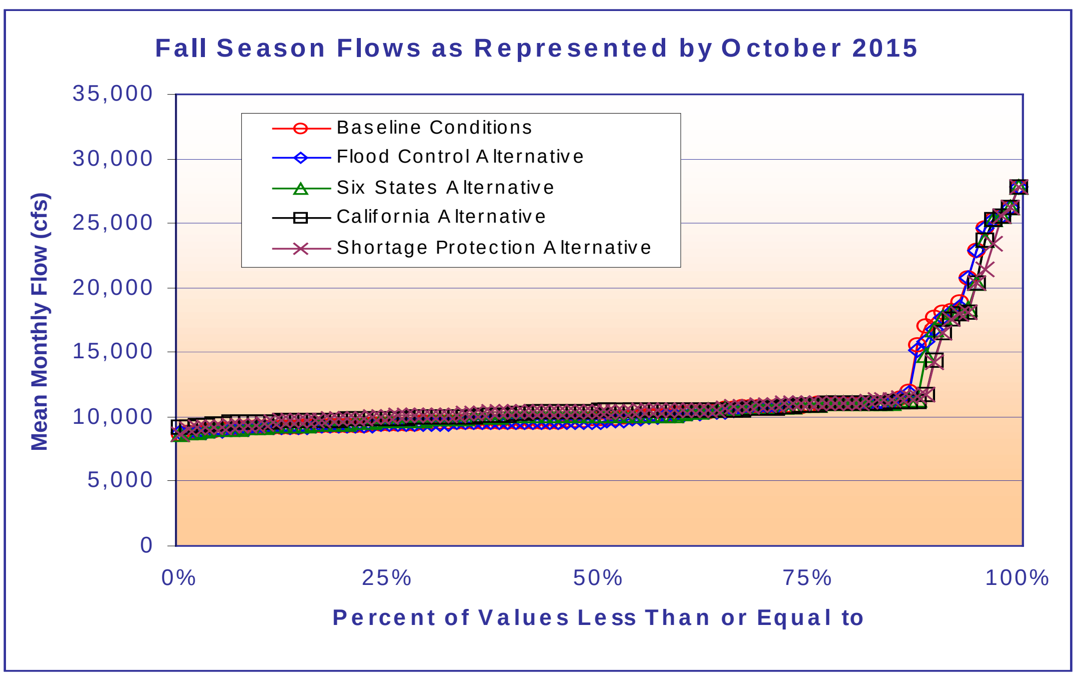


Figure 3.3-18d
Colorado River Seasonal Flows Downstream of Havasu NWR
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Year 2015



criteria, mean monthly flows under the surplus conditions are estimated to be similar to those under the baseline conditions. Beyond the 15-year interim surplus criteria, there is very little difference between the flows of the baseline conditions and the surplus alternatives. The magnitude of flows resulting from flood releases is comparable. The frequency of these larger than normal flows is comparable for the representative spring, summer and fall season months. The most noticeable difference occurs in the representative winter season month (January). The probability of larger than normal flows for the baseline conditions and surplus alternatives ranges between 20 and 25 percent. However, the differences between the surplus alternatives and the baseline conditions are no more than 3 percentage points.

A numerical comparison of various exceedence frequencies of the baseline conditions to the surplus alternatives for the 15-year interim surplus criteria period and ensuing 35-year period is presented in Table 3.3-13. As noted in this table, the minimum observed flow value for all of the alternatives is 4,930 cfs and the maximum observed value is 48,117 cfs.

Table 3.3-13
Comparison of Mean Monthly Flow Data – Baseline to Surplus Alternatives
Colorado River Downstream of Havasu NWR (River Mile = 242.3)

Exceedence Frequency	Mean Monthly Flows (cfs) for Years 2001 to 2015					Mean Monthly Flows (cfs) for Years 2016 to 2050				
	Baseline	Flood Control	Six States	California	Shortage Protection	Baseline	Flood Control	Six States	California	Shortage Protection
Minimum Flows	5,857	5,869	4,930	4,932	4,930	4,781	6,099	4,935	4,937	4,935
90%	8,375	8,258	8,868	9,030	9,066	7,746	7,736	8,040	8,018	8,005
75%	10,647	10,655	10,695	10,726	10,803	9,848	9,788	9,851	9,846	9,838
50%	14,617	14,526	14,846	14,987	15,016	13,614	13,620	13,459	13,451	13,434
25%	17,103	16,990	17,265	17,508	17,529	16,012	16,022	15,818	15,801	15,777
10%	18,870	18,896	18,831	18,846	18,863	17,907	17,917	17,866	17,865	17,864
Maximum Flows	46,838	46,850	46,838	46,850	46,838	48,117	48,135	48,117	48,135	48,117

3.3.4.5.2 River Flows Between Parker Dam and Palo Verde Diversion

The Colorado River Indian Reservation diversion is located at Headgate Rock Dam. The Headgate Rock Dam is located approximately 14 miles below Parker Dam. Flows in this reach of the river result from releases at Parker Dam (Lake Havasu). Changes in future flow patterns may result from potential water transfers and exchanges between the California agricultural water agencies and MWD, effectively changing the diversion point of water deliveries. For example, under a potential transfer between IID and MWD (or SDCWA), the water that would normally be diverted at Imperial Dam would now be diverted above Parker Dam.

Although the proposed California intrastate transfers are included in the simulation of the surplus alternatives, the transfers themselves are not a direct result of the proposed interim surplus criteria. The California intrastate transfers proposed under the California 4.4 Plan and any potential environmental effects that would occur as a result of that action are expected to be addressed by separate NEPA compliance.

Figures 3.3-19(a-d) present a comparison of the representative seasonal flows in this segment of the river under baseline conditions to the surplus alternatives. The river location that was modeled for this reach of the river is located immediately upstream of the Colorado River Indian Reservation.

As illustrated on Figures 3.3-19(a-d), the section of the Colorado River between Parker Dam and the Palo Verde Diversion may experience lower mean monthly flows (about 440 cfs) during the 15-year interim surplus criteria period as a result of the California intrastate transfers simulated under the Six States, California and Shortage Protection alternatives. The modeling assumptions for the baseline conditions and Flood Control Alternative simulations assumed that no California intrastate transfers would occur. Therefore, higher mean monthly flows would be expected under baseline conditions and under the Flood Control Alternative. During the 15-year interim surplus criteria period and with the transfers, the lowest flows would occur under the Six States Alternative. However, beyond the 15-year interim surplus criteria period, mean monthly flows under the surplus conditions are similar. Beyond the 15-year interim surplus criteria period, the transfers are also included in the simulation for the Six States, California and Shortage Protection alternatives. Therefore, the differences in mean monthly flows under baseline conditions and the Flood Control Alternative to those of the other surplus alternatives continue beyond year 2015.

A numerical comparison of various exceedence frequency of the baseline conditions to the surplus alternatives for the 15-year interim surplus criteria period and ensuing 35-year period is presented in Table 3.3-14. As noted on this table, the minimum observed flow value for all of the alternatives was 2,610 cfs and the maximum observed value was 44,479 cfs.

Figure 3.3-19a
Colorado River Seasonal Flows Upstream of Colorado River Indian Reservation
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Year 2015

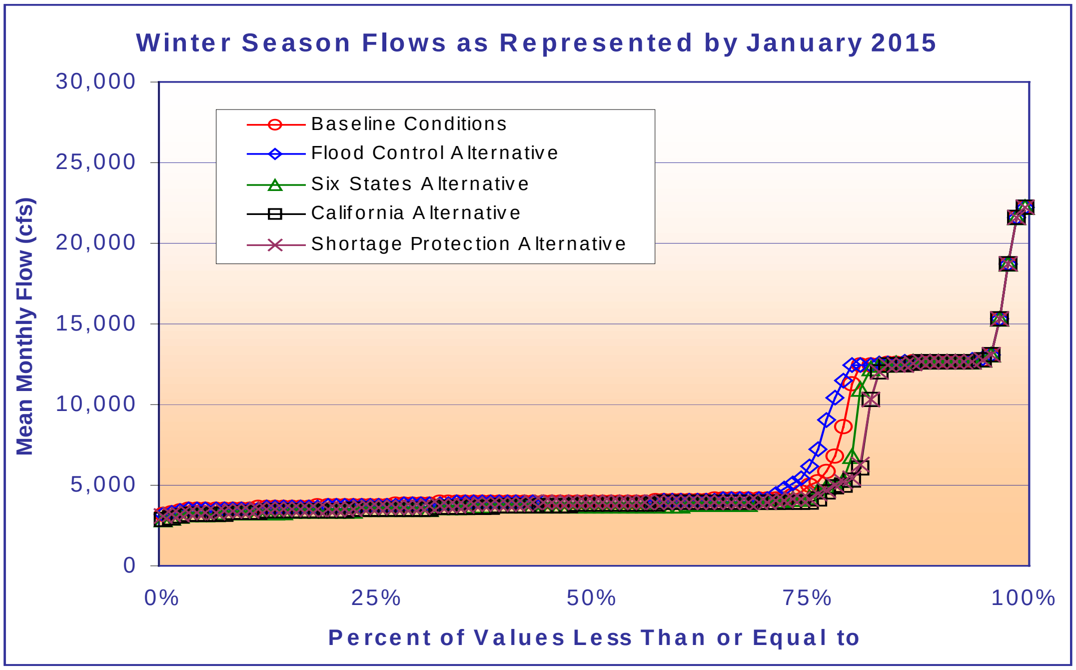


Figure 3.3-19b
Colorado River Seasonal Flows Upstream of Colorado River Indian Reservation
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Year 2015

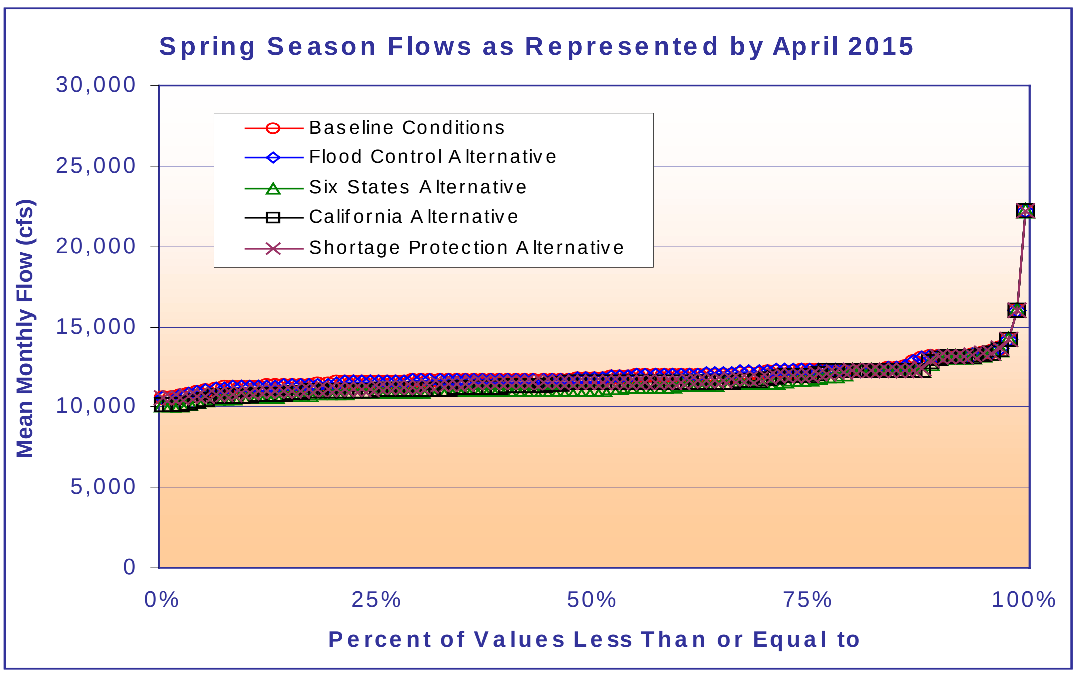


Figure 3.3-19c
Colorado River Seasonal Flows Upstream of Colorado River Indian Reservation
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Year 2015

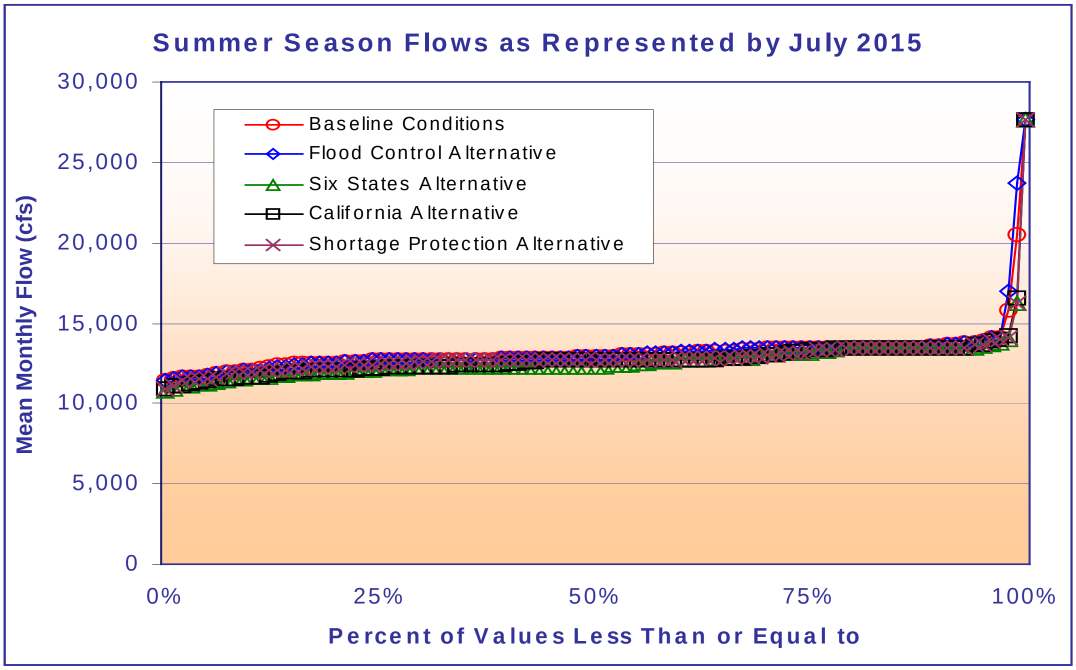


Figure 3.3-19d
Colorado River Seasonal Flows Upstream of Colorado River Indian Reservation
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Year 2015

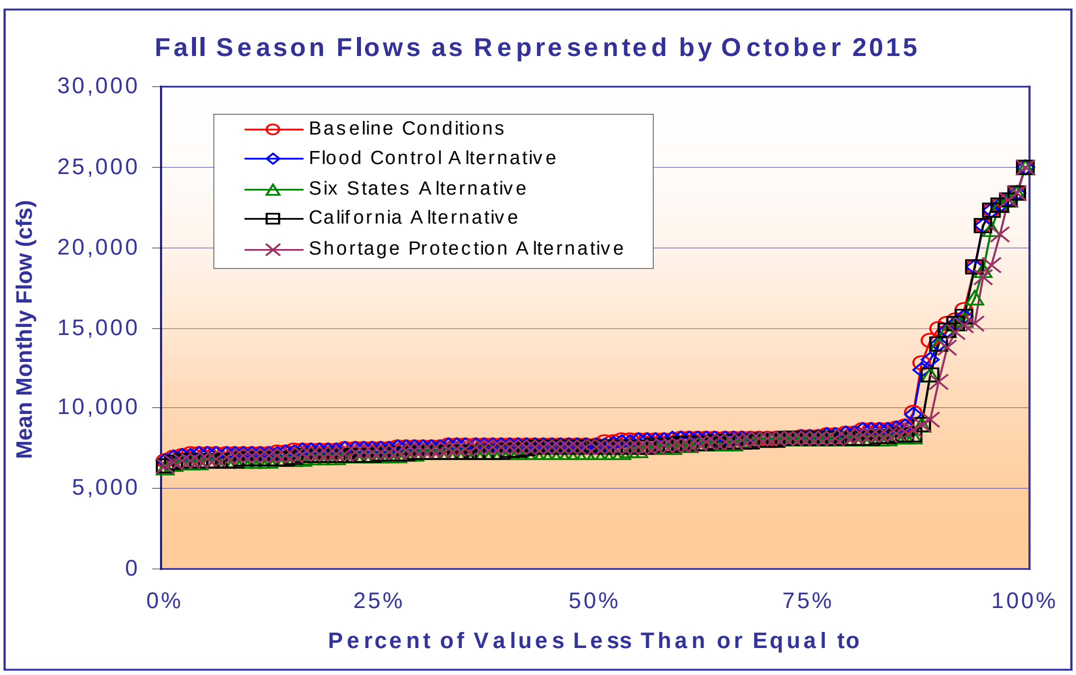


Table 3.3-6
Comparison of Mean Monthly Flow Data - Baseline to Surplus Alternatives
Colorado River Upstream of Colorado Indian Reservation (River Mile = 180.8)

Exceedence Frequency	Mean Monthly Flows (cfs) for Years 2001 to 2015					Mean Monthly Flows (cfs) for Years 2016 to 2050				
	Baseline	Flood Control	Six States	California	Shortage Protection	Baseline	Flood Control	Six States	California	Shortage Protection
Minimum Flows	3,149	3,149	2,910	2,846	3,116	3,117	3,117	2,610	2,610	2,610
90%	4,968	4,955	4,806	4,883	4,955	4,856	4,856	4,360	4,360	4,360
75%	8,042	8,119	7,715	7,816	7,880	7,598	7,613	6,802	6,801	6,800
50%	11,300	11,317	10,857	10,924	11,083	10,585	10,594	9,967	9,952	9,945
25%	12,737	12,755	12,523	12,552	12,662	12,299	12,314	11,644	11,631	11,631
10%	13,802	13,812	13,727	13,730	13,735	13,345	13,374	12,915	12,867	12,837
Maximum Flows	41,816	41,816	41,816	41,816	41,816	44,479	44,479	44,479	44,479	44,479

3.3.4.5.3 River Flows Between Palo Verde Diversion and Imperial Dam

The flow of the Colorado River between Palo Verde Diversion and Imperial Dam is normally set at the amount needed to meet the United States diversion requirements downstream of the Palo Verde Diversion plus deliveries to Mexico. Currently, during the spring, summer and fall, the average monthly flow of the river as it approaches Imperial Dam varies between 9,000 and 11,000 cfs. During the winter months, the average flow drops to about 5,000 cfs.

Similar to the reach of the river between Parker Dam and Palo Verde Diversion, the simulation of this segment of the river indicates that future river flows may be affected by the implementation of the California 4.4 Plan as simulated for the Six States, California and Shortage Protection alternatives. Flows under the Flood Control Alternative are estimated to be similar to those under the baseline conditions. However, because diversions by PVID further reduce the water remaining in the river below Palo Verde Diversion, the potential river flow decrease in this reach of the river may be greater since the proportion of the transfer water to water remaining in the river is higher for this segment of the river. Nevertheless, all of the flows observed under baseline conditions and the surplus alternatives fall within the range of historical flows recorded in this reach of the river.

Figures 3.3-20(a-d) present a comparison of the representative seasonal flows in this segment of the river under baseline conditions to the surplus alternatives. The river location that was modeled for this reach of the river is located immediately downstream of the Palo Verde Irrigation District.

Figure 3.3-20a
Colorado River Seasonal Flows Downstream of Palo Verde Irrigation District
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Year 2015

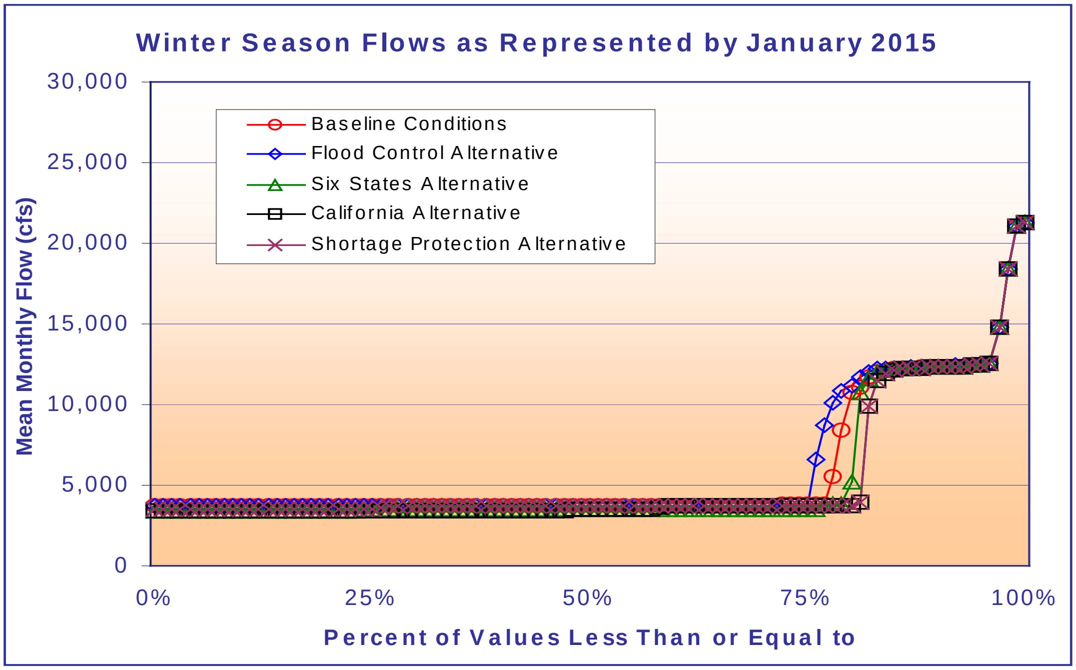


Figure 3.3-20b
Colorado River Seasonal Flows Downstream of Palo Verde Irrigation District
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Year 2015

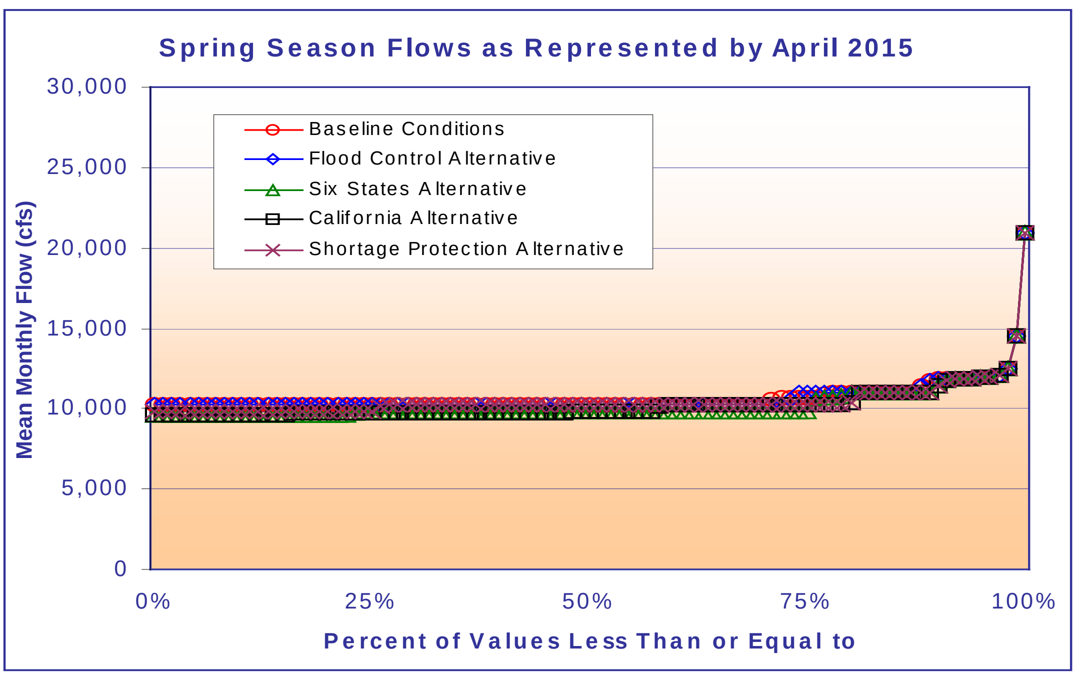


Figure 3.3-20c
Colorado River Seasonal Flows Downstream of Palo Verde Irrigation District
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Year 2015

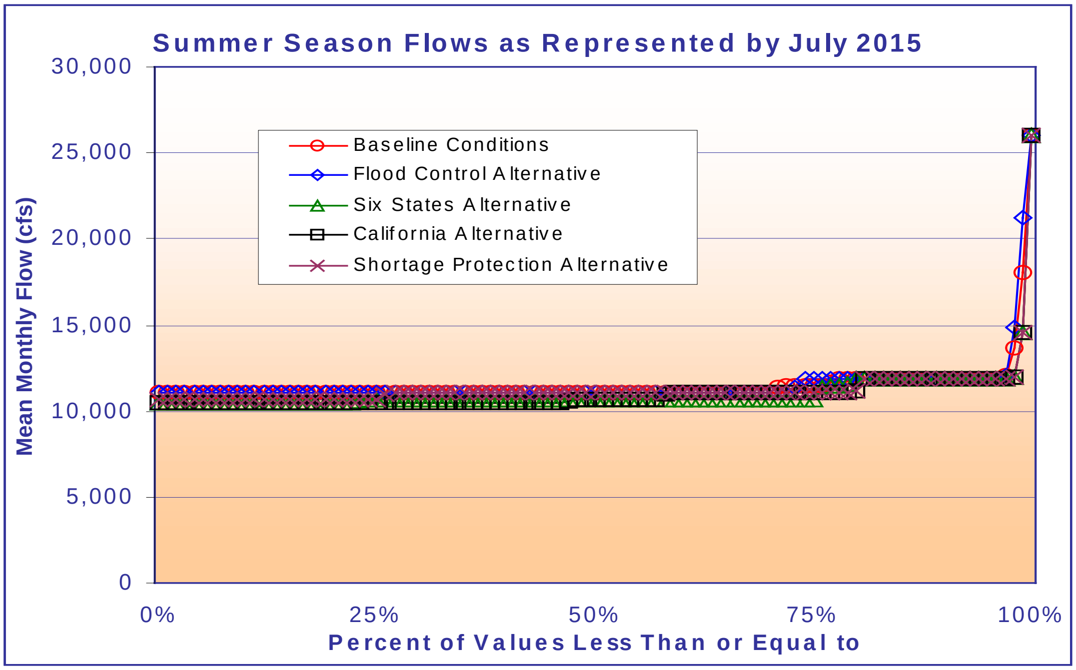


Figure 3.3-20d
Colorado River Seasonal Flows Downstream of Palo Verde Irrigation District
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Year 2015

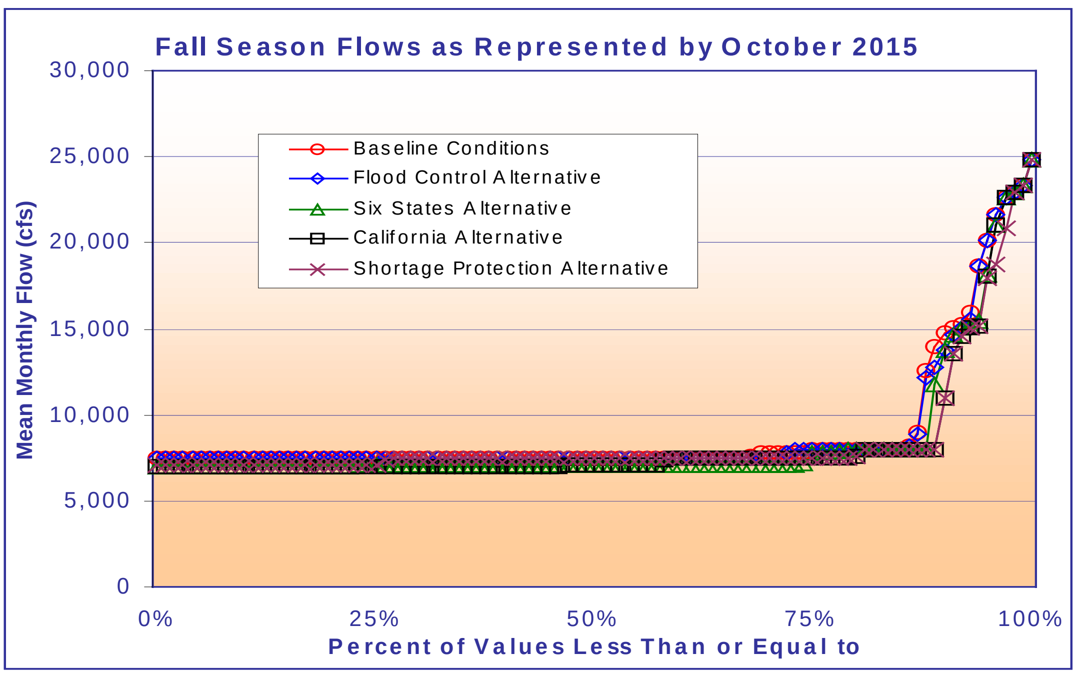


Table 3.3-15 shows the frequency that flows in the Colorado River below the Palo Verde Diversion exceed the projected flows under the baseline conditions for the surplus alternatives during the 15-year interim surplus criteria period and the ensuring 35-year period. As noted on this table, the minimum observed flow value for all of the alternatives is 3,166 cfs and the maximum observed value is 42,836 cfs.

Table 3.3-15
Comparison of Mean Monthly Flow Data – Baseline to Surplus Alternatives
Colorado River Below PVID (River Mile = 133.8)

Exceedence Frequency	Mean Monthly Flows (cfs) for Years 2001 to 2015					Mean Monthly Flows (cfs) for Years 2016 to 2050				
	Baseline	Flood Control	Six States	California	Shortage Protection	Baseline	Flood Control	Six States	California	Shortage Protection
Minimum Flows	3,708	3,708	3,387	3,387	3,469	3,674	3,674	3,166	3,166	3,166
90%	4,753	4,753	4,644	4,801	4,833	4,713	4,713	4,201	4,201	4,201
75%	7,537	7,528	7,292	7,325	7,605	7,435	7,435	6,618	6,618	6,618
50%	10,347	10,347	9,834	9,823	10,219	9,204	9,215	9,136	9,136	9,136
25%	11,322	11,322	11,074	11,122	11,260	11,004	11,004	10,071	10,065	10,038
10%	12,675	12,752	12,481	12,430	12,405	11,669	11,782	11,631	11,563	11,535
Maximum Flows	39,805	39,805	39,805	39,805	39,805	42,836	42,836	42,836	42,836	42,836

3.3.4.5.4 River Flows Between Imperial Dam and Morelos Dam

The flows below Imperial Dam include the water delivered to Mexico in accordance with the Treaty. Mexico's principal diversion is at Morelos Dam, where most of its Colorado River water apportionment is diverted. Approximately 140,000 acre-feet per year are delivered to Mexico at a point approximately one mile east of the river at the Southern Land Boundary. However, for modeling purposes, that delivery was accounted for at the NIB. In addition, the model produces the mean monthly flows within the river at a location immediately below the modeled Mexico Diversion at Morelos Dam. These mean monthly flows are excess flows in the Colorado River system that may reach the Colorado River Delta. Figures 3.3-21(a-d) present a comparison of the representative seasonal flows in this segment of the river under baseline conditions to the surplus alternatives.

As illustrated in Figures 3.3-21(a-d), the availability of excess flows under the baseline conditions and surplus alternatives is infrequent. The lowest frequency is expected to occur under the Shortage Protection Alternative, while the highest frequency is expected to occur under the Six States Alternative. Most of the time, there would be no excess flows available. Further, the magnitude of the future excess flows is expected to decrease over time as a result of the increasing water demands of the Upper Division states.

Figure 3.3-21a
Colorado River Seasonal Flows Below Mexico Diversion at Morelos Dam
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Year 2015

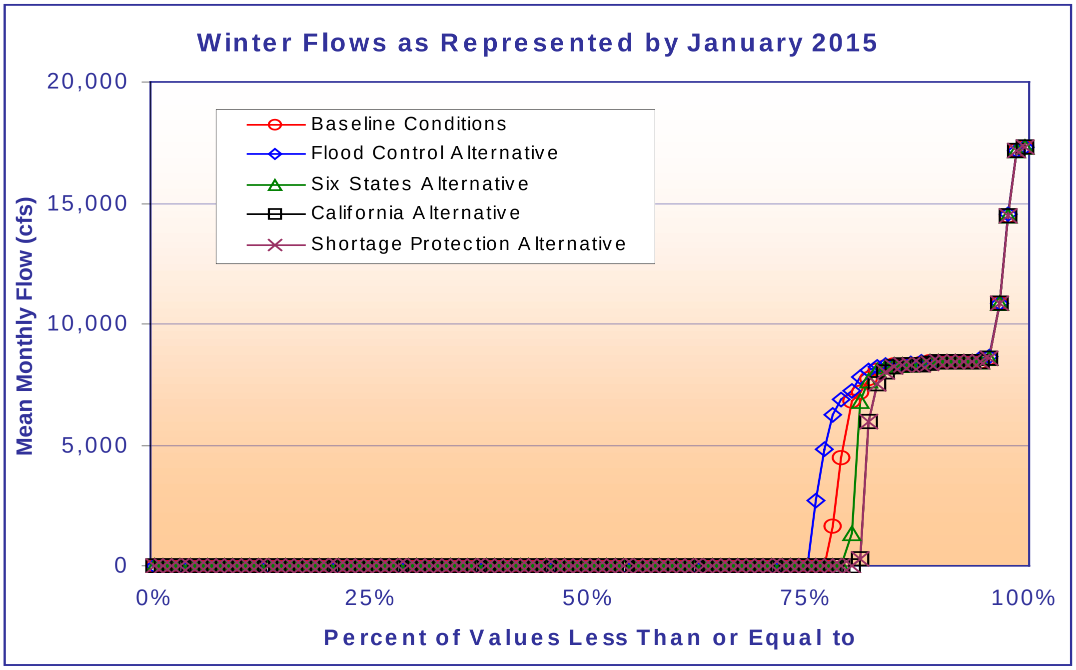


Figure 3.3-21b
Colorado River Seasonal Flows Below Mexico Diversion at Morelos Dam
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Year 2015

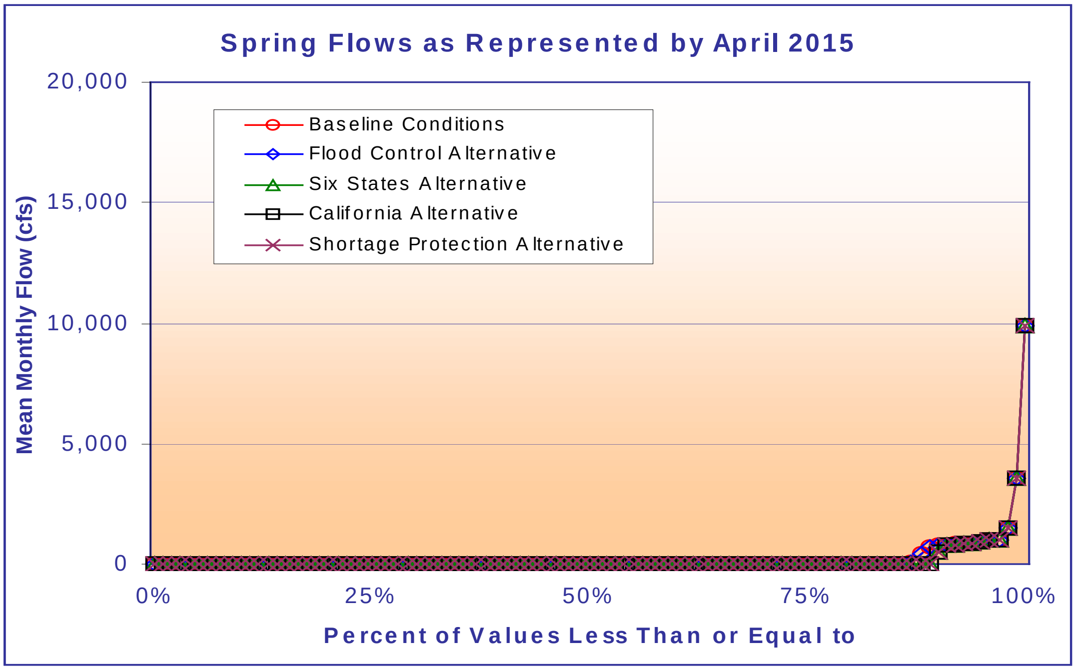


Figure 3.3-21c
Colorado River Seasonal Flows Below Mexico Diversion at Morelos Dam
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Year 2015

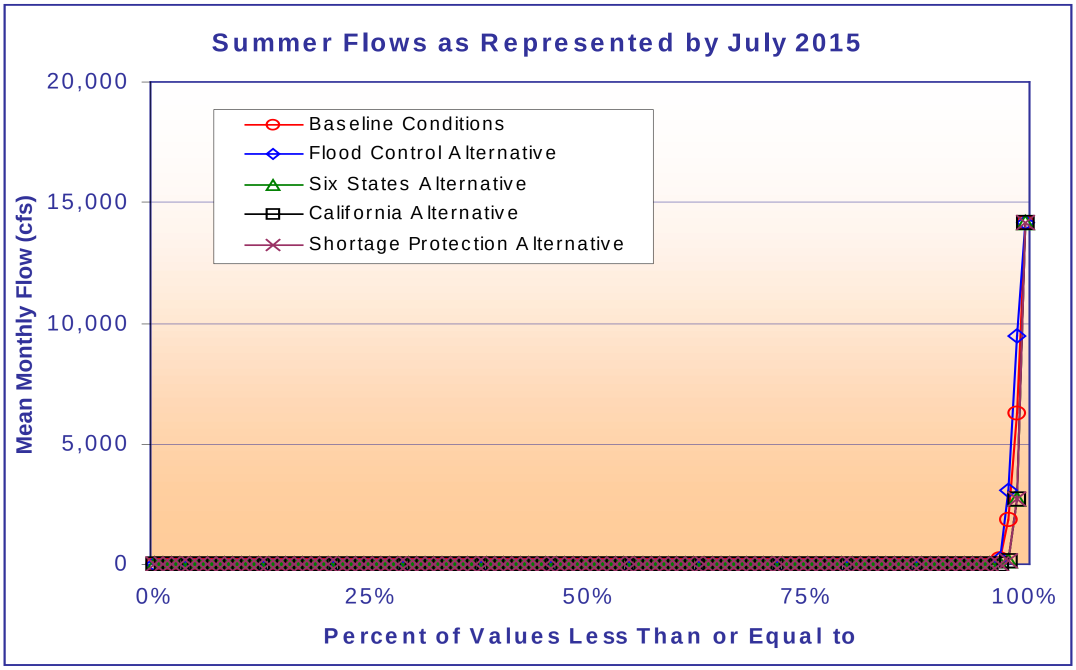
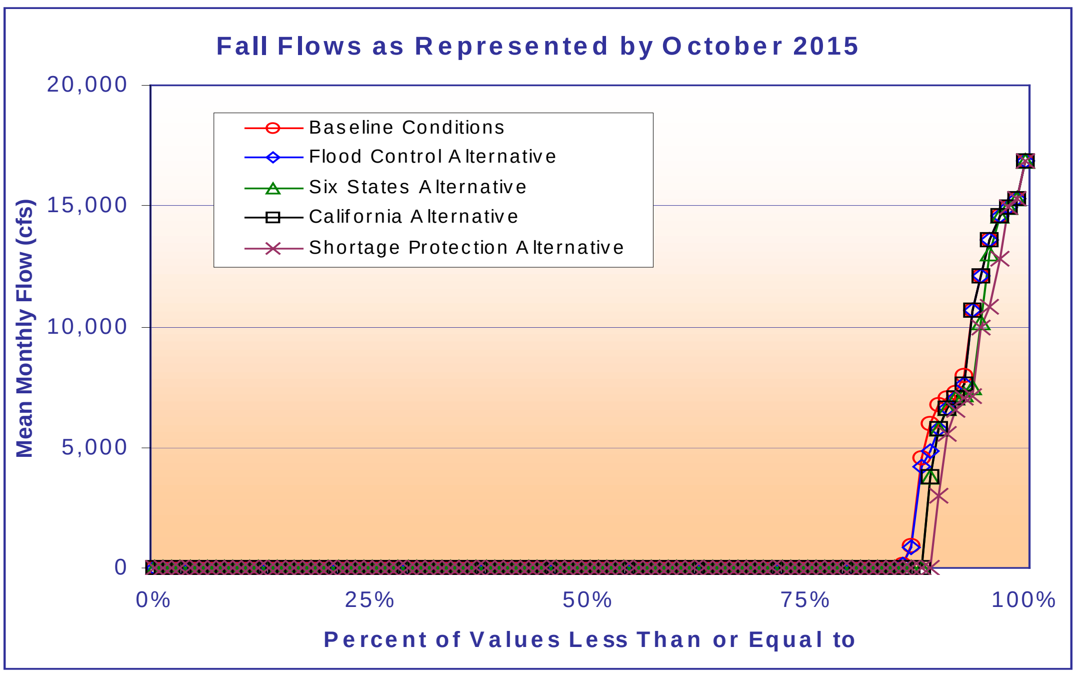


Figure 3.3-21d
Colorado River Seasonal Flows Below Mexico Diversion at Morelos Dam
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Year 2015



A numerical comparison of various exceedence frequencies of the baseline conditions to the surplus alternatives for the 15-year interim surplus criteria period and ensuing 35-year period is presented in Table 3.3-16. As noted on this table, the minimum observed flow value for all of the alternatives is close to zero cfs and the maximum observed value is 31,050 cfs. Further, the frequency of occurrence of excess flows available to Mexico is expected to be higher during the interim surplus criteria period because of current high reservoir levels.

Table 3.3-16
Comparison of Mean Monthly Flow Data – Baseline to Surplus Alternatives
Below Mexico Diversion at Morelos Dam (~River Mile = 23.10)

Exceedence Frequency	Mean Monthly Flows (cfs) for Years 2001 to 2015 [1]					Mean Monthly Flows (cfs) for Years 2016 to 2050 [1]				
	Baseline	Flood Control	Six States	California	Shortage Protection	Baseline	Flood Control	Six States	California	Shortage Protection
Minimum Flows	0	0	0	0	0	0	0	0	0	0
90%	0	0	0	0	0	0	0	0	0	0
75%	0	0	0	0	0	0	0	0	0	0
50%	0	0	0	0	0	0	0	0	0	0
25%	0	0	0	0	0	0	0	0	0	0
10%	5,368	5,689	4,847	4,724	4,649	0	0	0	0	0
Maximum Flows	27,961	27,961	27,961	27,961	27,961	31,050	31,050	31,050	31,050	31,050

1. The mean monthly flows noted to be zero in the above table equate to approximately 10 af/month, which when converted to mean monthly flow values round down to zero.