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## 4. Environmental Consequences and Mitigation Measures

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### 4.8 RECREATION

In this section impacts to recreation are assessed for both reservoirs and rivers that could be affected by the proposed project. The proposed flow objectives are compared to the existing conditions as described in the affected environment. In addition, the Water Right Priority System alternative is compared to both the base case and the proposed project. The reservoirs evaluated are New Melones, New Don Pedro, and Lake McClure. The rivers assessed are the San Joaquin, Stanislaus, Tuolumne, and Merced rivers. There would be no impacts to recreation in the conveyance facilities, wildlife refuges, hunting clubs, or in the Sacramento-San Joaquin Delta as a result of the proposed project.

#### 4.8.1 Impact Issues and Evaluation Criteria

No key issues regarding recreation were identified during the public scoping phase of this project. The main effect that the proposed project could potentially have on recreation relates to reservoir levels and flow of water in the rivers. Recreational use is affected by the amount and timing of water levels and releases.

##### 4.8.1.1 Reservoirs

Recreation opportunity thresholds are based on water depths (or water elevation levels) of the reservoirs. Critical depths occur when boat ramps are no longer operational, causing marinas to close, or when campgrounds or picnic areas are limited by the small surface area of the reservoir available for recreation. These critical levels were established for each reservoir in the CVPIA Draft PEIS (1997a) and were based on information provided by the operators of the reservoirs. Elevation levels (water depths) were calculated for this EIS/EIR from the area and capacity tables for each reservoir and the Reclamation model storage capacity output.

Due to the nature of the hydrological input data and the use of average monthly operations, Reclamation's model results may be expected to have a margin of error of 10 to 20 percent. Therefore, frequencies which differ less than 10 percent from the base case are considered to be insignificant.

##### 4.8.1.2 Rivers

Streamflows determine the recreation opportunity thresholds in the rivers. Critical flows occur when either boating or swimming activities are either optimal or are not available (due to too little water or too rapidly flowing water). These critical flows were established for each river in the CVPIA

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Draft PEIS (1997d) and were based on information provided by the operators of recreational facilities along the rivers, rafting guides, and fishing guides. As with the reservoir analyses, the river flow analyses are based on the Reclamation model output.

Due to the nature of the hydrological input data and the use of average monthly operations, Reclamation's model results may be expected to have a margin of error of 10 to 20 percent. Therefore, frequencies which differ less than 10 percent from the base case are considered to be insignificant.

### 4.8.2 Environmental Consequences

The projected reservoir storage capacity and flow figures were obtained from the Reclamation model results. The Water Right Priority System alternative is compared to the proposed project qualitatively for each reservoir because this alternative was not modeled using Reclamation's modeling system. Rather the basis for analyses of this other alternative is the SWRCB's hydrologic modeling included in their recent Draft EIR (SWRCB 1997, 1998). Output from the two modeling systems are not directly comparable, and the base cases rely on different assumptions. Of concern to the recreation impact analyses is the fact that the Reclamation model alternatives include the New Melones Interim Plan of Operation (USBR 1997c) which has been in effect for over a year, while the SWRCB/DWR modeling of the base case does not.

#### 4.8.2.1 Reservoirs

The peak recreation seasons vary, but typically the majority of use occurs between Memorial Day and Labor Day. The recreation impact analysis, therefore, considers the water surface elevations of the reservoirs at the end of month for May and September. The frequency of occurrence when the reservoir falls below the critical elevations is summarized both in terms of numbers of months of occurrence, and in terms of percentages (Tables 4.8-1 through 4.8.-3). A frequency which is lower than the base case would indicate a beneficial effect of the proposed project. The entire 71-year period of record is examined as well as each of the water year types: critical, dry, below normal, above normal, and wet (Tables 4.8-1 through 4.8.-3).

#### New Melones Reservoir

The results for New Melones Reservoir from Reclamation's model are summarized in Table 4.8-1. Explanatory notes for the table appear on the page following the table.

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**Table 4.8-1: RECREATION IMPACT ASSESSMENT FOR NEW MELONES RESERVOIR**

	Frequency that Reservoir is Below Critical Threshold Elevation									
	Total Months	850 ft		860 ft		880 ft		900 ft		
		Total	%	Total	%	Total	%	Total	%	
<b>Without Project - May</b>										
All Years	71	1	1.4	2	2.8	2	2.8	4	5.6	
Critical	15	1	6.7	2	13.3	2	13.3	4	26.7	
Dry	11	0	0.0	0	0.0	0	0.0	0	0.0	
Below Normal	12	0	0.0	0	0.0	0	0.0	0	0.0	
Above Normal	14	0	0.0	0	0.0	0	0.0	0	0.0	
Wet	19	0	0.0	0	0.0	0	0.0	0	0.0	
<b>With Project - May</b>										
All Years	71	1	1.4	1	1.4	2	2.8	2	2.8	
Critical	15	1	6.7	1	6.7	2	13.3	2	13.3	
Dry	11	0	0.0	0	0.0	0	0.0	0	0.0	
Below Normal	12	0	0.0	0	0.0	0	0.0	0	0.0	
Above Normal	14	0	0.0	0	0.0	0	0.0	0	0.0	
Wet	19	0	0.0	0	0.0	0	0.0	0	0.0	
<b>Without Project-September</b>										
All Years	71	4	5.6	4	5.6	5	7.0	10	14.1	
Critical	15	4	26.7	4	26.7	5	33.3	7	46.7	
Dry	11	0	0.0	0	0.0	0	0.0	1	9.1	
Below Normal	12	0	0.0	0	0.0	0	0.0	1	8.3	
Above Normal	14	0	0.0	0	0.0	0	0.0	1	7.1	
Wet	19	0	0.0	0	0.0	0	0.0	0	0.0	
<b>With Project - September</b>										
All Years	71	2	2.8	2	2.8	4	5.6	5	7.0	
Critical	15	2	13.3	2	13.3	4	26.7	5	33.3	
Dry	11	0	0.0	0	0.0	0	0.0	0	0.0	
Below Normal	12	0	0.0	0	0.0	0	0.0	0	0.0	
Above Normal	14	0	0.0	0	0.0	0	0.0	0	0.0	
Wet	19	0	0.0	0	0.0	0	0.0	0	0.0	

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Notes:

- <850 ft. MSL - last boat ramps inoperable (old roads at Mark Twain, Parrot's Ferry, and Old Town recreation areas)
- <860 ft. MSL - last official boat ramp inoperable (Glory Hole), limited lake surface area, decline in campground and picnicking use
- <880 ft. MSL - marina closes
- <900 ft. MSL - decline in beach use

**No Action.** At the beginning of the summer in May, the base case shows that beach use is impaired about 26.7 percent of the time during a critically dry year. During critical years, the marina would be closed 13.3 percent of the time, while limited lake surface area, boat ramps, and campground/picnicking use would be adversely affected as well. The last boat ramp would be inoperable 6.7 percent of the time. For all other year types, there are no adverse effect on recreation uses at New Melones Reservoir. By September, beach use declines in all year types with the most restricted activity occurring (46.7 percent) in a critical year. Only in critical years does the surface water elevation drop below 850 ft, and this occurs for 26.7 percent of the end of summer months.

**Proposed Action.** In May the proposed project does not differ at all from the base case for all of the water years considered. In September the proposed project benefits recreational use by decreasing the frequencies with which the water depth falls below critical thresholds. During critical water years, this project benefit is significant for the most extreme thresholds (850 ft. MSL and 860 ft. MSL).

**Alternative Action.** The Water Right Priority System alternative is compared to the Reclamation's No Action alternative in a qualitative way. The SWRCB's Alternative 2 is similar to the Reclamation base case and is used for the comparison. During the peak recreation season, the Water Right Priority System alternative for New Melones Reservoir does decrease the frequency of occurrences with which the water depth falls below critical thresholds, but the impact is not significant. In a critical period (1928 through 1934), the Water Right Priority System alternative is significantly different from SWRCB's Alternative 2 by decreasing the frequencies for the most extreme thresholds (850 ft. MSL and 860 ft. MSL) from 32 percent to 0 and 34 percent to two percent, respectively. These impacts are beneficial.

### New Don Pedro Reservoir

The results for New Don Pedro Reservoir from the Reclamation's model are summarized in Table 4.8-2.

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**Table 4.8-2: RECREATION IMPACT ASSESSMENT FOR NEW DON PEDRO RESERVOIR**

	Total Months	Frequency that Reservoir is Below Critical Threshold Elevation							
		600 ft		630 ft		720 ft		780 ft	
		Total	%	Total	%	Total	%	Total	%
<b>Without Project - May</b>									
All Years	71	0	0.0	0	0.0	4	5.6	22	30.1
Critical	15	0	0.0	0	0.0	4	26.7	12	80.0
Dry	11	0	0.0	0	0.0	0	0.0	2	18.2
Below Normal	12	0	0.0	0	0.0	0	0.0	5	41.7
Above Normal	14	0	0.0	0	0.0	0	0.0	2	14.3
Wet	19	0	0.0	0	0.0	0	0.0	1	5.3
<b>With Project - May</b>									
All Years	71	0	0.0	0	0.0	4	5.6	24	33.8
Critical	15	0	0.0	0	0.0	4	26.7	13	86.7
Dry	11	0	0.0	0	0.0	0	0.0	3	27.3
Below Normal	12	0	0.0	0	0.0	0	0.0	5	41.7
Above Normal	14	0	0.0	0	0.0	0	0.0	2	14.3
Wet	19	0	0.0	0	0.0	0	0.0	1	5.3
<b>Without Project-September</b>									
All Years	71	0	0.0	0	0.0	12	16.9	42	59.2
Critical	15	0	0.0	0	0.0	9	60.0	15	100.0
Dry	11	0	0.0	0	0.0	1	9.1	11	100.0
Below Normal	12	0	0.0	0	0.0	2	16.7	10	83.3
Above Normal	14	0	0.0	0	0.0	0	0.0	6	42.9
Wet	19	0	0.0	0	0.0	0	0.0	0	0.0
<b>With Project - September</b>									
All Years	71	0	0.0	0	0.0	12	16.9	43	60.6
Critical	15	0	0.0	0	0.0	9	60.0	15	100.0
Dry	11	0	0.0	0	0.0	1	9.1	11	100.0
Below Normal	12	0	0.0	0	0.0	2	16.7	10	83.3
Above Normal	14	0	0.0	0	0.0	0	0.0	7	50.0
Wet	19	0	0.0	0	0.0	0	0.0	0	0.0

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Notes:

- <600 ft. MSL - last boat ramp inoperable (Fleming Meadow), marina closes (Fleming Meadows)
- <630 ft. MSL - marina closes (Moccasin Point)
- <720 ft. MSL - some boat ramps inoperable (Moccasin Point and Blue Oaks), limited lake surface area, and decline in campground and picnicking use
- <780 ft. MSL - decline in beach use

**No Action.** At the beginning of the summer in May, the base case shows that beach use is impaired, ranging from 80.0 percent of the time (critically dry year) to 5.3 percent of the time (wet year). During critical years, the boat ramps at Moccasin Point and Blue Oaks would be inoperable 26.7 percent of the time. For all other year types, there are no adverse effects on boat ramp operation at New Don Pedro Reservoir. By September, beach use declines in all year types except wet with the most restricted activity occurring (100.0 percent) in both critically dry and dry years. During critical, dry, and below normal years, the boat ramps at Moccasin Point and Blue Oaks would be inoperable, ranging from 9.1 to 60.0 percent of the time.

**Proposed Action.** For both May and September months, the proposed project does not differ significantly from the base case for all the water years considered. The proposed project slightly increases the frequencies with which the reservoir falls below critical thresholds, but these increases are at the highest elevation (780 ft. MSL) and are not significant impacts.

**Alternative Action.** During the peak recreation season, the Water Right Priority System alternative for New Don Pedro Reservoir does not differ significantly from the SWRCB's Alternative 2 during the entire period of record; but in the critical years, the alternative has a negative impact at both 720 ft. and 780 ft. MSL. This impact is less than significant, because some boat ramps would still be operable.

### Lake McClure

The results for Lake McClure from the Reclamation's model are summarized in Table 4.8-3.

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**Table 4.8-3: RECREATION IMPACT ASSESSMENT FOR LAKE MCCLURE**

		Frequency that Reservoir is Below Critical Threshold Elevation								
		Total Months	590 ft		600 ft		630 ft		650 ft	
Without Project - May			Total	%	Total	%	Total	%	Total	%
All Years		71	0	0.0	0	0.0	0	0.0	0	0.0
Critical		15	0	0.0	0	0.0	0	0.0	0	0.0
Dry		11	0	0.0	0	0.0	0	0.0	0	0.0
Below Normal		12	0	0.0	0	0.0	0	0.0	0	0.0
Above Normal		14	0	0.0	0	0.0	0	0.0	0	0.0
Wet		19	0	0.0	0	0.0	0	0.0	0	0.0
With Project - May		Total	%	Total	%	Total	%	Total	%	
All Years		71	0	0.0	0	0.0	0	0.0	0	0.0
Critical		15	0	0.0	0	0.0	0	0.0	0	0.0
Dry		11	0	0.0	0	0.0	0	0.0	0	0.0
Below Normal		12	0	0.0	0	0.0	0	0.0	0	0.0
Above Normal		14	0	0.0	0	0.0	0	0.0	0	0.0
Wet		19	0	0.0	0	0.0	0	0.0	0	0.0
Without Project-September		Total	%	Total	%	Total	%	Total	%	
All Years		71	0	0.0	0	0.0	0	0.0	1	1.4
Critical		15	0	0.0	0	0.0	0	0.0	1	6.7
Dry		11	0	0.0	0	0.0	0	0.0	0	0.0
Below Normal		12	0	0.0	0	0.0	0	0.0	0	0.0
Above Normal		14	0	0.0	0	0.0	0	0.0	0	0.0
Wet		19	0	0.0	0	0.0	0	0.0	0	0.0
With Project - September		Total	%	Total	%	Total	%	Total	%	
All Years		71	0	0.0	0	0.0	0	0.0	0	0.0
Critical		15	0	0.0	0	0.0	0	0.0	0	0.0
Dry		11	0	0.0	0	0.0	0	0.0	0	0.0
Below Normal		12	0	0.0	0	0.0	0	0.0	0	0.0
Above Normal		14	0	0.0	0	0.0	0	0.0	0	0.0
Wet		19	0	0.0	0	0.0	0	0.0	0	0.0

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Notes:

- <590 ft. MSL - last boat ramps inoperable (northern Barrett Cove and Piney Creek)
- <600 ft. MSL - limited lake surface area and marina closes
- <630 ft. MSL - boat ramp closes (southern Barrett Cove)
- <650 ft. MSL - boat ramp closes (McClure Point)

**No Action.** At the beginning of the summer in May, the base case shows that for all water years all the boat ramps are operable. By September, in critical water years, only the boat ramp at McClure Point is inoperable 6.7 percent of the time.

**Proposed Action.** For both May and September, the proposed project does not differ significantly from the base case for all the water years considered. On average, reservoir levels are lower with the project (see Table 4.2-8 for end of the year storage), but the levels do not reach critical elevations during the recreation season. The proposed project slightly decreases the frequencies with which the reservoir water levels fall below critical thresholds in critical water years in September, but this decrease is at the highest elevation and is not a significant impact.

**Alternative Action.** During the peak recreation season, the Water Right Priority System alternative for Lake McClure does not differ at all from the SWRCB's Alternative 2 during the entire period of record and in the critical years. The alternative action would have no impact on the base case.

### 4.8.2.1 Rivers

The peak recreation seasons vary by river, but typically the majority of use occurs between Memorial Day and Labor Day. This recreation impact analysis, therefore, considers the river flows during the peak season from May through September. The frequency of occurrence when the river flows are between or below the critical flows is summarized both in terms of numbers and in terms of percentages (Tables 4.8-4 through 4.8-7).

When a critical flow threshold above or below which flow-related recreation activities are impaired, a frequency of occurrence higher than the base case indicates a negative impact, and a frequency lower than the base case indicates a beneficial impact. However, when the optimal flow is stated as a range, the reverse is true. A frequency of occurrence that is higher than the base case indicates a beneficial impact, while a frequency of occurrence lower than the base case indicates a negative impact. The entire 71-year period of record is examined as well as each of the water year types: critical, dry, below normal, above normal, and wet.

The projected river flow figures were obtained from the Reclamation model. The Water Right Priority System alternative is compared to No Action qualitatively for each river because the basis for the analyses is a different set of model results, i.e., output reported in the SWRCB's Draft EIR (SWRCB 1997, 1998). The Reclamation model includes the New Melones Interim Plan of Operation which has been in effect for over a year (USBR 1997c).

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### San Joaquin River

The results for the San Joaquin River from the Reclamation's model are summarized in Table 4.8-4.

**Table 4.8-4: RECREATION IMPACT ASSESSMENT FOR THE SAN JOAQUIN RIVER**

	Total Months	Frequency that River is Between or Below Critical Flow Thresholds							
		> 500 cfs		300-500 cfs		200-300 cfs		<300 cfs	
		Total	%	Total	%	Total	%	Total	%
<b>Without Project - May through September</b>									
All Years	355	301	84.8	52	14.6	2	0.6	2	0.6
Critical	75	29	38.7	44	58.7	2	2.7	2	2.7
Dry	55	52	94.5	3	5.5	0	0.0	0	0.0
Below Normal	60	58	96.7	2	3.3	0	0.0	0	0.0
Above Normal	70	67	95.7	3	4.3	0	0.0	0	0.0
Wet	95	95	100.0	0	0.0	0	0.0	0	0.0
<b>With Project - May through September</b>									
All Years	355	305	85.9	47	13.2	2	0.6	2	0.6
Critical	75	33	44.0	40	53.3	2	2.7	2	2.7
Dry	55	53	96.4	2	3.6	0	0.0	0	0.0
Below Normal	60	58	96.7	2	3.3	0	0.0	0	0.0
Above Normal	70	67	95.7	3	4.3	0	0.0	0	0.0
Wet	95	95	100.0	0	0.0	0	0.0	0	0.0

Notes:

- >500 cfs - unknown recreational opportunities
- 300-500 cfs - optimal flow range for all boating activities
- 200-300 cfs - optimal range of canoeing flows
- <300 cfs - below optimal flows for swimming

**No Action.** Critical flows for the San Joaquin River occur above 500 cfs and below 300 cfs. During all water years the river has flows above 500 cfs, ranging from 38.7 percent of the time in critically dry years to 100.0 percent of the time in wet years. Flows are below 300 cfs only in critical years (2.7 percent of the time). The optimal range for all boating activities is between 300 and 500 cfs, and this range is achieved during all but wet years, ranging from 3.3 percent of the time (below normal years) to 58.7 percent of the time (critical years). Canoeing flows are optimized between 200 and 300 cfs, and this range is only achieved during critical years (2.7 percent of the time).

**Proposed Action.** With the project, the frequency of occurrence of flows above 500 cfs is slightly increased, but the impact is insignificant. Occurrence of flows below 300 cfs is exactly the same with

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or without the project. The occurrence of optimal flow ranges for boating is decreased slightly with the project, but the impact is insignificant. There is no difference between the project and the base case for the flows between 200 and 300 cfs.

**Alternative Action.** During the peak recreation season for all water years, the Water Right Priority System alternative for the San Joaquin River increases the flows above 500 cfs more than 12 percent of the time when compared to Alternative 2. This change exceeds the evaluation criteria (10 percent), but since the recreation opportunities are unknown above this threshold, the impact would be considered potentially significant.

During the critically dry water years, the Water Right Priority System alternative would provide more flows in the optimal range for all boating and less flows in the optimal range for canoeing. In addition, flows below the critical threshold for swimming would decrease, thus providing a beneficial impact. The alternative action would provide both beneficial and adverse impacts; therefore, the overall impact to recreation would be considered less than significant during critically dry water years.

### Stanislaus River

The Reclamation model's results for the Stanislaus River are summarized in Table 4.8-5.

**Table 4.8-5: RECREATION IMPACT ASSESSMENT FOR THE STANISLAUS RIVER**

	Total Months	Frequency that River is Between or Below Critical Flow Thresholds							
		700-800 cfs		<300 cfs		700-2,000 cfs		<700 cfs	
		Total	%	Total	%	Total	%	Total	%
<b>Without Project - May through September</b>									
All Years	355	25	7.0	127	35.8	123	34.6	231	65.1
Critical	75	2	2.7	46	61.3	10	13.3	65	86.7
Dry	55	1	1.8	22	40.0	25	45.5	30	54.5
Below Normal	60	10	16.7	16	26.7	21	35.0	39	65.0
Above Normal	70	6	8.6	25	35.7	25	35.7	45	64.3
Wet	95	6	6.3	18	18.9	42	44.2	52	54.7
<b>With Project - May through September</b>									
All Years	355	31	8.7	122	34.4	140	39.4	214	60.3
Critical	75	2	2.7	44	58.7	13	17.3	62	82.7
Dry	55	3	5.5	22	40.0	29	52.7	26	47.3
Below Normal	60	11	18.3	16	26.7	25	41.7	35	58.3
Above Normal	70	8	11.4	23	32.9	29	41.4	41	58.6
Wet	95	7	7.4	17	17.9	44	46.3	50	52.6

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Notes:

700-800 cfs	- optimal flow range for all boating activities on the lower reach
<300 cfs	- below minimum flows for all boating activities on the lower reach
700-2,000 cfs	- optimal flow range for all boating activities on the upper reach
<700 cfs	- below minimum flows for all boating activities on the upper reach

**No Action.** Critical flows for the Stanislaus River occur below 300 cfs on the lower reach of the river and below 700 cfs on the upper reach. Flows are below 300 cfs in all water years, ranging from 18.9 percent of the time during wet years to 61.3 percent of the time in critical years. During all water years the river has flows below 700 cfs, ranging from 54.7 percent of the time in wet years to 86.7 percent of the time in critically dry years. The optimal range for boating activities on the lower reach is between 700 and 800 cfs, and this range is achieved during all years, ranging from 1.8 percent of the time (dry years) to 16.7 percent of the time (below normal years). Boating flows on the upper reach are optimized between 700 and 2,000 cfs, and this range is achieved during all years, ranging from 13.3 percent of the time in critical years to 45.5 percent of the time in dry years. Flows below Goodwin Dam would not exceed 1,500 cfs except for flood flows. The No Action alternative has flows above 1,500 cfs 14 months during the recreation season during above normal and wet years (8.5 percent of the time).

**Proposed Action.** Critical flows for the Stanislaus River occur below 300 cfs in the lower reach of the river and below 700 cfs in the upper reach. With the project the occurrences of flows below 300 cfs on the lower reach and 700 cfs on the upper reach are slightly decreased (beneficial impacts), but these impacts are not significant. Again, the flows below Goodwin Dam would not exceed 1,500 cfs except for flood flows. With the project there would be flows above 1,500 cfs 17 months during the recreation season during above normal and wet years (10.3 percent of the time). The occurrence of optimal flow ranges for boating is increased slightly in the both the lower and upper reaches, but again the impacts are insignificant.

**Alternative Action.** During the peak recreation season for both the entire period and the critical period, the Water Right Priority System alternative for the Stanislaus River is no different than Alternative 2 for the critical flows (300 cfs in the lower reach and 700 cfs in the upper reach). For the entire period, flows in the optimal range for the upper reach (700 to 2,000 cfs) are significantly beneficial with the Water Right Priority System alternative, and are beneficial, but not significant, in the lower reach (700 to 800 cfs). During critical periods, flows are increased significantly in the optimal range for the lower reach and are decreased, but not significantly, in the upper reach.

### Tuolumne River

The results from Reclamation's model for the Tuolumne River are summarized in Table 4.8-6.

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**Table 4.8-6: RECREATION IMPACT ASSESSMENT FOR THE TUOLUMNE RIVER**

	Total Months	Frequency that River is Between or Below Critical Flow Thresholds							
		400-700 cfs		200-600 cfs		<500 cfs		<150 cfs	
		Total	%	Total	%	Total	%	Total	%
<b>Without Project - May through September</b>									
All Years	355	20	5.6	115	32.4	267	75.2	152	42.8
Critical	75	9	12.0	13	17.3	73	97.3	60	80.0
Dry	55	4	7.3	0	0.0	44	80.0	44	80.0
Below Normal	60	0	0.0	0	0.0	48	80.0	48	80.0
Above Normal	70	0	0.0	56	80.0	56	80.0	0	0.0
Wet	95	7	7.4	46	48.4	46	48.4	0	0.0
<b>With Project - May through September</b>									
All Years	355	17	4.8	112	31.5	264	74.4	152	42.8
Critical	75	9	12.0	10	13.3	70	93.3	60	80.0
Dry	55	0	0.0	0	0.0	44	80.0	44	80.0
Below Normal	60	0	0.0	0	0.0	48	80.0	48	80.0
Above Normal	70	0	0.0	56	80.0	56	80.0	0	0.0
Wet	95	8	8.4	46	48.4	46	48.4	0	0.0

Notes:

- 400-700 cfs - optimal flow range for all boating activities
- 200-600 cfs - optimal flow range for swimming
- <500 cfs - below minimum flows for power boating
- <150 cfs - below minimum flows for canoeing and kayaking

**No Action.** Critical flows for the Tuolumne River occur below 500 cfs for power boating and below 150 cfs for canoeing and kayaking. Flows are below 500 cfs for all water years, ranging from 48.4 percent of the time during wet years to 97.3 percent of the time in critical years. Flows are below 150 cfs in critical, dry, and below normal years, all 80 percent of the time. The optimal range for all boating activities is between 400 and 700 cfs, and this range is achieved in critical, dry, and wet years at 12.0, 7.3, and 7.4 percent of the time, respectively. Swimming flows are optimized between 200 and 600 cfs, and this range is achieved during critical, above normal, and wet years at 17.3, 80.0, and 48.4 percent of the time, respectively.

**Proposed Action.** There is no difference between the project and the base case for the flows below 500 cfs. Flows below 150 cfs are slightly improved during critical years, but this beneficial impact is not significant. The optimal flow ranges for boating for swimming are slightly decreased with the project, but the impact is not significant.

## 4. Environmental Consequences and Mitigation Measures

**Alternative Action.** During the peak recreation season for both the entire period and the critical period, the Water Right Priority System alternative for the Tuolumne River is not significantly different from Alternative 2 for both the critical flows (500 cfs and 150 cfs) and for the optimal ranges (400 to 700 cfs and 200 to 600 cfs).

### Merced River

Reclamation model's results for the Merced River are summarized in Table 4.8-7.

**Table 4.8-7: RECREATION IMPACT ASSESSMENT FOR THE MERCED RIVER**

	Total Months	Frequency that River is Between or Below Critical Flow Thresholds			
		< 500 cfs		50-200 cfs	
		Total	%	Total	%
<b>Without Project - May through September</b>					
All Years	355	293	82.5	80	22.5
Critical	75	75	100.0	14	18.7
Dry	55	55	100.0	14	25.5
Below Normal	60	60	100.0	10	16.7
Above Normal	70	62	88.6	17	24.3
Wet	95	41	43.2	25	26.3
<b>With Project - May through September</b>					
All Years	355	259	73.0	80	22.5
Critical	75	67	89.3	14	18.7
Dry	55	45	81.8	14	25.5
Below Normal	60	50	83.3	10	16.7
Above Normal	70	56	80.0	17	24.3
Wet	95	41	43.2	25	26.3

Notes:

<500 cfs - below minimum flows for all boating activities  
 50-200 cfs - optimal flow range for swimming

**No Action.** Critical flows for the Merced River occur below 500 cfs for all boating activities. Flows are below 500 cfs during all water years, ranging from 43.2 percent of the time (wet years) to 100.0 percent of the time (critical, dry, and below normal years). The optimal range for swimming is between 50 and 200 cfs, and this range is achieved during all water years, ranging from 16.7 percent of the time in below normal years to 26.3 percent of the time during wet years.

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## 4. Environmental Consequences and Mitigation Measures

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**Proposed Action.** With the project there is an decrease in frequency of flows below the threshold that is significant in critical, dry, and below normal years. Above normal and wet years are not significantly different with the project. The optimal flow range is between 50 and 200 cfs for swimming. With the project there is no change or no impact on recreation.

**Alternative Action.** During the peak recreation season for both the entire period and the critical period, the Water Right Priority System alternative for the Merced River is not significantly different from Alternative 2 for both the critical flows (500 cfs) and for the optimal range (50 to 200 cfs). There is no impact on recreation.

### 4.8.3 Impact Summary and Mitigation of Impacts

#### 4.8.3.1 Reservoirs

##### Proposed Action

- There are no adverse impacts to recreational use at any of the reservoirs. No mitigation is necessary.
- As a result of the proposed action, New Melones recreationists would benefit from increased reservoir levels during critical years in September. No mitigation is necessary.

##### Alternative Action

- As a result of the alternative action, New Melones recreationists would benefit from increased reservoir levels during critical years. No mitigation is necessary.
- As a result of the alternative action, there is an adverse impact to recreational use at Lake Don Pedro during critical water years. Both beach use and the operation of some boat ramps would be negatively impacted. Some boat ramps would still be operable, however, so this impact is less than significant.
- There are no impacts for Lake McClure as a result of the alternative action. No mitigation is necessary.

#### 4.8.3.2 Rivers

##### Proposed Action

- There are no significant impacts to river flows for recreationists for either the San Joaquin, Stanislaus, or Tuolumne rivers from the proposed action. No mitigation is required.

#### 4. Environmental Consequences and Mitigation Measures

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- With the project, there is a significant decrease in the frequency of flows below the critical threshold for boating activities during critical, dry, and below normal years on the Merced River. This impact is beneficial, and no mitigation is necessary.

##### **Alternative Action**

- With the alternative action, flows are increased above the critical threshold on the San Joaquin River in all water years. However, because the recreational opportunities are unknown above this flow level, the impact would be potentially significant. Until recreation opportunities can be determined and evaluated, the impact is unavoidable.
- During critically dry water years, the alternative action would provide additional flows for all boating activities and fewer flows for canoeing. In addition, there would be more flows in the optimal range for swimming. The alternative action, therefore, would provide both beneficial and adverse impacts. The overall impact to recreation would be considered less than significant.
- On the upper reach of the Stanislaus, there is a significant increase in the frequency of flows in the optimal range for boating for all years. During the critical years only, the frequency of occurrences of flows in the optimal range in the lower reach is also significant. These beneficial impacts do not require mitigation.
- There are no significant adverse impacts to river flows for recreationists for either the Tuolumne or Merced rivers from the alternative action. No mitigation is required.

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## 4. Environmental Consequences and Mitigation Measures

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