

Appendix 11E Reservoir Fish Species Analysis

no comparison could be made for Sites Reservoir. Reservoir storage at Sites Reservoir would be greatest under Alternative 1A (Table 11E-1). However, all alternatives would benefit cold-water reservoir species relative to the NAA because Sites Reservoir, and the new habitat it would create, would not exist under the NAA.

Table 11E-1. Sites Reservoir Long-Term Average Storage Volume under Each Alternative (TAF)¹

Water Year Type	Alt 1A	Alt 1B	Alt 2	Alt 3
April				
Wet	1,427	1,405	1,224	1,371
Above Normal	1,188	1,152	1,067	1,079
Below Normal	911	857	769	776
Dry	984	906	828	778
Critically Dry	508	471	438	384
All	1,072	1,028	922	952
May				
Wet	1,434	1,412	1,231	1,378
Above Normal	1,182	1,147	1,062	1,074
Below Normal	903	831	762	746
Dry	972	871	817	724
Critically Dry	470	433	403	338
All	1,064	1,012	914	930
June				
Wet	1,425	1,403	1,223	1,369
Above Normal	1,175	1,093	1,056	1,010
Below Normal	886	798	745	676
Dry	915	807	761	632
Critically Dry	405	366	341	278
All	1,035	972	887	877
July				
Wet	1,412	1,388	1,211	1,354
Above Normal	1,154	1,059	1,032	895
Below Normal	847	765	708	608
Dry	825	719	674	533
Critically Dry	336	295	273	208
All	992	927	844	812
August				
Wet	1,378	1,351	1,177	1,318
Above Normal	1,103	1017	977	804
Below Normal	804	730	663	556
Dry	729	630	579	450
Critically Dry	275	235	215	167
All	936	875	788	754
September				
Wet	1,345	1,322	1,144	1,289

Water Year Type	Alt 1A	Alt 1B	Alt 2	Alt 3
Above Normal	1,053	975	921	758
Below Normal	779	713	639	538
Dry	663	564	516	393
Critically Dry	234	198	179	153
All	894	836	746	720
October				
Wet	1,321	1,299	1,119	1,270
Above Normal	1,025	964	907	791
Below Normal	750	686	609	514
Dry	602	505	458	344
Critically Dry	213	183	162	139
All	860	808	716	702
November				
Wet	1,336	1,318	1,134	1,289
Above Normal	1,035	974	917	803
Below Normal	752	684	611	511
Dry	579	488	439	337
Critically Dry	205	175	154	133
All	861	810	717	707

¹ No values are presented for the NAA because Sites Reservoir would not yet be constructed.
Alt = alternative; TAF = thousand acre-feet.

11E.3.1.2. Shasta Lake

Differences in Shasta Lake storage volume between the NAA and each alternative during April through November are presented in Table 11E-2. Differences in reservoir storage under Alternatives 1A, 1B, and 2 generally would be small relative to the NAA. Storage would be consistently >5% higher under Alternative 3 in Critically Dry Water Years between June and September, representing a minor beneficial effect on cold-water reservoir species.

Table 11E-2. Percent Difference in Shasta Lake Storage Volume between Each Alternative and the NAA¹

Water Year Type	Alt 1A vs. NAA	Alt 1B vs. NAA	Alt 2 vs. NAA	Alt 3 vs. NAA
April				
Wet	0.0	0.0	0.0	0.1
Above Normal	0.0	0.0	0.0	0.1
Below Normal	0.0	0.1	-0.1	0.2
Dry	0.6	0.8	0.6	1.5
Critically Dry	1.8	1.7	1.5	3.1
All	0.3	0.4	0.3	0.8
May				
Wet	0.0	-0.2	0.0	-0.1
Above Normal	0.0	-0.1	0.0	-0.2
Below Normal	0.0	0.5	-0.1	0.7
Dry	0.5	1.2	0.5	2.3

Water Year Type	Alt 1A vs. NAA	Alt 1B vs. NAA	Alt 2 vs. NAA	Alt 3 vs. NAA
Critically Dry	2.3	2.3	2.2	4.3
All	0.4	0.5	0.3	1.0
June				
Wet	0.0	-0.2	0.0	-0.1
Above Normal	0.0	0.9	0.0	1.1
Below Normal	0.0	0.9	-0.1	2.3
Dry	0.5	1.4	0.6	3.5
Critically Dry	3.5	3.8	3.3	6.1
All	0.4	0.9	0.4	1.9
July				
Wet	0.0	-0.2	0.0	0.0
Above Normal	0.2	1.5	0.3	3.3
Below Normal	0.3	1.2	0.2	3.6
Dry	0.6	1.6	0.7	4.4
Critically Dry	4.0	4.6	3.9	7.7
All	0.6	1.1	0.6	2.7
August				
Wet	0.0	-0.1	0.0	0.0
Above Normal	0.7	1.9	0.9	5.2
Below Normal	0.8	1.5	0.6	4.7
Dry	0.7	1.9	0.8	5.2
Critically Dry	2.9	3.7	2.8	7.2
All	0.7	1.2	0.7	3.4
September				
Wet	0.0	0.1	0.0	0.2
Above Normal	1.3	2.1	1.5	5.4
Below Normal	0.9	1.5	0.8	5.0
Dry	0.7	1.8	0.8	5.2
Critically Dry	1.9	2.7	1.9	6.6
All	0.7	1.3	0.7	3.5
October				
Wet	0.0	0.1	0.0	0.2
Above Normal	1.0	1.5	1.2	3.8
Below Normal	1.0	1.4	0.8	3.7
Dry	0.9	2.0	1.0	4.9
Critically Dry	1.5	2.2	1.3	6.0
All	0.7	1.1	0.7	2.9
November				
Wet	0.1	0.2	0.1	0.3
Above Normal	0.8	1.3	1.1	3.0
Below Normal	0.6	0.7	0.5	1.9
Dry	0.9	1.6	1.0	4.1
Critically Dry	1.7	2.5	1.6	6.4
All	0.6	1.0	0.6	2.4

¹ A positive value indicates an increase in storage under the alternative relative to the NAA; a negative value indicates a reduction in storage under the alternative relative to the NAA.

Alt = alternative; NAA = No Action Alternative.

11E.3.1.3. Lake Oroville

Differences in Lake Oroville storage between the NAA and each alternative during April through November are presented in Table 11E-3. Differences in storage volume between the NAA and each alternative would be minimal in all months and water year types analyzed.

Table 11E-3. Percent Difference in Lake Oroville Storage Volume between Each Alternative and the NAA¹

Water Year Type	Alt 1A vs. NAA	Alt 1B vs. NAA	Alt 2 vs. NAA	Alt 3 vs. NAA
April				
Wet	0.0	0.0	0.0	0.0
Above Normal	0.0	0.0	0.0	0.0
Below Normal	0.3	0.2	0.3	0.4
Dry	0.1	0.2	0.1	0.3
Critically Dry	0.1	0.2	0.0	0.0
All	0.1	0.1	0.1	0.1
May				
Wet	0.0	0.0	0.0	0
Above Normal	0.0	0.0	0.0	0.0
Below Normal	0.3	0.2	0.3	0.4
Dry	0.0	0.4	0.0	0.5
Critically Dry	0.1	0.2	0.0	0.2
All	0.1	0.1	0.1	0.2
June				
Wet	0.0	0.0	0.0	0.0
Above Normal	0.0	0.1	0.0	0.2
Below Normal	0.5	0.5	0.5	0.5
Dry	2.0	2.3	2.0	2.5
Critically Dry	2.1	2.1	1.9	1.7
All	0.6	0.6	0.5	0.7
July				
Wet	0.0	0.0	0.0	0.0
Above Normal	0.0	0.1	0.0	0.8
Below Normal	1.2	1.2	1.2	1.1
Dry	3.6	3.8	3.4	3.5
Critically Dry	3.1	3.1	2.7	2.5
All	1.0	1.0	0.9	1.0
August				
Wet	0.0	-0.1	0.0	-0.1
Above Normal	0.0	0.1	0.0	0.8
Below Normal	1.6	1.5	1.5	1.3
Dry	3.2	3.6	3.0	3.4

Water Year Type	Alt 1A vs. NAA	Alt 1B vs. NAA	Alt 2 vs. NAA	Alt 3 vs. NAA
Critically Dry	2.2	2.3	1.7	1.2
All	0.9	0.9	0.8	0.9
September				
Wet	-0.2	-0.5	-0.2	-0.4
Above Normal	0.0	0.0	0.0	0.9
Below Normal	1.1	0.7	1.0	0.1
Dry	3.0	3.4	2.9	3.1
Critically Dry	2.3	2.2	1.8	1.2
All	0.7	0.6	0.7	0.6
October				
Wet	-0.2	-0.5	-0.2	-0.4
Above Normal	0.0	0.0	0.0	1.0
Below Normal	1.2	0.9	1.1	0.5
Dry	1.6	1.6	1.5	2.0
Critically Dry	1.7	2.0	1.3	1.4
All	0.5	0.3	0.4	0.5
November				
Wet	-0.2	-0.5	-0.2	-0.5
Above Normal	0.0	0.0	0.0	1.3
Below Normal	1.0	0.8	0.9	0.2
Dry	0.7	1.3	0.6	1.5
Critically Dry	1.1	1.4	0.7	0.8
All	0.3	0.2	0.2	0.3

¹ A positive value indicates an increase in storage under the alternative relative to the NAA; a negative value indicates a reduction in storage under the alternative relative to the NAA.

Alt = alternative; NAA = No Action Alternative.

11E.3.1.4. Folsom Lake

Differences in Folsom Lake storage between the NAA and each alternative during April through November are presented in Table 11E-4. Storage would generally be similar between each alternative and the NAA in all months and water year types analyzed.

Table 11E-4. Percent Difference in Folsom Lake Storage Volume between Each Alternative and the NAA¹

Water Year Type	Alt 1A vs. NAA	Alt 1B vs. NAA	Alt 2 vs. NAA	Alt 3 vs. NAA
April				
Wet	0.0	0.0	0.0	0.0
Above Normal	0.0	0.0	0.0	0.0
Below Normal	0.0	0.0	0.0	-0.1
Dry	0.0	0.2	0.0	0.4
Critically Dry	-0.4	-0.8	1.1	-0.4
All	0.0	0.0	0.1	0.0
May				
Wet	0.0	0.0	0.0	0.0

Water Year Type	Alt 1A vs. NAA	Alt 1B vs. NAA	Alt 2 vs. NAA	Alt 3 vs. NAA
Above Normal	0.0	0.0	0.0	0.0
Below Normal	0.0	0.0	0.0	0.0
Dry	-0.1	0.5	-0.1	0.8
Critically Dry	0.4	0.0	0.8	-0.6
All	0.0	0.1	0.1	0.1
June				
Wet	0.0	-0.1	0.0	0.0
Above Normal	-0.1	0.6	-0.1	0.5
Below Normal	0.0	0.2	0.0	0.3
Dry	-0.2	0.6	-0.2	1.3
Critically Dry	0.4	-0.1	0.8	-1.1
All	0.0	0.2	0.0	0.3
July				
Wet	0.0	0.0	0.0	0.0
Above Normal	-0.1	1.4	-0.1	2.9
Below Normal	0.0	0.4	-0.2	2.6
Dry	-0.2	0.7	-0.2	1.7
Critically Dry	-0.2	-0.3	0.7	-1.5
All	-0.1	0.4	0.0	1.1
August				
Wet	0.0	0.0	0.0	0.0
Above Normal	0.0	1.3	0.1	4.4
Below Normal	0.1	0.6	-0.3	3.7
Dry	-0.8	-0.2	-0.8	0.5
Critically Dry	2.8	2.5	3.7	1.8
All	0.1	0.5	0.1	1.6
September				
Wet	0.0	-0.5	0.0	-0.3
Above Normal	0.2	1.8	0.5	7.8
Below Normal	0.0	0.5	-0.1	5.0
Dry	-0.9	-0.2	-0.9	0.5
Critically Dry	3.0	2.6	4.0	1.9
All	0.1	0.3	0.2	2.1
October				
Wet	0.0	-0.5	0.0	-0.2
Above Normal	0.2	1.8	0.7	7.7
Below Normal	-0.1	0.3	0.0	4.5
Dry	-0.8	-0.1	-0.8	0.4
Critically Dry	3.2	2.7	4.1	2.0
All	0.2	0.3	0.3	2.0
November				
Wet	0.0	-0.1	0.0	-0.4
Above Normal	0.1	0.9	0.3	2.1
Below Normal	-0.2	0.2	0.0	2.7
Dry	0.0	0.2	-0.3	-0.7

Water Year Type	Alt 1A vs. NAA	Alt 1B vs. NAA	Alt 2 vs. NAA	Alt 3 vs. NAA
Critically Dry	2.1	1.5	2.6	0.3
All	0.2	0.3	0.2	0.5

¹ A positive value indicates an increase in storage under the alternative relative to the NAA; a negative value indicates a reduction in storage under the alternative relative to the NAA.

Alt = alternative; NAA = No Action Alternative.

11E.3.2. Reservoir Water Surface Elevation Reductions

11E.3.2.1. Sites Reservoir

Sites Reservoir WSE reductions of ≥ 6 feet for each alternative during March through June are presented in Table 11E-5. Because Sites Reservoir does not exist under the NAA, no quantitative comparison was made for Sites Reservoir. Reservoir WSE reductions would occur less frequently under Alternatives 1A and 2 and more frequently under Alternatives 1B and 3. However, all alternatives would provide a benefit to warm-water reservoir species relative to the NAA because Sites Reservoir, and the new habitat it would create, would not exist under the NAA.

Table 11E-5. Sites Reservoir Water Surface Elevation Reductions for Each Alternative (Difference in Number of Years)¹

Alternative	Water Surface Elevation Reductions of 6 feet or More for Each Alternative over the 82-Year Period of Record			
	March	April	May	June
Alternative 1A	0	4	4	19
Alternative 1B	0	4	11	28
Alternative 2	0	3	4	20
Alternative 3	0	3	20	38

¹ No values are presented for NAA because Sites Reservoir would not yet be constructed.

11E.3.2.2. Shasta Lake

For Shasta Lake, WSE reductions for each alternative for March through June are presented in Table 11E-6. Comparisons of WSE reductions between the NAA and each alternative for March through June are presented in Table 11E-7. Under each alternative, reservoir warm-water fish species habitat conditions in Shasta Lake generally would be similar to or more suitable than those under the NAA.

Table 11E-6. Shasta Lake Water Surface Elevation Reductions for Each Alternative (Number of Years)

Alternative	Water Surface Elevation Reductions of 6 feet or more for each alternative over the 82-year period of record			
	March	April	May	June
NAA	4	2	20	58
Alternative 1A	4	1	20	58
Alternative 1B	4	0	18	57
Alternative 2	4	1	20	58
Alternative 3	4	0	17	55

Table 11E-7. Comparison of Shasta Lake Water Surface Elevation Reductions between Alternatives (Difference in Number of Years)

Comparison	Water Surface Elevation Reductions of 6 feet or more for each comparison over the 82-year period of record			
	March	April	May	June
Alternative 1A Relative to NAA	0	-1	0	0
Alternative 1B Relative to NAA	0	-2	-2	-1
Alternative 2 Relative to NAA	0	-1	0	0
Alternative 3 Relative to NAA	0	-2	-3	-3

11E.3.2.3. Lake Oroville

For Lake Oroville, WSE reductions for each alternative for March through June are presented in Table 11E-8. Comparisons of WSE reductions between the NAA and each alternative for March through June are presented in Table 11E-9. Under each alternative, reservoir warm-water fish species habitat conditions in Lake Oroville generally would be similar to the NAA.

Table 11E-8. Lake Oroville Water Surface Elevation Reductions for Each Alternative (Number of Years)

Alternative	Water Surface Elevation Reductions of 6 feet or more for each alternative over the 82-year period of record			
	March	April	May	June
NAA	2	1	13	46
Alternative 1A	2	1	13	46
Alternative 1B	2	2	13	46
Alternative 2	2	1	13	46
Alternative 3	2	2	13	47

Table 11E-9. Comparison of Lake Oroville Water Surface Elevation Reductions between Alternatives (Difference in Number of Years)

Comparison	Water Surface Elevation Reductions of 6 feet or more for each comparison over the 82-year period of record			
	March	April	May	June
Alternative 1A Relative to NAA	0	0	0	0
Alternative 1B Relative to NAA	0	1	0	0
Alternative 2 Relative to NAA	0	0	0	0
Alternative 3 Relative to NAA	0	1	0	1

11E.3.2.4. Folsom Lake

For Folsom Lake, WSE reductions for each alternative for March through June are presented in Table 11E-10. Comparisons of WSE reductions between the NAA and each alternative for March through June are presented in Table 11E-11. Under each alternative, reservoir warm-water fish species habitat conditions in Folsom Lake generally would be similar to those under the NAA.

Table 11E-10. Folsom Lake Water Surface Elevation Reductions for Each Alternative (Number of Years)

Alternative	Water Surface Elevation Reductions of 6 feet or more for each alternative over the 82-year period of record			
	March	April	May	June
NAA	0	2	2	26
Alternative 1A	0	1	2	26
Alternative 1B	1	2	2	26
Alternative 2	0	1	2	26
Alternative 3	1	1	2	27

Table 11E-11. Comparison of Folsom Lake Water Surface Elevation Reductions between Alternatives (Difference in Number of Years)

Comparison	Water Surface Elevation Reductions of 6 feet or more for each comparison over the 82-year period of record			
	March	April	May	June
Alternative 1A Relative to NAA	0	-1	0	0
Alternative 1B Relative to NAA	1	0	0	0
Alternative 2 Relative to NAA	0	-1	0	0
Alternative 3 Relative to NAA	1	-1	0	1

11E.3.2.5. San Luis Reservoir

For San Luis Reservoir, WSE reductions for each alternative for March through June are presented in Table 11E-12. Comparisons of WSE reductions between the NAA and each alternative for March through June are presented in Table 11E-13. Under each alternative, reservoir warm-water fish species habitat conditions in San Luis Reservoir generally would be similar to those under the NAA.

Table 11E-12. San Luis Reservoir Water Surface Elevation Reductions for Each Alternative (Number of Years)

Alternative	Water Surface Elevation Reductions of 6 feet or more for each alternative over the 82-year period of record			
	March	April	May	June
NAA	0	22	62	82
Alternative 1A	0	22	62	82
Alternative 1B	0	22	62	82
Alternative 2	0	22	62	82
Alternative 3	0	22	62	82

Table 11E-13. Comparison of San Luis Reservoir Water Surface Elevation Reductions between Alternatives (Difference in Number of Years)

Comparison	Water Surface Elevation Reductions of 6 feet or more for each comparison over the 82-year period of record			
	March	April	May	June
Alternative 1A Relative to NAA	0	0	0	0
Alternative 1B Relative to NAA	0	0	0	0
Alternative 2 Relative to NAA	0	0	0	0
Alternative 3 Relative to NAA	0	0	0	0

11E.4 Impact Conclusions

Reservoir storage model results were examined for Shasta Lake, Lake Oroville, Folsom Lake, and San Luis Reservoir during April through November for cold-water fish species; reductions in average monthly surface elevations greater than 6 feet were examined during March through June for warm-water species.

11E.4.1. Impacts Associated with Alternatives 1A-3 at Sites Reservoir

11E.4.1.1. Cold-Water Fish Species

Long-term average monthly storage and average monthly storage by water year type during all months at Sites Reservoir (Table 11E-1) would be expected to be greatest under Alternative 1A and would be less for Alternatives 1B-3.

However, under the NAA, there would be no habitat for cold-water fish species and it is likely that the construction of Sites Reservoir under Alternatives 1, 2, and 3 would create habitat that benefits cold-water fish species.

11E.4.1.2. Warm-Water Fish Species

Alternatives 1A and 2 would be expected to have the fewest WSE reductions, whereas Alternatives 1B and 3 would be expected to have the greatest number of WSE reductions (Table 11E-5).

However, under the NAA, there would be no habitat for warm-water fish species and it is likely that the construction of Sites Reservoir under Alternatives 1, 2, and 3 would create habitat that benefits warm-water fish species.

11E.4.2. Impacts Associated with Alternative 1A Relative to the NAA

11E.4.2.1. Shasta Lake

Cold-Water Fish Species

Relative to the NAA, Alternative 1A would be expected to provide similar amounts of habitat for cold-water fish species based on modeling results for reservoir storage conditions, indicating similar long-term average monthly storage and similar average monthly storage by water year type during all months of the evaluation period (Table 11E-2).

It is unlikely that cold-water fish habitat is limiting in Shasta Lake; therefore, it is unlikely that changes in reservoir storage under Alternative 1A would have a population-level effect on cold-water fish species in Shasta Lake relative to the NAA.

Warm-Water Fish Species

Relative to the NAA, Alternative 1A would be expected to provide similar warm-water fish nesting conditions, based on modeling results indicating similar frequencies of monthly WSE reductions of 6 feet or more (Table 11E-7).

It is unlikely that a small difference in the number of years with monthly WSE reductions of greater than 6 feet under Alternative 1A would have a population-level effect on bass and other warm-water fish in Shasta Lake relative to the NAA.

11E.4.2.2. Lake Oroville**Cold-Water Fish Species**

Relative to the NAA, Alternative 1A would be expected to provide similar amounts of habitat for cold-water fish species based on modeling results for reservoir storage conditions indicating similar long-term average monthly storage, and similar average monthly storage by water year type during all months of the evaluation period (Table 11E-3).

It is unlikely that cold-water fish habitat is limiting in Lake Oroville; therefore, it is unlikely that changes in reservoir storage under Alternative 1A would have a population-level effect on cold-water fish species in Lake Oroville, relative to the NAA.

Warm-Water Fish Species

Relative to the NAA, Alternative 1A would be expected to provide similar warm-water fish nesting conditions, based on modeling results indicating similar frequencies of monthly WSE reductions of 6 feet or more (Table 11E-8).

It is unlikely that a small difference in the number of years with monthly WSE reductions of greater than 6 feet under Alternative 1A would have a population-level effect on bass and other warm-water fish in Lake Oroville, relative to the NAA.

11E.4.2.3. Folsom Lake**Cold-Water Fish Species**

Relative to the NAA, Alternative 1A would be expected to provide similar amounts of habitat for cold-water fish species based on modeling results for reservoir storage conditions (Table 11E-4) indicating similar long-term average monthly storage, and similar average monthly storage by water year type during all months of the evaluation period.

It is unlikely that cold-water fish habitat is limiting in Folsom Lake; therefore, it is unlikely that changes in reservoir storage under Alternative 1A would have a population-level effect on cold-water fish species in Folsom Lake relative to the NAA.

Warm-Water Fish Species

Relative to the NAA, Alternative 1A would be expected to provide similar warm-water fish nesting conditions, based on modeling results indicating similar frequencies of monthly WSE reductions of 6 feet or more (Table 11E-10).

It is unlikely that a small difference in the number of years with monthly WSE reductions of greater than 6 feet under Alternative 1A would have a population-level effect on bass and other warm-water fish in Folsom Lake, relative to the NAA.

11E.4.2.4. San Luis Reservoir**Warm-Water Fish Species**

Relative to the NAA, Alternative 1A would be expected to provide similar warm-water fish nesting conditions, based on modeling results indicating similar frequencies of monthly WSE reductions of 6 feet or more (Tables 11E-12 and 11E-13).

It is unlikely that a small difference in the number of years with monthly WSE reductions of greater than 6 feet under Alternative 1A would have a population-level effect on bass and other warm-water fish in San Luis Reservoir, relative to the NAA.

11E.4.3. Impacts Associated with Alternative 1B Relative to the NAA

11E.4.3.1. Shasta Lake

Cold-Water Fish Species

Relative to the NAA, Alternative 1B would be expected to provide similar amounts of habitat for cold-water fish species based on modeling results for reservoir storage conditions indicating similar long-term average monthly storage, and similar average monthly storage by water year type during all months of the evaluation period (Table 11E-2).

It is unlikely that cold-water fish habitat is limiting in Shasta Lake; therefore, it is unlikely that changes in reservoir storage under Alternative 1B would have a population-level effect on cold-water fish species in Shasta Lake, relative to the NAA.

Warm-Water Fish Species

Relative to the NAA, Alternative 1B would be expected to provide similar warm-water fish nesting conditions, based on modeling results indicating similar or slightly lower frequencies of monthly WSE reductions of 6 feet or more (Table 11E-7).

It is unlikely that a small difference in the number of years with monthly WSE reductions of greater than 6 feet under Alternative 1B would have a population-level effect on bass and other warm-water fish in Shasta Lake, relative to the NAA.

11E.4.3.2. Lake Oroville

Cold-Water Fish Species

Relative to the NAA, Alternative 1B would be expected to provide similar amounts of habitat for cold-water fish species based on modeling results for reservoir storage conditions indicating similar long-term average monthly storage, and similar average monthly storage by water year type during all months of the evaluation period (Table 11E-3).

It is unlikely that cold-water fish habitat is limiting in Lake Oroville; therefore, it is unlikely that changes in reservoir storage under Alternative 1B would have a population-level effect on cold-water fish species in Lake Oroville, relative to the NAA.

Warm-Water Fish Species

Relative to the NAA, Alternative 1B would be expected to provide similar warm-water fish nesting conditions, based on modeling results indicating similar frequencies of monthly WSE reductions of 6 feet or more (Table 11E-8).

It is unlikely that a small difference in the number of years with monthly WSE reductions of greater than 6 feet under Alternative 1B would have a population-level effect on bass and other warm-water fish in Lake Oroville, relative to the NAA.

11E.4.3.3. Folsom Lake**Cold-Water Fish Species**

Relative to the NAA, Alternative 1B would be expected to provide similar amounts of habitat for cold-water fish species based on modeling results for reservoir storage conditions indicating similar long-term average monthly storage, and similar average monthly storage by water year type during all months of the evaluation period (Table 11E-4).

It is unlikely that cold-water fish habitat is limiting in Folsom Lake; therefore, it is unlikely that changes in reservoir storage under Alternative 1B would have a population-level effect on cold-water fish species in Folsom Lake, relative to the NAA.

Warm-Water Fish Species

Relative to the NAA, Alternative 1B would be expected to provide similar warm-water fish nesting conditions, based on modeling results indicating similar frequencies of monthly WSE reductions of 6 feet or more (Table 11E-10).

It is unlikely that a small difference in the number of years with monthly WSE reductions of greater than 6 feet under Alternative 1B would have a population-level effect on bass and other warm-water fish in Folsom Lake, relative to the NAA.

11E.4.3.4. San Luis Reservoir**Warm-Water Fish Species**

Relative to the NAA, Alternative 1B would be expected to provide similar warm-water fish nesting conditions, based on modeling results indicating similar frequencies of monthly WSE reductions of 6 feet or more (Tables 11E-12 and 11E-13).

It is unlikely that a small difference in the number of years with monthly WSE reductions of greater than 6 feet under Alternative 1B would have a population-level effect on bass and other warm-water fish in San Luis Reservoir, relative to the NAA.

11E.4.4. Impacts Associated with Alternative 2 Relative to the NAA**11E.4.4.1. Shasta Lake****Cold-Water Fish Species**

Relative to the NAA, Alternative 2 would be expected to provide similar amounts of habitat for cold-water fish species based on modeling results for reservoir storage conditions indicating similar long-term average monthly storage, and similar average monthly storage by water year type during all months of the evaluation period (Table 11E-2).

It is unlikely that cold-water fish habitat is limiting in Shasta Lake; therefore, it is unlikely that changes in reservoir storage under Alternative 2 would have a population-level effect on cold-water fish species in Shasta Lake, relative to the NAA.

Warm-Water Fish Species

Relative to the NAA, Alternative 2 would be expected to provide similar warm-water fish nesting conditions, based on modeling results indicating similar frequencies of monthly WSE reductions of 6 feet or more (Table 11E-7).

It is unlikely that a small difference in the number of years with monthly WSE reductions of greater than 6 feet under Alternative 2 would have a population-level effect on bass and other warm-water fish in Shasta Lake, relative to the NAA.

11E.4.4.2. Lake Oroville**Cold-Water Fish Species**

Relative to the NAA, Alternative 2 would be expected to provide similar amounts of habitat for cold-water fish species based on modeling results for reservoir storage conditions indicating similar long-term average monthly storage, and similar average monthly storage by water year type during all months of the evaluation period (Table 11E-3).

It is unlikely that cold-water fish habitat is limiting in Lake Oroville; therefore, it is unlikely that changes in reservoir storage under Alternative 2 would have a population-level effect on cold-water fish species in Lake Oroville, relative to the NAA.

Warm-Water Fish Species

Relative to the NAA, Alternative 2 would be expected to provide similar warm-water fish nesting conditions, based on modeling results indicating similar frequencies of monthly WSE reductions of 6 feet or more (Table 11E-8).

It is unlikely that a small difference in the number of years with monthly WSE reductions of greater than 6 feet under Alternative 2 would have a population-level effect on bass and other warm-water fish in Lake Oroville, relative to the NAA.

11E.4.4.3. Folsom Lake**Cold-Water Fish Species**

Relative to the NAA, Alternative 2 would be expected to provide similar amounts of habitat for cold-water fish species based on modeling results for reservoir storage conditions indicating similar long-term average monthly storage, and similar average monthly storage by water year type during all months of the evaluation period (Table 11E-4).

It is unlikely that cold-water fish habitat is limiting in Folsom Lake; therefore, it is unlikely that changes in reservoir storage under Alternative 2 would have a population-level effect on cold-water fish species in Folsom Lake, relative to the NAA.

Warm-Water Fish Species

Relative to the NAA, Alternative 2 would be expected to provide similar warm-water fish nesting conditions, based on modeling results indicating similar frequencies of monthly WSE reductions of 6 feet or more (Table 11E-10).

It is unlikely that a small difference in the number of years with monthly WSE reductions of greater than 6 feet under Alternative 2 would have a population-level effect on bass and other warm-water fish in Folsom Lake, relative to the NAA.

11E.4.4.4. San Luis Reservoir

Warm-Water Fish Species

Relative to the NAA, Alternative 2 would be expected to provide similar warm-water fish nesting conditions, based on modeling results indicating similar frequencies of monthly WSE reductions of 6 feet or more (Tables 11E-12 and 11E-13).

It is unlikely that a small difference in the number of years with monthly WSE reductions of greater than 6 feet under Alternative 2 would have a population-level effect on bass and other warm-water fish in San Luis Reservoir, relative to the NAA.

11E.4.5. Impacts Associated with Alternative 3 Relative to the NAA

11E.4.5.1. Shasta Lake

Cold-Water Fish Species

Relative to the NAA, Alternative 3 would be expected to provide similar amounts of habitat for cold-water fish species based on modeling results for reservoir storage conditions indicating similar long-term average monthly storage, and similar average monthly storage by water year type during all months of the evaluation period (Table 11E-2). Storage would be consistently >5% higher under Alternative 3 in Critically Dry Water Years between June and September.

However, it is unlikely that cold-water fish habitat is limiting in Shasta Lake; therefore, it is unlikely that changes in reservoir storage under Alternative 3 would have a population-level effect on cold-water fish species in Shasta Lake, relative to the NAA.

Warm-Water Fish Species

Relative to the NAA, Alternative 3 would be expected to provide similar warm-water fish nesting conditions, based on modeling results indicating similar frequencies of monthly WSE reductions of 6 feet or more (Table 11E-7).

It is unlikely that a small difference in the number of years with monthly WSE reductions of greater than 6 feet under Alternative 3 would have a population-level effect on bass and other warm-water fish in Shasta Lake, relative to the NAA.

11E.4.5.2. Lake Oroville

Cold-Water Fish Species

Relative to the NAA, Alternative 3 would be expected to provide similar amounts of habitat for cold-water fish species based on modeling results for reservoir storage conditions indicating similar long-term average monthly storage, and similar average monthly storage by water year type during all months of the evaluation period (Table 11E-3).

It is unlikely that cold-water fish habitat is limiting in Lake Oroville; therefore, it is unlikely that changes in reservoir storage under Alternative 3 would have a population-level effect on cold-water fish species in Lake Oroville, relative to the NAA.

Warm-Water Fish Species

Relative to the NAA, Alternative 3 would be expected to provide similar warm-water fish nesting conditions, based on modeling results indicating similar frequencies of monthly WSE reductions of 6 feet or more (Table 11E-8).

It is unlikely that a small difference in the number of years with monthly WSE reductions of greater than 6 feet under Alternative 3 would have a population-level effect on bass and other warm-water fish in Lake Oroville, relative to the NAA.

11E.4.5.3. Folsom Lake

Cold-Water Fish Species

Relative to the NAA, Alternative 3 would be expected to provide similar amounts of habitat for cold-water fish species based on modeling results for reservoir storage conditions (Table 11E-4) indicating similar long-term average monthly storage, and similar average monthly storage by water year type during all months of the evaluation period.

It is unlikely that cold-water fish habitat is limiting in Folsom Lake; therefore, it is unlikely that changes in reservoir storage under Alternative 3 would have a population-level effect on cold-water fish species in Folsom Lake, relative to the NAA.

Warm-Water Fish Species

Relative to the NAA, Alternative 3 would be expected to provide similar warm-water fish nesting conditions, based on modeling results indicating similar frequencies of monthly WSE reductions of 6 feet or more (Table 11E-10).

It is unlikely that a small difference in the number of years with monthly WSE reductions of greater than 6 feet under Alternative 3 would have a population-level effect on bass and other warm-water fish in Folsom Lake, relative to the NAA.

11E.4.5.4. San Luis Reservoir

Warm-Water Fish Species

Relative to the NAA, Alternative 3 would be expected to provide similar warm-water fish nesting conditions, based on modeling results indicating similar frequencies of monthly WSE reductions of 6 feet or more (Tables 11E-12 and 11E-13).

It is unlikely that a small difference in the number of years with monthly WSE reductions of greater than 6 feet under Alternative 3 would have a population-level effect on bass and other warm-water fish in San Luis Reservoir, relative to the NAA.

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