

App 5

## Appendix V. Fisheries Impact Analysis Supporting Data

This appendix contains tables with data which support the EIS fisheries impact analysis.

V-2

C - 0 5 6 0 4 0

C-056040

Table A. Fishery Resources of the Sacramento River

Common Name	Scientific Name
<b>NATIVE SPECIES</b>	
<u>Anadromous - game</u>	
White sturgeon	<u>Acipenser transmontanus</u>
Green sturgeon	<u>Acipenser medirostris</u>
Chinook salmon	<u>Oncorhynchus tshawytscha</u>
Steelhead trout	<u>Salmo gairdneri</u>
<u>Anadromous - nongame</u>	
Pacific lamprey	<u>Lampetra tridentata</u>
River lamprey	<u>Lampetra ayresi</u>
Pacific brook lamprey	<u>Lampetra pacifica</u>
<u>Resident - game</u>	
Rainbow trout	<u>Salmo gairdneri</u>
Sacramento perch	<u>Archoplites interruptus</u>
<u>Resident - nongame</u>	
Sacramento blackfish	<u>Orthodon microlepidotus</u>
Hardhead	<u>Mylopharodon conocephalus</u>
Hitch	<u>Lavinia exilicauda</u>
Sacramento squawfish	<u>Ptychocheilus grandis</u>
Sacramento splittail	<u>Pogonichthys macrolepidotus</u>
California roach	<u>Hesperoleucus symmetricus</u>
Speckled dace	<u>Rhinichthys osculus</u>
Sacramento sucker	<u>Catostomus occidentalis</u>
Mosquitofish	<u>Gambusia affinis</u>
Tule perch	<u>Hysterochampus traskii</u>
Coastrange sculpin	<u>Cottus aleuticus</u>
Prickly sculpin	<u>Cottus asper</u>
Riffle sculpin	<u>Cottus gulosus</u>
Crayfish	<u>Pacifastacus leniusculus</u>

Table A. Continued

Common Name	Scientific Name
<b>INTRODUCED SPECIES</b>	
<u>Anadromous</u> - game	
American shad	<u>Alosa</u> <u>sapidissima</u>
Striped bass	<u>Morone</u> <u>saxatilis</u>
<u>Resident</u> - game	
Brown trout	<u>Salmo</u> <u>trutta</u>
Channel catfish	<u>Ictalurus</u> <u>punctatus</u>
White catfish	<u>Ictalurus</u> <u>catus</u>
Yellow bullhead	<u>Ictalurus</u> <u>natalis</u>
Brown bullhead	<u>Ictalurus</u> <u>nebulosus</u>
Black bullhead	<u>Ictalurus</u> <u>melas</u>
Black crappie	<u>Pomoxis</u> <u>nigromaculatus</u>
White crappie	<u>Pomoxis</u> <u>annularis</u>
Green sunfish	<u>Lepomis</u> <u>cyaneus</u>
Bluegill	<u>Lepomis</u> <u>macrochirus</u>
Redear sunfish	<u>Lepomis</u> <u>microlophus</u>
Largemouth bass	<u>Micropterus</u> <u>salmoides</u>
Smallmouth bass	<u>Micropterus</u> <u>dolomieu</u>
<u>Resident</u> - nongame	
Threadfin shad	<u>Dorosoma</u> <u>petenense</u>
Carp	<u>Cyprinus</u> <u>carpio</u>
Goldfish	<u>Carassius</u> <u>auratus</u>
Golden shiner	<u>Notemigonus</u> <u>crysoleucas</u>
Red shiner	<u>Notropis</u> <u>lutrensis</u>
Fathead minnow	<u>Pimephales</u> <u>promelas</u>
Tahoe sucker	<u>Catostomus</u> <u>tahoensis</u>
Mosquitofish	<u>Gambusia</u> <u>affinis</u>
Mississippi silverside	<u>Menidia</u> <u>audens</u>
Threespine stickleback	<u>Gasterosteus</u> <u>aculeatus</u>
Bigscale logperch	<u>Percina</u> <u>macrolepida</u>
Yellowfin goby	<u>Acanthogobius</u> <u>flavimanus</u>
Asian clam	<u>Corbicula</u> <u>fluminea</u>

Sources: Hazel and Kelley 1966, Moyle 1976, McGriff 1983.

Note: This list does not contain species only rarely observed.

Table B. Mean Weighted Spawning Temperature Index  
for Chinook Salmon Runs at Cottonwood and Red Bluff Stations:  
Sacramento River Service Area

Station	Year	
	1985	2020
Cottonwood		
late-fall	.85	.90
winter	.34	.39
spring	.26	.32
fall	.77	.80
Red Bluff		
late fall	.48	.47
winter	.02	.06
spring	.15	.14
fall	.74	.73

Table C. Number of Years with Mean Monthly Discharge  
less than 6,000 cfs at Keswick and Red Bluff stations  
Under Existing Conditions and the No-Action Alternative:  
Sacramento River Service Area

Station	Year	
	1985	2020
Keswick		
January	34	33
February	28	29
March	34	34
April	23	22
May	10	9
June	1	2
July	0	0
August	0	1
September	46	30
October	40	36
November	12	12
December	30	30
Red Bluff		
January	17	14
February	12	11
March	15	13
April	4	1
May	1	1
June	0	0
July	0	0
August	0	0
September	18	14
October	39	23
November	7	8
December	14	14

Table D. Mean Weighted Rearing Temperature Indices  
for Chinook Salmon at the  
Cottonwood and Red Bluff stations for sensitive months:  
Sacramento River Service Area

Station	Year	
	1985	2020
Cottonwood		
April	.97	.98
May	.97	.97
June	.94	.95
July	.90	.92
August	.81	.87
September	.71	.77
October	.86	.87
November	.93	.94
average	.88	.91
Red Bluff		
April	.92	.93
May	.85	.84
June	.79	.70
July	.77	.64
August	.67	.55
September	.54	.57
October	.80	.81
November	.94	.94
average	.79	.75

Table E. Frequency of Temperatures Exceeding 57°F at Lewiston Dam  
 During Potential and Sensitive Spawning Months:  
 Sacramento River Service Area

Month	Year	
	1985	2020
July	3	1
August	8	7
September	10	9
October	9	9
November	0	0

Table F. Frequency of Temperatures Exceeding 65°F at Lewiston Dam  
 During Potential and Sensitive Rearing Months:  
 Sacramento River Service Area

Month	Year	
	1985	2020
May	0	0
June	1	0
July	0	0
August	0	0
September	6	1
October	1	1

Table G. Percent Change in No-Action Alternative Average  
 Monthly Reservoir Area Compared to 1985:  
 Sacramento River Service Area

Reservoir	Percent Change
Shasta	
October	2
November	3
December	3
January	3
February	2
March	2
April	1
May	2
June	2
July	2
August	3
September	3
Clair Engle	
October	5
November	5
December	4
January	4
February	4
March	4
April	3
May	3
June	3
July	4
August	4
September	5

Note: Clair Engle Reservoir is shown as change in storage, but shows the same trends as change in area.

Table H. Mean Monthly Rise in Reservoir Surface Elevation in Feet: Sacramento River Service Area

Month	Year	
	1985	2020
April	4 (68)	4 (62)
May	0 (23)	0 (25)
June	0 (0)	0 (0)

Note: The percent frequency of years with increasing surface elevations for the months indicated is presented in parentheses.

Note: Clair Engle Reservoir data was not available, but the changes are assumed to be similar to those of Shasta Reservoir.

Table I. Mean Monthly Fall in Reservoir Surface Elevation in Feet: Sacramento River Service Area

Month	Year	
	1985	2020
April	-6 (32)	-5 (37)
May	-9 (77)	-9 (75)
June	-19 (100)	-16 (100)

Note: The percent frequency of years with decreasing surface elevations for the months indicated is presented in parentheses.

Note: Clair Engle Reservoir data were not available, but the changes are assumed to be similar to those of Shasta Reservoir.

Table J. Mean Weighted Spawning Temperature Index for  
Chinook Salmon Runs at Cottonwood and Red Bluff Stations:  
Sacramento River Service Area

Station	No- Action	Alternatives							
		1B	2	3	4A/B	4C/D	5	6	7
Cottonwood									
late fall	.90	.76	.87	.89	.87	.77	.73	.76	.75
winter	.34	.26	.37	.38	.37	.26	.26	.26	.23
spring	.32	.47	.27	.17	.27	.47	.47	.47	.52
fall	.80	.86	.77	.73	.77	.86	.86	.86	.89
Red Bluff									
late fall	.47	.48	.46	.48	.46	.48	.42	.45	.44
winter	.00	.00	.00	.00	.00	.00	.00	.00	.00
spring	.14	.08	.12	.05	.12	.06	.27	.08	.18
fall	.73	.68	.71	.68	.71	.68	.85	.70	.76

Table K. Number of Years with Mean Monthly Discharges less than 6,000 cfs at Keswick and Red Bluff Stations:  
Sacramento River Service Area

Station	Alternatives								
	No-Action	1B	2	3	4A/B	4C/D	5	6	7
<b>Keswick</b>									
January	33	19	33	33	33	33	19	33	33
February	29	33	28	29	28	29	31	31	29
March	34	24	35	33	35	34	22	31	34
April	22	14	24	24	24	22	14	23	22
May	9	6	8	4	8	6	9	9	11
June	2	2	1	1	1	2	1	1	2
July	0	0	0	0	0	0	0	0	0
August	1	0	0	0	0	0	0	0	1
September	30	13	26	21	26	12	14	12	47
October	36	18	38	38	38	30	18	36	33
November	12	9	15	23	15	25	14	34	8
December	30	12	28	32	28	33	14	40	29
<b>Red Bluff</b>									
January	14	7	10	12	10	9	3	17	13
February	11	10	9	15	9	8	2	11	10
March	13	17	13	26	13	12	8	13	12
April	1	1	1	6	1	0	0	2	1
May	1	1	1	1	1	0	1	1	1
June	0	0	0	0	0	0	0	0	0
July	0	0	0	0	0	0	0	0	0
August	0	0	0	0	0	0	0	0	0
September	14	34	26	27	26	3	19	13	18
October	23	36	30	37	30	14	30	36	26
November	8	11	4	17	4	13	9	29	5
December	14	13	5	12	5	7	4	19	14

Table L. Mean Rearing Temperature Indices for Chinook Salmon  
at the Cottonwood and Red Bluff Stations for Sensitive Months:  
Sacramento River Service Area

Station	Alternatives								
	No-Action	1B	2	3	4A/B	4C/D	5	6	7
<b>Cottonwood</b>									
April	.98	.99	.98	.99	.98	.99	.99	.98	.98
May	.97	.96	.97	.98	.97	.97	.95	.96	.97
June	.95	.92	.95	.95	.95	.93	.89	.94	.93
July	.92	.87	.91	.93	.91	.88	.81	.90	.91
August	.87	.76	.85	.84	.85	.76	.94	.82	.85
September	.77	.69	.74	.74	.74	.68	.87	.69	.77
October	.87	.79	.85	.80	.85	.80	.95	.78	.89
November	.94	.92	.93	.94	.93	.93	.96	.94	.94
average	.91	.86	.90	.89	.90	.87	.92	.88	.90
<b>Red Bluff</b>									
April	.93	.93	.93	.93	.93	.93	.93	.93	.93
May	.84	.84	.85	.86	.85	.86	.81	.84	.84
June	.70	.68	.70	.71	.70	.70	.62	.70	.66
July	.64	.57	.63	.68	.63	.65	.53	.62	.61
August	.55	.48	.56	.58	.56	.53	.64	.57	.50
September	.57	.53	.55	.58	.55	.53	.68	.54	.54
October	.81	.76	.79	.73	.79	.75	.90	.74	.83
November	.94	.93	.94	.94	.94	.94	.96	.94	.94
average	.75	.71	.74	.75	.74	.74	.76	.73	.73

Table M. Frequency of Temperatures Exceeding 57°F at Lewiston Dam  
During Potential and Sensitive Spawning Months:  
Sacramento River Service Area

Month	Alternatives								
	No-Action	1B	2	3	4A/B	4C/D	5	6	7
July	1	2	1	1	1	1	2	0	3
August	7	5	7	7	7	3	4	7	6
September	9	6	9	9	9	6	8	8	10
October	9	5	9	9	9	6	8	10	10
November	0	0	0	0	0	0	0	0	0

Table N. Frequency of Temperatures Exceeding 65°F at Lewiston Dam  
During Potential and Sensitive Rearing Months:  
Sacramento River Service Area

Month	Alternatives								
	No-Action	1B	2	3	4A/B	4C/D	5	6	7
May	0	0	0	0	0	1	0	0	0
June	0	0	0	0	0	0	0	0	0
July	0	0	0	0	0	1	0	0	0
August	0	0	0	0	0	1	0	0	0
September	1	4	3	4	3	2	2	3	3
October	1	1	1	1	1	1	0	1	1

Table O. Percent Change in Average Monthly  
Reservoir Area Compared to the No-Action Alternative  
Sacramento River Service Area

Station	Alternatives							
	1B	2	3	4A/B	4C/D	5	6	7
<b>Shasta</b>								
October	-13	-4	-5	-4	-15	-7	-13	2
November	-12	-3	-3	-3	-10	-6	-10	0
December	-11	-3	-3	-3	-9	-6	-7	0
January	-11	-3	-3	-3	-9	-7	-6	-1
February	-9	-3	-2	-3	-7	-7	-5	0
March	-9	-2	-2	-2	-6	-6	-4	-1
April	-8	-2	-2	-2	-5	-6	-4	0
May	-8	-2	-2	-2	-6	-5	-4	-1
June	-8	-2	-3	-2	-6	-4	-4	0
July	-9	-3	-4	-3	-10	-5	-5	0
August	-11	-4	-5	-4	-14	-5	-10	2
September	-12	-4	-6	-4	-15	-5	-13	2
<b>Clair Engle</b>								
October	11	0	0	0	-13	-14	0	-2
November	12	0	0	0	-13	-13	0	-2
December	11	0	0	0	-12	-12	0	-1
January	10	0	0	0	-10	-10	0	-1
February	9	0	0	0	-9	-9	0	-2
March	8	0	0	0	-9	-9	0	-2
April	7	0	0	0	-8	-8	0	-1
May	6	0	0	0	-6	-6	1	-1
June	6	0	0	0	-6	-6	1	0
July	7	0	0	0	-8	-8	1	0
August	8	0	0	0	-9	-9	1	0
September	10	0	0	0	-12	-12	1	-1

Note: Clair Eservoirngle Re is change in storage, but shows the same trends as change in area.

Table P. Average Monthly Increase in Reservoir  
Surface Elevation in Feet:  
Sacramento River Service Area

Month	Alternatives								
	No-Action	1B	2	3	4A/B	4C/D	5	6	7
April	4 (62)	6 (68)	5 (61)	5 (63)	5 (61)	5 (50)	7 (63)	6 (59)	4 (66)
May	0 (25)	1 (25)	0 (23)	0 (25)	0 (23)	0 (14)	1 (23)	0 (23)	0 (25)
June	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

Table Q. Average Monthly Decrease in Reservoir  
Surface Elevation in Feet:  
Sacramento River Service Area

Month	Alternatives								
	No-Action	1B	2	3	4A/B	4C/D	5	6	7
April	-5 (37)	-7 (32)	-6 (39)	-6 (38)	-6 (39)	-7 (50)	-5 (38)	-6 (41)	-6 (34)
May	-9 (75)	-10 (75)	-9 (77)	-10 (75)	-9 (77)	-10 (86)	-8 (77)	-11 (77)	-7 (75)
June	-16 (100)	-18 (100)	-19 (100)	-19 (100)	-19 (100)	-24 (100)	-17 (100)	-19 (100)	-15 (100)

Note: The percent frequency of years with decreasing surface elevations for the months indicated is presented in parentheses.

Note: Clair Engle data were not available, but the changes are assumed to be similar to those of Shasta Reservoir.