Appendix N New Melones Stepped Release Plan
Attachment N.1 Stanislaus River Water Temperature Analysis

N.1.1 Model Overview

This analysis enumerates the frequency at which mean monthly HEC-5Q simulated water temperatures exceed water temperature index values or occur outside index ranges for multiple fish species in the Stanislaus River. Index values and ranges were primarily obtained from the scientific literature and agency reports for each species and life stage at multiple locations within the river. Two additional performance metrics for water temperature were included to assess how the Stepped Release Plan (SRP) affects water temperature conditions for Central Valley steelhead. Frequencies were calculated for the baseline and each alternative at one or more locations of life stage presence in the river by water year type. For the environmental impact statement analysis, the incremental change between the baseline and each alternative was then calculated.

N.1.2 Model Development

N.1.2.1 Methods

Water temperature was simulated in HEC-5Q for water years 1922 through 2020 for the Stanislaus River. Outputs from HEC-5Q were used as inputs to the analysis.

Water temperature index values were compiled for the life stages present in the Stanislaus River for Central Valley steelhead (Table N.1-1). These index values were primarily taken from Appendix C, *Species Spatial and Temporal Domains*, and Appendix D, *Seasonal Operations Deconstruction*, of the Biological Assessment. Water temperature index values and ranges were compiled for the life stages present in the Stanislaus River for following non-listed species: fall-run Chinook salmon, Pacific lamprey, river lamprey, hardhead, Sacramento hitch, striped bass, American shad, and largemouth bass (Table N.1-2). These values and ranges were primarily taken from the 2017 Sites Reservoir Project Draft Environmental Impact Report/Environmental Impact Statement (Sites Project Authority and Bureau of Reclamation 2017), Appendix 12D, Water Temperature Index Value Selection Rationale, with supplemental information taken from the scientific literature as necessary. Index values and index ranges used in this analysis typically characterize the suitable, optimal, acceptable, and observed temperature range needed for survival, growth, or presence. In addition to these values, the two temperature values were included to evaluate how the SRP may affect steelhead:

- The survival temperature threshold for juvenile steelhead is less than or equal to 68 degrees Fahrenheit (°F) from May 1 to October 31.
- The temperature threshold for steelhead egg incubation is less than or equal to 54°F from December 1 to May 31.

The analysis calculates the frequency that modeled water temperatures under the baseline and each alternative would either exceed the temperature index value or occur outside the index range for a given species and life stage. The analysis uses a monthly time step, and the percent of months exceeding the index value or occurring outside the index range was computed over the entire 98-water year simulation period for each San Joaquin Valley (60-20-20) water year type. Frequencies of exceedance for each alternative are compared to baseline conditions, in keeping with guidance on the proper use of model outputs, to calculate the incremental effect of the alternative. To best characterize potential differences, the analysis evaluates frequencies by water year type for all months of life stage presence combined and within the reach of river where the life stage is present.

Table N.1-1. Water Temperature Index Values for Central Valley Steelhead in the Stanislaus River.

Species	Life Stage	Months of Presence	Model Output Locations	Temperature Index Value/Range (°F)	Temperature Index References
Steelhead	Adult Migration and Holding	Jul-Mar	Orange Blossom Bridge, above confluence	41-66.2	Migration impairment (Keefer et al. 2009)
Steelhead	Adult Migration and Holding	Jul-Mar	Orange Blossom Bridge, above confluence	69.8	Lethal limit to adult migrants (Coutant 1970)
Steelhead	Adult Migration and Holding	Jul-Mar	Orange Blossom Bridge, above confluence	59.9	Pathogen virulence threshold (McCullough 1999)
Steelhead	Spawning	Dec-May	Orange Blossom Bridge	45-55	Successful spawning range (Bell 1991, Federal Energy Regulatory Commission 1993, Richter and Kolmes 2005)
Steelhead	Spawning	Dec-May	Orange Blossom Bridge	59.9	Pathogen virulence threshold (McCullough 1999)
Steelhead	Kelt Emigration	Feb-Jun	Orange Blossom Bridge, above confluence	66.2	Migration impairment (Keefer et al. 2009)

Species	Life Stage	Months of Presence	Model Output Locations	Temperature Index Value/Range (°F)	Temperature Index References
Steelhead	Kelt Emigration	Feb-Jun	Orange Blossom Bridge, above confluence	69.8	Lethal to adult migrating steelhead (Coutant 1970)
Steelhead	Kelt Emigration	Feb-Jun	Orange Blossom Bridge, above confluence	59.9	Pathogen virulence threshold (McCullough 1999)
Steelhead	Egg Incubation and Fry Emergence	Dec-Jul	Orange Blossom Bridge	45-52	Optimal incubation temperature (McCullough et al. 2001)
Steelhead	Egg Incubation and Fry Emergence	Dec-Jul	Orange Blossom Bridge	59.9	Fry pathogen virulence threshold (McCullough 1999)
Steelhead	Egg Incubation	Dec-May	Orange Blossom Bridge	54	Stepped release plan egg metric (Appendix N, *New Melones Stepped Release Plan*)
Steelhead	Juvenile Rearing	Year-round	Orange Blossom Bridge, above confluence	66.2	Upper limit of optimum temperatures for juvenile steelhead growth, assuming maximum ration levels (Myrick 1998; Myrick and Cech 2001)
Steelhead	Juvenile Rearing and Outmigration	Year-round	Orange Blossom Bridge, above confluence	59.9	Pathogen virulence threshold (McCullough 1999)
Steelhead	Juvenile Outmigration	Year-round	Orange Blossom Bridge, above confluence	55	Upper limit of successful smoltification (Zaugg and Wagner 1973; Wedemeyer et al. 1980; U.S. Environmental Protection Agency 2003)
Steelhead	Juvenile Rearing and Outmigration	May-Oct	Orange Blossom Bridge	68	Stepped release plan juvenile rearing metric (Appendix N)

Table N.1-2. Water Temperature Index Values and Index Ranges for Non-Listed Fish Species in the Stanislaus River.

Species	Life Stage	Months of Presence	Model Output Locations	Temperature Index Value/Range (°F)	Temperature Index References
Fall-run Chinook salmon	Adult Migration	Jul-Dec	Orange Blossom Bridge, above confluence	37.9-68	Successful migration upper limit (Reiser and Bjornn 1979, Goniea et al. 2006)
Fall-run Chinook salmon	Adult Migration	Jul-Dec	Orange Blossom Bridge, above confluence	59.9	Pathogen virulence threshold (McCullough 1999)
Fall-run Chinook salmon	Adult Holding and Spawning	Oct-Jan	Orange Blossom Bridge	42.1-55	Spawning initiation range (McCullough 1999)
Fall-run Chinook salmon	Adult Holding and Spawning	Oct-Jan	Orange Blossom Bridge	59.9	Pathogen virulence threshold (McCullough 1999)
Fall-run Chinook salmon	Egg Incubation and Fry Emergence	Dec-Mar	Orange Blossom Bridge	42.8-56[1]	Slater 1963, U.S. Fish and Wildlife Service 1999, Myrick and Cech 2004, Bratovich et al. 2012, Martin et al. 2017
Fall-run Chinook salmon	Egg Incubation and Fry Emergence	Dec-Mar	Orange Blossom Bridge	59.9	Pathogen virulence threshold (McCullough 1999)
Fall-run Chinook salmon	Juvenile Rearing	Mar-Jun	Orange Blossom Bridge	55.4-68	Optimum temperature for growth, smoltification, and predation vulnerability (Myrick and Cech 2002, Marine and Cech 2004)
Fall-run Chinook salmon	Juvenile Rearing and Outmigration	Mar-Jun	Orange Blossom Bridge	75.2	Upper incipient lethal temperature (Brett 1952, Brett et al. 1982, Myrick and Cech 2004)

[1] Exact endpoints fall somewhere between 53.6°F and 56°F, with recommended upper thermal optimum of 53.6°F to 55.9°F (Myrick and Cech 2004, Martin et al. 2017)

Species	Life Stage	Months of Presence	Model Output Locations	Temperature Index Value/Range (°F)	Temperature Index References
Fall-run Chinook salmon	Juvenile Outmigration	Mar-Jun	Orange Blossom Bridge	59.9	Pathogen virulence threshold (McCullough 1999)
Pacific Lamprey	Spawning and Egg Incubation	April-Aug	Orange Blossom Bridge	50-64	Observed range of high survival and low occurrence of embryonic developmental abnormalities (Meeuwig et al. 2003, 2005)
Pacific Lamprey	Ammocoete Rearing and Emigration	Year-round	Orange Blossom Bridge, above confluence	72	Upper limit for high survival and low occurrence of developmental abnormalities (Meeuwig et al. 2003, 2005)
Western River Lamprey	Spawning and Egg Incubation	Feb-Jul	Orange Blossom Bridge	50-64	Observed range of high survival and low occurrence of embryonic developmental abnormalities (Meeuwig et al. 2003, 2005)
Western River Lamprey	Ammocoete Rearing and Emigration	Year-round	Orange Blossom Bridge, above confluence	72	Upper limit for high survival and low developmental abnormalities (Meeuwig et al. 2003, 2005)
Hardhead	Spawning	Apr-Jun	Orange Blossom Bridge	59-64	Optimal range (Wang 1986)
Hardhead	Non-spawning Adults	Year-round	Orange Blossom Bridge	57.2-78.8	Commonly observed range (Thompson et al. 2012)
Striped Bass	Spawning, Embryo Incubation, and Initial Rearing	Apr-Jun	Orange Blossom Bridge	59-68	Optimal range (Moyle 2002)

Species	Life Stage	Months of Presence	Model Output Locations	Temperature Index Value/Range (°F)	Temperature Index References
Striped Bass	Larvae, Fry, and Juvenile Rearing and Emigration	Year-round	Orange Blossom Bridge, above confluence	61-71	Optimal range (Fay et al. 1983)
American Shad	Spawning, Embryo Incubation, and Initial Rearing	Apr-Jun	Orange Blossom Bridge	62-75	Optimal range (Moyle 2002)
American Shad	Larvae, Fry, and Juvenile Rearing and Emigration	Year-round	Orange Blossom Bridge, above confluence	63-77	Optimal range (Moyle 2002)
Threadfin Shad	Spawning	Apr-Aug	Orange Blossom Bridge	63-77	Optimal range (Moyle 2002)
Threadfin Shad	Non-spawning Adult	Year-round	Orange Blossom Bridge	63-77	Optimal range (Moyle 2002)
Largemouth Bass	Spawning	Apr-Jun	Orange Blossom Bridge	55-79	Observed range (Stuber et al. 1982)
Largemouth Bass	Non-spawning Adult	Year-round	Orange Blossom Bridge	77-86	Optimal range for growth (Moyle 2002)
Smallmouth Bass	Adult	Jun-Aug	Orange Blossom Bridge	>66	Lower end of observed summer-time range (Moyle 2002)
Smallmouth Bass	Adult	Year-round	Orange Blossom Bridge	77-80	Optimal range for growth (Moyle 2002)
Spotted Bass	Spawning	Apr-Jun	Orange Blossom Bridge	59-64	Aasen and Henry 1981
Spotted Bass	Adult	Jun-Aug	Orange Blossom Bridge	75-87	Preferred summer-time range (Moyle 2002)

N.1.2.2 Assumptions/Uncertainty

One limitation of the analysis is that, due to model limitations, a monthly mean time step was the smallest time step available for water temperature model outputs. As a result, the intra-month variation around the monthly mean cannot be evaluated, which introduces uncertainty in the results.

Another limitation of the analysis is that it treats all exceedances above the temperature criteria as equal because no magnitude of exceedance was calculated. A 0.1 degrees Celsius (°C) magnitude of exceedance could be very different to a steelhead than a 10°C magnitude of exceedance. However, as defined in Appendix N, *New Melones Stepped Release Plan*, the temperature criteria did not include magnitude of exceedance.

An assumption of this analysis is that all fish at and around the model output locations experience the same temperature as the model output. Small-scall differences in water temperature related to depth, shade, water movement, and a large number of other factors are common in streams (Poole et al. 2001), but this was not accounted for in the analysis. This introduced uncertainty in the results.

N.1.2.3 Code and Data Repository

Code and analysis outputs can be found at:
https://icfonline.sharepoint.com/:f:/r/sites/EP/USBR_2021LTO/Public%20Draft%20Alternatives/Appendix%20N.%20Stanislaus%20SRP%20Attachments/Stanislaus%20River%20Water%20Temperature%20Analysis/Code%20and%20Data?csf=1&web=1&e=qCWIps

Figures were generated in the file:
https://icfonline.sharepoint.com/:x:/r/sites/EP/USBR_2021LTO/Public%20Draft%20Alternatives/Appendix%20N.%20Stanislaus%20SRP%20Attachments/Stanislaus%20River%20Water%20Temperature%20Analysis/Figures/BA_Stanislaus_water_temperature_figures.xlsx?d=w542849af3d144d59b45d7f3a7731224a&csf=1&web=1&e=7CKKrq

N.1.3 Results

N.1.3.1 Biological Assessment

N.1.3.1.1 HEC 5Q Water Temperature Model Outputs

HEC 5Q water temperature model outputs are provided in this attachment to aid the reader in visually interpreting the results of the analysis. By drawing or imagining a horizontal line that intersects the y-axis at each water temperature value listed in Table N.1-1 and Table N.1-2, the reader can determine the frequency above or below the value by viewing the resulting probability of exceedance along the x-axis for each model scenario. Model outputs are presented by month for two locations in the Stanislaus River: Orange Blossom Bridge and above the confluence with the San Joaquin River. Figure N.1-1 presents exceedance curves of modeled monthly water temperatures at Orange Blossom Bridge for all months and water year types combined for each model scenario. Figure N.1-2 through Figure N.1-13 present exceedance curves of modeled monthly water temperatures at Orange Blossom Bridge for all water year types combined by month.

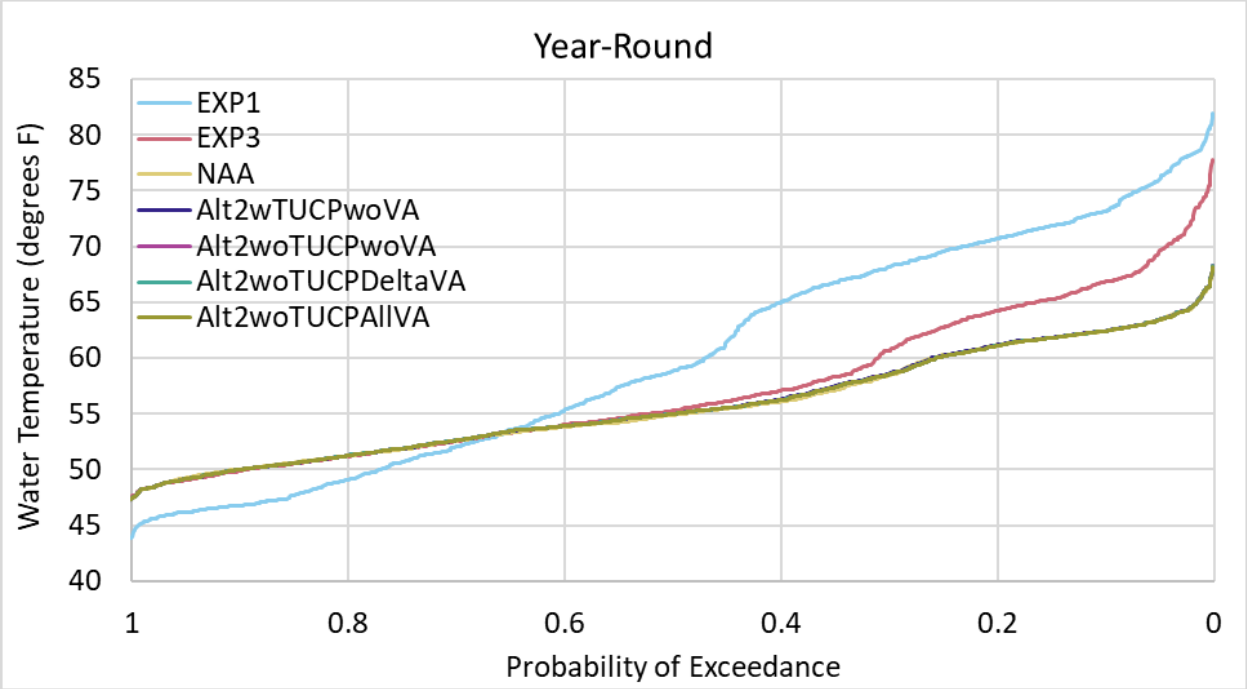

Figure N.1-1. Exceedance plot of modeled water temperatures, Stanislaus River at Orange Blossom Bridge, year-round.

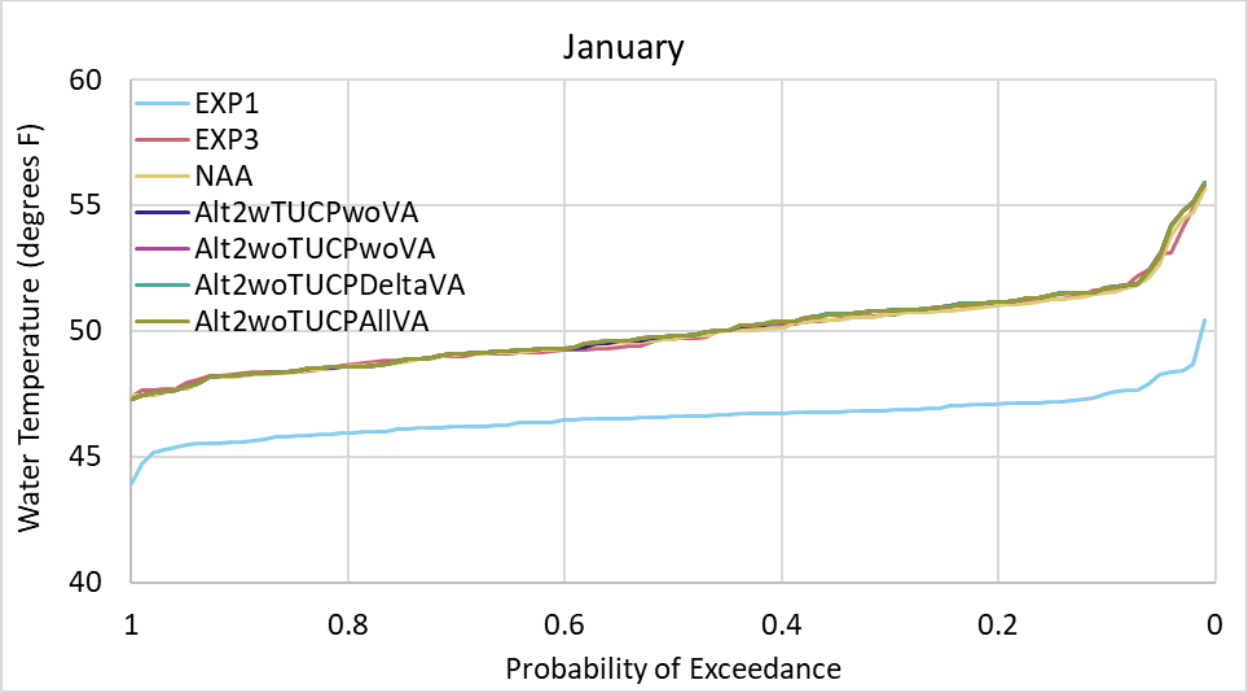

Figure N.1-2. Exceedance plot of modeled water temperatures, Stanislaus River at Orange Blossom Bridge, January.

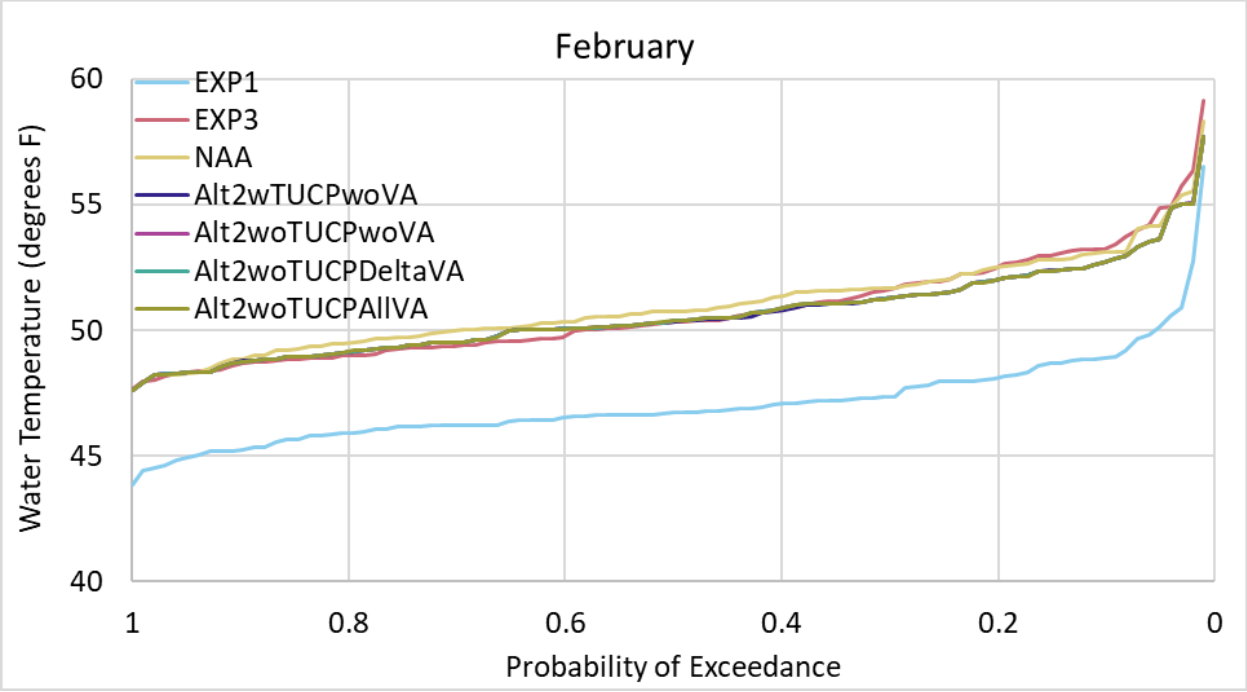

Figure N.1-3. Exceedance plot of modeled water temperatures, Stanislaus River at Orange Blossom Bridge, February.

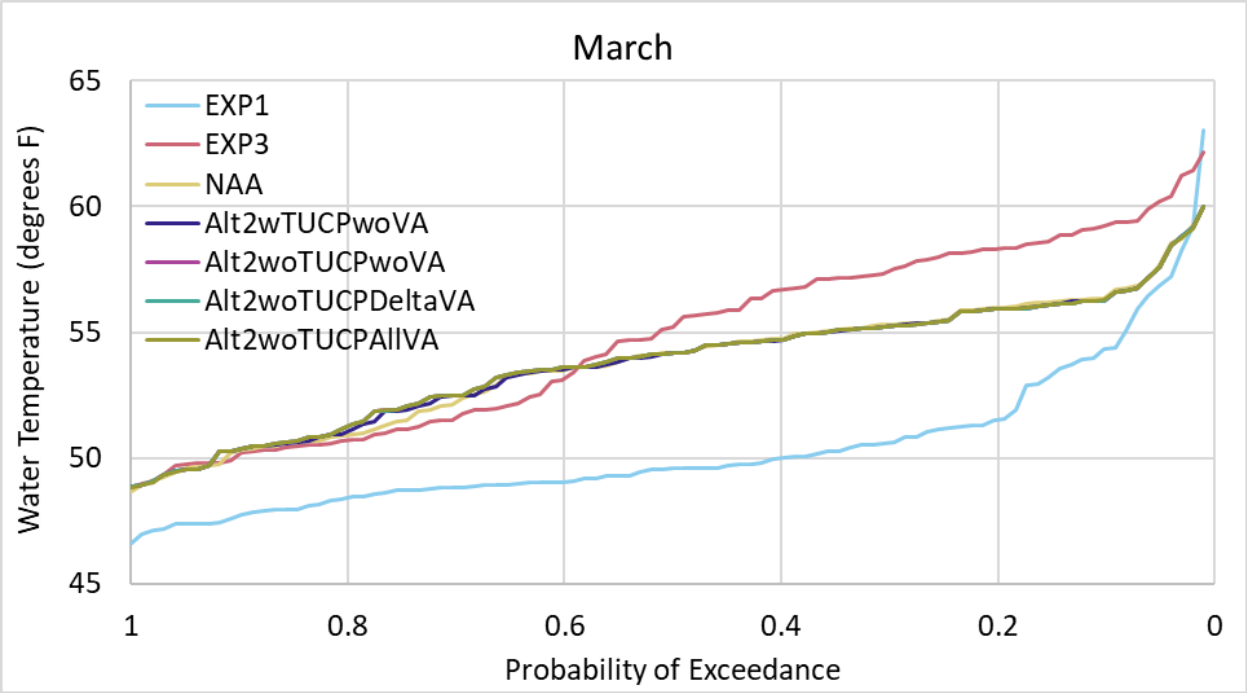

Figure N.1-4. Exceedance plot of modeled water temperatures, Stanislaus River at Orange Blossom Bridge, March.

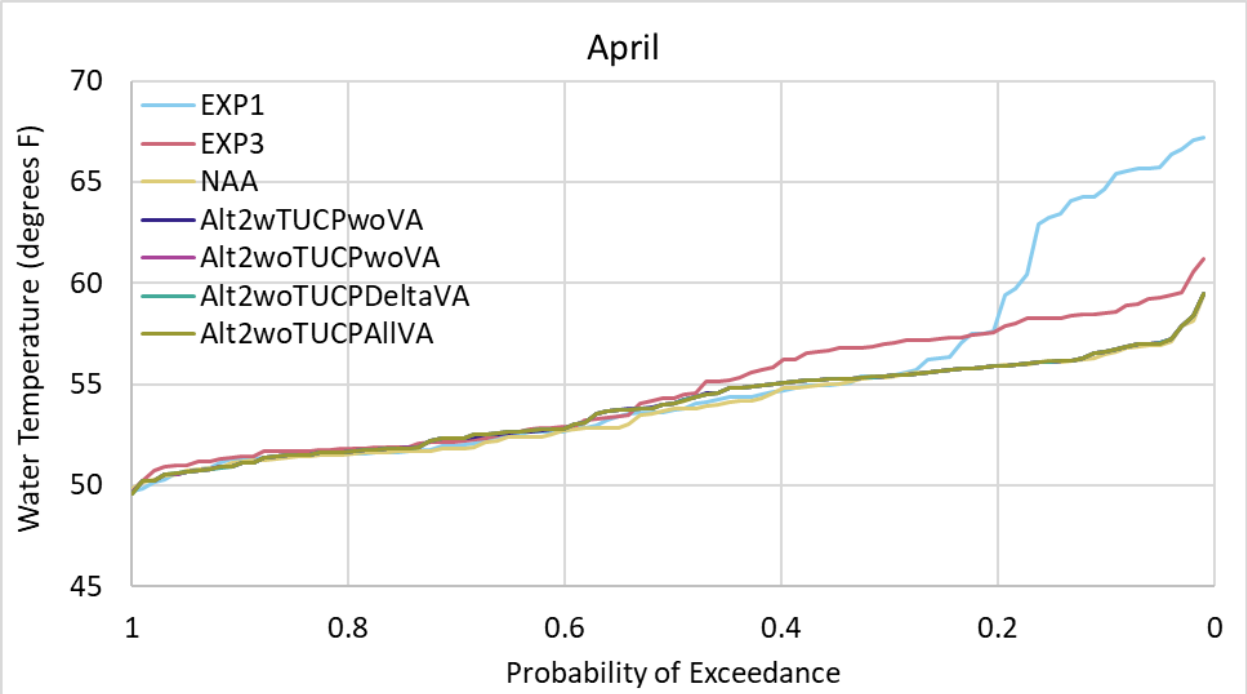

Figure N.1-5. Exceedance plot of modeled water temperatures, Stanislaus River at Orange Blossom Bridge, April.

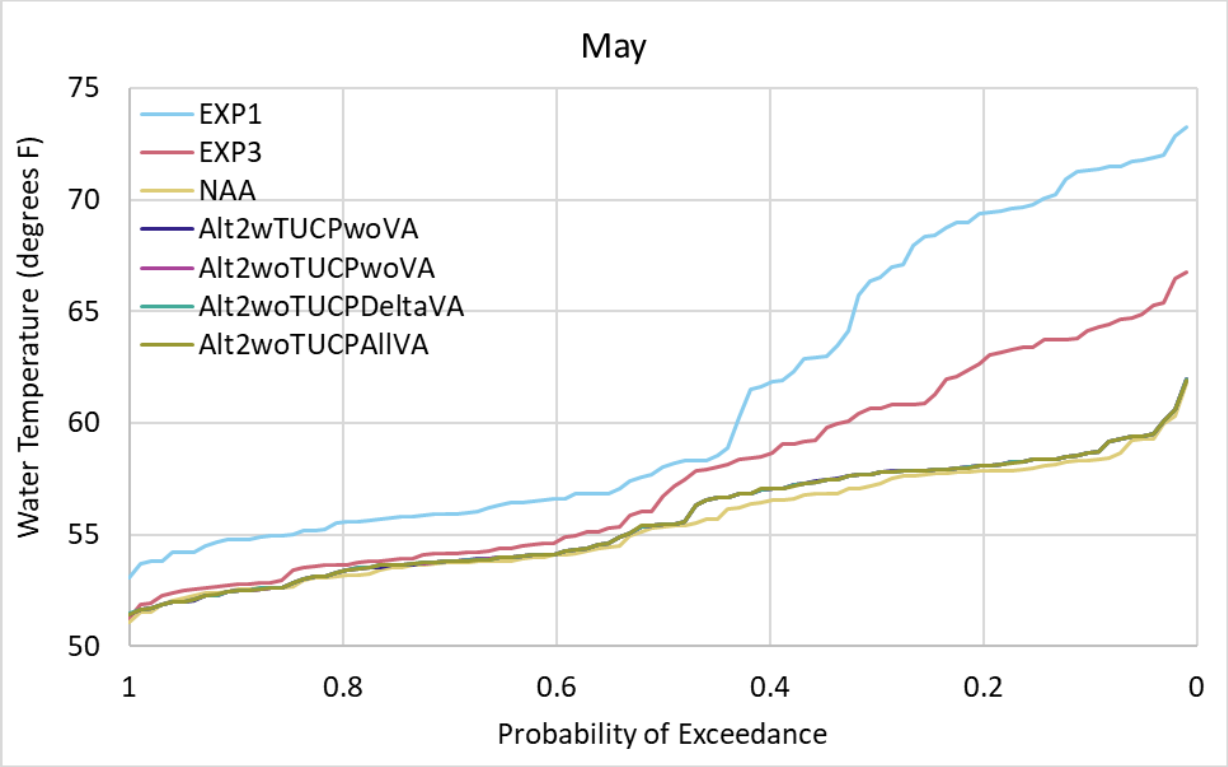

Figure N.1-6. Exceedance plot of modeled water temperatures, Stanislaus River at Orange Blossom Bridge, May.

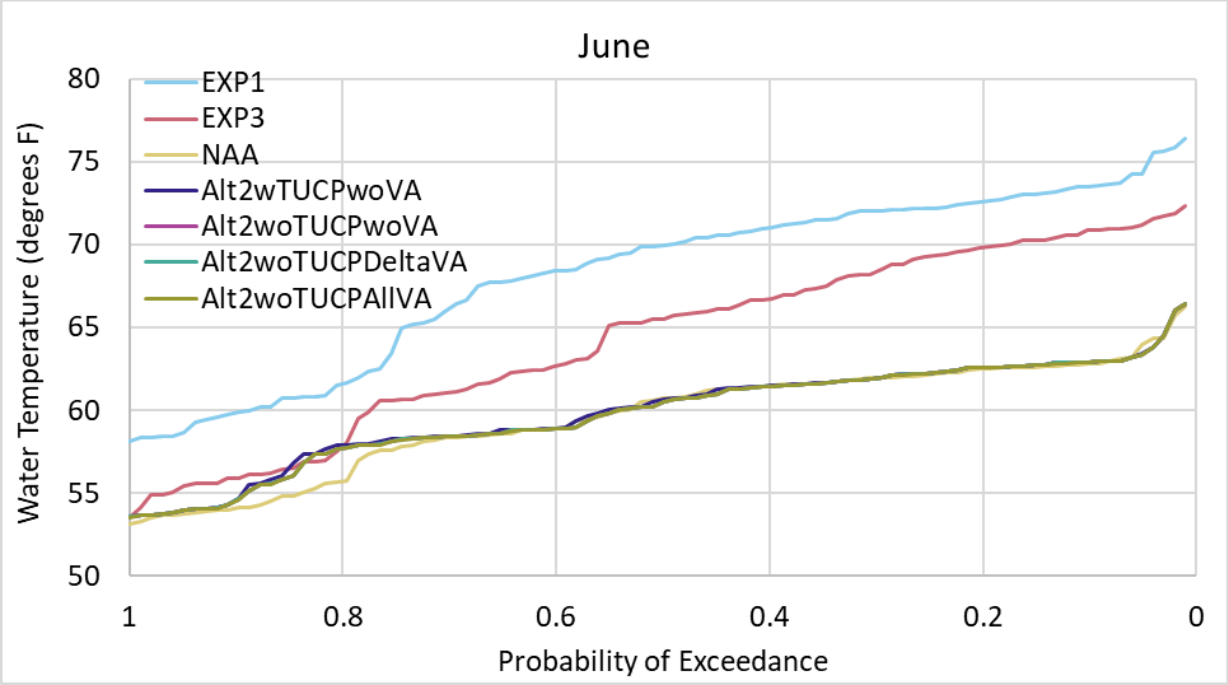

Figure N.1-7. Exceedance plot of modeled water temperatures, Stanislaus River at Orange Blossom Bridge, June.

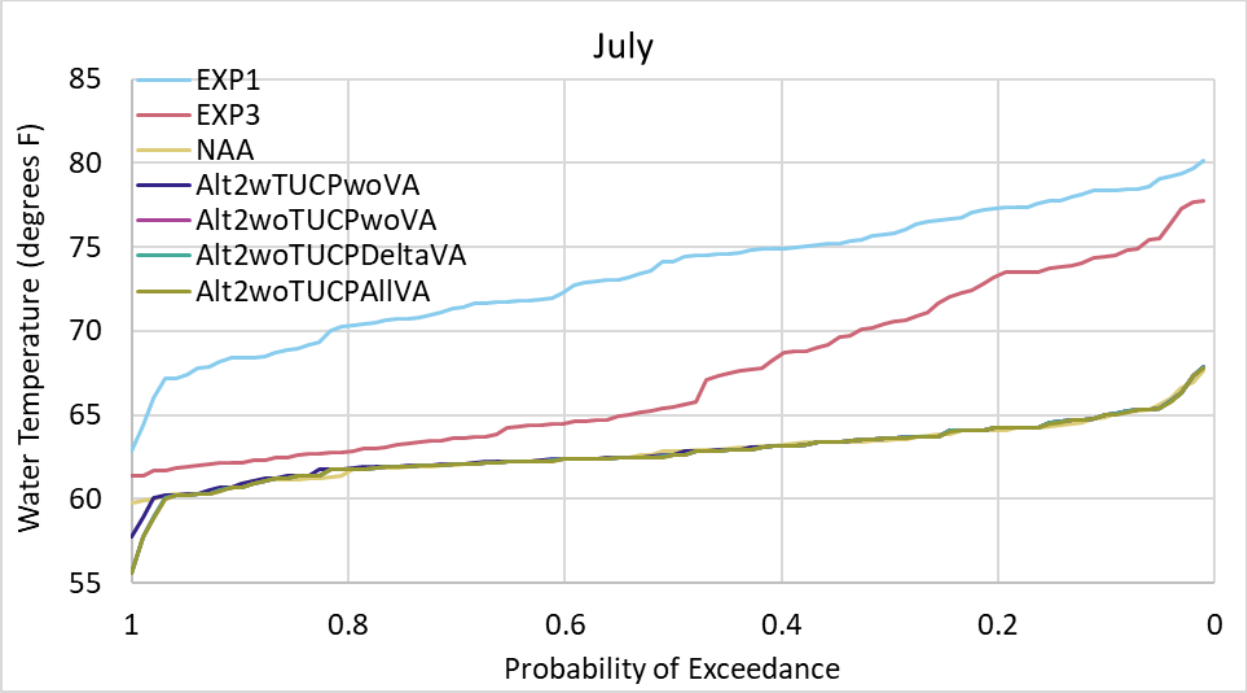

Figure N.1-8. Exceedance plot of modeled water temperatures, Stanislaus River at Orange Blossom Bridge, July.

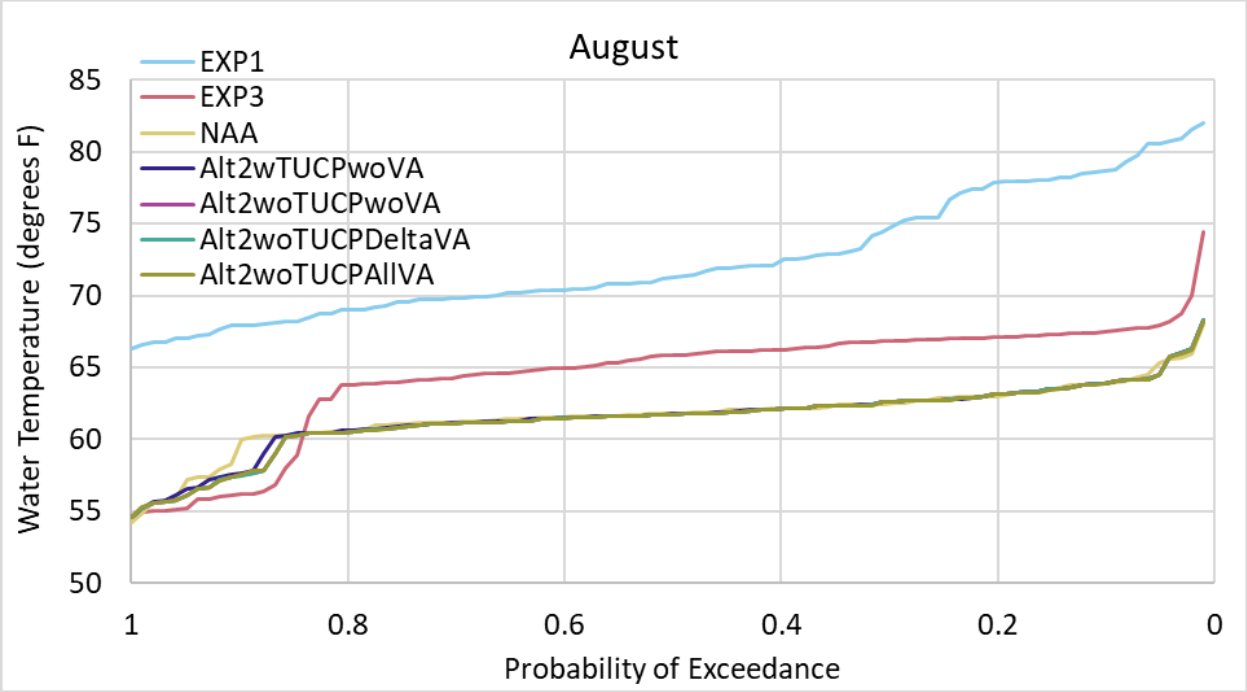

Figure N.1-9. Exceedance plot of modeled water temperatures, Stanislaus River at Orange Blossom Bridge, August.

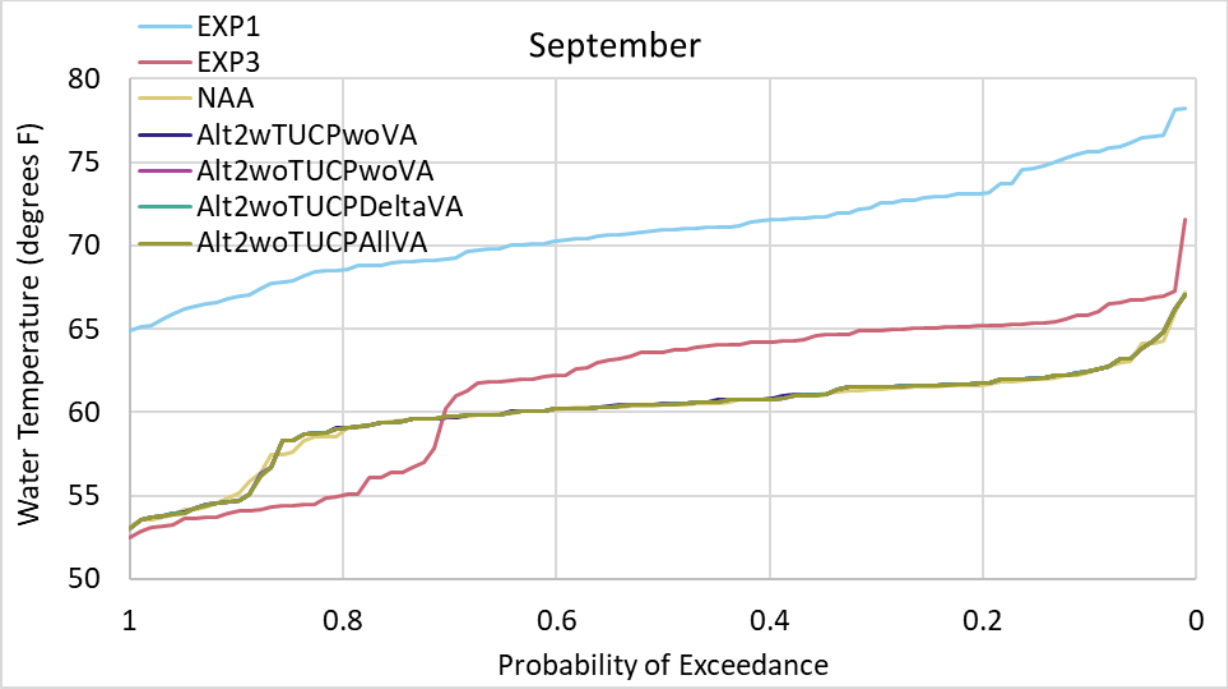

Figure N.1-10. Exceedance plot of modeled water temperatures, Stanislaus River at Orange Blossom Bridge, September.

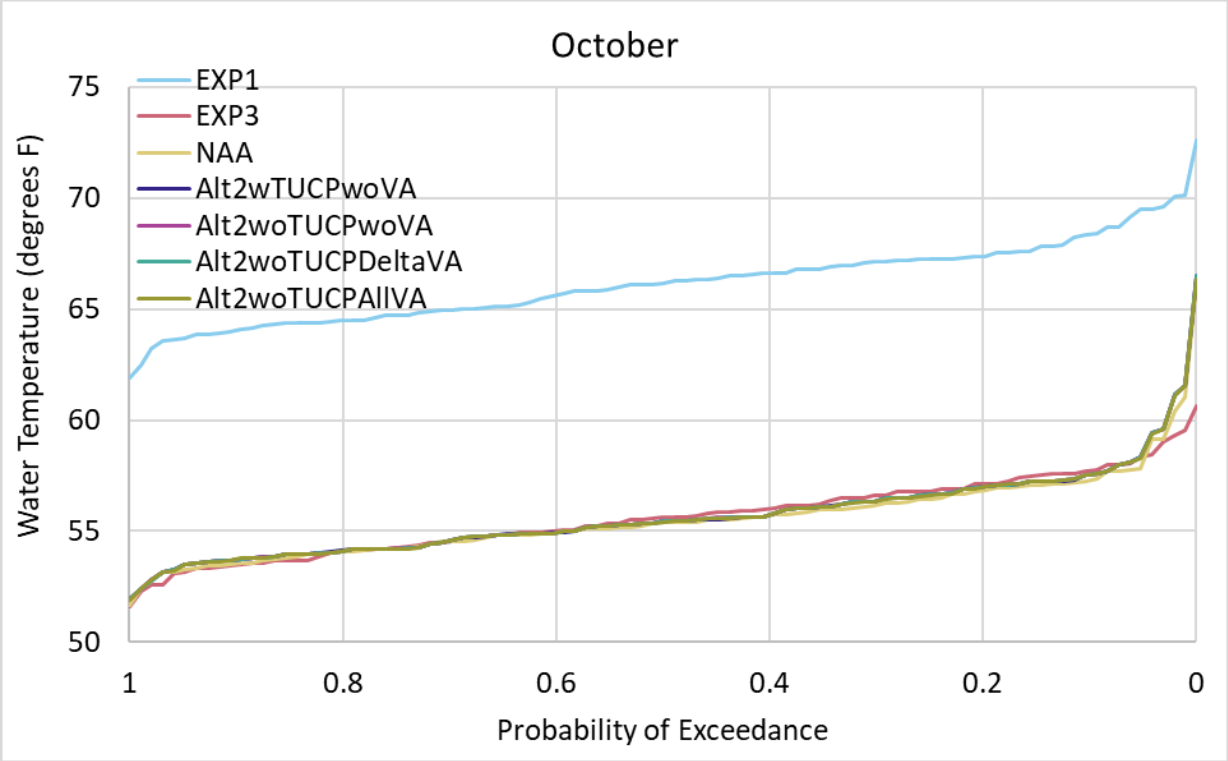

Figure N.1-11. Exceedance plot of modeled water temperatures, Stanislaus River at Orange Blossom Bridge, October.

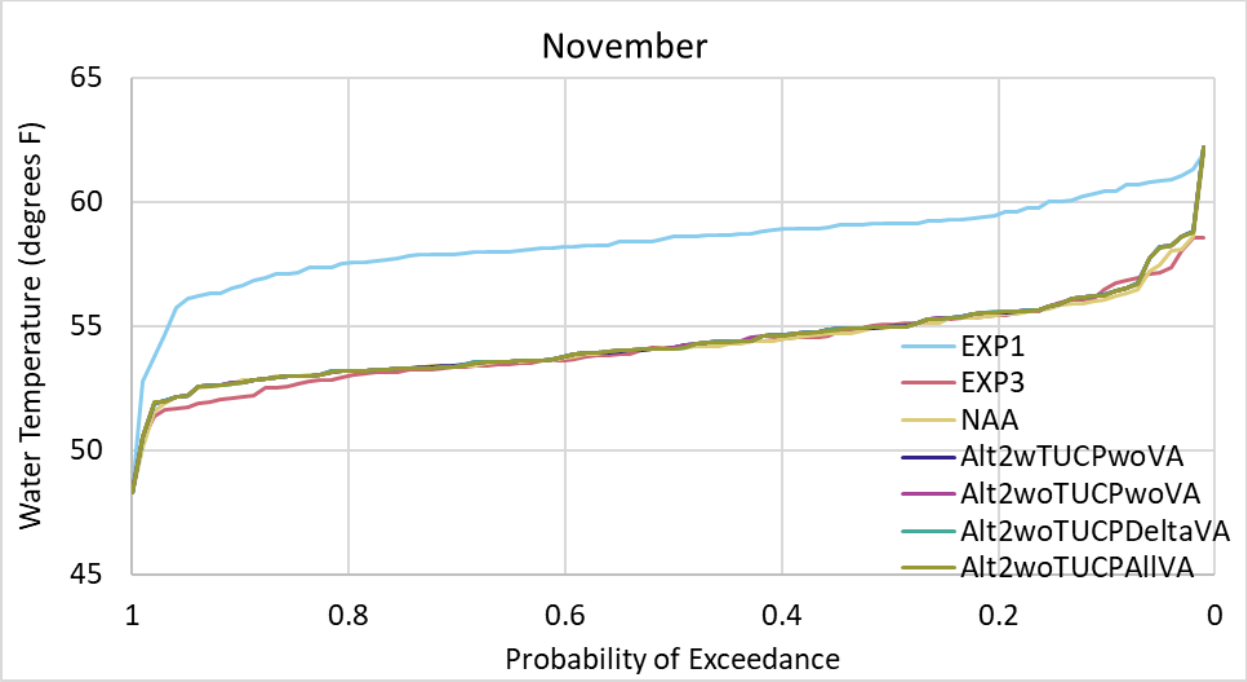

Figure N.1-12. Exceedance plot of modeled water temperatures, Stanislaus River at Orange Blossom Bridge, November.

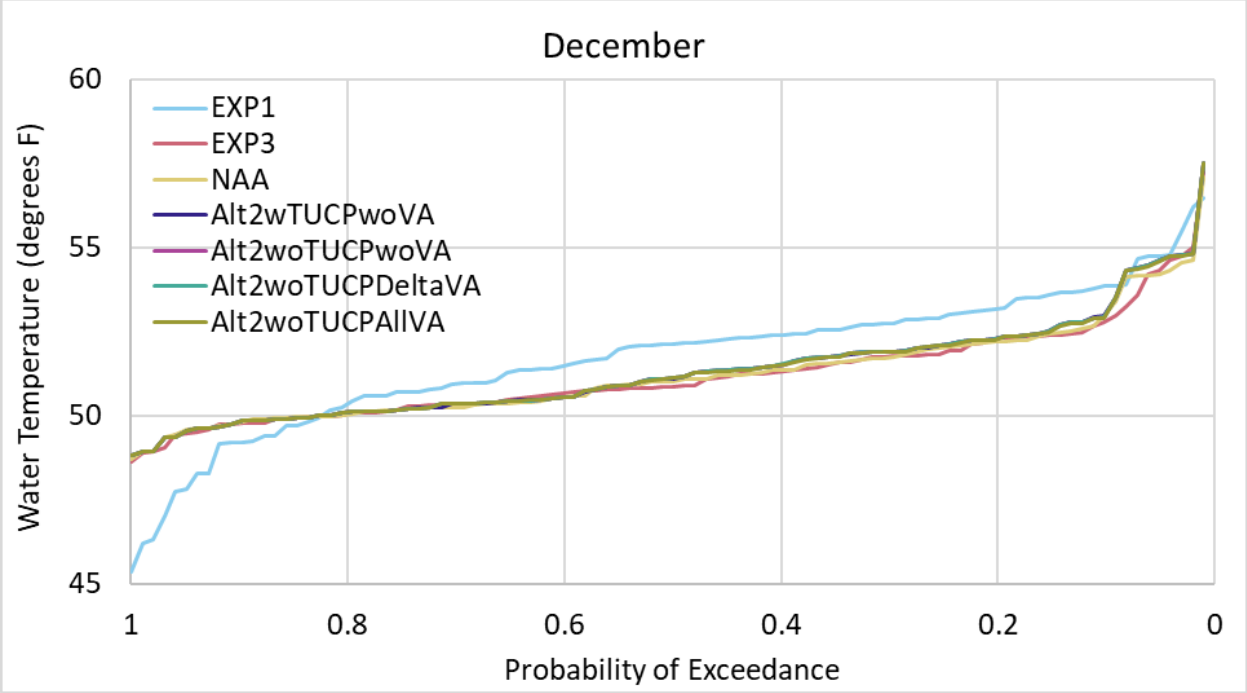

Figure N.1-13. Exceedance plot of modeled water temperatures, Stanislaus River at Orange Blossom Bridge, December.

Figure N.1-14 presents exceedance curves of modeled monthly water temperatures above the San Joaquin River confluence for all months combined for each model scenario. Figure N.1-15 through Figure N.1-26 present exceedance curves of modeled monthly water temperatures above the San Joaquin River confluence for each month separately.

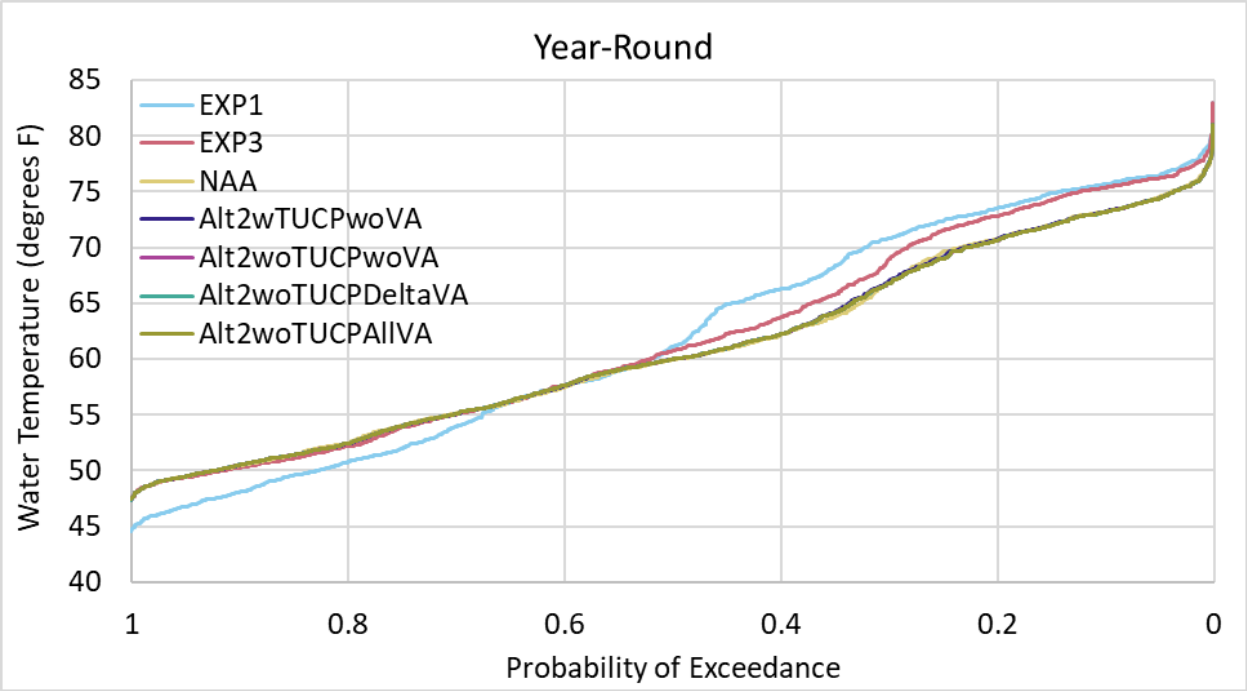

Figure N.1-14. Exceedance plot of modeled water temperatures, Stanislaus River above confluence with San Joaquin River, year-round.

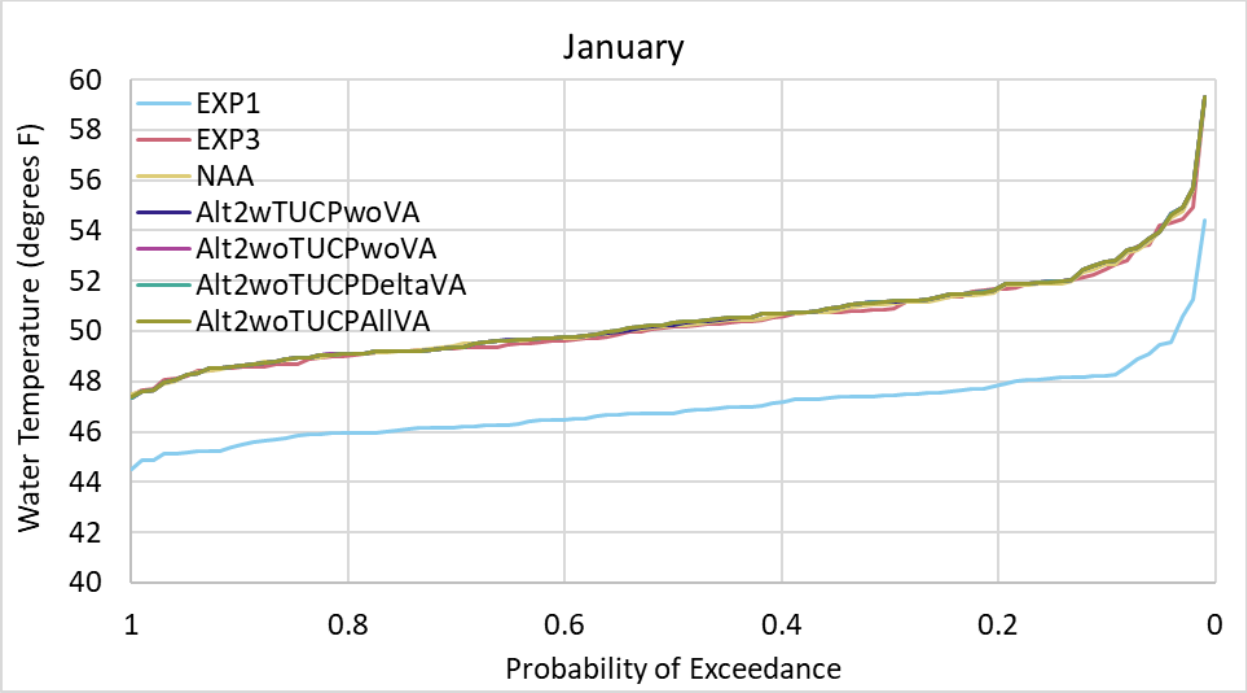

Figure N.1-15. Exceedance plot of modeled water temperatures, Stanislaus River above confluence with San Joaquin River, January.

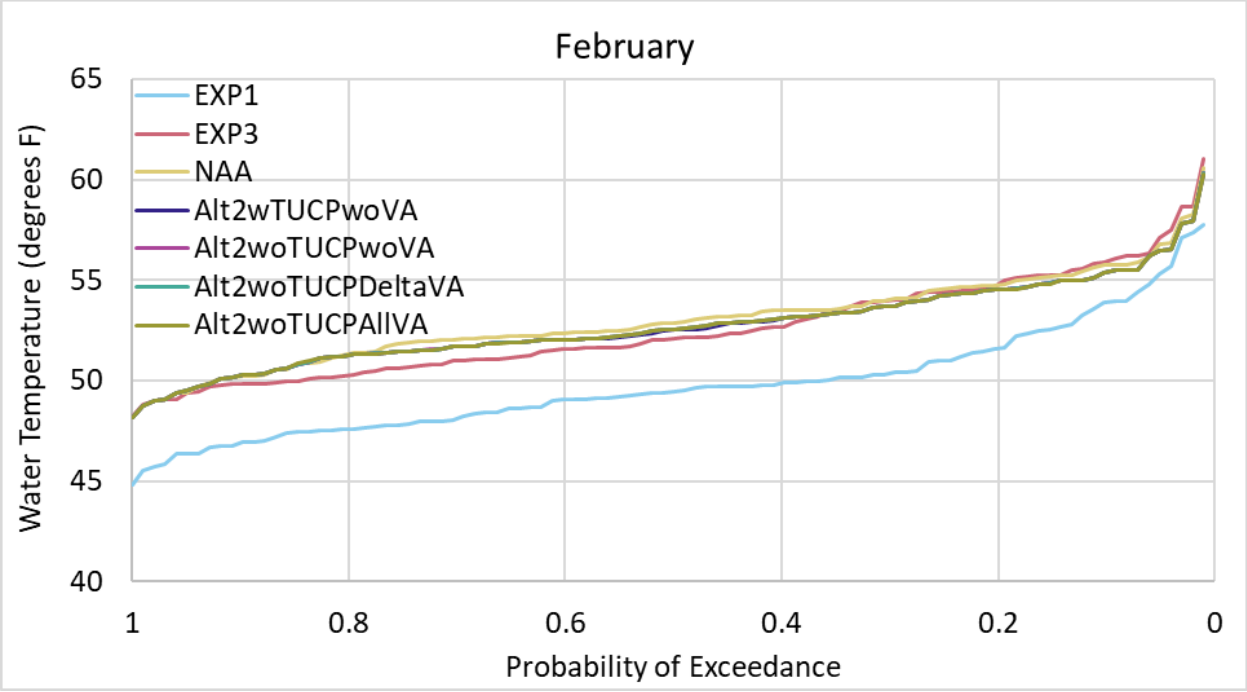

Figure N.1-16. Exceedance plot of modeled water temperatures, Stanislaus River above confluence with San Joaquin River, February.

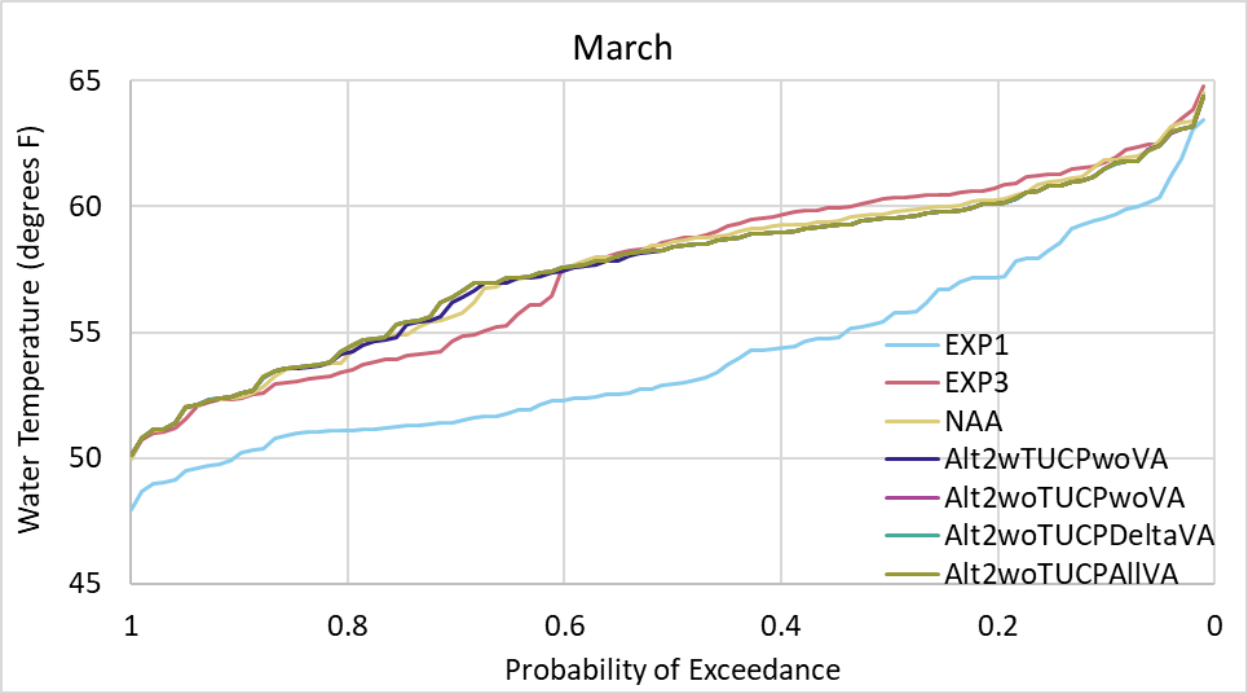

Figure N.1-17. Exceedance plot of modeled water temperatures, Stanislaus River above confluence with San Joaquin River, March.

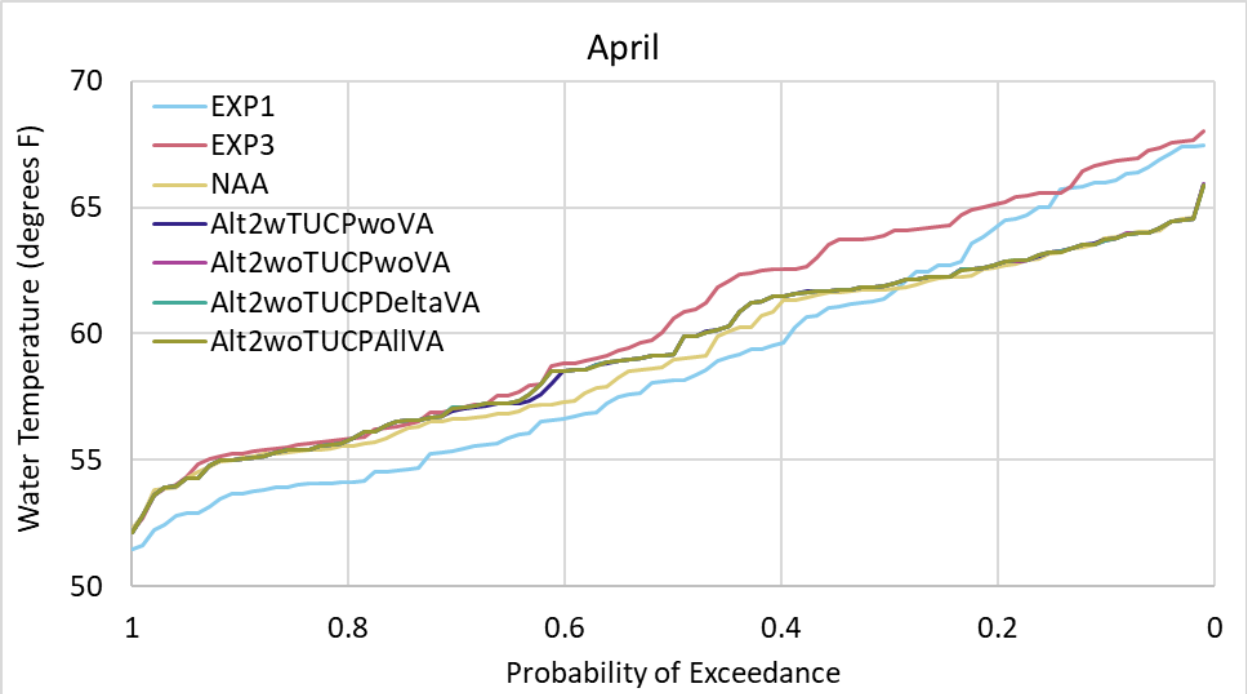

Figure N.1-18. Exceedance plot of modeled water temperatures, Stanislaus River above confluence with San Joaquin River, April.

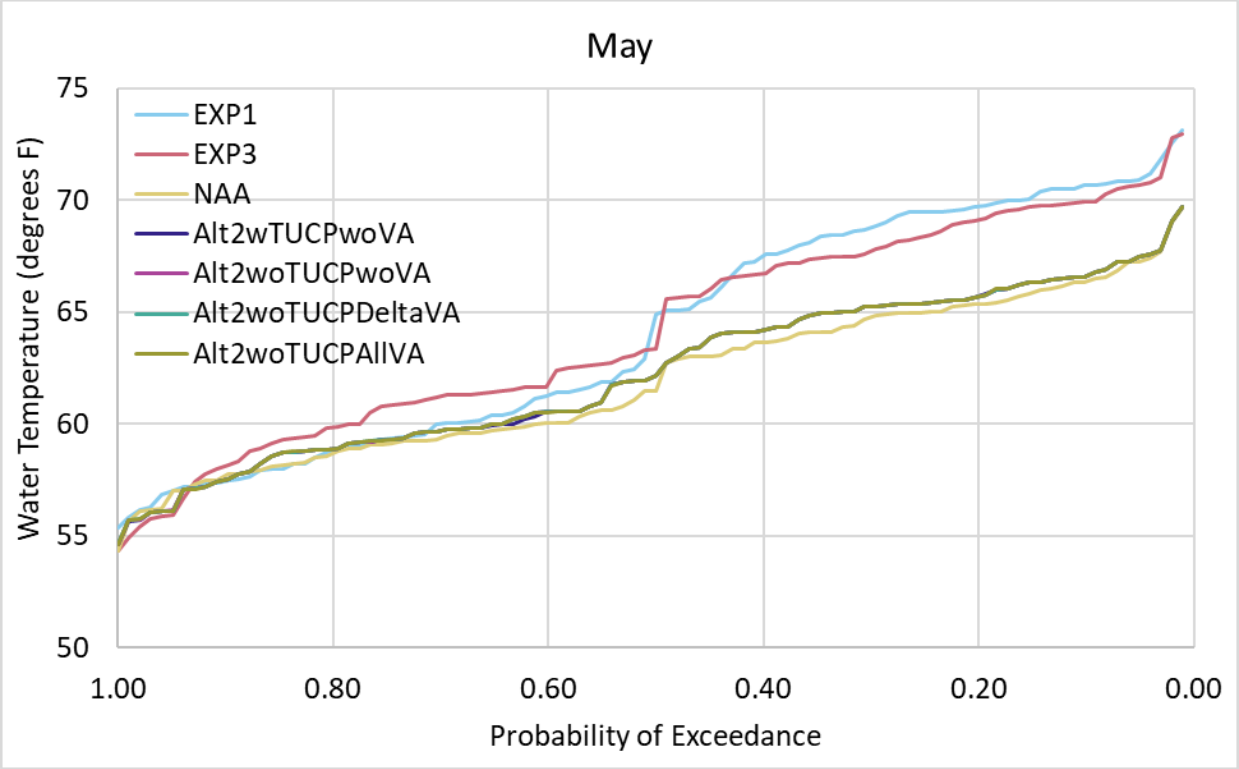

Figure N.1-19. Exceedance plot of modeled water temperatures, Stanislaus River above confluence with San Joaquin River, May.

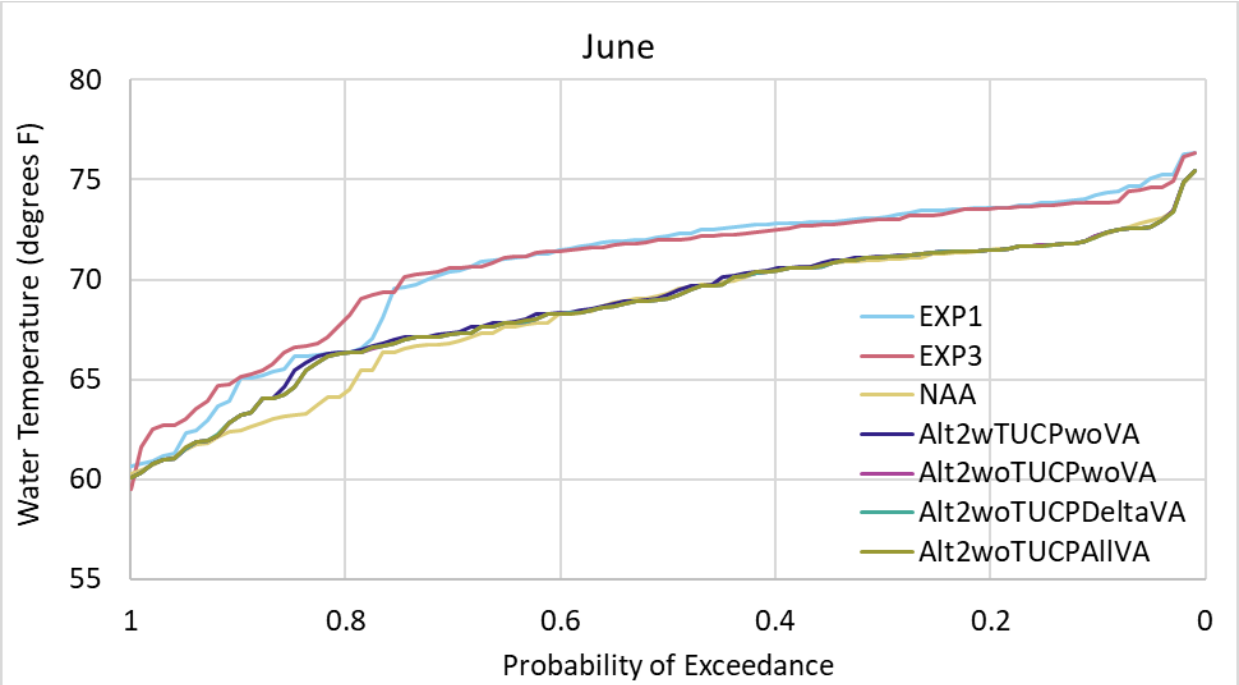

Figure N.1-20. Exceedance plot of modeled water temperatures, Stanislaus River above confluence with San Joaquin River, June.

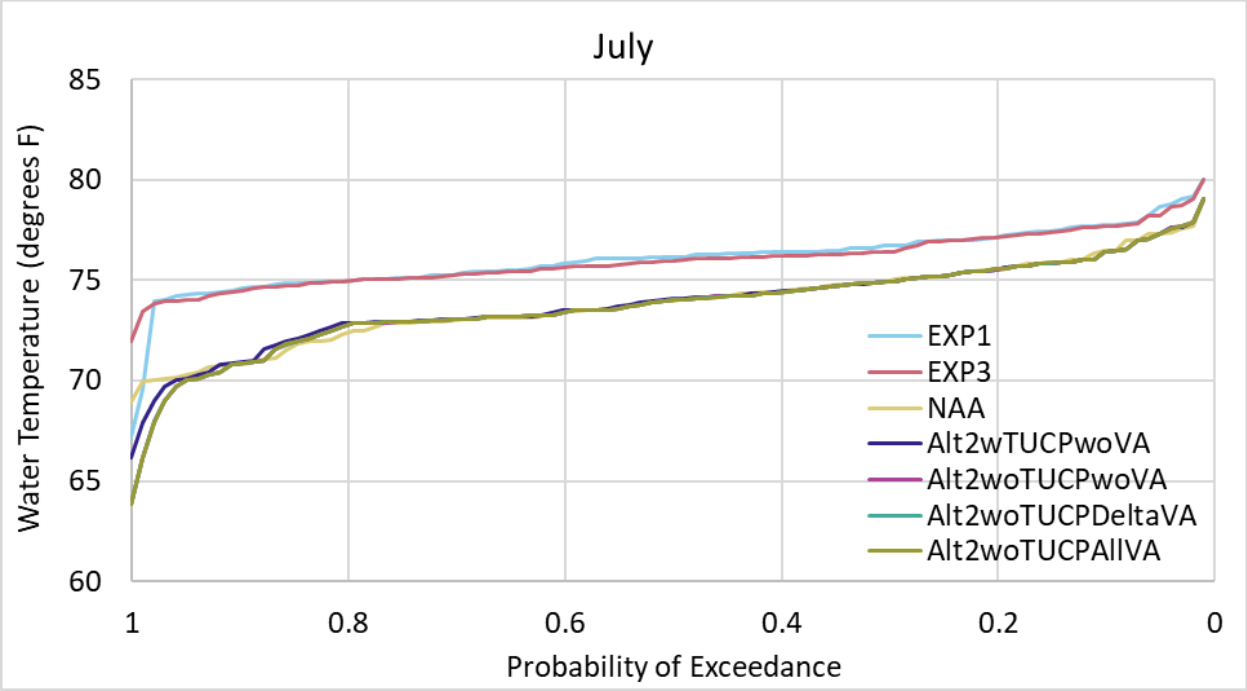

Figure N.1-21. Exceedance plot of modeled water temperatures, Stanislaus River above confluence with San Joaquin River, July.

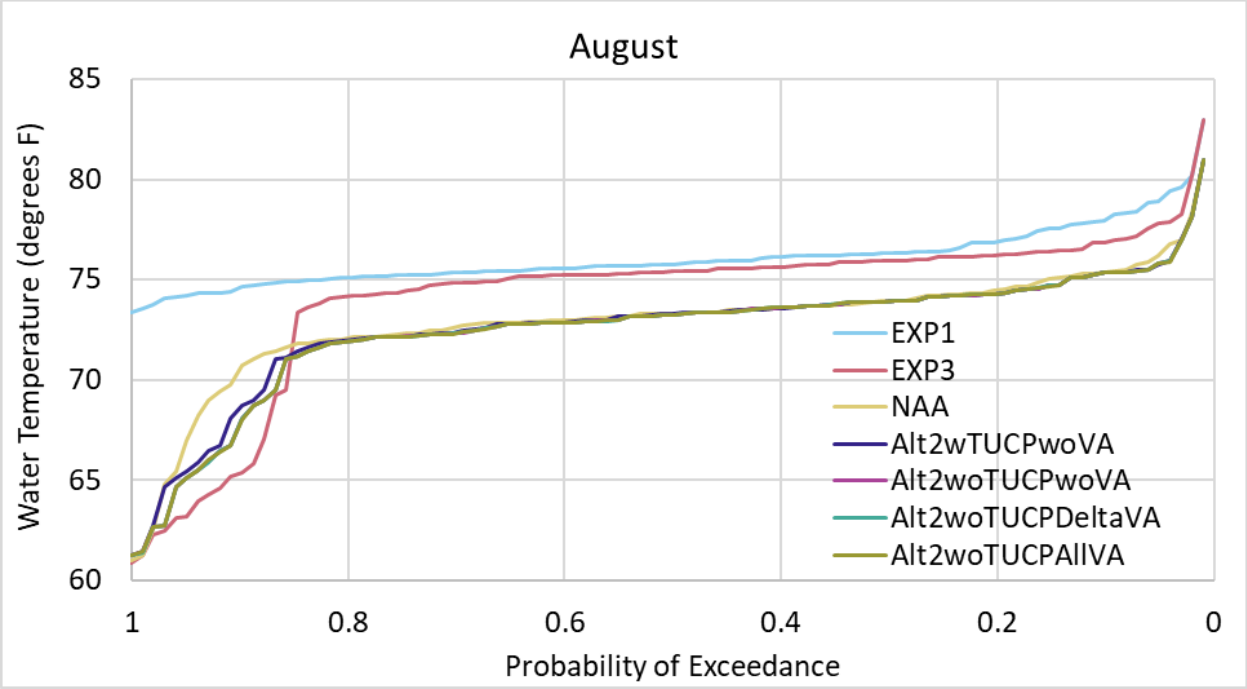

Figure N.1-22. Exceedance plot of modeled water temperatures, Stanislaus River above confluence with San Joaquin River, August.

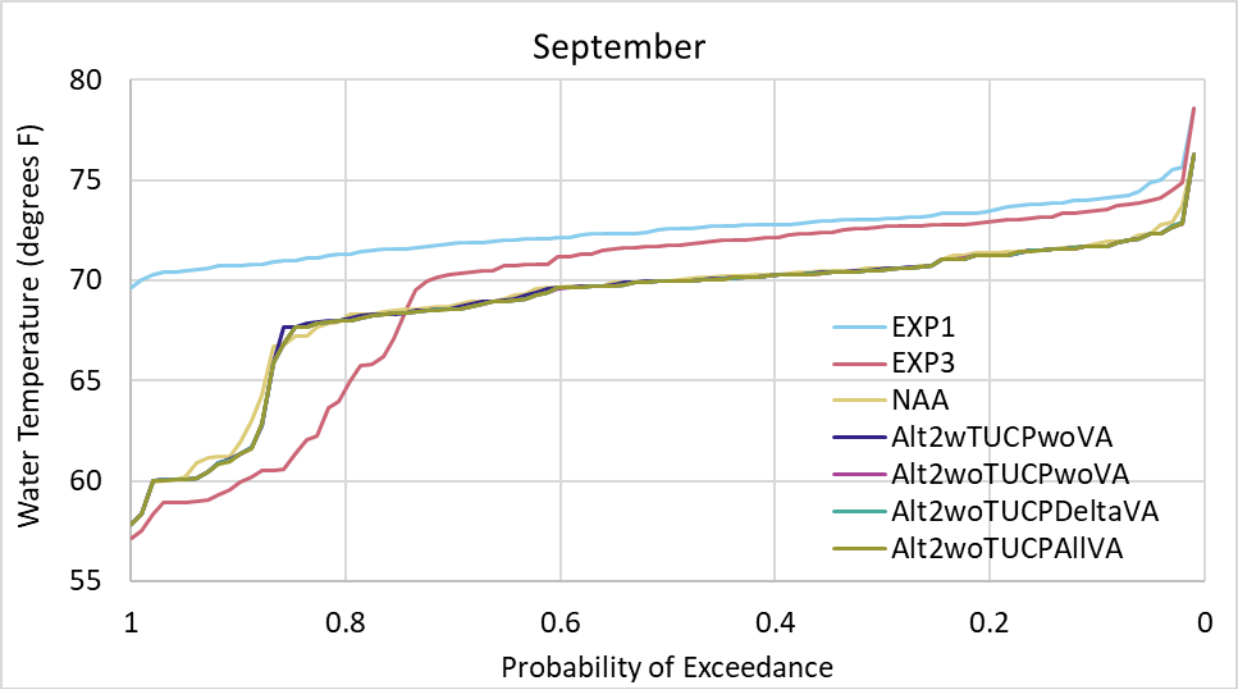

Figure N.1-23. Exceedance plot of modeled water temperatures, Stanislaus River above confluence with San Joaquin River, September.

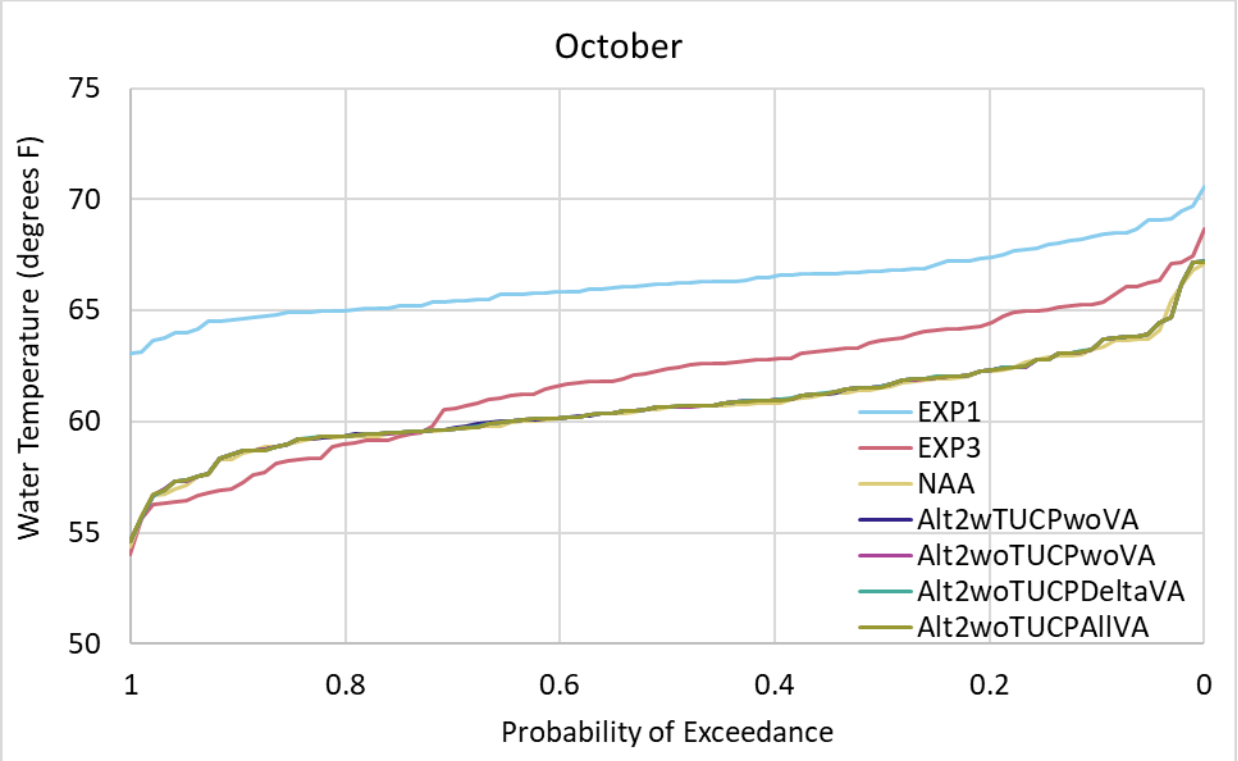

Figure N.1-24. Exceedance plot of modeled water temperatures, Stanislaus River above confluence with San Joaquin River, October.

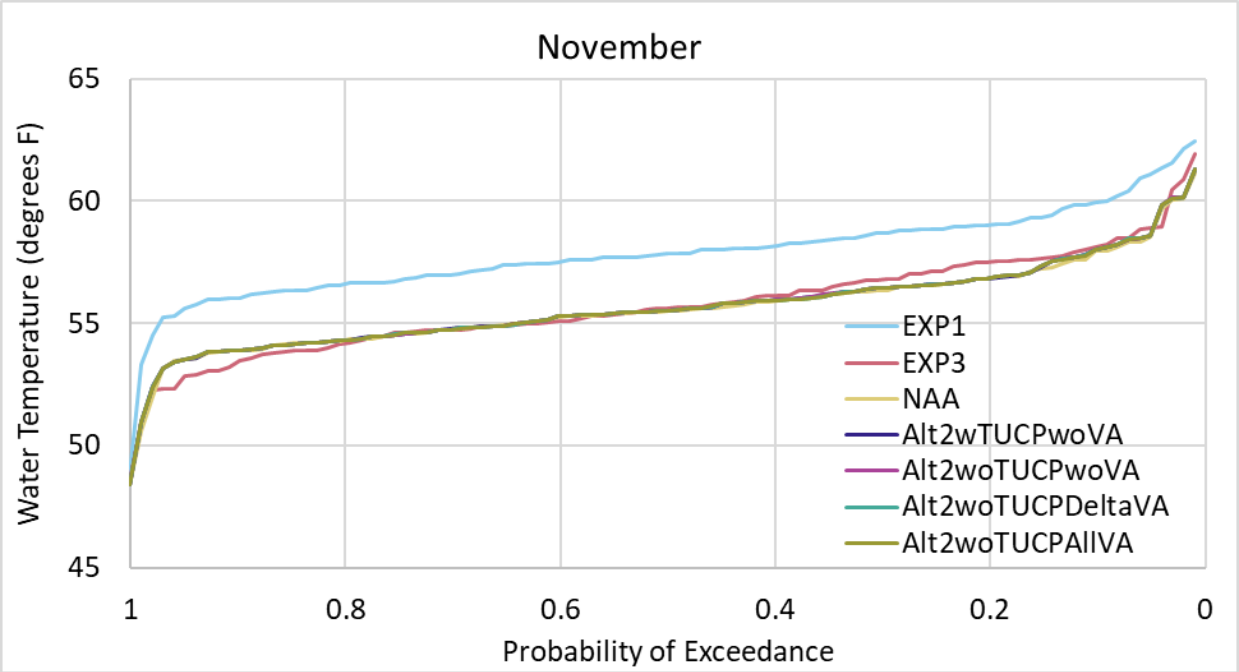

Figure N.1-25. Exceedance plot of modeled water temperatures, Stanislaus River above confluence with San Joaquin River, November.

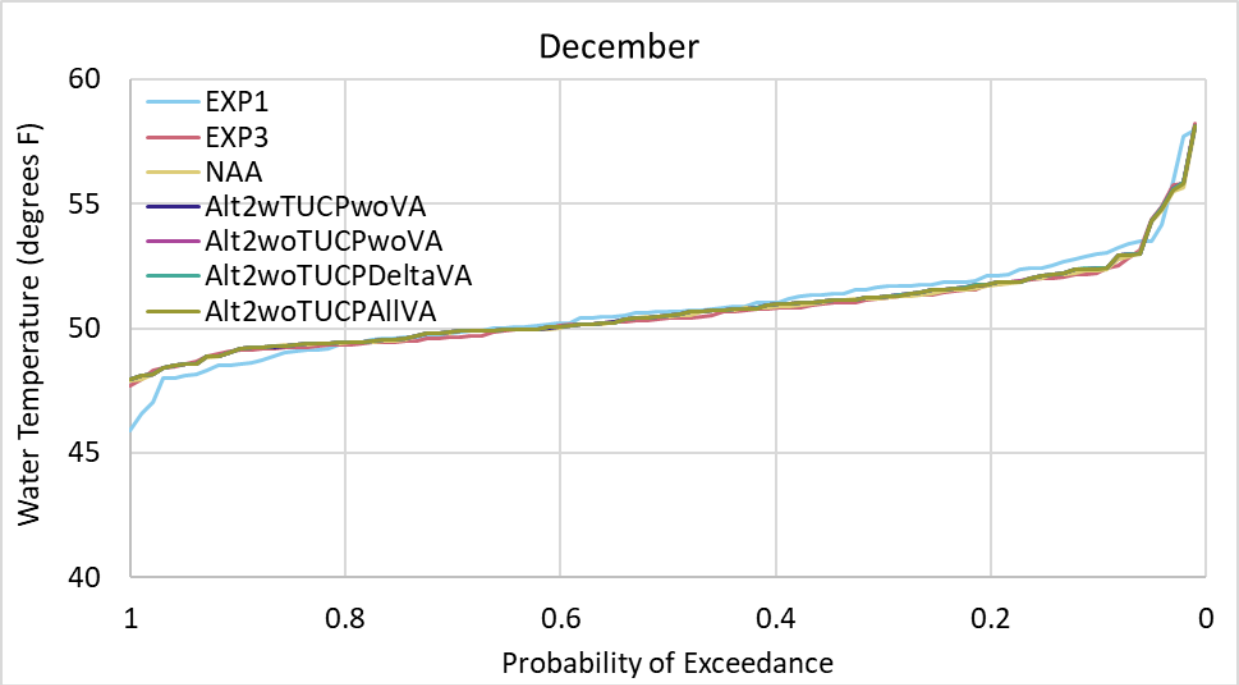

Figure N.1-26. Exceedance plot of modeled water temperatures, Stanislaus River above confluence with San Joaquin River, December.

N.1.3.1.2 Central Valley Steelhead

N.1.3.1.2.1 Adult Migration and Holding

Water temperature-related effects on steelhead adult migration and holding in the Stanislaus River were evaluated by assessing: (1) the percent of months with water temperature outside the 41°F to 66.2°F range of minimal migration impairment (Keefer et al. 2009); (2) the percent of months with water temperature above the 69.8°F upper lethal limit to adult migrants (Coutant 1970); and (3) the percent of months with water temperature above the 59.9°F pathogen virulence threshold (McCullough 1999) at Orange Blossom Bridge and above the confluence with the San Joaquin River (Table N.1-1).

Results for the 41°F to 66.2°F range are presented in Table N.1-3 for Orange Blossom Bridge and Table N.1-4 for the confluence. At Orange Blossom Bridge, the percent of months outside the range was low for NAA and the four Alt 2 versions. In wet water years, water temperatures were outside the range 100% of the time under EXP1in August and September and in the 90% to 95% range in July under EXP1 and EXP3. Percentages outside the range were much lower in other month under EXP1 and EXP3 and were 0% throughout the July to March period under the NAA, Alt2a, Alt2b, Alt2c, and Alt2d.

Table N.1-3. Percent of months outside the 41°F to 66.2°F water temperature range for minimal adult steelhead migration impairment by water year type (San Joaquin Valley Index) and month, and for all years combined, Stanislaus River at Orange Blossom Bridge, July through March.

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCP woVA	Alt2woTUCP woVA	Alt2woTUCP DeltaVA	Alt2woTUCP AllVA
W	7	90.9	95.5	0.0	0.0	0.0	0.0	0.0
W	8	100.0	4.5	0.0	0.0	0.0	0.0	0.0
W	9	100.0	0.0	0.0	0.0	0.0	0.0	0.0
W	10	31.8	0.0	0.0	0.0	0.0	0.0	0.0
W	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	7	100.0	91.7	0.0	0.0	0.0	0.0	0.0
AN	8	100.0	8.3	0.0	0.0	0.0	0.0	0.0
AN	9	100.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	10	50.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCP woVA	Alt2woTUCP woVA	Alt2woTUCP DeltaVA	Alt2woTUCP AllVA
AN	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	7	100.0	78.6	0.0	7.1	7.1	7.1	7.1
BN	8	100.0	14.3	0.0	0.0	0.0	0.0	0.0
BN	9	100.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	10	28.6	0.0	0.0	0.0	0.0	0.0	0.0
BN	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	7	100.0	11.8	0.0	0.0	0.0	0.0	0.0
D	8	100.0	70.6	0.0	0.0	0.0	0.0	0.0
D	9	94.1	0.0	0.0	0.0	0.0	0.0	0.0
D	10	52.9	0.0	0.0	0.0	0.0	0.0	0.0
D	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	7	97.0	3.0	9.1	6.1	6.1	6.1	6.1
C	8	100.0	75.8	3.0	6.1	6.1	6.1	6.1
C	9	87.9	24.2	3.0	6.1	6.1	6.1	3.0
C	10	68.8	0.0	3.1	3.1	3.1	3.1	3.1
C	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	7	96.9	46.9	3.1	3.1	3.1	3.1	3.1
All	8	100.0	41.8	1.0	2.0	2.0	2.0	2.0
All	9	94.9	8.2	1.0	2.0	2.0	2.0	1.0
All	10	49.5	0.0	1.0	1.0	1.0	1.0	1.0

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCP woVA	Alt2woTUCP woVA	Alt2woTUCP DeltaVA	Alt2woTUCP AllVA
All	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0

°F = degrees Fahrenheit; WYT = Water Year Type; W = Wet; AN = Above Normal; BN = Below Normal; D = Dry; C = Critical.

At the confluence, the percent of months outside the 41°F to 66.2°F range for all water year types combined varied from 30.9% under Alt2b, Alt2c, and Alt2d to 38.9% under EXP1 (Table N.1-4). Among water year types, the percent of months outside the range increased from wetter to drier water year types.

Table N.1-4. Percent of months outside the 41°F to 66.2°F water temperature range for minimal adult steelhead migration impairment by water year type (San Joaquin Valley Index) and month, and for all years combined, Stanislaus River above confluence with San Joaquin River, July through March.

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCP woVA	Alt2woTUCP woVA	Alt2woTUCP DeltaVA	Alt2woTUCP AllVA
W	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
W	8	100.0	45.5	77.3	72.7	72.7	72.7	72.7
W	9	100.0	18.2	40.9	40.9	40.9	40.9	40.9
W	10	54.5	0.0	0.0	0.0	0.0	0.0	0.0
W	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AN	8	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AN	9	100.0	75.0	100.0	91.7	91.7	91.7	91.7
AN	10	50.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCP woVA	Alt2woTUCP woVA	Alt2woTUCP DeltaVA	Alt2woTUCP AllVA
AN	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
BN	8	100.0	100.0	100.0	100.0	100.0	100.0	100.0
BN	9	100.0	78.6	100.0	100.0	100.0	100.0	100.0
BN	10	50.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
D	8	100.0	100.0	100.0	100.0	100.0	100.0	100.0
D	9	100.0	100.0	100.0	100.0	100.0	100.0	100.0
D	10	35.3	5.9	0.0	0.0	0.0	0.0	0.0
D	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	7	100.0	100.0	100.0	97.0	93.9	93.9	93.9
C	8	100.0	100.0	100.0	97.0	93.9	93.9	93.9
C	9	100.0	100.0	100.0	100.0	100.0	100.0	100.0
C	10	56.3	15.6	6.3	6.3	6.3	6.3	6.3
C	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	7	100.0	100.0	100.0	99.0	98.0	98.0	98.0
All	8	100.0	87.8	94.9	92.9	91.8	91.8	91.8
All	9	100.0	75.5	86.7	85.7	85.7	85.7	85.7
All	10	50.5	6.2	2.1	2.1	2.1	2.1	2.1
All	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCP woVA	Alt2woTUCP woVA	Alt2woTUCP DeltaVA	Alt2woTUCP AllVA
All	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0

°F = degrees Fahrenheit; WYT = Water Year Type; W = Wet; AN = Above Normal; BN = Below Normal; D = Dry; C = Critical.

Results for the 69.8°F upper limit are presented in Table N.1-5 for Orange Blossom Bridge and Table N.1-6 for the confluence. At Orange Blossom Bridge, the percent of months above the limit for all water year types combined varied from 0% under NAA, Alt2a, Alt2b, Alt2c, and Alt2d to 24.5% under EXP1 (Table N.1-5). Among water year types, the percent of months outside the range increased from drier to wetter water year types under EXP1 and EXP3, but remained at 0% among all water year types for NAA and Alt 2a-d.

Table N.1-5. Percent of months above the 69.8°F lethal water temperature limit for adult steelhead migration by water year type (San Joaquin Valley Index) and month, and for all years combined, Stanislaus River at Orange Blossom Bridge, July through March.

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCP woVA	Alt2woTUCP woVA	Alt2woTUCP DeltaVA	Alt2woTUCP AllVA
W	7	90.9	95.5	0.0	0.0	0.0	0.0	0.0
W	8	95.5	0.0	0.0	0.0	0.0	0.0	0.0
W	9	81.8	0.0	0.0	0.0	0.0	0.0	0.0
W	10	4.5	0.0	0.0	0.0	0.0	0.0	0.0
W	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	7	100.0	41.7	0.0	0.0	0.0	0.0	0.0
AN	8	91.7	0.0	0.0	0.0	0.0	0.0	0.0
AN	9	66.7	0.0	0.0	0.0	0.0	0.0	0.0
AN	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCPwoVA	Alt2woTUCPwoVA	Alt2woTUCPDeltaVA	Alt2woTUCPAllVA
AN	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	7	85.7	42.9	0.0	0.0	0.0	0.0	0.0
BN	8	78.6	0.0	0.0	0.0	0.0	0.0	0.0
BN	9	64.3	0.0	0.0	0.0	0.0	0.0	0.0
BN	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	7	70.6	0.0	0.0	0.0	0.0	0.0	0.0
D	8	58.8	5.9	0.0	0.0	0.0	0.0	0.0
D	9	70.6	0.0	0.0	0.0	0.0	0.0	0.0
D	10	5.9	0.0	0.0	0.0	0.0	0.0	0.0
D	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	7	72.7	0.0	0.0	0.0	0.0	0.0	0.0
C	8	48.5	3.0	0.0	0.0	0.0	0.0	0.0
C	9	51.5	3.0	0.0	0.0	0.0	0.0	0.0
C	10	3.1	0.0	0.0	0.0	0.0	0.0	0.0
C	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	7	81.6	32.7	0.0	0.0	0.0	0.0	0.0
All	8	70.4	2.0	0.0	0.0	0.0	0.0	0.0
All	9	65.3	1.0	0.0	0.0	0.0	0.0	0.0
All	10	3.1	0.0	0.0	0.0	0.0	0.0	0.0
All	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCP woVA	Alt2woTUCP woVA	Alt2woTUCP DeltaVA	Alt2woTUCP AllVA
All	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0

°F = degrees Fahrenheit; WYT = Water Year Type; W = Wet; AN = Above Normal; BN = Below Normal; D = Dry; C = Critical.

At the confluence, the percent of months above the limit for all water year types combined ranged from 26.0% under Alt2b, Alt2c, and Alt2d to 33.1% under EXP1 (Table N.1-6). The highest and lowest percent of months above the limit among water year types was variable and depended on model scenario.

Table N.1-6. Percent of months above the 69.8°F lethal water temperature limit for adult steelhead migration by water year type (San Joaquin Valley Index) and month, and for all years combined, Stanislaus River above confluence with San Joaquin River, July through March.

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCP woVA	Alt2woTUCP woVA	Alt2woTUCP DeltaVA	Alt2woTUCP AllVA
W	7	90.9	100.0	95.5	90.9	90.9	90.9	90.9
W	8	100.0	36.4	54.5	50.0	50.0	50.0	50.0
W	9	100.0	18.2	9.1	9.1	9.1	9.1	9.1
W	10	4.5	0.0	0.0	0.0	0.0	0.0	0.0
W	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AN	8	100.0	91.7	100.0	100.0	100.0	100.0	100.0
AN	9	100.0	58.3	75.0	75.0	75.0	75.0	75.0
AN	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCP woVA	Alt2woTUCP woVA	Alt2woTUCP DeltaVA	Alt2woTUCP AllVA
AN	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
BN	8	100.0	100.0	100.0	100.0	100.0	100.0	100.0
BN	9	100.0	78.6	64.3	64.3	64.3	64.3	64.3
BN	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
D	8	100.0	100.0	100.0	100.0	100.0	100.0	100.0
D	9	94.1	94.1	58.8	58.8	58.8	58.8	58.8
D	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	7	100.0	100.0	100.0	93.9	90.9	90.9	90.9
C	8	100.0	100.0	100.0	93.9	90.9	90.9	90.9
C	9	100.0	100.0	72.7	69.7	66.7	66.7	66.7
C	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	7	98.0	100.0	99.0	95.9	94.9	94.9	94.9
All	8	100.0	84.7	89.8	86.7	85.7	85.7	85.7
All	9	99.0	72.4	55.1	54.1	53.1	53.1	53.1
All	10	1.0	0.0	0.0	0.0	0.0	0.0	0.0
All	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCP woVA	Alt2woTUCP woVA	Alt2woTUCP DeltaVA	Alt2woTUCP AllVA
All	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0

°F = degrees Fahrenheit; WYT = Water Year Type; W = Wet; AN = Above Normal; BN = Below Normal; D = Dry; C = Critical.

Results for the 59.9°F pathogen virulence limit are presented in Table N.1-7 for Orange Blossom Bridge and Table N.1-8 for the confluence. At Orange Blossom Bridge, the percent of months above the limit for all water year types combined ranged from 28.0% under Alt2b, Alt2c, and Alt2d to 46.2% under EXP1 (Table N.1-7). The highest percent of months above the limit occurred in critical water years and the lowest percent of months above the limit occurred mostly in wet years.

Table N.1-7. Percent of months above the 59.9°F pathogen virulence water temperature threshold for adult steelhead migration by water year type (San Joaquin Valley Index) and month, and for all years combined, Stanislaus River at Orange Blossom Bridge, July through March.

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCP woVA	Alt2woTUCP woVA	Alt2woTUCP DeltaVA	Alt2woTUCP AllVA
W	7	100.0	100.0	95.5	100.0	100.0	100.0	100.0
W	8	100.0	31.8	54.5	50.0	50.0	50.0	50.0
W	9	100.0	18.2	4.5	9.1	9.1	9.1	9.1
W	10	100.0	0.0	0.0	0.0	0.0	0.0	0.0
W	11	13.6	0.0	0.0	0.0	0.0	0.0	0.0
W	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AN	8	100.0	91.7	100.0	100.0	100.0	100.0	100.0
AN	9	100.0	50.0	66.7	66.7	66.7	66.7	66.7
AN	10	100.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCPwoVA	Alt2woTUCPwoVA	Alt2woTUCPDeltaVA	Alt2woTUCPAllVA
AN	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
BN	8	100.0	100.0	100.0	100.0	100.0	100.0	100.0
BN	9	100.0	71.4	50.0	50.0	50.0	50.0	50.0
BN	10	100.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	11	13.3	0.0	0.0	0.0	0.0	0.0	0.0
BN	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
D	8	100.0	100.0	100.0	100.0	100.0	100.0	100.0
D	9	100.0	94.1	82.4	82.4	82.4	82.4	82.4
D	10	100.0	0.0	0.0	0.0	0.0	0.0	0.0
D	11	5.9	0.0	0.0	0.0	0.0	0.0	0.0
D	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	3	0.0	5.9	0.0	0.0	0.0	0.0	0.0
C	7	100.0	100.0	100.0	93.9	90.9	90.9	90.9
C	8	100.0	100.0	100.0	93.9	90.9	90.9	90.9
C	9	100.0	100.0	97.0	97.0	97.0	97.0	97.0
C	10	100.0	3.1	9.4	9.4	9.4	9.4	9.4
C	11	28.1	0.0	3.1	3.1	3.1	3.1	3.1
C	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	3	3.0	12.1	3.0	3.0	3.0	3.0	3.0
All	7	100.0	100.0	99.0	98.0	96.9	96.9	96.9
All	8	100.0	83.7	89.8	86.7	85.7	85.7	85.7
All	9	100.0	70.4	63.3	64.3	64.3	64.3	64.3
All	10	100.0	1.0	3.1	3.1	3.1	3.1	3.1
All	11	15.3	0.0	1.0	1.0	1.0	1.0	1.0

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCP woVA	Alt2woTUCP woVA	Alt2woTUCP DeltaVA	Alt2woTUCP AllVA
All	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	3	1.0	5.1	1.0	1.0	1.0	1.0	1.0

°F = degrees Fahrenheit; WYT = Water Year Type; W = Wet; AN = Above Normal; BN = Below Normal; D = Dry; C = Critical.

At the confluence, the percent of months above the limit for all water year types combined ranged from 43.5% under Alt2b, Alt2c, and Alt2d to 46.4% under EXP1 (Table N.1-8). The highest percent of months above the limit occurred in critical water years and the lowest percent of months above the limit occurred mostly in wet years.

Table N.1-8. Percent of months above the 59.9°F pathogen virulence water temperature threshold for adult steelhead migration by water year type (San Joaquin Valley Index) and month, and for all years combined, Stanislaus River above confluence with San Joaquin River, July through March.

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCP woVA	Alt2woTUCP woVA	Alt2woTUCP DeltaVA	Alt2woTUCP AllVA
W	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
W	8	100.0	100.0	100.0	100.0	100.0	100.0	100.0
W	9	100.0	59.1	90.9	90.9	90.9	90.9	90.9
W	10	100.0	18.2	18.2	22.7	22.7	22.7	22.7
W	11	18.2	0.0	0.0	0.0	0.0	0.0	0.0
W	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	3	0.0	9.1	4.5	4.5	4.5	4.5	4.5
AN	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AN	8	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AN	9	100.0	91.7	100.0	100.0	100.0	100.0	100.0
AN	10	100.0	50.0	50.0	58.3	58.3	58.3	58.3
AN	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCPwoVA	Alt2woTUCPwoVA	Alt2woTUCPDeltaVA	Alt2woTUCPAllVA
AN	3	0.0	8.3	0.0	0.0	0.0	0.0	0.0
BN	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
BN	8	100.0	100.0	100.0	100.0	100.0	100.0	100.0
BN	9	100.0	100.0	100.0	100.0	100.0	100.0	100.0
BN	10	100.0	78.6	50.0	50.0	50.0	50.0	50.0
BN	11	6.7	0.0	0.0	0.0	0.0	0.0	0.0
BN	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	3	0.0	14.3	0.0	0.0	0.0	0.0	0.0
D	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
D	8	100.0	100.0	100.0	100.0	100.0	100.0	100.0
D	9	100.0	100.0	100.0	100.0	100.0	100.0	100.0
D	10	100.0	94.1	82.4	88.2	88.2	88.2	88.2
D	11	17.6	11.8	5.9	5.9	5.9	5.9	5.9
D	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	3	0.0	35.3	29.4	23.5	23.5	23.5	23.5
C	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
C	8	100.0	100.0	100.0	100.0	100.0	100.0	100.0
C	9	100.0	100.0	100.0	100.0	100.0	100.0	100.0
C	10	100.0	100.0	100.0	100.0	96.9	96.9	96.9
C	11	6.3	3.1	6.3	6.3	6.3	6.3	6.3
C	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	2	0.0	3.0	3.0	3.0	3.0	3.0	3.0
C	3	24.2	72.7	60.6	51.5	51.5	51.5	51.5
All	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
All	8	100.0	100.0	100.0	100.0	100.0	100.0	100.0
All	9	100.0	89.8	98.0	98.0	98.0	98.0	98.0
All	10	100.0	71.1	64.9	68.0	67.0	67.0	67.0
All	11	10.2	3.1	3.1	3.1	3.1	3.1	3.1
All	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCPwoVA	Alt2woTUCPwoVA	Alt2woTUCPDeltaVA	Alt2woTUCPAllVA
All	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	2	0.0	1.0	1.0	1.0	1.0	1.0	1.0
All	3	8.2	35.7	26.5	22.4	22.4	22.4	22.4

°F = degrees Fahrenheit; WYT = Water Year Type; W = Wet; AN = Above Normal; BN = Below Normal; D = Dry; C = Critical.

N.1.3.1.2.2 Spawning

Water temperature-related effects on steelhead spawning in the Stanislaus River were evaluated by assessing: (1) the percent of months with water temperature outside the 45°F to 55°F range of successful spawning (Bell 1991, Federal Energy Regulatory Commission 1993, Richter and Kolmes 2005); and (2) the percent of months with water temperature above the 59.9°F pathogen virulence threshold (McCullough 1999) at Orange Blossom Bridge (Table N.1-1).

Results for the 45°F to 55°F range are presented in Table N.1-9 for Orange Blossom Bridge. The percent of months outside the range for all water year types combined varied from 21.4% under NAA to 26.7% under EXP1. Among water year types, the percent of months outside the range generally increased from wetter to drier water year types.

Table N.1-9. Percent of months outside the 45°F to 55°F water temperature range for successful steelhead spawning by water year type (San Joaquin Valley Index) and month, and for all years combined, Stanislaus River at Orange Blossom Bridge, December through May.

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCPwoVA	Alt2woTUCPwoVA	Alt2woTUCPDeltaVA	Alt2woTUCPAllVA
W	12	4.5	0.0	0.0	0.0	0.0	0.0	0.0
W	1	4.5	0.0	0.0	0.0	0.0	0.0	0.0
W	2	22.7	0.0	0.0	0.0	0.0	0.0	0.0
W	3	0.0	18.2	13.6	13.6	9.1	13.6	13.6
W	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	5	40.9	4.5	4.5	4.5	4.5	4.5	4.5
AN	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	3	0.0	8.3	16.7	8.3	8.3	8.3	8.3
AN	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	5	91.7	16.7	0.0	0.0	0.0	0.0	0.0

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCP woVA	Alt2woTUCP woVA	Alt2woTUCP DeltaVA	Alt2woTUCP AllVA
BN	12	6.7	0.0	0.0	0.0	0.0	0.0	0.0
BN	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	2	7.1	0.0	0.0	0.0	0.0	0.0	0.0
BN	3	0.0	35.7	0.0	0.0	0.0	0.0	0.0
BN	4	0.0	14.3	7.1	14.3	14.3	14.3	14.3
BN	5	92.9	21.4	14.3	14.3	14.3	14.3	14.3
D	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	2	0.0	5.9	5.9	0.0	0.0	0.0	0.0
D	3	0.0	58.8	47.1	47.1	47.1	47.1	47.1
D	4	29.4	70.6	41.2	64.7	64.7	64.7	64.7
D	5	94.1	100.0	88.2	94.1	94.1	94.1	94.1
C	12	3.1	3.1	3.1	3.1	3.1	3.1	3.1
C	1	3.0	3.0	3.0	6.1	6.1	6.1	6.1
C	2	3.0	6.1	6.1	9.1	9.1	9.1	9.1
C	3	24.2	90.9	69.7	69.7	69.7	69.7	69.7
C	4	87.9	97.0	78.8	81.8	81.8	81.8	81.8
C	5	100.0	100.0	100.0	100.0	100.0	100.0	100.0
All	12	3.1	1.0	1.0	1.0	1.0	1.0	1.0
All	1	2.0	1.0	1.0	2.0	2.0	2.0	2.0
All	2	7.1	3.1	3.1	3.1	3.1	3.1	3.1
All	3	8.2	51.0	36.7	35.7	34.7	35.7	35.7
All	4	34.7	46.9	34.7	40.8	40.8	40.8	40.8
All	5	83.7	57.1	52.0	53.1	53.1	53.1	53.1

°F = degrees Fahrenheit; WYT = Water Year Type; W = Wet; AN = Above Normal; BN = Below Normal; D = Dry; C = Critical.

Results for the 59.9°F pathogen virulence limit for steelhead spawning are presented in Table N.1-10 for Orange Blossom Bridge. The percent of months above the limit for all water year types combined ranged from 0.7% under NAA, Alt2a, Alt2b, Alt2c, and Alt2d to 10.2% under EXP1. Among water year types, the percent of months outside the range increased from wetter to drier water year types.

Table N.1-10. Percent of months above the 59.9°F pathogen virulence water temperature threshold for steelhead spawning by water year type (San Joaquin Valley Index) and month, and for all years combined, Stanislaus River at Orange Blossom Bridge, December through May.

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCP woVA	Alt2woTUCP woVA	Alt2woTUCP DeltaVA	Alt2woTUCP AllVA
W	12.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	5.0	4.5	0.0	0.0	0.0	0.0	0.0	0.0
AN	12.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	12.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	5.0	14.3	0.0	0.0	0.0	0.0	0.0	0.0
D	12.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	3.0	0.0	5.9	0.0	0.0	0.0	0.0	0.0
D	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	5.0	58.8	11.8	0.0	0.0	0.0	0.0	0.0
C	12.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	3.0	3.0	12.1	3.0	3.0	3.0	3.0	3.0
C	4.0	51.5	6.1	0.0	0.0	0.0	0.0	0.0

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCP woVA	Alt2woTUCP woVA	Alt2woTUCP DeltaVA	Alt2woTUCP AllVA
C	5.0	87.9	93.9	9.1	9.1	9.1	9.1	9.1
All	12.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	3.0	1.0	5.1	1.0	1.0	1.0	1.0	1.0
All	4.0	17.3	2.0	0.0	0.0	0.0	0.0	0.0
All	5.0	42.9	33.7	3.1	3.1	3.1	3.1	3.1

°F = degrees Fahrenheit; WYT = Water Year Type; W = Wet; AN = Above Normal; BN = Below Normal; D = Dry; C = Critical.

N.1.3.1.2.3 Kelt Emigration

Water temperature-related effects on steelhead kelt emigration in the Stanislaus River were evaluated by assessing: (1) the percent of months with water temperature above the 66.2°F limit of migration impairment (Keefer et al. 2009); (2) the percent of month with water temperature above the 69.8°F lethal limit (Coutant 1970) and (3) the percent of month with water temperature above the 59.9°F pathogen virulence threshold (McCullough 1999) at Orange Blossom Bridge and above the confluence with the San Joaquin River (Table N.1-1).

Results for the 66.2°F migration impairment limit are presented in Table N.1-11 for Orange Blossom Bridge and Table N.1-12 for the confluence. At Orange Blossom Bridge, the percent of months above the limit ranged from 0.2% under NAA, Alt2a, Alt2b, Alt2c, and Alt2d to 20.8% under EXP1 (Table N.1-11). Among water year types, the percent of months above the limit increased from wetter to drier water year types.

Table N.1-11. Percent of months above the 66.2°F migration impairment water temperature limit for steelhead kelt emigration by water year type (San Joaquin Valley Index) and month, and for all years combined, Stanislaus River at Orange Blossom Bridge, February through June.

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCP woVA	Alt2woTUCP woVA	Alt2woTUCP DeltaVA	Alt2woTUCP AllVA
W	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	6	9.1	0.0	0.0	0.0	0.0	0.0	0.0
AN	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCPwoVA	Alt2woTUCPwoVA	Alt2woTUCPDeltaVA	Alt2woTUCPAllVA
AN	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	6	75.0	75.0	0.0	0.0	0.0	0.0	0.0
BN	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	5	7.1	0.0	0.0	0.0	0.0	0.0	0.0
BN	6	92.9	78.6	0.0	0.0	0.0	0.0	0.0
D	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	5	41.2	0.0	0.0	0.0	0.0	0.0	0.0
D	6	100.0	88.2	0.0	0.0	0.0	0.0	0.0
C	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	4	12.1	0.0	0.0	0.0	0.0	0.0	0.0
C	5	66.7	6.1	0.0	0.0	0.0	0.0	0.0
C	6	81.8	21.2	3.0	3.0	3.0	3.0	3.0
All	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	4	4.1	0.0	0.0	0.0	0.0	0.0	0.0
All	5	30.6	2.0	0.0	0.0	0.0	0.0	0.0
All	6	69.4	42.9	1.0	1.0	1.0	1.0	1.0

°F = degrees Fahrenheit; WYT = Water Year Type; W = Wet; AN = Above Normal; BN = Below Normal; D = Dry; C = Critical.

At the confluence, the percent of months above the limit ranged from 19.4% under Alt2b, Alt2c, and Alt2d to 28.4% under EXP3 (Table N.1-12). Among water year types, the percent of months above the limit increased from wetter to drier water year types.

Table N.1-12. Percent of months above the 66.2°F migration impairment water temperature limit for steelhead kelt emigration by water year type (San Joaquin Valley Index) and month, and for all years combined, Stanislaus River above confluence with San Joaquin River, February through June.

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCP woVA	Alt2woTUCP woVA	Alt2woTUCP DeltaVA	Alt2woTUCP AllVA
W	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	5	4.5	0.0	0.0	0.0	0.0	0.0	0.0
W	6	36.4	36.4	4.5	22.7	22.7	22.7	22.7
AN	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	6	83.3	100.0	91.7	91.7	91.7	91.7	91.7
BN	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	5	14.3	0.0	0.0	0.0	0.0	0.0	0.0
BN	6	92.9	100.0	92.9	100.0	100.0	100.0	100.0
D	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	4	0.0	5.9	0.0	0.0	0.0	0.0	0.0
D	5	58.8	70.6	0.0	23.5	23.5	23.5	23.5
D	6	100.0	100.0	100.0	100.0	100.0	100.0	100.0
C	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	4	24.2	33.3	0.0	0.0	0.0	0.0	0.0
C	5	87.9	93.9	33.3	36.4	36.4	36.4	36.4
C	6	100.0	100.0	100.0	100.0	97.0	97.0	97.0
All	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	4	8.2	12.2	0.0	0.0	0.0	0.0	0.0
All	5	42.9	43.9	11.2	16.3	16.3	16.3	16.3

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCPwoVA	Alt2woTUCPwoVA	Alt2woTUCPDeltaVA	Alt2woTUCPAllVA
All	6	82.7	85.7	76.5	81.6	80.6	80.6	80.6

°F = degrees Fahrenheit; WYT = Water Year Type; W = Wet; AN = Above Normal; BN = Below Normal; D = Dry; C = Critical.

Results for the 69.8°F lethal limit are presented in Table N.1-13 for Orange Blossom Bridge and Table N.1-14 for the confluence. At Orange Blossom Bridge, the percent of months above the limit ranged from 0% under NAA, Alt2a, Alt2b, Alt2c, and Alt2d to13.3% under EXP1 (Table N.1-13). Among water year types, the percent of months above the limit generally increased from wetter to drier water year types.

Table N.1-13. Percent of months above the 69.8°F lethal water temperature limit for steelhead kelt emigration by water year type (San Joaquin Valley Index) and month, and for all years combined, Stanislaus River at Orange Blossom Bridge, February through June.

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCPwoVA	Alt2woTUCPwoVA	Alt2woTUCPDeltaVA	Alt2woTUCPAllVA
W	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	6	9.1	0.0	0.0	0.0	0.0	0.0	0.0
AN	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	6	75.0	25.0	0.0	0.0	0.0	0.0	0.0
BN	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	6	85.7	42.9	0.0	0.0	0.0	0.0	0.0
D	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	5	5.9	0.0	0.0	0.0	0.0	0.0	0.0

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCP woVA	Alt2woTUCP woVA	Alt2woTUCP DeltaVA	Alt2woTUCP AllVA
D	6	76.5	52.9	0.0	0.0	0.0	0.0	0.0
C	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	5	39.4	0.0	0.0	0.0	0.0	0.0	0.0
C	6	45.5	3.0	0.0	0.0	0.0	0.0	0.0
All	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	5	14.3	0.0	0.0	0.0	0.0	0.0	0.0
All	6	52.0	19.4	0.0	0.0	0.0	0.0	0.0

°F = degrees Fahrenheit; WYT = Water Year Type; W = Wet; AN = Above Normal; BN = Below Normal; D = Dry; C = Critical.

At the confluence, the percent of months above the limit ranged from 8.8% under Alt2b, Alt2c, and Alt2d to 18.2% under EXP1 (Table N.1-14). Among water year types, the percent of months above the limit generally increased from wetter to drier water year types.

Table N.1-14. Percent of months above the 69.8°F lethal water temperature limit for steelhead kelt emigration by water year type (San Joaquin Valley Index) and month, and for all years combined, Stanislaus River above confluence with San Joaquin River, February through June.

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCP woVA	Alt2woTUCP woVA	Alt2woTUCP DeltaVA	Alt2woTUCP AllVA
W	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	5	4.5	0.0	0.0	0.0	0.0	0.0	0.0
W	6	9.1	0.0	0.0	4.5	4.5	4.5	4.5
AN	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	6	75.0	91.7	0.0	0.0	0.0	0.0	0.0
BN	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCP woVA	Alt2woTUCP woVA	Alt2woTUCP DeltaVA	Alt2woTUCP AllVA
BN	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	5	7.1	0.0	0.0	0.0	0.0	0.0	0.0
BN	6	78.6	85.7	14.3	14.3	14.3	14.3	14.3
D	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	5	5.9	0.0	0.0	0.0	0.0	0.0	0.0
D	6	100.0	100.0	64.7	70.6	70.6	70.6	70.6
C	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	5	45.5	36.4	0.0	0.0	0.0	0.0	0.0
C	6	97.0	100.0	93.9	87.9	84.8	84.8	84.8
All	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	5	18.4	12.2	0.0	0.0	0.0	0.0	0.0
All	6	72.4	74.5	44.9	44.9	43.9	43.9	43.9

°F = degrees Fahrenheit; WYT = Water Year Type; W = Wet; AN = Above Normal; BN = Below Normal; D = Dry; C = Critical.

Results for the 59.9°F pathogen virulence threshold are presented in Table N.1-15 for Orange Blossom Bridge and Table N.1-16 for the confluence. At Orange Blossom Bridge, the percent of months above the threshold ranged from 11.6% under NAA, Alt2b, Alt2c, and Alt2d to 30.2% under EXP1 (Table N.1-15). Among water year types, the percent of months above the threshold increased from wetter to drier water year types.

Table N.1-15. Percent of months above the 59.9°F pathogen virulence water temperature threshold for steelhead kelt emigration by water year type (San Joaquin Valley Index) and month, and for all years combined, Stanislaus River at Orange Blossom Bridge, February through June.

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCP woVA	Alt2woTUCP woVA	Alt2woTUCP DeltaVA	Alt2woTUCP AllVA
W	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCP woVA	Alt2woTUCP woVA	Alt2woTUCP DeltaVA	Alt2woTUCP AllVA
W	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	5	4.5	0.0	0.0	0.0	0.0	0.0	0.0
W	6	54.5	0.0	0.0	4.5	4.5	4.5	4.5
AN	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	6	100.0	100.0	8.3	8.3	8.3	8.3	8.3
BN	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	5	14.3	0.0	0.0	0.0	0.0	0.0	0.0
BN	6	100.0	100.0	14.3	28.6	28.6	28.6	28.6
D	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	3	0.0	5.9	0.0	0.0	0.0	0.0	0.0
D	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	5	58.8	11.8	0.0	0.0	0.0	0.0	0.0
D	6	100.0	100.0	100.0	100.0	100.0	100.0	100.0
C	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	3	3.0	12.1	3.0	3.0	3.0	3.0	3.0
C	4	51.5	6.1	0.0	0.0	0.0	0.0	0.0
C	5	87.9	93.9	9.1	9.1	9.1	9.1	9.1
C	6	100.0	97.0	100.0	93.9	90.9	90.9	90.9
All	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	3	1.0	5.1	1.0	1.0	1.0	1.0	1.0
All	4	17.3	2.0	0.0	0.0	0.0	0.0	0.0
All	5	42.9	33.7	3.1	3.1	3.1	3.1	3.1
All	6	89.8	76.5	54.1	55.1	54.1	54.1	54.1

°F = degrees Fahrenheit; WYT = Water Year Type; W = Wet; AN = Above Normal; BN = Below Normal; D = Dry; C = Critical.

At the confluence, the percent of months above the threshold ranged from 43.5% under EXP1 to 53.1% under EXP3 (Table N.1-16). Among water year types, the percent of months above the threshold increased from wetter to drier water year types.

Table N.1-16. Percent of months above the 59.9°F pathogen virulence water temperature threshold for steelhead kelt emigration by water year type (San Joaquin Valley Index) and month, and for all years combined, Stanislaus River above confluence with San Joaquin River, February through June.

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCPwoVA	Alt2woTUCPwoVA	Alt2woTUCPDeltaVA	Alt2woTUCPAllVA
W	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	3	0.0	9.1	4.5	4.5	4.5	4.5	4.5
W	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	5	9.1	13.6	9.1	4.5	4.5	4.5	4.5
W	6	100.0	95.5	100.0	100.0	100.0	100.0	100.0
AN	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	3	0.0	8.3	0.0	0.0	0.0	0.0	0.0
AN	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	5	75.0	91.7	25.0	41.7	41.7	41.7	41.7
AN	6	100.0	100.0	100.0	100.0	100.0	100.0	100.0
BN	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	3	0.0	14.3	0.0	0.0	0.0	0.0	0.0
BN	4	0.0	28.6	7.1	21.4	21.4	21.4	21.4
BN	5	64.3	92.9	35.7	57.1	57.1	57.1	57.1
BN	6	100.0	100.0	100.0	100.0	100.0	100.0	100.0
D	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	3	0.0	35.3	29.4	23.5	23.5	23.5	23.5
D	4	47.1	76.5	70.6	70.6	70.6	70.6	70.6
D	5	94.1	100.0	100.0	100.0	100.0	100.0	100.0
D	6	100.0	100.0	100.0	100.0	100.0	100.0	100.0
C	2	0.0	3.0	3.0	3.0	3.0	3.0	3.0
C	3	24.2	72.7	60.6	51.5	51.5	51.5	51.5
C	4	90.9	100.0	93.9	93.9	93.9	93.9	93.9
C	5	100.0	100.0	100.0	100.0	100.0	100.0	100.0
C	6	100.0	100.0	100.0	100.0	100.0	100.0	100.0
All	2	0.0	1.0	1.0	1.0	1.0	1.0	1.0

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCP woVA	Alt2woTUCP woVA	Alt2woTUCP DeltaVA	Alt2woTUCP AllVA
All	3	8.2	35.7	26.5	22.4	22.4	22.4	22.4
All	4	38.8	51.0	44.9	46.9	46.9	46.9	46.9
All	5	70.4	78.6	61.2	65.3	65.3	65.3	65.3
All	6	100.0	99.0	100.0	100.0	100.0	100.0	100.0

°F = degrees Fahrenheit; WYT = Water Year Type; W = Wet; AN = Above Normal; BN = Below Normal; D = Dry; C = Critical.

N.1.3.1.2.4 Egg Incubation and Fry Emergence

Water temperature-related effects on steelhead egg incubation and fry emergence in the Stanislaus River were evaluated by assessing: (1) the percent of months with water temperature outside the 45°F to 52°F range for optimal egg incubation (McCullough et al. 2001); (2) the percent of months with water temperatures above the 54°F index value for egg incubation (Appendix N); and (3) the percent of months with water temperature above the 59.9°F pathogen virulence threshold (McCullough 1999) at Orange Blossom Bridge (Table N.1-1).

Results for the 45°F to 52°F optimal egg incubation range are presented in Table N.1-17. The percent of months outside the range varied from 56.3% under EXP1 to 61.9% under Alt2c and Alt 2d. Among water year types, the percent of months outside the range generally increased from wetter to drier water year types.

Table N.1-17. Percent of months outside the 45°F to 52°F optimal egg incubation water temperature range steelhead by water year type (San Joaquin Valley Index) and month, and for all years combined, Stanislaus River at Orange Blossom Bridge, December through July.

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCP woVA	Alt2woTUCP woVA	Alt2woTUCP DeltaVA	Alt2woTUCP AllVA
W	12	81.8	9.1	13.6	13.6	13.6	13.6	13.6
W	1	4.5	4.5	4.5	4.5	4.5	4.5	4.5
W	2	22.7	9.1	0.0	4.5	4.5	4.5	4.5
W	3	0.0	22.7	31.8	45.5	45.5	45.5	45.5
W	4	18.2	31.8	22.7	22.7	22.7	22.7	22.7
W	5	100.0	86.4	81.8	72.7	72.7	77.3	77.3
W	6	100.0	100.0	100.0	100.0	100.0	100.0	100.0
W	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AN	12	41.7	0.0	0.0	8.3	8.3	8.3	8.3
AN	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	2	0.0	8.3	8.3	8.3	8.3	8.3	8.3

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCPwoVA	Alt2woTUCPwoVA	Alt2woTUCPDeltaVA	Alt2woTUCPAllVA
AN	3	0.0	33.3	50.0	50.0	50.0	50.0	50.0
AN	4	66.7	50.0	41.7	50.0	50.0	50.0	50.0
AN	5	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AN	6	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AN	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
BN	12	46.7	20.0	20.0	20.0	20.0	20.0	20.0
BN	1	0.0	7.1	0.0	0.0	0.0	0.0	0.0
BN	2	7.1	14.3	14.3	7.1	7.1	7.1	7.1
BN	3	7.1	57.1	57.1	57.1	64.3	64.3	64.3
BN	4	71.4	64.3	42.9	71.4	71.4	71.4	71.4
BN	5	100.0	100.0	100.0	100.0	100.0	100.0	100.0
BN	6	100.0	100.0	100.0	100.0	100.0	100.0	100.0
BN	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
D	12	41.2	29.4	29.4	29.4	29.4	29.4	29.4
D	1	0.0	11.8	11.8	11.8	11.8	11.8	11.8
D	2	0.0	23.5	35.3	35.3	35.3	35.3	35.3
D	3	5.9	82.4	94.1	88.2	88.2	88.2	88.2
D	4	76.5	100.0	100.0	100.0	100.0	100.0	100.0
D	5	100.0	100.0	100.0	100.0	100.0	100.0	100.0
D	6	100.0	100.0	100.0	100.0	100.0	100.0	100.0
D	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
C	12	50.0	37.5	40.6	43.8	43.8	43.8	43.8
C	1	3.0	9.1	9.1	9.1	9.1	9.1	9.1
C	2	6.1	45.5	45.5	33.3	33.3	33.3	33.3
C	3	45.5	100.0	100.0	100.0	100.0	100.0	100.0
C	4	97.0	100.0	100.0	100.0	100.0	100.0	100.0
C	5	100.0	100.0	100.0	100.0	100.0	100.0	100.0
C	6	100.0	100.0	100.0	100.0	100.0	100.0	100.0
C	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
All	12	54.1	22.4	24.5	26.5	26.5	26.5	26.5
All	1	2.0	7.1	6.1	6.1	6.1	6.1	6.1
All	2	8.2	24.5	24.5	20.4	20.4	20.4	20.4
All	3	17.3	65.3	71.4	73.5	74.5	74.5	74.5
All	4	68.4	73.5	67.3	72.4	72.4	72.4	72.4

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCPwoVA	Alt2woTUCPwoVA	Alt2woTUCPDeltaVA	Alt2woTUCPAllVA
All	5	100.0	96.9	95.9	93.9	93.9	94.9	94.9
All	6	100.0	100.0	100.0	100.0	100.0	100.0	100.0
All	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0

°F = degrees Fahrenheit; WYT = Water Year Type; W = Wet; AN = Above Normal; BN = Below Normal; D = Dry; C = Critical.

Results for the 54°F egg incubation value are presented in Table N.1-18. The percent of months above the value ranged from 27.0% under EXP1 to 33.2% under EXP3. Among water year types, the percent of months above the value generally increased from wetter to drier water year types.

Table N.1-18. Percent of months above the 54°F value for steelhead egg incubation by water year type (San Joaquin Valley Index) and month, and for all years combined, Stanislaus River at Orange Blossom Bridge, December through May.

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCPwoVA	Alt2woTUCPwoVA	Alt2woTUCPDeltaVA	Alt2woTUCPAllVA
W	12	81.8	9.1	13.6	13.6	13.6	13.6	13.6
W	1	4.5	4.5	4.5	4.5	4.5	4.5	4.5
W	2	22.7	9.1	0.0	4.5	4.5	4.5	4.5
W	3	0.0	22.7	31.8	45.5	45.5	45.5	45.5
W	4	18.2	31.8	22.7	22.7	22.7	22.7	22.7
W	5	100.0	86.4	81.8	72.7	72.7	77.3	77.3
W	6	100.0	100.0	100.0	100.0	100.0	100.0	100.0
W	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AN	12	41.7	0.0	0.0	8.3	8.3	8.3	8.3
AN	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	2	0.0	8.3	8.3	8.3	8.3	8.3	8.3
AN	3	0.0	33.3	50.0	50.0	50.0	50.0	50.0
AN	4	66.7	50.0	41.7	50.0	50.0	50.0	50.0
AN	5	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AN	6	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AN	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
BN	12	46.7	20.0	20.0	20.0	20.0	20.0	20.0
BN	1	0.0	7.1	0.0	0.0	0.0	0.0	0.0
BN	2	7.1	14.3	14.3	7.1	7.1	7.1	7.1

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCP woVA	Alt2woTUCP woVA	Alt2woTUCP DeltaVA	Alt2woTUCP AllVA
BN	3	7.1	57.1	57.1	57.1	64.3	64.3	64.3
BN	4	71.4	64.3	42.9	71.4	71.4	71.4	71.4
BN	5	100.0	100.0	100.0	100.0	100.0	100.0	100.0
BN	6	100.0	100.0	100.0	100.0	100.0	100.0	100.0
BN	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
D	12	41.2	29.4	29.4	29.4	29.4	29.4	29.4
D	1	0.0	11.8	11.8	11.8	11.8	11.8	11.8
D	2	0.0	23.5	35.3	35.3	35.3	35.3	35.3
D	3	5.9	82.4	94.1	88.2	88.2	88.2	88.2
D	4	76.5	100.0	100.0	100.0	100.0	100.0	100.0
D	5	100.0	100.0	100.0	100.0	100.0	100.0	100.0
D	6	100.0	100.0	100.0	100.0	100.0	100.0	100.0
D	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
C	12	50.0	37.5	40.6	43.8	43.8	43.8	43.8
C	1	3.0	9.1	9.1	9.1	9.1	9.1	9.1
C	2	6.1	45.5	45.5	33.3	33.3	33.3	33.3
C	3	45.5	100.0	100.0	100.0	100.0	100.0	100.0
C	4	97.0	100.0	100.0	100.0	100.0	100.0	100.0
C	5	100.0	100.0	100.0	100.0	100.0	100.0	100.0
C	6	100.0	100.0	100.0	100.0	100.0	100.0	100.0
C	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
All	12	54.1	22.4	24.5	26.5	26.5	26.5	26.5
All	1	2.0	7.1	6.1	6.1	6.1	6.1	6.1
All	2	8.2	24.5	24.5	20.4	20.4	20.4	20.4
All	3	17.3	65.3	71.4	73.5	74.5	74.5	74.5
All	4	68.4	73.5	67.3	72.4	72.4	72.4	72.4
All	5	100.0	96.9	95.9	93.9	93.9	94.9	94.9
All	6	100.0	100.0	100.0	100.0	100.0	100.0	100.0
All	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0

°F = degrees Fahrenheit; WYT = Water Year Type; W = Wet; AN = Above Normal; BN = Below Normal; D = Dry; C = Critical.

Results for the 59.9°F pathogen virulence threshold are presented in Table N.1-19. The percent of months above the threshold ranged from19.4% under Alt2a, Alt2b, Alt2c, and Alt2d to 31.4% under EXP1. Among water year types, the percent of months above the threshold increased from wetter to drier water year types.

Table N.1-19. Percent of months above the 59.9°F pathogen virulence water temperature threshold for steelhead egg incubation and fry emergence by water year type (San Joaquin Valley Index) and month, and for all years combined, Stanislaus River at Orange Blossom Bridge, December through July.

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCPwoVA	Alt2woTUCPwoVA	Alt2woTUCPDeltaVA	Alt2woTUCPAllVA
W	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	5	4.5	0.0	0.0	0.0	0.0	0.0	0.0
W	6	54.5	0.0	0.0	4.5	4.5	4.5	4.5
W	7	100.0	100.0	95.5	100.0	100.0	100.0	100.0
AN	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	6	100.0	100.0	8.3	8.3	8.3	8.3	8.3
AN	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
BN	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	5	14.3	0.0	0.0	0.0	0.0	0.0	0.0
BN	6	100.0	100.0	14.3	28.6	28.6	28.6	28.6
BN	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
D	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCP woVA	Alt2woTUCP woVA	Alt2woTUCP DeltaVA	Alt2woTUCP AllVA
D	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	3	0.0	5.9	0.0	0.0	0.0	0.0	0.0
D	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	5	58.8	11.8	0.0	0.0	0.0	0.0	0.0
D	6	100.0	100.0	100.0	100.0	100.0	100.0	100.0
D	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
C	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	3	3.0	12.1	3.0	3.0	3.0	3.0	3.0
C	4	51.5	6.1	0.0	0.0	0.0	0.0	0.0
C	5	87.9	93.9	9.1	9.1	9.1	9.1	9.1
C	6	100.0	97.0	100.0	93.9	90.9	90.9	90.9
C	7	100.0	100.0	100.0	93.9	90.9	90.9	90.9
All	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	3	1.0	5.1	1.0	1.0	1.0	1.0	1.0
All	4	17.3	2.0	0.0	0.0	0.0	0.0	0.0
All	5	42.9	33.7	3.1	3.1	3.1	3.1	3.1
All	6	89.8	76.5	54.1	55.1	54.1	54.1	54.1
All	7	100.0	100.0	99.0	98.0	96.9	96.9	96.9

°F = degrees Fahrenheit; WYT = Water Year Type; W = Wet; AN = Above Normal; BN = Below Normal; D = Dry; C = Critical.

N.1.3.1.2.5 Juvenile Rearing and Outmigration

Water temperature-related effects on juvenile steelhead rearing and outmigration in the Stanislaus River were evaluated by assessing: (1) the percent of months with water temperature above the 66.2°F upper optimal limit of growth without food limitation (Myrick 1998; Myrick and Cech 2001); (2) the percent of months with water temperature above the 59.9°F pathogen virulence threshold (McCullough 1999); (3) the percent of months with water temperatures above the 68°F index value for juvenile rearing (Appendix N); and (4) the percent of months with water temperatures above the 55°F limit of successful smoltification at Orange Blossom Bridge and above the confluence with the San Joaquin River (Table N.1-1).

Results for the 66.2°F migration impairment limit are presented in Table N.1-20 for Orange Blossom Bridge and Table N.1-21 for the confluence. At Orange Blossom Bridge, the percent of months above the limit ranged from 0.6% under the NAA to 37.1% under EXP1 (Table N.1-20). Among water year types, the percent of months above the threshold generally increased from wetter to drier water year types.

Table N.1-20. Percent of months above the 66.2°F upper optimal limit for rearing steelhead juveniles by water year type (San Joaquin Valley Index) and month, and for all years combined, Stanislaus River at Orange Blossom Bridge, Year-round.

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCPwoVA	Alt2woTUCPwoVA	Alt2woTUCPDeltaVA	Alt2woTUCPAllVA
W	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	6	9.1	0.0	0.0	0.0	0.0	0.0	0.0
W	7	90.9	95.5	0.0	0.0	0.0	0.0	0.0
W	8	100.0	4.5	0.0	0.0	0.0	0.0	0.0
W	9	100.0	0.0	0.0	0.0	0.0	0.0	0.0
W	10	31.8	0.0	0.0	0.0	0.0	0.0	0.0
W	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	6	75.0	75.0	0.0	0.0	0.0	0.0	0.0
AN	7	100.0	91.7	0.0	0.0	0.0	0.0	0.0
AN	8	100.0	8.3	0.0	0.0	0.0	0.0	0.0
AN	9	100.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	10	50.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCP woVA	Alt2woTUCP woVA	Alt2woTUCP DeltaVA	Alt2woTUCP AllVA
BN	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	5	7.1	0.0	0.0	0.0	0.0	0.0	0.0
BN	6	92.9	78.6	0.0	0.0	0.0	0.0	0.0
BN	7	100.0	78.6	0.0	7.1	7.1	7.1	7.1
BN	8	100.0	14.3	0.0	0.0	0.0	0.0	0.0
BN	9	100.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	10	28.6	0.0	0.0	0.0	0.0	0.0	0.0
BN	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	5	41.2	0.0	0.0	0.0	0.0	0.0	0.0
D	6	100.0	88.2	0.0	0.0	0.0	0.0	0.0
D	7	100.0	11.8	0.0	0.0	0.0	0.0	0.0
D	8	100.0	70.6	0.0	0.0	0.0	0.0	0.0
D	9	94.1	0.0	0.0	0.0	0.0	0.0	0.0
D	10	52.9	0.0	0.0	0.0	0.0	0.0	0.0
D	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	4	12.1	0.0	0.0	0.0	0.0	0.0	0.0
C	5	66.7	6.1	0.0	0.0	0.0	0.0	0.0
C	6	81.8	21.2	3.0	3.0	3.0	3.0	3.0
C	7	97.0	3.0	9.1	6.1	6.1	6.1	6.1
C	8	100.0	75.8	3.0	6.1	6.1	6.1	6.1
C	9	87.9	24.2	3.0	6.1	6.1	6.1	3.0
C	10	68.8	0.0	3.1	3.1	3.1	3.1	3.1
C	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCP woVA	Alt2woTUCP woVA	Alt2woTUCP DeltaVA	Alt2woTUCP AllVA
All	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	4	4.1	0.0	0.0	0.0	0.0	0.0	0.0
All	5	30.6	2.0	0.0	0.0	0.0	0.0	0.0
All	6	69.4	42.9	1.0	1.0	1.0	1.0	1.0
All	7	96.9	46.9	3.1	3.1	3.1	3.1	3.1
All	8	100.0	41.8	1.0	2.0	2.0	2.0	2.0
All	9	94.9	8.2	1.0	2.0	2.0	2.0	1.0
All	10	49.5	0.0	1.0	1.0	1.0	1.0	1.0
All	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0

°F = degrees Fahrenheit; WYT = Water Year Type; W = Wet; AN = Above Normal; BN = Below Normal; D = Dry; C = Critical.

At the confluence, the percent of months above the limit ranged from 31.0% under the NAA to 40.3% under EXP1 (Table N.1-21). Among water year types, the percent of months above the threshold generally increased from wetter to drier water year types.

Table N.1-21. Percent of months above the 66.2°F upper optimal growth limit for rearing steelhead juveniles by water year type (San Joaquin Valley Index) and month, and for all years combined, Stanislaus River above the confluence with the San Joaquin River, Year-round.

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCP woVA	Alt2woTUCP woVA	Alt2woTUCP DeltaVA	Alt2woTUCP AllVA
W	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	5	4.5	0.0	0.0	0.0	0.0	0.0	0.0
W	6	36.4	36.4	4.5	22.7	22.7	22.7	22.7
W	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
W	8	100.0	45.5	77.3	72.7	72.7	72.7	72.7
W	9	100.0	18.2	40.9	40.9	40.9	40.9	40.9
W	10	54.5	0.0	0.0	0.0	0.0	0.0	0.0

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCPwoVA	Alt2woTUCPwoVA	Alt2woTUCPDeltaVA	Alt2woTUCPAllVA
W	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	6	83.3	100.0	91.7	91.7	91.7	91.7	91.7
AN	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AN	8	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AN	9	100.0	75.0	100.0	91.7	91.7	91.7	91.7
AN	10	50.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	5	14.3	0.0	0.0	0.0	0.0	0.0	0.0
BN	6	92.9	100.0	92.9	100.0	100.0	100.0	100.0
BN	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
BN	8	100.0	100.0	100.0	100.0	100.0	100.0	100.0
BN	9	100.0	78.6	100.0	100.0	100.0	100.0	100.0
BN	10	50.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	4	0.0	5.9	0.0	0.0	0.0	0.0	0.0
D	5	58.8	70.6	0.0	23.5	23.5	23.5	23.5
D	6	100.0	100.0	100.0	100.0	100.0	100.0	100.0
D	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
D	8	100.0	100.0	100.0	100.0	100.0	100.0	100.0

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCPwoVA	Alt2woTUCPwoVA	Alt2woTUCPDeltaVA	Alt2woTUCPAllVA
D	9	100.0	100.0	100.0	100.0	100.0	100.0	100.0
D	10	35.3	5.9	0.0	0.0	0.0	0.0	0.0
D	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	4	24.2	33.3	0.0	0.0	0.0	0.0	0.0
C	5	87.9	93.9	33.3	36.4	36.4	36.4	36.4
C	6	100.0	100.0	100.0	100.0	97.0	97.0	97.0
C	7	100.0	100.0	100.0	97.0	93.9	93.9	93.9
C	8	100.0	100.0	100.0	97.0	93.9	93.9	93.9
C	9	100.0	100.0	100.0	100.0	100.0	100.0	100.0
C	10	56.3	15.6	6.3	6.3	6.3	6.3	6.3
C	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	4	8.2	12.2	0.0	0.0	0.0	0.0	0.0
All	5	42.9	43.9	11.2	16.3	16.3	16.3	16.3
All	6	82.7	85.7	76.5	81.6	80.6	80.6	80.6
All	7	100.0	100.0	100.0	99.0	98.0	98.0	98.0
All	8	100.0	87.8	94.9	92.9	91.8	91.8	91.8
All	9	100.0	75.5	86.7	85.7	85.7	85.7	85.7
All	10	50.5	6.2	2.1	2.1	2.1	2.1	2.1
All	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0

°F = degrees Fahrenheit; WYT = Water Year Type; W = Wet; AN = Above Normal; BN = Below Normal; D = Dry; C = Critical.

Results for the 59.9°F pathogen virulence threshold are presented in Table N.1-22 for Orange Blossom Bridge and Table N.1-23 for the confluence. At Orange Blossom Bridge, the percent of months above the threshold ranged from 25.8% under Alt2b, Alt2c, and Alt2d to 47.1% under EXP1 (Table N.1-22). Among water year types, the percent of months above the threshold increased from wetter to drier water year types.

Table N.1-22. Percent of months above the 59.9°F pathogen virulence water temperature threshold for juvenile steelhead rearing and outmigration by water year type (San Joaquin Valley Index) and month, and for all years combined, Stanislaus River at Orange Blossom Bridge, Year-round.

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCPwoVA	Alt2woTUCPwoVA	Alt2woTUCPDeltaVA	Alt2woTUCPAllVA
W	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	5	4.5	0.0	0.0	0.0	0.0	0.0	0.0
W	6	54.5	0.0	0.0	4.5	4.5	4.5	4.5
W	7	100.0	100.0	95.5	100.0	100.0	100.0	100.0
W	8	100.0	31.8	54.5	50.0	50.0	50.0	50.0
W	9	100.0	18.2	4.5	9.1	9.1	9.1	9.1
W	10	100.0	0.0	0.0	0.0	0.0	0.0	0.0
W	11	13.6	0.0	0.0	0.0	0.0	0.0	0.0
W	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	6	100.0	100.0	8.3	8.3	8.3	8.3	8.3
AN	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AN	8	100.0	91.7	100.0	100.0	100.0	100.0	100.0
AN	9	100.0	50.0	66.7	66.7	66.7	66.7	66.7
AN	10	100.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCP woVA	Alt2woTUCP woVA	Alt2woTUCP DeltaVA	Alt2woTUCP AllVA
BN	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	5	14.3	0.0	0.0	0.0	0.0	0.0	0.0
BN	6	100.0	100.0	14.3	28.6	28.6	28.6	28.6
BN	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
BN	8	100.0	100.0	100.0	100.0	100.0	100.0	100.0
BN	9	100.0	71.4	50.0	50.0	50.0	50.0	50.0
BN	10	100.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	11	13.3	0.0	0.0	0.0	0.0	0.0	0.0
BN	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	3	0.0	5.9	0.0	0.0	0.0	0.0	0.0
D	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	5	58.8	11.8	0.0	0.0	0.0	0.0	0.0
D	6	100.0	100.0	100.0	100.0	100.0	100.0	100.0
D	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
D	8	100.0	100.0	100.0	100.0	100.0	100.0	100.0
D	9	100.0	94.1	82.4	82.4	82.4	82.4	82.4
D	10	100.0	0.0	0.0	0.0	0.0	0.0	0.0
D	11	5.9	0.0	0.0	0.0	0.0	0.0	0.0
D	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	3	3.0	12.1	3.0	3.0	3.0	3.0	3.0
C	4	51.5	6.1	0.0	0.0	0.0	0.0	0.0
C	5	87.9	93.9	9.1	9.1	9.1	9.1	9.1
C	6	100.0	97.0	100.0	93.9	90.9	90.9	90.9
C	7	100.0	100.0	100.0	93.9	90.9	90.9	90.9
C	8	100.0	100.0	100.0	93.9	90.9	90.9	90.9
C	9	100.0	100.0	97.0	97.0	97.0	97.0	97.0
C	10	100.0	3.1	9.4	9.4	9.4	9.4	9.4
C	11	28.1	0.0	3.1	3.1	3.1	3.1	3.1

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCPwoVA	Alt2woTUCPwoVA	Alt2woTUCPDeltaVA	Alt2woTUCPAllVA
C	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	3	1.0	5.1	1.0	1.0	1.0	1.0	1.0
All	4	17.3	2.0	0.0	0.0	0.0	0.0	0.0
All	5	42.9	33.7	3.1	3.1	3.1	3.1	3.1
All	6	89.8	76.5	54.1	55.1	54.1	54.1	54.1
All	7	100.0	100.0	99.0	98.0	96.9	96.9	96.9
All	8	100.0	83.7	89.8	86.7	85.7	85.7	85.7
All	9	100.0	70.4	63.3	64.3	64.3	64.3	64.3
All	10	100.0	1.0	3.1	3.1	3.1	3.1	3.1
All	11	15.3	0.0	1.0	1.0	1.0	1.0	1.0
All	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0

°F = degrees Fahrenheit; WYT = Water Year Type; W = Wet; AN = Above Normal; BN = Below Normal; D = Dry; C = Critical.

At the confluence, the percent of months above the threshold ranged from 50.0% under the NAA to 52.4% under EXP3 (Table N.1-23). Among water year types, the percent of months above the threshold generally increased from wetter to drier water year types.

Table N.1-23. Percent of months above the 59.9°F pathogen virulence water temperature threshold for juvenile steelhead rearing and outmigration by water year type (San Joaquin Valley Index) and month, and for all years combined, Stanislaus River above the confluence with the San Joaquin River, Year-round.

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCPwoVA	Alt2woTUCPwoVA	Alt2woTUCPDeltaVA	Alt2woTUCPAllVA
W	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	3	0.0	9.1	4.5	4.5	4.5	4.5	4.5
W	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	5	9.1	13.6	9.1	4.5	4.5	4.5	4.5
W	6	100.0	95.5	100.0	100.0	100.0	100.0	100.0
W	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
W	8	100.0	100.0	100.0	100.0	100.0	100.0	100.0
W	9	100.0	59.1	90.9	90.9	90.9	90.9	90.9

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCPwoVA	Alt2woTUCPwoVA	Alt2woTUCPDeltaVA	Alt2woTUCPAllVA
W	10	100.0	18.2	18.2	22.7	22.7	22.7	22.7
W	11	18.2	0.0	0.0	0.0	0.0	0.0	0.0
W	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	3	0.0	8.3	0.0	0.0	0.0	0.0	0.0
AN	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	5	75.0	91.7	25.0	41.7	41.7	41.7	41.7
AN	6	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AN	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AN	8	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AN	9	100.0	91.7	100.0	100.0	100.0	100.0	100.0
AN	10	100.0	50.0	50.0	58.3	58.3	58.3	58.3
AN	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	3	0.0	14.3	0.0	0.0	0.0	0.0	0.0
BN	4	0.0	28.6	7.1	21.4	21.4	21.4	21.4
BN	5	64.3	92.9	35.7	57.1	57.1	57.1	57.1
BN	6	100.0	100.0	100.0	100.0	100.0	100.0	100.0
BN	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
BN	8	100.0	100.0	100.0	100.0	100.0	100.0	100.0
BN	9	100.0	100.0	100.0	100.0	100.0	100.0	100.0
BN	10	100.0	78.6	50.0	50.0	50.0	50.0	50.0
BN	11	6.7	0.0	0.0	0.0	0.0	0.0	0.0
BN	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	3	0.0	35.3	29.4	23.5	23.5	23.5	23.5
D	4	47.1	76.5	70.6	70.6	70.6	70.6	70.6
D	5	94.1	100.0	100.0	100.0	100.0	100.0	100.0
D	6	100.0	100.0	100.0	100.0	100.0	100.0	100.0
D	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCPwoVA	Alt2woTUCPwoVA	Alt2woTUCPDeltaVA	Alt2woTUCPAllVA
D	8	100.0	100.0	100.0	100.0	100.0	100.0	100.0
D	9	100.0	100.0	100.0	100.0	100.0	100.0	100.0
D	10	100.0	94.1	82.4	88.2	88.2	88.2	88.2
D	11	17.6	11.8	5.9	5.9	5.9	5.9	5.9
D	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	2	0.0	3.0	3.0	3.0	3.0	3.0	3.0
C	3	24.2	72.7	60.6	51.5	51.5	51.5	51.5
C	4	90.9	100.0	93.9	93.9	93.9	93.9	93.9
C	5	100.0	100.0	100.0	100.0	100.0	100.0	100.0
C	6	100.0	100.0	100.0	100.0	100.0	100.0	100.0
C	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
C	8	100.0	100.0	100.0	100.0	100.0	100.0	100.0
C	9	100.0	100.0	100.0	100.0	100.0	100.0	100.0
C	10	100.0	100.0	100.0	100.0	96.9	96.9	96.9
C	11	6.3	3.1	6.3	6.3	6.3	6.3	6.3
C	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	2	0.0	1.0	1.0	1.0	1.0	1.0	1.0
All	3	8.2	35.7	26.5	22.4	22.4	22.4	22.4
All	4	38.8	51.0	44.9	46.9	46.9	46.9	46.9
All	5	70.4	78.6	61.2	65.3	65.3	65.3	65.3
All	6	100.0	99.0	100.0	100.0	100.0	100.0	100.0
All	7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
All	8	100.0	100.0	100.0	100.0	100.0	100.0	100.0
All	9	100.0	89.8	98.0	98.0	98.0	98.0	98.0
All	10	100.0	71.1	64.9	68.0	67.0	67.0	67.0
All	11	10.2	3.1	3.1	3.1	3.1	3.1	3.1
All	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0

°F = degrees Fahrenheit; WYT = Water Year Type; W = Wet; AN = Above Normal; BN = Below Normal; D = Dry; C = Critical.

Results for the 68°F juvenile steelhead rearing index value are presented in Table N.1-24 for Orange Blossom Bridge. At Orange Blossom Bridge, the percent of months above the value ranged from 0.2% under NAA, Alt2a, Alt2b, Alt2c, and Alt2d to 60.6% under EXP1. Among water year types, the percent of months above the value generally increased from wetter to drier water year types.

Table N.1-24. Percent of months above the 68°F juvenile steelhead rearing index value by water year type (San Joaquin Valley Index) and month, and for all years combined, Stanislaus River at Orange Blossom Bridge, May through October.

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCPwoVA	Alt2woTUCPwoVA	Alt2woTUCPDeltaVA	Alt2woTUCPAllVA
W	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	6	9.1	0.0	0.0	0.0	0.0	0.0	0.0
W	7	90.9	95.5	0.0	0.0	0.0	0.0	0.0
W	8	95.5	0.0	0.0	0.0	0.0	0.0	0.0
W	9	95.5	0.0	0.0	0.0	0.0	0.0	0.0
W	10	13.6	0.0	0.0	0.0	0.0	0.0	0.0
AN	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	6	75.0	50.0	0.0	0.0	0.0	0.0	0.0
AN	7	100.0	66.7	0.0	0.0	0.0	0.0	0.0
AN	8	100.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	9	100.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	5	7.1	0.0	0.0	0.0	0.0	0.0	0.0
BN	6	85.7	64.3	0.0	0.0	0.0	0.0	0.0
BN	7	92.9	71.4	0.0	0.0	0.0	0.0	0.0
BN	8	92.9	0.0	0.0	0.0	0.0	0.0	0.0
BN	9	92.9	0.0	0.0	0.0	0.0	0.0	0.0
BN	10	7.1	0.0	0.0	0.0	0.0	0.0	0.0
D	5	41.2	0.0	0.0	0.0	0.0	0.0	0.0
D	6	88.2	76.5	0.0	0.0	0.0	0.0	0.0
D	7	100.0	5.9	0.0	0.0	0.0	0.0	0.0
D	8	88.2	5.9	0.0	0.0	0.0	0.0	0.0
D	9	88.2	0.0	0.0	0.0	0.0	0.0	0.0
D	10	17.6	0.0	0.0	0.0	0.0	0.0	0.0
C	5	51.5	0.0	0.0	0.0	0.0	0.0	0.0
C	6	69.7	12.1	0.0	0.0	0.0	0.0	0.0

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCP woVA	Alt2woTUCP woVA	Alt2woTUCP DeltaVA	Alt2woTUCP AllVA
C	7	84.8	0.0	0.0	0.0	0.0	0.0	0.0
C	8	75.8	9.1	3.0	3.0	3.0	3.0	3.0
C	9	63.6	3.0	0.0	0.0	0.0	0.0	0.0
C	10	15.6	0.0	0.0	0.0	0.0	0.0	0.0
All	5	25.5	0.0	0.0	0.0	0.0	0.0	0.0
All	6	62.2	32.7	0.0	0.0	0.0	0.0	0.0
All	7	91.8	40.8	0.0	0.0	0.0	0.0	0.0
All	8	87.8	4.1	1.0	1.0	1.0	1.0	1.0
All	9	83.7	1.0	0.0	0.0	0.0	0.0	0.0
All	10	12.4	0.0	0.0	0.0	0.0	0.0	0.0

°F = degrees Fahrenheit; WYT = Water Year Type; W = Wet; AN = Above Normal; BN = Below Normal; D = Dry; C = Critical.

Results for the 55°F successful smoltification limit are presented in Table N.1-25 for Orange Blossom Bridge and Table N.1-26 for the confluence. At Orange Blossom Bridge, the percent of months above the limit ranged from 25.5% under the NAA to 31.8% under EXP3 (Table N.1-25). Among water year types, the percent of months above the value generally increased from wetter to drier water year types.

Table N.1-25. Percent of months above the 55°F successful smoltification water temperature limit for steelhead by water year type (San Joaquin Valley Index) and month, and for all years combined, Stanislaus River at Orange Blossom Bridge, January through May.

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCP woVA	Alt2woTUCP woVA	Alt2woTUCP DeltaVA	Alt2woTUCP AllVA
W	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	3	0.0	18.2	13.6	13.6	9.1	13.6	13.6
W	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W	5	40.9	4.5	4.5	4.5	4.5	4.5	4.5
AN	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	3	0.0	8.3	16.7	8.3	8.3	8.3	8.3
AN	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	5	91.7	16.7	0.0	0.0	0.0	0.0	0.0

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCPwoVA	Alt2woTUCPwoVA	Alt2woTUCPDeltaVA	Alt2woTUCPAllVA
BN	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	3	0.0	35.7	0.0	0.0	0.0	0.0	0.0
BN	4	0.0	14.3	7.1	14.3	14.3	14.3	14.3
BN	5	92.9	21.4	14.3	14.3	14.3	14.3	14.3
D	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	2	0.0	5.9	5.9	0.0	0.0	0.0	0.0
D	3	0.0	58.8	47.1	47.1	47.1	47.1	47.1
D	4	29.4	70.6	41.2	64.7	64.7	64.7	64.7
D	5	94.1	100.0	88.2	94.1	94.1	94.1	94.1
C	1	0.0	3.0	3.0	6.1	6.1	6.1	6.1
C	2	3.0	6.1	6.1	9.1	9.1	9.1	9.1
C	3	24.2	90.9	69.7	69.7	69.7	69.7	69.7
C	4	87.9	97.0	78.8	81.8	81.8	81.8	81.8
C	5	100.0	100.0	100.0	100.0	100.0	100.0	100.0
All	1	0.0	1.0	1.0	2.0	2.0	2.0	2.0
All	2	1.0	3.1	3.1	3.1	3.1	3.1	3.1
All	3	8.2	51.0	36.7	35.7	34.7	35.7	35.7
All	4	34.7	46.9	34.7	40.8	40.8	40.8	40.8
All	5	83.7	57.1	52.0	53.1	53.1	53.1	53.1

°F = degrees Fahrenheit; WYT = Water Year Type; W = Wet; AN = Above Normal; BN = Below Normal; D = Dry; C = Critical.

At the confluence, the percent of months above the limit ranged from 42.2% under EXP1 to 56.5% under the NAA (Table N.1-26). Among water year types, the percent of months above the limit increased from wetter to drier water year types.

Table N.1-26. Percent of months above the 55°F successful smoltification water temperature limit for steelhead by water year type (San Joaquin Valley Index) and month, and for all years combined, Stanislaus River above confluence with San Joaquin River, January through May.

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCPwoVA	Alt2woTUCPwoVA	Alt2woTUCPDeltaVA	Alt2woTUCPAllVA
W	1	0.0	0.0	4.5	4.5	4.5	4.5	4.5
W	2	0.0	4.5	4.5	0.0	0.0	0.0	0.0

WYT	Month	EXP1	EXP3	NAA	Alt2wTUCPwoVA	Alt2woTUCPwoVA	Alt2woTUCPDeltaVA	Alt2woTUCPAllVA
W	3	0.0	18.2	36.4	40.9	40.9	40.9	40.9
W	4	22.7	72.7	72.7	68.2	68.2	68.2	68.2
W	5	100.0	90.9	95.5	95.5	95.5	95.5	95.5
AN	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	2	0.0	8.3	8.3	8.3	8.3	8.3	8.3
AN	3	0.0	41.7	50.0	50.0	50.0	50.0	50.0
AN	4	58.3	91.7	83.3	83.3	83.3	83.3	83.3
AN	5	100.0	100.0	100.0	100.0	100.0	100.0	100.0
BN	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	2	0.0	14.3	14.3	7.1	7.1	7.1	7.1
BN	3	7.1	57.1	64.3	64.3	71.4	71.4	71.4
BN	4	78.6	100.0	92.9	92.9	92.9	92.9	92.9
BN	5	100.0	100.0	100.0	100.0	100.0	100.0	100.0
D	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	2	0.0	17.6	17.6	11.8	11.8	11.8	11.8
D	3	23.5	94.1	94.1	94.1	94.1	94.1	94.1
D	4	88.2	100.0	100.0	100.0	100.0	100.0	100.0
D	5	100.0	100.0	100.0	100.0	100.0	100.0	100.0
C	1	0.0	3.0	3.0	3.0	3.0	3.0	3.0
C	2	15.2	33.3	30.3	21.2	21.2	21.2	21.2
C	3	84.8	100.0	100.0	100.0	100.0	100.0	100.0
C	4	100.0	100.0	100.0	100.0	100.0	100.0	100.0
C	5	100.0	100.0	100.0	100.0	100.0	100.0	100.0
All	1	0.0	1.0	2.0	2.0	2.0	2.0	2.0
All	2	5.1	18.4	17.3	11.2	11.2	11.2	11.2
All	3	33.7	67.3	73.5	74.5	75.5	75.5	75.5
All	4	72.4	92.9	90.8	89.8	89.8	89.8	89.8
All	5	100.0	98.0	99.0	99.0	99.0	99.0	99.0

°F = degrees Fahrenheit; WYT = Water Year Type; W = Wet; AN = Above Normal; BN = Below Normal; D = Dry; C = Critical.

N.1.3.2 Environmental Impact Statement

N.1.3.2.1 HEC 5Q Water Temperature Model Outputs

[TBD]

N.1.3.2.2 Central Valley Steelhead

[TBD]

N.1.4 References

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