Appendix 11J Through Delta Survival of Juvenile Salmonids

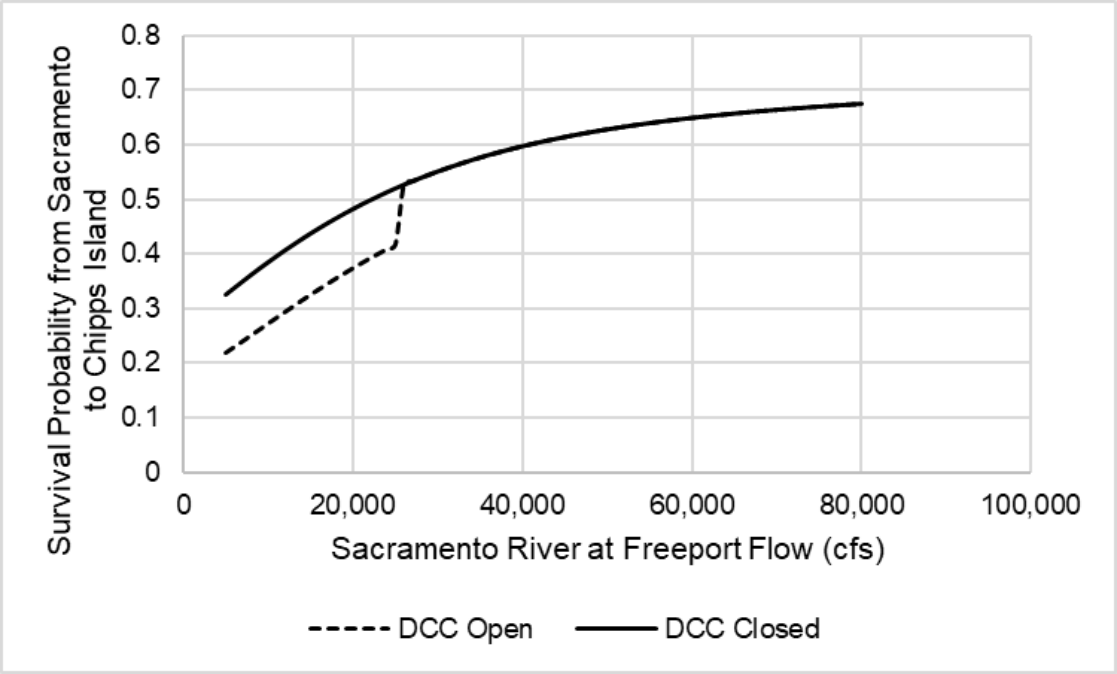
Appendix 11J Through-Delta Survival of Juvenile Salmonids

11J.1 Introduction

This appendix describes the through-Delta survival analysis of juvenile salmonids based on the model of Perry et al. (2018). The analysis was conducted through a spreadsheet implementation of the model that was provided by Perry (pers. comm.) which reproduces the mean response of the STARS (Survival, Travel time, and Routing Simulation) model estimating through-Delta survival, travel time, and routing of juvenile Chinook salmon as a function of Sacramento River flow at Freeport (Perry et al. 2019).

11J.2 Methods

The original Excel file <North Delta Routing Management Tool v2.1.xlsx> (Perry pers. comm.) was adapted to make through-Delta survival calculations for the No Action Alternative (NAA) and Alternatives 1, 2, and 3 CALSIM modeling outputs for the Sacramento River at Freeport. A lookup table of through-Delta survival in 1,000-cubic-feet-per-second increments was calculated (plotted in Figure 11J-1), with estimates of through-Delta survival for each month under each alternative being calculated based on the CALSIM modeling applied to the lookup table (with interpolation as necessary) for the months of September through June.



Notes: DCC = Delta Cross Channel; cfs = cubic feet per second.

Figure 11J-1. Through-Delta Survival Function Based on Perry et al. (2018).

The analysis was undertaken with the assumption that no Georgiana Slough Migratory Barrier was in place, and included a sensitivity analysis that assumed the presence of the barrier with a 50% reduction in entry into Georgiana Slough based on the approximate lower reduction[1] observed during 2 years of effectiveness studies completed by California Department of Water Resources (2012, 2015).

11J.3 Results

The results of the analyses are discussed in Chapter 11, *Aquatic Biological Resources*. Table 11J-1 provides the results of the sensitivity analysis including 50% reduction into Georgiana Slough assumed to occur as a result of the Georgiana Slough Migratory Barrier implementation.

Table 11J-1. Probability of Juvenile Chinook Salmon Through-Delta Survival, Averaged by Month and Water Year Type, Based on Perry et al. (2018), Including 50% Reduction in Georgiana Slough Entry Assumed for Georgiana Slough Migratory Barrier.

Month	Water Year Type	NAA	Alt 1A	Alt 1B	Alt 2	Alt 3
Sep	Wet	0.42	0.42 (0%)	0.42 (0%)	0.42 (0%)	0.42 (0%)
Sep	Above Normal	0.42	0.42 (0%)	0.42 (0%)	0.42 (0%)	0.42 (1%)
Sep	Below Normal	0.32	0.33 (1%)	0.33 (2%)	0.33 (1%)	0.33 (2%)

[1] The higher reduction (2011) was ~67%.

Month	Water Year Type	NAA	Alt 1A	Alt 1B	Alt 2	Alt 3
Sep	Dry	0.29	0.30 (4%)	0.30 (4%)	0.30 (4%)	0.30 (3%)
Sep	Critically Dry	0.33	0.33 (0%)	0.34 (3%)	0.33 (-1%)	0.34 (2%)
Oct	Wet	0.40	0.40 (0%)	0.40 (-1%)	0.40 (0%)	0.40 (0%)
Oct	Above Normal	0.34	0.35 (1%)	0.35 (1%)	0.35 (1%)	0.36 (5%)
Oct	Below Normal	0.34	0.34 (2%)	0.34 (2%)	0.34 (2%)	0.35 (4%)
Oct	Dry	0.31	0.33 (5%)	0.33 (5%)	0.32 (4%)	0.31 (-1%)
Oct	Critically Dry	0.27	0.28 (6%)	0.28 (5%)	0.28 (5%)	0.27 (2%)
Nov	Wet	0.44	0.43 (-2%)	0.43 (-2%)	0.43 (-2%)	0.43 (-2%)
Nov	Above Normal	0.42	0.42 (0%)	0.42 (0%)	0.42 (0%)	0.42 (1%)
Nov	Below Normal	0.42	0.43 (2%)	0.43 (2%)	0.43 (2%)	0.43 (2%)
Nov	Dry	0.38	0.39 (3%)	0.39 (2%)	0.39 (1%)	0.38 (1%)
Nov	Critically Dry	0.32	0.32 (-1%)	0.32 (0%)	0.32 (0%)	0.32 (0%)
Dec	Wet	0.51	0.51 (0%)	0.51 (0%)	0.51 (0%)	0.51 (0%)
Dec	Above Normal	0.51	0.50 (-1%)	0.50 (0%)	0.50 (-1%)	0.51 (0%)
Dec	Below Normal	0.51	0.51 (0%)	0.51 (0%)	0.51 (0%)	0.51 (1%)
Dec	Dry	0.47	0.47 (0%)	0.47 (0%)	0.47 (0%)	0.48 (0%)
Dec	Critically Dry	0.42	0.42 (-1%)	0.42 (-1%)	0.42 (-1%)	0.42 (-1%)
Jan	Wet	0.63	0.63 (0%)	0.63 (0%)	0.63 (0%)	0.63 (0%)
Jan	Above Normal	0.59	0.59 (0%)	0.59 (0%)	0.59 (0%)	0.59 (0%)
Jan	Below Normal	0.53	0.52 (-1%)	0.52 (-1%)	0.52 (-1%)	0.53 (0%)
Jan	Dry	0.48	0.48 (0%)	0.48 (0%)	0.48 (0%)	0.48 (0%)
Jan	Critically Dry	0.47	0.47 (0%)	0.46 (0%)	0.47 (0%)	0.46 (-1%)
Feb	Wet	0.66	0.66 (0%)	0.66 (0%)	0.66 (0%)	0.66 (0%)
Feb	Above Normal	0.62	0.62 (0%)	0.62 (0%)	0.62 (0%)	0.62 (0%)
Feb	Below Normal	0.58	0.58 (-1%)	0.58 (-1%)	0.58 (-1%)	0.58 (-1%)
Feb	Dry	0.53	0.53 (0%)	0.53 (0%)	0.53 (0%)	0.53 (0%)
Feb	Critically Dry	0.49	0.49 (0%)	0.49 (0%)	0.49 (0%)	0.49 (0%)
Mar	Wet	0.63	0.63 (0%)	0.63 (0%)	0.63 (0%)	0.63 (0%)
Mar	Above Normal	0.62	0.62 (-1%)	0.62 (-1%)	0.62 (-1%)	0.62 (-1%)
Mar	Below Normal	0.53	0.52 (-2%)	0.52 (-1%)	0.52 (-1%)	0.52 (-2%)
Mar	Dry	0.51	0.51 (-1%)	0.51 (-1%)	0.51 (-1%)	0.51 (-1%)
Mar	Critically Dry	0.47	0.47 (0%)	0.47 (0%)	0.47 (0%)	0.47 (0%)
Apr	Wet	0.61	0.60 (0%)	0.60 (0%)	0.60 (0%)	0.60 (0%)
Apr	Above Normal	0.56	0.56 (0%)	0.56 (0%)	0.56 (0%)	0.56 (0%)
Apr	Below Normal	0.51	0.51 (0%)	0.51 (0%)	0.51 (0%)	0.51 (0%)
Apr	Dry	0.47	0.47 (0%)	0.47 (0%)	0.47 (0%)	0.47 (0%)
Apr	Critically Dry	0.44	0.44 (0%)	0.44 (0%)	0.44 (0%)	0.44 (0%)

Month	Water Year Type	NAA	Alt 1A	Alt 1B	Alt 2	Alt 3
May	Wet	0.58	0.58 (0%)	0.58 (0%)	0.58 (0%)	0.58 (0%)
May	Above Normal	0.53	0.53 (0%)	0.53 (0%)	0.53 (0%)	0.53 (0%)
May	Below Normal	0.49	0.49 (0%)	0.49 (0%)	0.49 (0%)	0.49 (0%)
May	Dry	0.45	0.45 (0%)	0.45 (0%)	0.45 (0%)	0.45 (0%)
May	Critically Dry	0.42	0.42 (0%)	0.42 (0%)	0.42 (0%)	0.42 (0%)
Jun	Wet	0.46	0.46 (0%)	0.46 (-1%)	0.46 (0%)	0.46 (-1%)
Jun	Above Normal	0.39	0.39 (-2%)	0.39 (-2%)	0.39 (-2%)	0.39 (-2%)
Jun	Below Normal	0.36	0.36 (-1%)	0.36 (-1%)	0.36 (-1%)	0.36 (-1%)
Jun	Dry	0.36	0.36 (0%)	0.36 (0%)	0.36 (0%)	0.36 (0%)
Jun	Critically Dry	0.32	0.32 (0%)	0.32 (0%)	0.32 (0%)	0.32 (0%)

Note: Percentage values in parentheses indicate differences of alternatives compared to NAA.

11J.4 References

11J.4.1. Printed References

California Department of Water Resources. 2012. 2011 Georgiana Slough Non-Physical Barrier Performance Evaluation Project Report. Sacramento, CA: Bay-Delta Office, California Department of Water Resources.

California Department of Water Resources. 2015. 2012 Georgiana Slough Non-Physical Barrier Performance Evaluation Project Report. Sacramento, CA: Bay-Delta Office, California Department of Water Resources.

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11J.4.2. Personal Communications

Perry, Russell. Research Fisheries Biologist, Quantitative Fisheries Ecology Section, USGS Western Fisheries Research Center, Columbia River Research Laboratory, Cook, WA. June 18, 2019—Email containing Excel file <North Delta Routing Management Tool v2.1.xlsx> sent to Marin Greenwood, Aquatic Ecologist, ICF, Sacramento, CA.