# EXHIBIT ARWA-703

## CALIFORNIA WATERFIX PROJECT

## "UNREASONABLE EFFECTS" OF THE NATIONAL MARINE FISHERIES SERVICE BIOLOGICAL OPINION ON ANADROMOUS FISHERIES RESOURCES OF THE LOWER AMERICAN RIVER

## 1.0 TESTIMONY FINDING NO. 1 - THE CURRENT STATUS OF STEELHEAD IN THE LOWER AMERICAN RIVER IS POOR

The current status of steelhead in the lower American River is poor. This is demonstrated in the NMFS 2017 Biological Opinion (BO) for California WaterFix by the following direct statements.

- NMFS (2017, Appendix B, p. 43) – "*An average of 143* [steelhead] *redds have been counted on the American River from 2002 to 2015 (data from Hannon et al. 2003; Hannon and Deason 2008; Chase 2010).*"
- NMFS (2017, p. 74) – "*The American River* [steelhead] *population is small, with only a few hundred individuals returning to spawn each year (Reclamation 2015)*."
- NMFS (2017, p. 985) – "*Within the American River,* [steelhead] *redd counts have shown a decline of approximately 6% a year over the past decade. Over the period from 2002-2015, the annual average redd count on the American River was 142 redds per year. However, in 2015, only 58 redds were observed, which is the lowest number ever observed for this particular survey*."
- NMFS (2017, p. 56) - "*Most wild CCV* [California Central Valley] [steelhead] *populations are very small and may lack the resiliency to persist for protracted periods if subjected to additional stressors, particularly widespread stressors such as climate change.*"
- NMFS (2017, Appendix B, p. 44) – "*Overall, steelhead returns to hatcheries have fluctuated so much from 2001 to 2015 that no clear trend is present, other than the fact that the numbers are still far below those seen in the 1960s and 1970s, and only a tiny fraction of the historical estimate. Returns of natural origin fish are very poorly monitored, but the little data available suggest that the numbers are very small….*"
- NMFS (2017, p. 56) – "*In summary, the status of the CCV steelhead DPS* [Distinct Population Segment] *appears to have remained unchanged since the 2011 status review, and the DPS is likely to become endangered within the near future throughout all or a significant portion of its range (NMFS 2016a)*."

## 2.0 TESTIMONY FINDING NO. 2 – CONDITIONS IN THE LOWER AMERICAN RIVER ARE DEGRADED

Current habitat conditions, and conditions under the analytical baseline used by NMFS (the No Action Alternative (NAA)) in its 2017 BO, in the lower American River are degraded. This is demonstrated, in part, by the following direct statements in the NMFS 2017 BO.

- NMFS (2017, p. 56) – "…*the current conditions of CCV* [California Central Valley] *steelhead critical habitat are significantly degraded…*"

- NMFS (2017, p. 56) – "*Many of the PBFs* [physical or biological features] *of CCV steelhead critical habitat are degraded and provide limited high quality habitat.*

- NMFS (2017, p. 75) – "*CCV steelhead spawn in this reach of the upper accessible Sacramento River as well as throughout the lower American River between its confluence with the Sacramento River up to Nimbus Dam. The PBF of freshwater spawning sites for these species has been degraded within the action area due to high water temperatures…*"

- NMFS (2017, p. 76) – "[steelhead] *Freshwater rearing and migration PBFs have been degraded from their historical condition within the action area…The lower American River has experienced similar losses of rearing habitat…*"

- NMFS (2017, p. 1020) – "*...In the American River, below Nimbus dam, excessive temperatures attributable to the baseline strongly indicate that* [steelhead] *eggs still in the gravel or laid in April and May will have the potential for substantially reduced viability and a high proportion of mortality or embryo abnormalities which will affect their future survival and fitness*."

The Biological Assessment (BA) for the California WaterFix (Reclamation 2016) also referred to degraded habitat in the lower American River associated with warm water temperatures.

- Reclamation (2016, p. 4-36) – "*In the American River, NMFS (2009: 192) noted that there is general consensus that critical habitat for CCV steelhead is impaired, with particular concern being CVP operational effects: warm water temperatures during embryo incubation, rearing, and migration;*"

The Central Valley anadromous salmonid recovery plan (NMFS 2014) also recognizes the degradation of steelhead habitat, and the role that elevated water temperatures play in that degradation.

- NMFS (2014, p. 56) – *"The habitat in the Central Valley that remains accessible to anadromous O. mykiss has been drastically altered and degraded*."

- NMFS (2014, Appendix B, p. 4-36) – "*Water temperatures during the summer months can become unsuitable for juvenile steelhead rearing and potentially high water temperatures is believed to be one of the limiting factors for steelhead production (SWRI 2001).*"

- NMFS (2014, Appendix A, p. 17) – "*Key stressors to steelhead in the American River include… Warm water temperatures, particularly below dams, affecting juvenile rearing and outmigration and adult immigration and holding*".

- NMFS (2014, Appendix A, p. 18) – "*There is a general consensus in the available literature suggesting that habitat for steelhead in the American River below Nimbus Dam is impaired (Reclamation 2008; NMFS 2009a; Water Forum 2005; Water Forum 2005a; SWRI 2001; CDFW 1991, 2001). Of particular concern are warm water temperatures… It has been suggested that the environmental factor probably most limiting to natural production of steelhead in the lower American River is high water temperatures during the summer and fall (Water Forum 2005; Reclamation 2008).*"

- NMFS (2014, Appendix A, p. 21) – "*Water temperature management for anadromous salmonids is an issue of concern in the lower American River*."

## 3.0 TESTIMONY FINDING NO. 3 – SUBSTANTIAL DIFFERENCES OCCUR IN THE WATER TEMPERATURE EXCEEDANCE DISTRIBUTIONS BETWEEN THE PROPOSED ACTION AND THE NO ACTION ALTERNATIVE FOR STEELHEAD IN THE LOWER AMERICAN RIVER

Following is an examination of information explicitly presented in the 2017 NMFS BO for WaterFix. Because the BO references modeling results and information presented in the WaterFix BA (Reclamation 2016), the examination also includes relevant information presented in the BA, specifically water temperature exceedance distributions presented in Appendix 5.C.

The examination of information is presented in the following order.

First, NMFS's conclusions in the BO regarding water temperature-related effects are presented for particular steelhead lifestages in the lower American River.

Second, particularly relevant lifestage and month-specific statements in the 2017 NMFS BO regarding water temperature effects are presented, followed by my analysis of the referenced water temperature exceedance distributions presented in the BO or the BA.

Third, as applicable, I present my analyses of relevant lifestage and month-specific water temperature exceedance distributions presented in Appendix 5.C of the BA, but were not explicitly presented or discussed in the BO.

### 3.1 STEELHEAD JUVENILE REARING (YEAR-ROUND)

The 2017 NMFS BO contains the following general statements about water temperature conditions for this lifestage:

- "*NMFS concludes that changes in water temperature conditions between the PA and NAA will not result in adverse effects to juvenile steelhead in the American River*." (P. 405)

- "*The values for the PA in these exceedance plots generally match those of the NAA. Further examination of critical water years during August at Watt Avenue… the higher end of the PA curves indicate that water temperatures are up to approximately 4°F higher for individual months depending on the exceedance percentile (**Figure 2-35**)*." (P. 393)

The water temperature thresholds of 63°F (and 69°F) were used by NMFS for the steelhead juvenile rearing evaluation. (P. 394)

My examination of **Figure 2-35** reveals that the PA would result in less suitable (> 0.5°F up to nearly 4°F warmer) water temperatures than the NAA over more than 50% of the time during August of critical years, when the water temperatures under both the PA and the NAA exceed 63°F and 69°F at Watt Avenue.

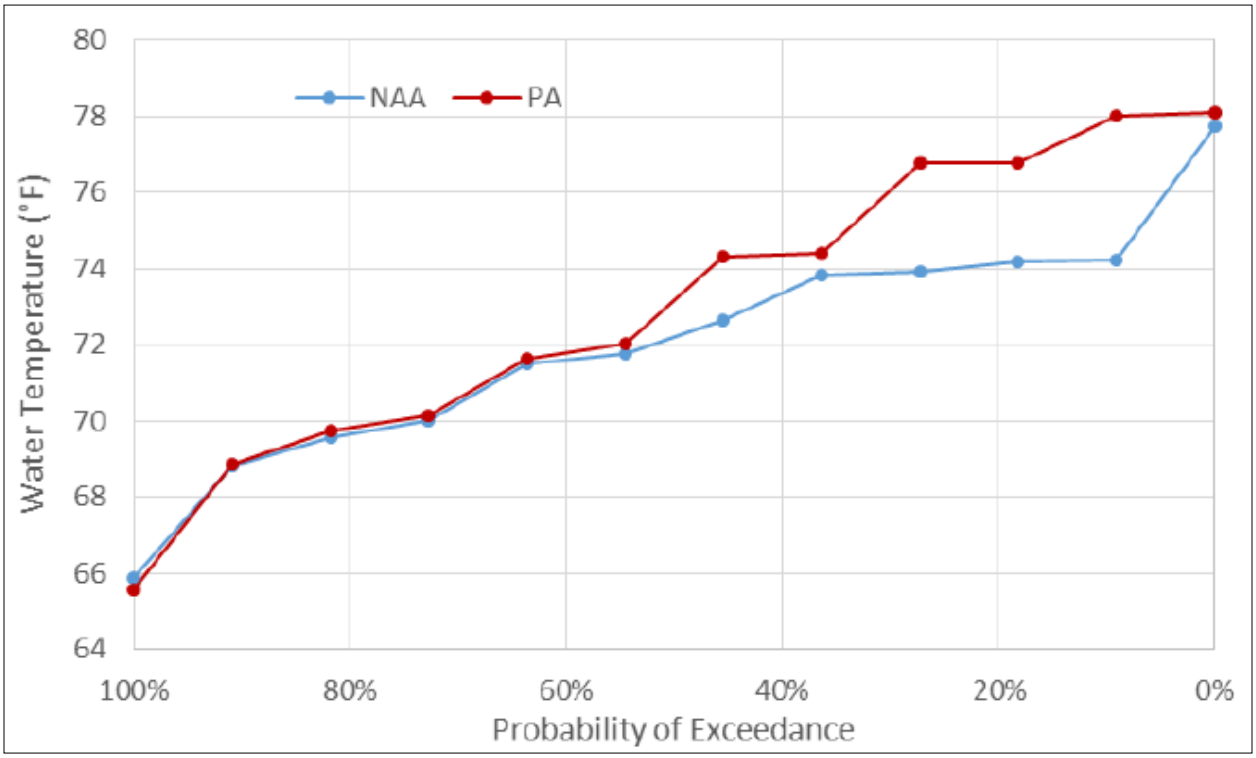
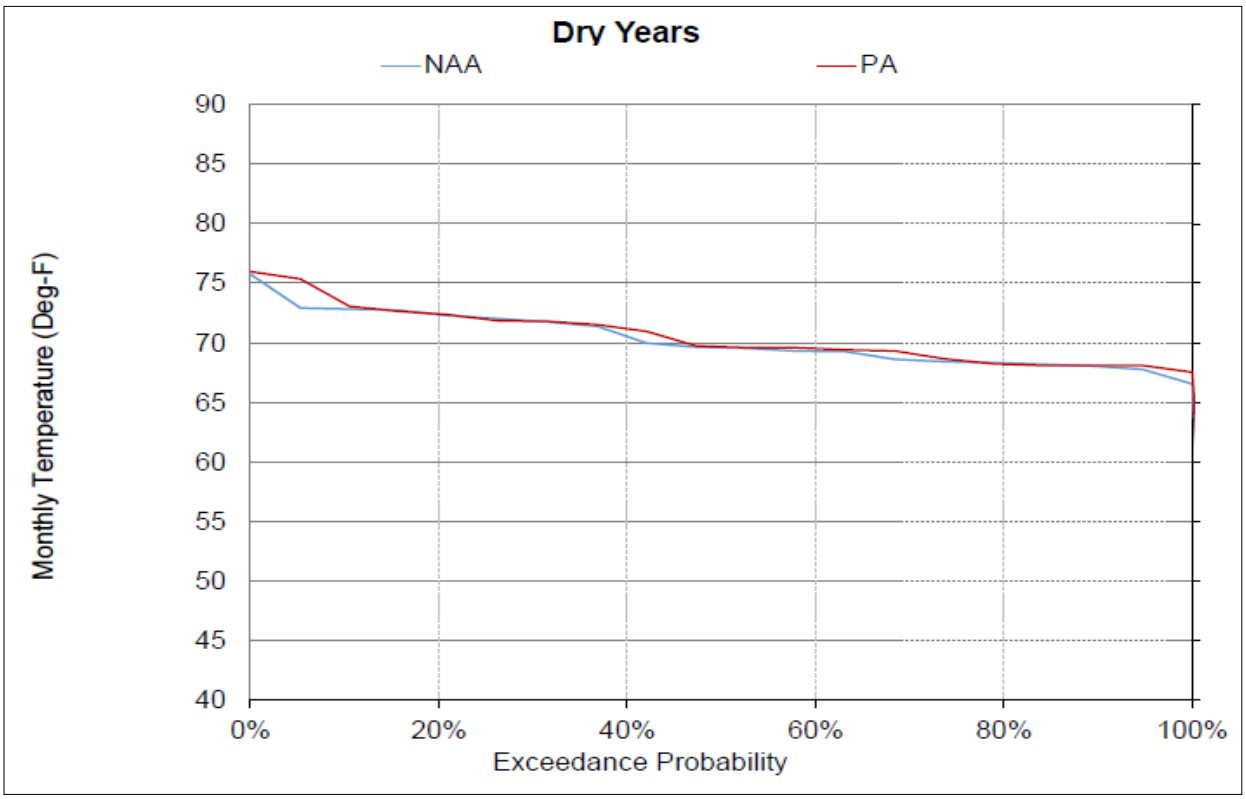



**Figure 2-35. Exceedance Plot of Mean Monthly Water Temperatures (°F) in the American River at Watt Avenue in August of Critical Water Years.**

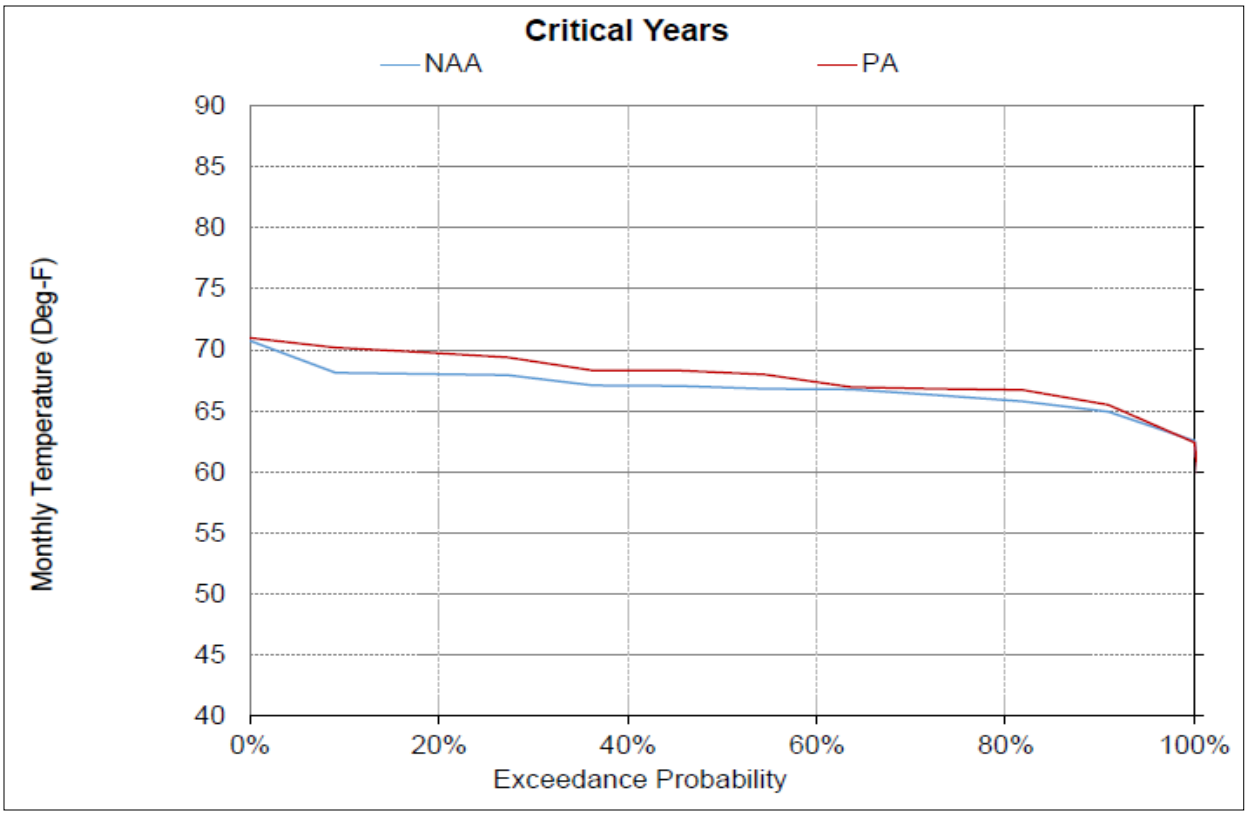
In addition to that which was explicitly presented in the BO for water temperature exceedance distributions during the steelhead juvenile rearing lifestage, my examination of the water temperature exceedance distributions presented in the BA (Appendix 5.C) includes the following:

- **Figure 5.C.7-15-18** (BA Appendix 5.C) indicates that the PA would result in less suitable (> 0.5°F up to more than 2°F warmer) water temperatures over nearly 25% of the dry water year type exceedance distribution at Watt Avenue under the PA relative to the NAA during August, when water temperatures exceed 63°F.
- **Figure 5.C.7-14-18** (BA Appendix 5.C) indicates that the PA would result in less suitable (> 0.5°F up to about 2°F warmer) water temperatures over nearly 80% of the

entire critical water year type exceedance distribution at Hazel Avenue under the PA relative to the NAA during August, when water temperatures exceed 63°F.




**BA Appendix 5.C, Figure 5.C.7-15-18. American River at Watt Avenue, Monthly Temperature Probability of Exceedance (August, Dry excerpt).**




**BA Appendix 5.C, Figure 5.C.7-14-18. American River at Hazel Avenue, Monthly Temperature Probability of Exceedance (August, Critical excerpt).**

### 3.2 STEELHEAD SMOLT EMIGRATION (DECEMBER – JUNE)

The 2017 NMFS BO contains the following general statements about water temperature conditions for this lifestage:

- "*Overall, the water temperature modeling results and the threshold analysis indicate that thermal impacts on the steelhead smolt emigration life stage will largely be the same with implementation of either the PA or NAA operations. The PA is not expected to result in adverse effects, relative to the NAA.*" (P. 413)

- "*The curves for PA generally match those of the NAA. Further examination of June of above normal water years at Hazel Avenue (**Figure 2-36**)… reveals that the curves were mostly similar overall with the exception of a few differences of more than 1°F in the middle of the range.*" (P. 408)

The water temperature thresholds of 61°F (and 64°F) were used by NMFS for the steelhead smolt emigration evaluation. (P. 410)

My examination of **Figure 2-36** reveals that the PA would result in less suitable (> 0.5°F up to more than 1°F warmer) water temperatures than the NAA over more than 40% of the time during June of above normal years, when the water temperatures under both the PA and the NAA exceed 61°F at Hazel Avenue.

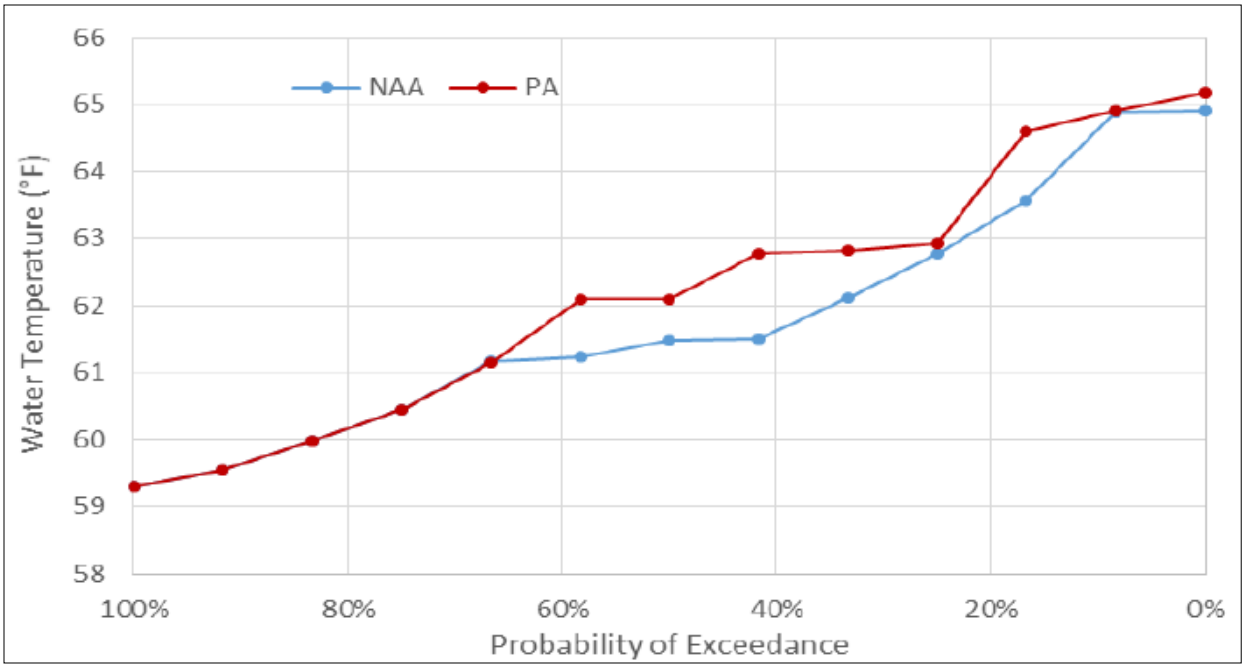



**Figure 2-36. Exceedance Plot of Mean Monthly Water Temperatures (°F) in the American River at Hazel Avenue in June of Above Normal Water Years.**

## 4.0 LITERATURE CITED

National Marine Fisheries Service (NMFS). 2017. Endangered Species Act Section 7(a)(2) Biological Opinion, Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response, and Fish and Wildlife Coordination Act Recommendations for the California WaterFix Project in Central Valley, California. June 16, 2017.

United States Department of the Interior, Bureau of Reclamation (Reclamation). 2016. Biological Assessment for the California WaterFix. Prepared by ICF International. July 2016.