

EXHIBIT ARWA-500

PART 2 TESTIMONY OF TOM GOHRING, P.E.

1. I am the Executive Director of the Water Forum. I hold a Bachelor of Science degree in Agricultural Engineering from the California Polytechnic State University, San Luis Obispo, and a Master of Science degree in Engineering from the University of California, Davis. I am a licensed professional engineer in the State of California.
2. My professional experience includes engineering design, hydrologic modeling, managing and directing multidisciplinary engineering projects, and directing stakeholder engagement. A copy of my resume, which accurately describes my education and experience, is **Exhibit ARWA-301**.
3. I testified in Part 1 of this proceeding about the Water Forum and its co-equal objectives related to water supply reliability and protection of the lower American River. My Part 1 testimony also explained that the Water Forum is a consortium of environmental groups, water managers, business leaders, and public agencies in the Sacramento region who are supportive of our efforts to establish a more protective flow standard for the American River downstream from Nimbus Dam, also known as the lower American River.
4. I also testified in Part 1 about the injury of California WaterFix to legal users of water in the American River basin and the benefits of the "Modified Flow Management Standard" or "Modified FMS." In particular, I explained that the Modified FMS was developed to address the combination of two factors that could dramatically impact both water supplies in the Sacramento region and the lower American River's environmental resources: (A) the vulnerability of Folsom Reservoir to severely dry conditions, as demonstrated by the Sacramento region's experience during the recent drought of 2012 through 2015; and (B) the fact that the California WaterFix could increase that vulnerability by enabling Central Valley Project (CVP) operations that would draw the reservoir too low in years preceding severely dry years and, therefore, reducing any water storage buffer that Folsom Reservoir can provide. My Part 1 testimony was submitted as **Exhibit ARWA-300e** and summarized in **Exhibit ARWA-309**.
5. My testimony in Part 2 of this proceeding primarily concerns the environmental harm of the California WaterFix to the lower American River, and the Modified FMS as a response to this harm and, more

generally, protection of lower American River habitat and water supplies for legal users of water. This testimony and all of the testimony and exhibits supporting the Modified FMS, are submitted both on behalf of the Water Forum and Water Forum members known as the American River Water Agencies group, which is the Cities of Folsom, Roseville and Sacramento, Placer County Water Agency, Sacramento County Water Agency, Sacramento Suburban Water District and San Juan Water District.

Need for the Modified Flow Management Standard

6. The Water Forum, in cooperation with the U.S. Bureau of Reclamation (Reclamation) and the resource agencies, developed the 2006 Flow Management Standard (2006 FMS), which Reclamation has been implementing since 2006. The National Marine Fisheries Service (NMFS) incorporated portions of the 2006 FMS in their 2009 biological opinion for operations of the CVP and State Water Project (SWP), but directed Reclamation to implement a more protective water temperature management approach for the lower American River. This directive was part of the impetus for the Water Forum's efforts to develop an improved flow management standard for the lower American River. Other motivations for revising the 2006 FMS included: (A) Bay-Delta Conservation Plan and California WaterFix modeling results that showed Folsom Reservoir being drained to its modeled "dead pool" in the future; and (B) our experience with the 2012-15 drought, which illustrated the potential for catastrophic water supply and environmental consequences of lower Folsom Reservoir levels.
7. During 2014 and 2015, I attended American River Group (ARG) meetings convened by Reclamation. During 2015, I also directed field work and analyses that enabled Reclamation, the California Department of Fish and Wildlife (CDFW), the U.S. Fish and Wildlife Service (USFWS) and NMFS to manage releases from Folsom Dam in real-time to minimize drought impacts on the salmonids in the lower American River.
8. At the ARG meeting on March 19, 2015, I became very concerned when Reclamation announced that their real-time drought operations for the next several weeks would include reduction in releases to the lower American River to 500 cfs, the lowest release rate since 1977; and possible increased releases if the water temperature at Rossmoor reached or exceeded 57 degrees Fahrenheit. However, there were no existing water temperature gauges at Rossmoor Bar.

9. Under my direction, the Water Forum installed temperature probes in the lower American River near Rossmoor Bar to allow Reclamation to implement their plans for real-time operations. A member of my staff or I entered the waters of the lower American River numerous times during March 2015 to assess the condition of and download data from the Rossmoor Bar temperature probes. We provided the Rossmoor water temperature data on a near-daily basis to Reclamation, fish agencies and interested stakeholders. **Exhibit ARWA-503** is a true and accurate excerpt of the Water Forum operations web log that summarizes the data collection, dissemination, and modeling that was conducted during this period.
10. In 2015, with guidance from Reclamation and CDFW staff, I developed a steelhead fry emergence model to estimate the number of steelhead redds that were at risk from elevated water temperatures in the lower American River. The steelhead fry emergence model used data that the Water Forum collected at Rossmoor Bar and redd observations collected *in situ* by Reclamation and CDFW staff. The steelhead fry emergence model estimated how many of the 2015-established steelhead redds were still viable and when the steelhead fry would be expected to reach a life stage that would be less sensitive to elevated water temperatures.
11. I observed Reclamation, CDFW, USFWS, and NMFS utilizing the Water Forum's temperature data and output from our steelhead fry emergence model as part of their operational decision-making during 2015.
12. The Water Forum received the Governor's Environmental and Economic Leadership Award (GEELA) for our steelhead protection efforts during 2015. A copy of the program for the 2015 GEELA program, which reflects the Water Forum's award, is **Exhibit ARWA-302**.
13. From December 2013 to July 2015, I convened 11 separate Water Forum Drought Conferences that were attended by representatives of Sacramento-area water providers, environmental groups, and business organizations, as well as Reclamation, CDFW, USFWS, and NMFS. These drought conferences were a forum for problem solving in which water and environmental interests shared their perspectives and experiences of drought impacts. My observation of this process was that the collaborative relationships of Water Forum members accelerated potential solutions and avoided drought responses that could have been disastrous for any single interest of sector.

14. My experience during the recent drought has shown me that catastrophic environmental conditions are already very real possibilities in the lower American River as a result of low Folsom Reservoir levels. Because California WaterFix could enable Reclamation and DWR to export more water released from Folsom Reservoir, that project could exacerbate the existing environmental risks in the American River Basin. The Modified FMS is intended to protect against the risks associated with operations that would occur in what DWR has called the “stressed water supply conditions” that could otherwise harm ecological resources and impair water diversions in the American River Basin.
15. I understand by reviewing the California WaterFix biological assessment (BA) and its underlying modeling that the project operations will reduce storage in Folsom Reservoir during June and July, relative to the analytical baseline (No Action Alternative). Jeffrey Weaver of HDR extracted from the BA modeling, and provided to me, the results that are accurately depicted in **Exhibits ARWA-504** and **ARWA-505**. **Exhibit ARWA-505** contains tabulated results of the BA modeling and shows that for the Q5 (central tendency) climate scenario, the Proposed Action would result in an average reduction in Folsom Reservoir end-of-June storage of 22,000 acre-feet. The exhibit also shows decreased end-of-June storage in all year types except critical. These reductions range from a 13,000 acre-foot reduction in wet years to a 39,000 acre-foot reduction in dry years. **Exhibit ARWA-504** shows similar results for the Q0 (current) climate scenario. These exhibits also show significant decreased end-of-July Folsom storage for the proposed action. For example, **Exhibit ARWA-505** shows reductions in end-of-July storage in all year types except above and below normal, with reductions ranging from 4,000 acre-foot reduction in critical years to 42,000 acre-foot reduction in dry years.
16. Based on my extensive experience in the role of Water Forum Executive Director, and in reviewing modeling results, I conclude that these modeling results indicate that California WaterFix will reduce Folsom Reservoir storage during June and July in most years.
17. Figure 23 of **Exhibit ARWA-702** shows that decreased end-of-June and end-of-July (as well as end-of-May) Folsom Reservoir storage will result in increased annual maximum weekly average water temperatures in the lower American River. As the Water Forum's Executive Director, I directed and oversaw the preparation of the *Biological Rationale, Development and Performance of the Modified Flow Management Standard* which is **Exhibit ARWA-702**.

18. Based on my extensive experience for the Water Forum in reviewing modeling results to determine how various projects and CVP operations may affect the lower American River's fish and their habitat, I understand that increased annual maximum weekly average water temperatures in the lower American River will harm steelhead, for which the status is poor. **Exhibit ARWA-703** describes the current degraded conditions of steelhead habitat in the lower American River, particularly associated with warm water temperatures.
19. Given that: (A) the California WaterFix BA modeling shows reduced end-of-June and end-of-July Folsom storage; (B) reduced end-of-June and end-of-July Folsom storage causes increased water temperatures in the lower American River; and (C) increased water temperatures in the lower American River will harm steelhead, I conclude that California WaterFix will harm lower American River steelhead. That species is listed as threatened under the state and federal Endangered Species Acts.
20. Mr. Paul Bratovich will also present testimony in this proceeding (**Exhibit ARWA-700**) that California WaterFix will result in water temperature-related unreasonable effects on steelhead in the lower American River. The lower American River is depicted in **Exhibit ARWA-506**.
21. Based on my experience gained through years of engagement in management of Folsom Reservoir and the lower American River, and based upon my review of the BA modeling results described above, my opinion is that an institutional protection of Folsom Reservoir storage, including end-of-December and end-of-May storage requirements, is needed to protect the American River's fishery and water supply resources, given that California WaterFix would expand the CVP's capacity to export water from Folsom Reservoir and reduce reservoir storage levels.
22. As I testified in Part 1, the Water Forum's technical team has developed, under my direction, a modified approach to managing flows and water temperatures in the lower American River that would, among other things, avoid extreme low storage conditions in Folsom Reservoir and reduce the frequency of unsuitable water temperature conditions in the lower American River. Our work proceeded based on the following three objectives:
 - Maintain sufficient storage in Folsom Reservoir to avoid drawing the reservoir down to 90,000 acre-feet during a simulated repeat of the 1976-77 drought, with a 2030 level of water demand

- Provide greater protection of the American River Basin water resources for environmental purposes, particularly regarding water temperature conditions
 - Avoid re-directed impacts to Sacramento River fisheries
23. Over a period of approximately 24 months, the Water Forum technical team and I – in consultation with the water suppliers and environmental groups within the Water Forum – developed revisions to the 2006 FMS to meet the three objectives above.
 24. The Water Forum technical team and I reviewed numerous different CalSim II modeling runs and associated analyses of coordinated CVP and SWP operations to seek to identify a "sweet spot" that adequately addressed all three of the above objectives. Our modeling assumed existing regulations and facilities and a 2030-level of water demand. Our modeling did not include climate change assumptions, because our technical consultants advised me that important updates to the representation of reservoir operations upstream of Folsom Reservoir – primarily Placer County Water Agency's (PCWA) and Sacramento Municipal Utility District's (SMUD) projects – were not represented in any available CalSim II climate change scenarios. The Water Forum technical team decided that it was critical to use the best available representation of hydrologic conditions in the American River Basin, so we used modeling that incorporates revised operations by PCWA and SMUD. This issue is discussed in Mr. Jeffrey Weaver's Part 1 testimony (**Exhibit ARWA-400**). Some of the Water Forum's modeling results showed that it would be possible to further enhance benefits to fish in, and water supplies from, the American River, but that the cost would be increasing Sacramento River water temperatures. That was not the "sweet spot" for which we were looking.
 25. Ultimately, finding that "sweet spot" involved making a variety of changes to the 2006 FMS that would result in protections to American River environmental and water supply resources, while avoiding re-directed impacts to the Sacramento River's fisheries. The Water Forum technical team developed a new American River Index that more accurately characterizes water years in the American River Basin based on the most up-to-date projections of the operations of the two projects that affect inflows to Folsom Reservoir, namely the PCWA and SMUD projects described above.
 26. The resulting Minimum Release Requirements from Folsom and Nimbus dams include balancing increased Folsom Reservoir storage

with decreased water temperatures during the most sensitive times of the year for the fisheries resources in the lower American River.

Contents of the Modified FMS and Modeling of Its Effects

27. Resulting from this work, the major components of the Modified FMS are:
- Minimum Release Requirements from Nimbus Dam that reflect an improved approach to setting year-round minimum lower American River streamflows
 - End-of-May and end-of-December Folsom Reservoir storage requirements
 - Redd dewatering protective adjustments
 - Spring pulse flow
 - Water temperature management planning and implementation that takes advantage of generally increased Folsom Reservoir storage and a corresponding larger cold water pool
 - Continued convening of the American River Group
28. Under my direction, Water Forum consultants performed a number of types of modeling of the Modified FMS to assess its performance and effects in order to develop a strong and defensible product built upon science and established modeling practices. The methods and results of these modeling efforts are provided in the *Rationale, Objectives, and Assessment Methodology for Water and Power Resources for the Modified Flow Management Standard (Exhibit ARWA-601)*, *Biological Rationale, Development and Performance of the Modified Flow Management Standard (Exhibit ARWA-702)* and their supporting technical memoranda. The modeling simulated CVP and SWP operations, lower American River water temperatures, and Sacramento River water temperatures over an 82-year period of hydrology (October 1921 through September 2003) using the current regulatory framework; historical inflows, adjusted for the influence of land use changes and upstream flow regulations; and a 2030 level of water demand. The results of the simulations showed that the Modified FMS would:
- Maintain Folsom Reservoir storage above 90,000 acre-feet during the simulated 1976-77 drought, and end-of-December storage above 230,000 acre-feet in all simulated years, which

would improve water-supply reliability in the Sacramento region and protect the region's water supplies against possible overly aggressive drawdowns of the reservoir as a result of California WaterFix's implementation;

- Reduce water temperature, relative to the 2006 FMS, during the months of March through October, which provides a higher frequency of more suitable water temperature conditions for fall-run Chinook salmon and steelhead in the lower American River; and
 - Avoid re-directed potential water temperature-related impacts to listed species on the Sacramento River.
29. In Part 1, I submitted proposed terms and conditions that, if applied to Reclamation's water-right permits for Folsom Dam and Reservoir (Permits Nos. 11315 and 11316), would implement the Modified FMS (**Exhibit ARWA-308**). The Water Forum also submitted modeling assumptions (**Exhibit ARWA-401**) and modeling results (**Exhibit ARWA-402**) that represented conditions associated with implementation of the Modified FMS.
30. Since completion of Part 1, we have updated some of the parameters of the Modified FMS stated in **Exhibit ARWA-308** to reduce the potential for dewatering of fall-run Chinook salmon redds in the lower American River. The potential for dewatering fall-run Chinook salmon redds became apparent to us after Part 1 as a result of the Water Forum's review of the most current salmon redd distribution data for the lower American River.
31. Since Part 1, we have updated fall-run Chinook salmon spawning redd spatial distributions (by adding 2015 data), temporal distributions (focused on middle 99% of the cumulative distribution), and redd depth distributions (by adding more than 500 additional redd depths collected during the fall of 2011 through 2015, for a total of over 900 redd depths).
32. As part of the Water Forum's ongoing commitment to using the best-available scientific data and technical tools, we have updated the spatial and temporal fall-run Chinook salmon and steelhead spawning distribution, and the redd depth distribution data in our technical analyses (see **Exhibit ARWA-702**, Attachment C - Lower American River Potential Redd Dewatering Analyses). The updated analyses indicated that the Part 1 version of the Modified FMS could adversely affect fall-run Chinook salmon through increased redd dewatering,

relative to the 2006 FMS. Our assessment was that, with incorporation of the above data updates, the Modified FMS from Part 1 required adjustments to meet our “sweet spot” objectives.

33. Analysis of the updated redd distribution data led our technical team to revise the following parameters of the Modified FMS to achieve the desired “sweet spot”: (A) extended the fall-run Chinook salmon redd dewatering protection to February; (B) added a fourth-year drought exception; (C) altered the Minimum Release Requirement curves to reduce the minimum release requirements during October through December to reduce fall-run Chinook salmon redd dewatering potential; (D) simplified the fall-run Chinook salmon dewatering algorithm; (E) changed the flood control curve for Folsom Reservoir to be consistent with Reclamation/DWR modeling; (F) changed the Folsom Reservoir October through December inflow forecast, for modeling purposes, to be based on the 90% exceedance volume from the CalSim II period of record; and (G) retrained Cal-Sim II's water supply index-delivery index (WSI-DI) curve consistent with what I understand to be standard procedure for CalSim modeling. The technical aspects of these changes are described in more detail in the associated technical memoranda.
34. The result of this recent work is an updated version of the Modified FMS that is more robust while still meeting the following objectives:
 - Maintain Folsom Reservoir storage above 90,000 acre-feet end-of-December and above 230,000 acre-feet in all simulated years
 - Provide greater protection of the American River Basin water resources for environmental purposes, particularly for water temperature conditions in the lower American River for the benefit of fall-run Chinook salmon and steelhead
 - Avoid re-directed adverse water temperature effects in the Sacramento River
35. These results are depicted in more detail in Mr. Weaver's and Mr. Bratovich's testimony and their supporting technical memoranda. Mr. Weaver has submitted testimony in **Exhibit ARWA-600** that provides, among other modeling results, the reservoir storage effects and Shasta Reservoir cold-water pool effects of the Modified FMS. Mr. Bratovich has submitted testimony in **Exhibit ARWA-700** concluding that the Modified FMS will result in an equivalent or increased level of protection for fall-run Chinook salmon, and an increased level of

protection for steelhead in the lower American River without re-directing impacts to the Sacramento River.

36. Based on the technical work that reflects our use of the best available data for fall-run Chinook redd dewatering in the lower American River, the Water Forum and the American River Water Agencies respectfully submit, as **Exhibit ARWA-502**, updated water-right terms and conditions that, if applied, to Reclamation's permits for Folsom Dam and Reservoir – Permits Nos. 11315 and 11316 – would implement an updated Modified FMS. Based on my testimony above, and the coordinated Water Forum testimony submitted with this testimony, I conclude that applying the Modified FMS to those Reclamation permits would be an appropriate method to prevent the implementation of California WaterFix from causing unreasonable effects to the lower American River's steelhead and other sensitive fish.
37. As discussed above and in Mr. Bratovich's testimony, the California WaterFix Proposed Action would result in exacerbated adverse water temperature conditions in the lower American River for federally-listed steelhead. Because the Modified FMS would reduce the risk of elevated water temperatures from March through October, particularly during drier water years, to the lower American River's steelhead, applying an integrated package of water supply and environmental terms provided for by the Modified FMS as terms and conditions on any approval of the California WaterFix would be an appropriate method to address California WaterFix's environmental effects in the lower American River.
38. **Exhibit ARWA-501** is a PowerPoint presentation and my summary of this testimony.