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18
 19 BEFORE THE
 20 CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

21 HEARING IN THE MATTER OF
 22 CALIFORNIA DEPARTMENT OF WATER
 RESOURCES AND UNITED STATES
 23 BUREAU OF RECLAMATION REQUEST
 FOR A CHANGE IN POINT OF
 24 DIVERSION FOR CALIFORNIA
 25 WATERFIX

PART 2 REBUTTAL TESTIMONY AND
 SUMMARY OF TESTIMONY OF DR.
 RICHARD A. DENTON, PH.D., P.E.,
 SUBMITTED ON BEHALF OF CONTRA
 COSTA COUNTY, CONTRA COSTA
 COUNTY WATER AGENCY, AND
 SOLANO COUNTY

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1. Declaration of Qualifications

I, Dr. Richard Denton, declare that I am a Water Resources Consultant and sole-proprietor of Richard Denton and Associates. I have 45 years of experience in the areas of hydraulics and water quality. I received my Bachelor of Engineering (Civil) with First Class Honours in 1972 from the University of Canterbury, Christchurch, New Zealand. I received a Doctor of Philosophy (Ph.D.) in Civil Engineering in 1978 from the University of Canterbury. I am a registered Civil Engineer in the State of California (C47212).

From 1989 to 2006, I was an employee of the Contra Costa Water District (“CCWD”), Concord, California, and served for much of that time as Water Resources Manager. From 1982 to 1989, I was an Assistant Professor in Civil Engineering (Hydraulic and Coastal Engineering) on the faculty of the University of California at Berkeley. During the mid-80s, while at U.C. Berkeley, I prepared four detailed technical reports on the currents and water quality in San Francisco Bay under a contract from the State Water Resources Control Board (“SWRCB”).

I have been involved in SWRCB Bay-Delta water right and water quality hearings since 1989. I have extensive experience analyzing Central Valley operations and flow and salinity regimes in the Sacramento-San Joaquin Delta (“Delta”). I provided key input to the environmental review and water rights permitting for CCWD’s Los Vaqueros Project and development of the 1994 Bay-Delta Accord. Since 1996, I participated in development and permitting of the Grassland Bypass Project which regulated agricultural runoff and resulted in significant decreases in selenium and salinity loads from the west side of the San Joaquin Valley. I also served as chair of the CALFED Operations and Fish Forum from 2001 to 2006.

In 1995, I received the first annual Hugo B. Fischer Award from the California Water and Environmental Modeling Forum in recognition of my development and innovative application of a salinity-outflow model for the Delta. In 2010, I received a

1 Career Achievement Award from the California Water and Environmental Modeling
2 Forum.

3 As a Water Resources Consultant, I assisted CCWD's completion of the
4 environmental permitting of CCWD's Middle River Intake Project and Los Vaqueros
5 Enlargement Project. I am currently assisting Contra Costa County, the Contra Costa
6 County Water Agency, and Solano County on issues related to the California WaterFix
7 Project and efforts to restore the Delta ecosystem and increase California's water
8 supply reliability.

9 I am the author of 13 academic papers in peer-reviewed journals, 10 papers in
10 conference proceedings and 6 research reports. A copy of my statement of
11 qualifications has been accepted into the hearing record as Exhibit CCC-SC-2.

12 13 **2. Summary of My Detailed Rebuttal Testimony**

14 Preparation of detailed rebuttal testimony regarding the current WaterFix project
15 is very difficult without access to accurate and representative modeling of the current
16 version of project operations and its adverse effects on water quality in the Delta.

17 The most recent modeling study of the proposed WaterFix project released to the
18 SWRCB and the public, CWF H3+, does not represent the current version of the project.
19 CWF H3+ is the Project adopted by DWR that is the subject of the Petition for Change
20 in Point of Diversion requested by DWR and Reclamation. (Exhibit DWR-1010, Page 2,
21 Line 15)

22 Because SWP contractors are expected to fund most of the cost of the WaterFix
23 twin tunnels, almost all of the exports through the north Delta diversion facility ("NDD")
24 will be SWP water. This is different than what was assumed in CWF H3+.

25 If the twin tunnels are operating in the spring and summer primarily or exclusively
26 for the SWP, then CWF H3+ misrepresents the relative drawdown of the State Water
27 Project ("SWP") and Central Valley Project ("CVP") upstream reservoirs. The
28 corresponding environmental impacts due to changes in the flows and temperatures

1 downstream of the major upstream dams are also not simulated accurately or disclosed.

2 The CWF H3+ modeling also assumed a Rio Vista minimum flow requirement
3 from January through August. However, that flow requirement is not among Petitioners'
4 operating criteria for the WaterFix project, as currently proposed. This also makes the
5 CWF H3+ modeling unacceptable for the purposes of this Part 2 hearing.

6 The CWF H3+ modeling, and earlier modeling studies, used a redefined
7 export/inflow ("E/I") ratio that allows more water to be exported from the Delta than
8 allowed under D-1641. This redefined E/I ratio does not apply to or limit exports
9 through the twin tunnels (isolated facility) in the north Delta, which means the E/I ratio's
10 original biological purpose, to protect against entrainment of fish, eggs and larvae, is not
11 achieved. The Petitioners' fishery expert, Dr. Marin Greenwood, testified in Part 2 that
12 eggs and larvae are present above the north Delta intakes.

13 The Petitioners have proposed the WaterFix project operating criteria be
14 modified in the future through adaptive management within a range bounded by the
15 Boundary 1 and Boundary 2 scenarios. However, the Boundary 1 alternative does
16 nothing to provide additional protection for fish and the Delta ecosystem: no Fall X2
17 requirements and no enhanced spring outflows. If the WaterFix project were to be
18 operated to Boundary 1 operating criteria, Delta outflows would be dangerously low,
19 especially in the Fall, resulting in even greater adverse impacts on water quality in the
20 Delta than disclosed for CWF H3+.

21 The CWF H3+ modeling, released to the public by the Petitioners as part of their
22 Part 2 case-in-chief, fails to consistently increase exports in wetter months ("Big Gulp")
23 and increases exports above existing levels in drier months when Delta outflows are
24 very low and the Delta ecosystem is most vulnerable. This is the exact opposite of the
25 claim made by the Petitioners that the proposed WaterFix project will "*improve the*
26 *ecosystem through reduction and reverse flow occurrences, flow patterns that will*
27 *become more consistent with natural flow patterns, by increasing exports in the wetter*
28 *periods and decreasing them in the dryer [sic.] periods"* (Transcript, February 22,

1 2018, Page 44, Line12.) Instead of taking a “Little Sip” during drier periods, the
2 proposed WaterFix project takes a huge gulp.

3 The SWRCB should consider including a permit term that limits exports based on
4 Delta outflow so exports would indeed be reduced during drier periods (*i.e.*, achieve the
5 “Little Sip” concept), and to help improve, restore and sustain the Delta ecosystem.

6 The Petitioners’ claim that the CWF H3+ scenario is within the range of
7 Alternative 4A, scenarios H3 and H4, is incorrect and misleading. The CWF H3+
8 scenario has more stringent restrictions on south Delta exports in April and May and
9 less restriction on Old and Middle River (“OMR”) flows in October and November.
10 These major differences in operating criteria result in Delta outflows, south-of-Delta
11 exports and Delta salinities for CWF H3+ that are well outside the range of scenarios H3
12 and H4.

13 The Petitioners have failed in Part 2 to present the CWF H3+ Delta inflow and
14 outflows in a form that informs the SWRCB whether the WaterFix project is consistent
15 with the SWRCB’s 2010 Delta Flow Criteria or the proposals being considered by the
16 SWRCB as part of the current update to the Bay-Delta Water Quality Control Plan.

17 The Part 2 proposed WaterFix project, CWF H3+, still shows up to 30%
18 reductions in the Sacramento inflow to the Delta at Freeport, and it shows daily-
19 averaged chloride concentrations near the intake to the Contra Costa Canal that are
20 well in excess of the SWRCB’s D-1641 Municipal and Industrial daily water quality
21 standard of 250 mg/L. These are the same problems I identified in my Part 2 case-in-
22 chief testimony using earlier WaterFix modeling for the Biological Assessment, BA H3+.

23 Without accurate and representative modeling and analysis of the proposed
24 project, the SWRCB will lack the basis to make an accurate or informed decision about
25 the environmental, water quality and water supply impacts or benefits of the project, or
26 the impacts of the project on legal users of water. The SWRCB should reject the
27 WaterFix change petition until the Petitioners correct this myriad of problems with their
28 proposed project.

1 **3. The Current Modeling and Analyses (CWF H3+) Do Not Represent**
2 **Current Version of Proposed WaterFix Project.**

3 The California WaterFix Administrative Draft Supplemental Environmental Impact
4 Report/Environmental Impact Statement (the “ADSEIR/EIS”), released to the public by
5 the California Department of Water Resources (“DWR”) and U.S. Bureau of
6 Reclamation (“Reclamation”) on June 12, 2018 (Exhibit SWRCB-113), based its
7 analysis of the environmental impacts of the proposed project on the same modeling
8 study, CWF H3+, submitted into evidence by DWR in Part 2 of this hearing (Exhibits
9 DWR-1077 and DWR-1078).

10 Final internal review and approval for meeting the requirements of the California
11 Environmental Quality Act (“CEQA”) and National Environmental Policy Act (“NEPA”)
12 have not been completed by DWR and Reclamation, and the ADSEIR/EIS is not a
13 public draft environmental document. However, DWR is unlikely to revise the
14 ADSEIR/EIS to include an updated modeling study before release of the official public
15 California WaterFix Draft Supplemental Environmental Impact Report/Environmental
16 Impact Statement (the “Draft SEIR/EIS”).

17 The CWF H3+ modeling assumes that the federal CVP will divert up to 4,600
18 cubic feet per second (cfs) of water for export via the twin tunnels. This is the maximum
19 amount that the CVP can divert at the Jones Pumping Plant up into the Delta Mendota
20 Canal.

21 Figure 1 in CCC-SC-52¹ shows the modeled CVP exports via the WaterFix twin
22 tunnels as a function of the total amount diverted through the twin tunnels, based on the
23 DWR’s CWF H3+ modeling data. The proposed maximum capacity of the two tunnels is
24 9,000 cfs. Tables 1 and 2 in CCC-SC-52 present the 82-year average export data by
25 month and the monthly-averaged CVP isolated facility export data, respectively.

26 On average, the CVP received about 40% of the total exports through the twin
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¹ Exhibit CCC-SC-52 is a true and correct copy.

1 tunnels (also referred to as the “isolated facility”). In many months, all of the water
2 going through the twin tunnels was for the CVP (100% share).

3 In the staged implementation (single tunnel) modeling released by DWR on
4 February 7, 2018², there was only a single, 6,000-cfs tunnel and the CVP share was
5 capped at only 1,000 cfs (CCC-SC-52, Table 3.)

6 The Metropolitan Water District of Southern California (“Metropolitan”) Board of
7 Directors is scheduled to vote on July 10, 2018, on a staff recommendation to pay for
8 the entire second tunnel and a share of the first tunnel, or 64.6% of the project cost
9 (Exhibit CCC-SC-67³). Metropolitan already voted to fund the second tunnel on April
10 10, 2018 but a revote was required for procedural reasons.

11 The CVP share of the twin tunnels’ diversions will therefore be much less than
12 assumed in CWF H3+, possibly even zero. This decision results in an inadequate
13 analysis of upstream SWP and CVP reservoir operations and the environmental
14 impacts in key fish species downstream of those reservoirs. The SWRCB did not
15 require the Petitioners to provide new modeling data that represents this significantly-
16 reduced CVP share.

17 Because CWF H3+ assumes the CVP share of the twin tunnels can be up to
18 51% of the total capacity, the CWF H3+ modeling used in the ADSEIR/EIS and in Part 2
19 fails to adequately simulate the relative releases from the CVP upstream reservoirs
20 (Shasta and Folsom Reservoirs) and the SWP’s Oroville Reservoir, or the flows in the
21 rivers downstream of those reservoirs and down into the Delta (CCC-SC-52, Figure 2.)
22 If the CVP use of the twin tunnels is limited, releases of stored water from Shasta and
23 Folsom Reservoirs are likely to be less than in CWF H3+ modeling, and the drawdown
24 of Oroville Reservoir by the SWP is likely to be greater.

25 These water levels and downstream flows are very important for fish and senior
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27 _____
28 ² <https://www.californiawaterfix.com/resources/updated-calsim-dsm2-and-biological-modeling-data/>

³ Exhibit CCC-SC-67 is a true and correct copy of selected slides from the document

1 water right holders in Northern California. Unless the Petitioners present updated and
 2 more detailed operations and water quality modeling reflecting the new SWP and CVP
 3 shares of twin tunnel diversions, the SWRCB will lack the basis to make an accurate or
 4 properly informed decision about the key hearing issues, such as the impacts on key
 5 fish species and legal users of water in the upstream tributaries.

6
 7 **4. The Current Modeling and Analyses (CWF H3+) Do Not Accurately**
 8 **Represent Sacramento Flows at Rio Vista during January through**
 9 **August.**

10 During cross-examination of DWR's expert witness, Eric Reyes, on February 27,
 11 2018, by Solano County's attorney, Daniel Wolk, Mr. Reyes acknowledged that DWR's
 12 CWF H3+ model study includes a minimum Rio Vista flow requirement of 3,000 cfs for
 13 January through August (the "Rio Vista Flow Standard"). (Transcript, February 27, 2018,
 14 Page 194 starting at Line 21.)

15 Mr. Reyes testified that he thought this was just a modeling assumption and not a
 16 part of the proposed WaterFix project. It was something that was just left in the model.

17 Unless DWR intends the Rio Vista Flow Standard to be an operating criterion
 18 and permit term, DWR has failed to provide the State Board with modeling that
 19 represents the actual proposed project.

20 Mr. Reyes stated his belief that there was only one month when WaterFix
 21 operations were controlled by the Rio Vista Flow Standard. (Transcript, February 27,
 22 2018, Page 198 starting at Line 16.) In fact, for CWF H3+ there are four months when
 23 flow and export operations in the Delta by the SWP and CVP were determined by the
 24 need to meet this Rio Vista Flow Standard. There are also two months when the
 25 September-December D-1641 Rio Vista standard is not met and Rio Vista flows are
 26 less than 3,000 cfs, *i.e.*, September-October 1934 (see Exhibit CCC-SC-53⁴, Table 1).

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⁴ CCC-SC-53 is a true and correct copy.

1 This is a clear modeling error that has not been explained by the Petitioners. The same
2 D-1641 modeling error occurs in the No Action Alternative (“NAA”) for September and
3 October 1934.

4 Mr. Reyes testified that the Rio Vista Flow Standard “*was something done as a*
5 *modeling convenience because early editions of this were showing low outflows in*
6 *certain months. So that was difficult for the DSM-2 model to process, so we needed*
7 *something just to keep the flows higher until we essentially worked out what our issues*
8 *were. And those issues were worked out, however, the criteria was left in, just the*
9 *modeling.*” (Transcript, February 27, 2018, Page 197 starting at Line 4.)

10 The SWRCB needs the opportunity to review proposed WaterFix project
11 modeling that does not include this Rio Vista Flow Standard in order to make a fair and
12 legal determination regarding the proposed WaterFix project. The SWRCB needs to be
13 able to determine whether the proposed WaterFix project and north Delta diversions
14 would result in unreasonably low Rio Vista flows and Delta outflows, in both the
15 CALSIM II simulations and in actual future operations with the proposed WaterFix
16 project.

17 The SWRCB should also consider whether a Rio Vista Flow Standard permit
18 term is needed, January through August, to ensure the SWP operators do not cause
19 Delta outflows to become very low once the WaterFix project comes on line. As Mr.
20 Reyes testified (Transcript, February 27, 2018, Page 197, starting at Line 4), the earlier
21 modeling indicated this could be a problem.

22 Such unreasonably low outflows would result in large increases in seawater
23 intrusion and significant adverse impacts on water quality in the Delta.

24 Unless all operating criteria and D-1641 standards are correctly simulated in the
25 WaterFix modeling, the SWRCB will lack the basis to make an accurate or properly
26 informed decision about the key hearing issues.

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1 **5. The Current Modeling and Analyses (CWF H3+) Do Not Accurately**
2 **Represent How the Proposed Project Will Actually Be Operated**
3 **Under Adaptive Management.**

4 The Petitioners have testified that the WaterFix adaptive management range
5 varies from the Boundary 1 to Boundary 2. (Exhibit DWR-1010, Page 9, Line 3;
6 Transcript, February 22, 2018, Page 66, starting at Line 22.)

7 The Boundary 1 Scenario has essentially no additional environmental flows or
8 export constraints. Boundary 1 does not include the Fall X2 requirement from the U.S.
9 Fish and Wildlife Service 2008 Biological Opinion (Exhibit SWRCB-87) and
10 recommended by the SWRCB in its 2010 Delta Flows Criteria Report (Exhibit SWRCB-
11 25) and the California Department of Fish and Wildlife's⁵ 2010 "Quantifiable Biological
12 Objectives and Flow Criteria for Aquatic and Terrestrial Species of Concern Dependent
13 on the Delta" (Exhibit SWRCB-66).

14 The 82-year averaged Delta outflows for Boundary 1 in September, October, and
15 November are much lower than the NAA (Exhibit CCC-SC-54⁶, Figure 1). Figure 2 of
16 Exhibit CCC-SC-56⁷ shows how individual months in September that are between
17 18,000-20,000 cfs in the NAA are reduced to as low as 3,000 cfs for Boundary 1. If
18 WaterFix were operated to these low Delta outflows under adaptive management, there
19 would be a corresponding increase in seawater intrusion in the fall, resulting in
20 significant degradation of Delta water quality (in terms of EC and chloride
21 concentrations). (see, e.g., Figure 1 and Table 1 in CCC-SC-56).

22 Because the Petitioners are considering using adaptive management to enable
23 them to operate the proposed WaterFix project according to Boundary 1 operating
24 criteria, the proposed project could cause significant water quality impacts in the Delta,
25 beyond those reported by the Petitioners for the CWF H3+ modeling. The
26

27 ⁵ At that time, called the Department of Fish and Game.

28 ⁶ Exhibit CCC-SC-54 is a true and correct copy.

⁷ Exhibit CCC-SC-56 is a true and correct copy.

1 corresponding impacts on legal users of water could also be larger than disclosed by
2 the Petitioners in Part 1 for Scenarios H3 and H4 (or CWF H3+.)

3 The SWRCB must include permit terms in the revised SWP and CVP permits
4 that ensure that WaterFix adaptive management actions to improve conditions for fish
5 do not result in worsening of Delta water quality (as would occur operating to the
6 Boundary 1 Scenario under adaptive management) and increased impacts on other
7 legal users of water.

8
9 **6. The Current WaterFix Modeling (CWF H3+) Is Not Within the Range of**
10 **Alternative 4A, Scenarios H3 and H4.**

11 The Petitioners testified in Part 2 of this hearing that “*CWF H3+ is the Project*
12 *adopted by DWR that is the subject of the Petition for Change in Point of Diversion*
13 *requested by DWR and Reclamation.*” (Exhibit DWR-1010, Page 2, Line 15). The
14 Petitioners further claim in Part 2 that CWF H3+ is within the range of alternatives
15 described in Part 1 and within the operational range of Alternative 4A, Scenarios H3 to
16 H4. (Exhibit DWR-1008, Slide 5; Exhibit DWR-1010, Page 8, Line 26.)

17 Under cross examination, the Petitioners’ witnesses acknowledged that the
18 flows, exports and salinities for the proposed WaterFix project CWF H3+ were outside
19 the range of scenarios H3 and H4 in some months (see, e.g., Transcript, February 27,
20 2018, Page 186, Line 8; Transcript, February 27, 2018, Page 201, starting at Line 4).

21 The Petitioners attempt to argue that their description of Alternative CWF H3+
22 being within the range of H3 and H4 only refers to operating criteria (e.g., Transcript,
23 February 22, 2018, Page 213, starting at Line 8.)

24 However, the SWRCB’s determination of whether there are significant adverse
25 impacts of the proposed project on the Delta ecosystem, the environment and legal
26 users of water should be based on the reservoir storage levels, the flows and
27 temperatures for fish in upstream tributaries and the Delta, the degradation of water
28 quality in the Delta due to reduced outflows, and other related parameters. These

1 parameters are the result of specific operating criteria, such as minimum flow limits and
2 maximum EC and chloride standards, but the bottom line is their impacts on the
3 environment and legal users of water.

4 The operating criteria for Scenarios H3 and H4, and the Biological Assessment
5 modeling BA H3+ included October and November limits on flow reversals in Old and
6 Middle River (OMR > -5,000 cfs). The operating criteria for CWF H3+ eliminated
7 (“updated”) these OMR limits (Exhibit DWR-1028, Slide 11). OMR limits are intended to
8 benefit fish. The elimination of OMR limits in CWF H3+ significantly reduced Delta
9 outflows in October compared to both H3 and H4, and significantly increased salinities
10 in the Delta.

11 Scenarios H3 and H4 had specific OMR operating criteria in October and
12 November, but CWF H3+ did not include such OMR operating criteria, so CWF H3+ is
13 not within that range of operating criteria. More importantly, as is discussed below,
14 degradation of Delta water quality in October, November and December is much greater
15 in CWF H3+ than either H3 or H4.

16 17 **6.1 The WaterFix modeling and operations criteria have changed** 18 **significantly since the Scenario H3 and H4 model runs.**

19 It is important to remember that the Petitioners’ Delta conveyance project has
20 been continually changing since the start of the original Bay Delta Conservation Plan
21 (“BDCP”) in 2006. The BDCP proposed project had adverse water quality impacts for
22 EC and chloride concentrations that were determined to be “*significant and*
23 *unavoidable*” (Exhibit SWRCB-5, Chapter 8 – Water Quality).

24 The WaterFix conveyance-only project was announced publicly in April 2015.
25 The Petitioners have determined that, with the proposed WaterFix project, those
26 salinity-related water quality impacts are less than significant (Exhibit SWRCB-110,
27 Pages 125-128). That finding is based on mitigation measure WQ-11: *Avoid, minimize*
28 *or offset, as feasible, reduced water quality conditions*. DWR intends to achieve this

1 mitigation measure and “avoid” water quality impacts by adaptively managing diversions
2 at the north and south Delta intakes, and by adaptively managing the Head of Old River
3 barrier, if feasible (Exhibit SWRCB-110, Page 125).

4 When the Petitioners developed Scenarios H3 and H4, they assumed the 2009
5 National Marine Fisheries Service Biological Opinion (Exhibit SWRCB-84, Page 632
6 and Page 642 *et seq.*) requirements for the limits on the ratio of San Joaquin inflow to
7 south Delta exports (April 1 through May 31) would not need to be met for the WaterFix
8 project. (Exhibit DWR-116.)

9 However, in preparing the WaterFix Biological Assessment (Exhibit SWRCB-104)
10 and the BA H3+ modeling, the Petitioners complied with the NMFS 2009 Biological
11 Opinion’s San Joaquin River Inflow to Export Ratio requirement (Action IV.2.1).

12 The BA H3+ modeling also was the basis for the WaterFix Final EIR/EIS that was
13 released to the public on December 22, 2016.

14 Between the release of the WaterFix Final EIR/EIS to the public on December
15 22, 2016, and DWR’s later certification of the WaterFix Final EIR/EIS on July 21, 2017
16 (Exhibit SWRCB-109), DWR and Reclamation consulted further with the U.S. Fish and
17 Wildlife Service, National Marine Fisheries Service, and the California Department of
18 Fish and Wildlife. The corresponding biological opinions and Incidental Take Permit
19 were issued on June 23, 2017, June 16, 2017 and July 26, 2017, respectively (Exhibit
20 SWRCB-105, SWRCB-106 and SWRCB-107, respectively).

21 As part of those consultations with the fisheries regulatory agencies, the following
22 additional modifications were made to the proposed project and incorporated into the
23 certified WaterFix Final EIR/EIS (Exhibit SWRCB-109):

- 24 1. New Spring Delta outflow targets and criteria, March-May; and
- 25 2. Elimination of the -5,000 cfs minimum Old and Middle River flow (OMR)
26 targets for October and November.

27 This resulted in a new modeling study CWF H3+ that served as the basis of the
28 Petitioners’ testimony in Part 2 of this hearing, and that served as the basis for DWR’s

1 CEQA findings for the certified WaterFix Final EIR/EIS. The CWF H3+ modeling was
2 not made available to the public until November 30, 2017. This was the date that DWR
3 submitted its Part 2 Case-in-Chief, and it was the date when the Cases-in-Chief of all
4 other Part 2 parties were due. This deprived Contra Costa County, the Contra Costa
5 County Water Agency, and Solano County of the opportunity to review, prior to
6 submitting their Part 2 testimony, the full CWF H3+ modeling – *the modeling that DWR*
7 *relied on when preparing its Part 2 testimony*. As discussed in more detailed in section
8 6.3 below, there are significant adverse water quality impacts in CWF H3+ that were in
9 the modeling for previous versions of the WaterFix project such as BA H3+ and
10 Scenarios H3 and H4.

11 The removal of the October-November minimum OMR targets resulted in lower
12 Delta outflows in October and November.

13 The WaterFix proposed project operational criteria were also refined based on
14 2017 USFWS and NMFS biological opinions by including a new real-time operations
15 approach for the following (Exhibit DWR-1008, Slide 6):

- 16 • North Delta Intake Bypass Flows
- 17 • South Delta export criteria for October-November
- 18 • Head of Old River Gate operations.

19 However, these real-time operations were not incorporated into the CWF H3+
20 modeling.

21
22 **6.2 In August 2017, the Petitioners failed to produce available**
23 **CWF H3+ full model runs after Contra Costa County, Contra**
24 **Costa County Water Agency, and Solano County requested**
25 **those data to inform their Part 2 testimony.**

26 The parties to Part 2 were seriously prejudiced in preparing their Part 2 testimony
27 and exhibits because the CWF H3+ modeling was not made available until November
28 30, 2017, even though it was the basis of DWR's certification of the WaterFix Final

1 EIR/EIS on July 21, 2017. Contra Costa County, Contra Costa County Water Agency,
2 and Solano County specifically requested any updated WaterFix modeling in August
3 2017, but were only directed to modeling data that were described as “*not a full run but*
4 *instead just sensitivity information.*” (Exhibit CCC-SC-57⁸, email from B.G. Heiland
5 (DWR) to Richard Denton, August 31, 2017.) DWR did not acknowledge that the CWF
6 H3+ full model runs had already been completed by mid-May 2017.

7 The Zip file for the CWF H3+ CALSIM operations modeling output (Exhibit DWR-
8 1077) is dated 4/28/2017. The Zip file for the CWF H3+ DSM2 EC water quality
9 modeling output (Exhibit DWR-1078) is dated 5/15/2017. These key WaterFix modeling
10 data model runs were completed early enough that DWR could have made the model
11 runs available to the parties and the public well before the November 30, 2017 deadline
12 for submission of Part 2 cases-in-chief. Moreover, these full model runs were available
13 at the time of Contra Costa County, Contra Costa County Water Agency, and Solano
14 County’s request in August 2017. DWR failed to produce the available full model runs
15 at a time when the agencies were preparing their Part 2 case-in-chief.

16
17 **6.3 The CWF H3+ operations criteria and resulting flow and water**
18 **quality simulations model runs are very different than the**
19 **Scenario H3 and H4 range.**

20 Modeling study CWF H3+ is the basis for the environmental analysis in the
21 WaterFix ADSEIR/EIS, released to the public on June 12, 2018. There are three major
22 differences in operations criteria between Alternative 4A, Scenarios H3 and H4, and the
23 current version of the proposed WaterFix project, CWF H3+:

- 24 1. CWF H3+ complies with the April-May limits on the ratio of San Joaquin
25 inflow to south Delta exports (Exhibit DWR-116).
26 2. CWF H3+ has new Spring Delta outflow targets and criteria, March-May
27

28 _____
⁸ Exhibit CCC-SC-57 is a true and correct copy of the document.

1 3. The -5,000 cfs minimum OMR flow targets for October and November in
2 Scenarios H3 and H4 and BA H3+ are eliminated.

3 These new operations criteria substantially reduced total south-of-Delta exports
4 in April and May and reduced Delta outflows in October relative to Scenarios H3 and
5 H4. This reduction in Delta outflows in October results in a corresponding increase in
6 seawater intrusion into the Delta and net degradation of water quality.

7 Figure 1 in Exhibit CCC-SC-58⁹ shows the October Delta outflows for CWF H3+
8 relative to the corresponding outflows from the NAA for water years 1922-2003. Also
9 plotted are the October outflows for Alternative 4A, Scenario H3 and H4, the basis of
10 the Petitioners' testimony in Part 1 of this hearing. The outflows for Scenarios H3 and
11 H4 are generally higher than the NAA, but the CWF H3+ outflows are the same or
12 slightly lower.

13 Figure 2 in Exhibit CCC-SC-58 shows the November Delta outflows for CWF H3+
14 relative to the corresponding outflows from the NAA for water years 1922-2003. Also
15 plotted are the November outflows for Alternative 4A, Scenario H3 and H4. Only outflow
16 data less than 16,000 cfs are plotted because changes in outflow at low outflow have
17 the greatest effect on seawater intrusion and water quality in the Delta. When Delta
18 outflows are less than 10,000 cfs, all of the with-project alternatives have Delta outflows
19 close or equal to the D-1641 Delta outflow standards (Exhibit SWRCB-21) and are
20 lower than the NAA outflows.

21 Figure 2 in Exhibit CCC-SC-54 shows the 82-year averages Delta outflows for
22 each month for the NAA, CWF H3+ and Alternative 4A, Scenario H3 and H4. In
23 October, the long-term averaged outflows for Scenarios H3 and H4 are generally higher
24 than the NAA, but the CWF H3+ average outflow is slightly lower than the NAA.

25 Figure 1 in Exhibit CCC-SC-54 shows the 82-year averages Delta outflows for
26 each month for the NAA, CWF H3+, and Boundary 1 and Boundary 2. Boundary 1 is
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⁹ Exhibit CCC-SC-58 is a true and correct copy.

1 the worst-case scenario for adaptive management of the proposed WaterFix project
2 because Delta flows are low, seawater intrusion into the Delta increases and there is
3 less protection for fish. Unlike the other WaterFix alternatives in Figure 1, Boundary 1
4 does not include the Fall X2 requirements (Exhibit DWR-515).

5 Boundary 2 in Figure 1 (Exhibit CCC-SC-54) is representative of, but not as
6 stringent as, the SWRCB's 2010 Delta Flow Criteria report recommendations (Exhibit
7 SWRCB-25). If Boundary 2 criteria were operated, WaterFix annual south-of-Delta
8 exports would be much less than either CWF H3+ or the NAA (CCC-SC-59, Figure 3).

9 In September, October and November, the Boundary 1 outflows are even less
10 than for CWF H3+, representing even larger seawater intrusion to the Delta than for the
11 CWF H3+ alternative. In all months, except April and May, the Boundary 2 outflows are
12 much higher than for CWF H3+ suggesting CWF H3+ will not leave enough unimpaired
13 flow in the Central Valley and Delta systems to meet the outflows recommended by the
14 SWRCB in its 2010 Delta Flow Criteria Report as necessary to restore and sustain key
15 fish species.

16 Figure 1 in Exhibit CCC-SC-55¹⁰ shows the increases in salinity (EC) in Old River
17 at Bacon Island relative to the No Action Alternative (NAA) due to the proposed Water
18 Fix project CWF H3+. Also shown are the increases in EC for Alternative 4A, scenarios
19 H3 and H4. This was the range of the WaterFix proposed project presented by the
20 Petitioners in Part 1 of this hearing. The version of the project for the Biological
21 Assessment and public release of the Final EIR/EIS, BA H3+, is also plotted. The
22 averaging is for the 16 years from October 1, 1975 through September 30, 1991. CWF
23 H3+ EC changes are well outside the range of H3 and H4 in October, November,
24 December, February, March, and April. There is significant degradation of water
25 quality, in terms of salinity, in October, November, March, April and June.

26 The Petitioners acknowledged these large increases in EC and chloride
27
28

¹⁰ Exhibit CCC-SC-55 is a true and correct copy.

1 concentration under cross-examination. (Transcript, February 22, 2018, starting at Page
2 199, Line 11.) Figure EC3 (Exhibit DWR-1015, Page 22) suggests the 16-year
3 averaged EC at San Andreas Landing for the proposed WaterFix project, CWF H3+, will
4 be greater than the NAA from September-November and February-June. Water quality
5 degradation on individual days or months could be even greater. CWF H3+ is outside
6 the range of Alt. 4A, scenarios H3 and H4 (Part 1 proposed project) in October-
7 November and February- April.

8 Figure CL1 in Exhibit DWR-1015, Page 24, suggests the 16-year averaged
9 chloride concentration at the Contra Costa Canal for the proposed WaterFix project,
10 CWF H3+, will be greater than the NAA from September-November, February-April, and
11 June. CWF H3+ is outside the range of Alternative 4A, scenarios H3 and H4 (Part 1
12 proposed project) from October-April.

13 The Petitioners have attempted in Part 2 to minimize these changes from the
14 Part 1 modeling (Scenarios H3 and H4) to the Part 2 modeling (CWF H3+), and the
15 corresponding significant increase in adverse impacts on the Delta ecosystem, the
16 environment and legal users of water.

17 In Exhibit DWR-1028, Slide 4, the Petitioners state the comparison of CWF H3+
18 with BA H3+ (sensitivity analysis): "*showed that overall operations including upstream*
19 *storage, river flows, and water supply deliveries remained similar.*" In Exhibit DWR-
20 1028, Slide 6, the Petitioners testify the August 2016 Biological Assessment included
21 only one set of operations criteria (H3+) and claim "*the July 2017 NOD included slight*
22 *revisions to H3+.*"

23 This is not correct. One of those changes, elimination of the October-November
24 OMR limits, was a major change, and it produced significant decreases in Delta outflow
25 in October and large increases in salinity in the Delta in October, November and
26 sometimes December.

27 In the Petitioners' water quality PowerPoint (Exhibit DWR-1027, Slide 4), the
28 Petitioners claim:

- 1 • CWF H3+ EC results generally fall between H3 and H4;
- 2 • CWF H3+ D-1641 M&I and Ag Water Quality Objectives are met the
- 3 majority of the time; and
- 4 • Any small percentage of probability of exceedence is equal to or less than
- 5 the NAA except at Emmaton which has a slightly higher probability.

6 These claims also are not correct. Figures 1 and 2 in Exhibit CCC-SC-55 clearly
 7 show that significant increases in salinity in the Delta relative to Scenarios H3 and H4 in
 8 October and November and significant water quality degradation in those months
 9 relative to the NAA. Since passage of the 2009 Delta Reform Act, it is State policy that
 10 the Bay-Delta should be managed to achieve the inherent objective of improving water
 11 quality to protect human health and the environment consistent with achieving water
 12 quality objectives in the Delta (Cal. Wat. Code, § 85020(e)).

13 Solano County, Contra Costa County and the Contra Costa County Water
 14 Agency submitted detailed CEQA/NEPA comments on the WaterFix Final EIR/EIS
 15 (released for public review and comment on December 22, 2016), including a comment
 16 by Solano County that *“the Final EIR/EIS is inadequate because it presents modeling*
 17 *data for a number of different versions of the preferred alternative (Alternative 4A), but*
 18 *not the current version of the Project.”* (Exhibit SWRCB-108, page 78.)

19 The Petitioners’ response to Solano County’s CEQA/NEPA comment was:

20 *“Commenter claims that the Delta outflow under Alternative 4A H3+*
 21 *scenario does not fall within H3 and H4 scenarios. This is incorrect.*
 22 *Changes in long-term average Delta outflow under Alternative 4A*
 23 *(ELT) as compared to the No Action Alternative (ELT) and Existing*
 24 *Conditions are shown in Figures 5-37 through 5-39 and Tables 5-*
 25 *10 through 5-12. As shown in Figure 5F.4-27, the incremental*
 26 *changes in Delta exports under H3+ compared to the No Action*
 27 *Alternative are found to be within the H3 and H4 scenarios.”*

28 This response to Solano County’s comment is inadequate. The figures referred

1 to in the Petitioners' response (Exhibit SWRCB-108, page 78) are based on H3+
2 modeling, but it is BA H3+ modeling, not the project that was adopted, CWF H3+. The
3 responses to this comment should have been based on a comparison with the adopted
4 and then "*current version*" of the proposed WaterFix project.

5 It is clear from the Delta outflow and Delta water quality data for the CWF H3+
6 alternative in Exhibits CCC-SC-54 and CCC-SC-55, and the Petitioners' own testimony
7 (Exhibit DWR-1015), that, in some months, the CWF H3+ Delta outflows and Delta EC
8 and chloride concentrations are indeed well outside the range of Scenarios H3 and H4.

9 The Petitioners describe these changes in Figure 1 of Exhibit DWR-1010, but
10 either (1) ignore the application of the April-May limit on the San Joaquin inflow to south
11 Delta exports ratio, or (2) incorrectly categorize the April-May limit as "*updated spring*
12 *outflow criteria*." Limiting exports from the south Delta as required by the 2009 NMFS
13 Biological Opinion (Exhibit SWRCB-84) can result in increased Delta outflows, but not in
14 every case. The effect of reducing exports from the south Delta could sometimes be
15 offset by increased exports from the new north Delta intakes, or releases from upstream
16 reservoirs could be reduced.

17 The Petitioners have made significant changes to their project since Part 1 but
18 have failed to adequately analyze and disclose those changes. The changes have
19 resulted in reductions in Delta outflows at key times of the year, reduced exports in
20 April-May which resulted in increased exports in later months (Exhibit CCC-SC-59¹¹,
21 Figures 1 and 2), and significant adverse impacts on EC and chloride concentrations in
22 the Fall.

23 Without detailed information about these significant impacts and a commitment
24 by the Petitioners to fully mitigate those impacts, the SWRCB will lack the basis to make
25 an accurate or informed decision about the key hearing issues.
26
27

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¹¹ Exhibit CCC-SC-59 is a true and correct copy.

1 **7. The Petitioners Incorrectly Redefine the SWRCB's D-1641**
2 **Export/Inflow Standard to Eliminate North Delta Exports from This**
3 **Standard.**

4 The Petitioners have arbitrarily redefined the export/inflow ratio in Water Rights
5 Decision 1641 ("D-1641") to allow more water to be exported (Exhibit SWRCB-21,
6 pages 184-187.) The current definition of the export/inflow ratio in D-1641 is (total
7 exports) divided by (total Delta inflow), where all the exports currently come from the
8 south Delta.

9 The Petitioners have redefined the export/inflow ratio as (south Delta exports)
10 divided by (total Delta inflow, minus North Delta exports). (Exhibit SWRCB-102, 2016
11 Final BDCP/California WaterFix EIR/EIS, Chapter 3, pages 3-38.)

12 This redefinition would allow the Petitioners to export more water than the official
13 D-1641 definition, especially in June. A detailed analysis of the CWF H3+ modeling
14 data shows that the total south-of-Delta exports for CWF H3+ exceeded the exports that
15 would have been allowed if the WaterFix project had been modeled using the original
16 SWRCB D-1641 definition of the E/I ratio in 57 months out of the total $82 \times 12 = 984$
17 months, October 1921 through September 2003. (Exhibit CCC-SC-61¹².)

18 The Petitioners' redefinition of the export/inflow ratio means that exports through
19 the north Delta intakes would be unconstrained by the export/inflow standard. There
20 would be no limit on total exports due to the export/inflow standard during periods when
21 exports were only being made through the north Delta intakes. If south Delta exports
22 are zero, the export/inflow ratio as redefined by the Petitioners is also zero.

23 This is unacceptable because it eliminates the D-1641 protection against
24 entrainment of eggs and larvae at the Delta export pumps and intakes, in this case, at
25 the proposed north Delta intakes. It is contrary to the State's co-equal goal of policy of
26 protecting, restoring, and enhancing the Delta ecosystem (Cal. Wat. Code, § 85054)

27
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¹² Exhibit CCC-SC-61 is a true and correct copy.

1 and the State policy of restoring the Delta ecosystem, including its fisheries and wildlife,
2 as the heart of a healthy estuary and wetland ecosystem. (Cal. Wat. Code, § 85020
3 (c).)

4
5 **7.1 The original biological objective for the export/inflow ratio was**
6 **to reduce entrainment of fish, egg, and larvae entrainment.**

7 The November 3, 1994 “Biological Explanation of the Joint Water Users
8 Proposed Bay-Delta Standards”¹³ formed the basis for development of the December
9 1994 Bay-Delta Accord and the new Bay-Delta standards in D-1641. I was a contributor
10 to that proposal. Key excerpts from the Biological Explanation are given in Exhibit
11 CCC-SC-62¹⁴.

12 The Biological Explanation document makes clear that the goal of the
13 export/inflow limits was to reduce fish, egg and larvae entrainment and mortality at the
14 pumps. The Biological Explanation document, at page 2-19, states that the Biological
15 Objective of the Export/Inflow ratio is to: *“Reduce fish, egg, and larvae entrainment and*
16 *mortality at the pumps through export restrictions and intensive real-time*
17 *monitoring/response designed to detect presence of fish in areas adjacent to the*
18 *pumps.”*

19 The Biological Explanation document, at page 2-19, states that the Intended
20 Benefits of the Export/Inflow ratio include that *“exports should decrease during those*
21 *years when fresh water inflow to the Delta is decreased and a larger percentage of fish*
22 *and other aquatic organisms are geographically distributed further upstream where their*
23 *susceptibility to export losses is increased.”* (Exhibit CCC-SC-62.)

24
25 _____
26 ¹³ The November 3, 1994 “Biological Explanation of the Joint Water Users Proposed Bay-Delta
27 Standards” can be downloaded from the following link:
28 https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/wq_control_plan/s/1995wqcp/admin_records/part05/368.pdf

¹⁴ Exhibit CCC-SC-62 is a true and correct copy of selected pages from the document.

1
2 **7.2 The Petitioners' fishery expert testified eggs and larvae of fish**
3 **species would occur at the north Delta intakes.**

4 Petitioners' fishery expert in Part 2, Dr. Marin Greenwood, provided testimony
5 that eggs and larvae would be present above the north Delta intakes and therefore
6 susceptible to entrainment at that location:

- 7 • *"CWF H3+ NDD are outside the main range of Delta Smelt and Longfin*
8 *Smelt and therefore are limited in their potential to cause adverse effects*
9 *such as entrainment of larvae. However, there is a potential for restricted*
10 *access of smelts to shallow water habitat upstream of the NDD and this*
11 *potential effect will be mitigated with 1,750 acres of restoration."* (Exhibit
12 Exhibit DWR-1012, Page 4, Line 2.)
- 13 • *Striped Bass and American Shad egg/larval entrainment at NDD*
14 – *Most spawning upstream of NDD*
15 ▪ *Striped Bass eggs/larvae drift downstream to Delta*
16 ▪ *Many American Shad rear upstream*
17 – *Some protection from spring flow criteria (less exports)*
18 (Exhibit DWR-1029, Slide 34.)
- 19 • *"BDCP-covered fishes in my testimony (White Sturgeon, Sacramento*
20 *Splittail, Pacific and River Lamprey) spawn upstream of the Delta and*
21 *generally move downstream into the Delta and adjacent areas as larvae or*
22 *juveniles, as do Striped Bass and American Shad."* (Exhibit DWR-1012,
23 Page 51, Line 16.)
- 24 • *"Entrainment of Striped Bass and American Shad early life stages (eggs*
25 *and larvae) was found to be a significant and unavoidable impact in the*
26 *FEIR/S. Striped Bass spawn in and upstream of the Delta. Eggs and larvae*
27 *move downstream at small sizes that could make them susceptible to*
28 *entrainment at the NDD. The FEIR/S (Exhibit SWRCB-102, Section*

1 11.3.5.2, *Impact AQUA-201, p. 11-3537*) found that the entrainment of
2 *Striped Bass at the NDD would constitute a significant and unavoidable*
3 *impact of the CWF H3+, based primarily on assessment of ten spring*
4 *(March, April, May, or June) simulated monthly periods of DSM2 particle*
5 *tracking modeling results for the H3 operational scenario.” (Exhibit*
6 *SWRCB-102, Section 11.3.4.2, Table 11-1A-96, p. 11-679.)” (Exhibit DWR-*
7 1012, Page 52, Line 16.)

8 Export/inflow limits are needed at both the south and north Delta intakes to
9 protect against entrainment of eggs and larvae of Delta smelt and other key fish
10 species.

11 In Part 1, the Petitioners (Jennifer Pierre) dismissed the effect of the change in
12 definition of the export/inflow ratio as inconsequential. (Transcript, Friday, July 29, 2016,
13 Page 233, Line 10.) The CWF H3+ data presented in Exhibit CCC-SC-61 suggest
14 additional water is able to be exported, primarily in the month of June. Redefining D-
15 1641 standards to allow additional delta exports in months when the additional exports
16 would not otherwise be permitted is not inconsequential.

17
18 **7.3 The Petitioners even used a third definition of the**
19 **export/inflow ratio in Scenarios H2 and H4.**

20 The Petitioners appear to have made an additional, unexplained, assumption: in
21 the case of Alternative 4A, Scenarios H2 and H4, the Sacramento River inflow was
22 assumed to be upstream, rather than downstream, of the proposed north Delta intakes.
23 (Exhibit SWRCB-102, Chapter 3, Page 3-39, Footnote 57.)

24 *“In computing the E/I ratio for Scenarios H1 and H3, the*
25 *Sacramento River Inflow is considered to be downstream of the*
26 *north Delta intakes. However, in computing the E/I ratio for*
27 *Scenarios H2 and H4, the Sacramento River inflow was assumed*
28 *to be upstream of the proposed north Delta intakes.”*

1 Scenario H4 was a version of the proposed project presented in Part 1 of this
2 hearing. This is an arbitrary third definition of the export/inflow ratio in D-1641.

3 The WaterFix project must operate to the original definition of the export/inflow
4 ratio to help reduce the entrainment of eggs and larvae at the north Delta intakes.
5 Unless new modeling is provided that complies with the D-1641 standard, the SWRCB
6 will lack the basis to make an informed decision.

7 The SWRCB should include a permit term in any new or revised SWP and CVP
8 water rights permits that clearly defines the export/inflow ratio, as applied to DWR and
9 Reclamation operations, as (total north and south exports) divided by (total Delta
10 inflow).

11
12 **8. New Version of Proposed Project (CWF H3+) Does Not Comply with**
13 **“Big Gulp, Little Sip” Concept.**

14 The Petitioners claim in Part 2 of this hearing that the proposed WaterFix project,
15 as represented by CWF H3+, will “*reduce water exports in drier years when Delta*
16 *aquatic resources are subject to increased stresses; and increase Delta exports in*
17 *wetter years when aquatic resources are not as affected by stresses in the Delta.*”
18 (Exhibit DWR-1010, Page 12, Line 2.)

19 During their oral testimony, the Petitioners claimed WaterFix will “*improve the*
20 *ecosystem through reduction and reverse flow occurrences, flow patterns that will*
21 *become more consistent with natural flow patterns, by increasing exports in the wetter*
22 *periods and decreasing them in the dryer [sic.] periods*” (Transcript, February 22,
23 2018, Page 44, Line 12.)

24 This “*Big Gulp, Little Sip*” concept was one of the early Planning Principles
25 adopted by the Steering Committee for the original Bay-Delta Conservation Plan
26 (BDCP), *i.e.*, “*Divert more water in the wetter periods and less in the drier periods.*”
27 (Exhibit CCC-SC-12, Bay Delta Conservation Plan, March 2009 brochure, “An Overview
28 and Update,” Page 6.) The BDCP and WaterFix project proponents often promoted this

1 “Big Gulp, Little Sip” concept. (Exhibit CCC-SC-13.)

2 In my written case-in-chief testimony (Exhibit CCC-SC-3, Page 11, Line 21), I
3 discussed how the WaterFix BA H3+ modeling did not comply with either the “Big Gulp”
4 or “Little Sip” portion of the concept. The proposed WaterFix project cannot consistently
5 capture extra water for export reductions during wet periods when Delta outflows are
6 very high. Similarly, in many dry months when Delta outflows are very low and the
7 Delta ecosystem is stressed, the WaterFix project would increase south-of-Delta
8 exports above the existing typical combined permitted capacity of 11,280 cfs. In some
9 cases, dry-period total exports would be increased by as much as 30 percent.

10 The version of the proposed WaterFix project submitted by the Petitioners for
11 Part 2 of this hearing, CWF H3+, likewise fails to comply with the “Big Gulp, Little Sip”
12 concept. (Exhibit CCC-SC-63¹⁵).

13 To ensure the proposed WaterFix project does not rely on exports from the Delta
14 during dry periods, the SWRCB should limit total exports based on Delta outflow. For
15 example, the SWRCB could limit total SWP and CVP south-of-Delta exports to 1.5
16 times the Delta outflow (the red diagonal line in Figure 1 of Exhibit CCC-SC-63). An
17 example of this kind of limit was previously shown in Figure 5 in Exhibit CCC-SC-17.

18 A limit on exports based on Delta outflow would reduce exports during drier
19 periods (i.e., achieve the “Little Sip” concept) and help improve, restore and sustain the
20 Delta ecosystem.

21
22 **9. The Proposed WaterFix Project, CWF H3+, Sometimes Reduces**
23 **Rather than Increases Sacramento Inflows to the Delta at Freeport.**

24 In my case-in-chief written testimony (Exhibit CCC-SC-3, Page 17, Line18), I
25 discussed how the WaterFix project (based on BA H3+ modeling) sometimes reduced
26 Sacramento River inflows to the Delta (well above the proposed North Delta Intakes) by
27

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¹⁵ Exhibit CCC-SC-63 is a true and correct copy.

1 as much as 30 percent.

2 As shown in Figure 1 of Exhibit CCC-SC-64¹⁶, the new proposed WaterFix
 3 project (CWF H3+) also reduces Sacramento River flows at Freeport by as much as 30
 4 percent.

5 The SWRCB, in its 2010 Delta Flow Criteria Report (Exhibit SWRCB-25),
 6 recommended significant increases of Sacramento inflow to the Delta and Delta outflow
 7 would be necessary in January through June in the Delta ecosystem for fishery
 8 protection, under existing conditions. Some of the reductions in flows, as measured at
 9 Freeport, caused by the proposed WaterFix project occur during the January through
 10 June period.

11 It is not sufficient to control the flow in the Sacramento River downstream of the
 12 NDD using percentage bypass rules. This would control how much of the inflow at
 13 Freeport can be diverted into the twin tunnels and what percentage should be left in the
 14 river to protect migrating anadromous fish species, but does not require absolute
 15 Sacramento inflow targets. The WaterFix project should be setting enhanced inflow
 16 targets such as those recommended in 2010 by the SWRCB and California Department
 17 of Fish and Wildlife, not reducing Sacramento inflows to the Delta.

18 Before the SWRCB can make an informed decision on the Petitioners' petition,
 19 the Co-Hearing Officers should require the Petitioners to analyze and disclose the
 20 reduction in inflows to the Delta at Freeport due to the WaterFix project, and to present
 21 this information as part of this hearing, so that the corresponding significant adverse
 22 environmental impacts of these flow reductions on the Bay-Delta ecosystem can be fully
 23 understood.

24 ///

25 ///

26 ///

27

28

¹⁶ Exhibit CCC-SC-64 is a true and correct copy.

1 **10. Petitioners have Eliminated Minimum Old and Middle River (OMR)**
2 **Flow Limits of -5,000 cfs for October and November Without**
3 **Explaining the Consequences.**

4 In my case-in-chief written testimony (Exhibit CCC-SC-3, Page 20), I discussed
5 how the WaterFix modeling (BA H3+ and earlier versions like Alternative 4A, Scenario
6 H3 and H4) had artificially high Delta outflows in October, which resulted in
7 underestimation of adverse water quality impacts in the Delta in October, November,
8 and sometimes December.

9 To simulate a 14-day shut down in south Delta exports during the October pulse
10 flow on the San Joaquin River (modeled as October 16-31) in BA H3+ (Exhibit DWR-
11 1075, Exhibit DWR-1076), the Petitioners assumed that Old and Middle River (OMR)
12 flows would be limited to a minimum of -5,000 cfs during the whole month of October.
13 (See Exhibit DWR-515, p. 6, Table 3, footnote c.) The same -5,000 cfs minimum OMR
14 limit was also applied in November in the earlier CALSIM II modeling studies.

15 However, the most recent version of the WaterFix project modeling (CWF H3+)
16 has removed these -5,000 cfs minimum OMR flows. In the July 2017 “Developments
17 after Publication of the Proposed Final Environmental Impact Report” (Exhibit SWRCB-
18 108 at Page 130), the Petitioners describe this change as follows:

19 *“Changes to south Delta export constraints: In the Final EIR/EIS*
20 *and in the BA, operational criteria included additional Old and*
21 *Middle River (OMR) flow requirements and south Delta export*
22 *restrictions during October and November. For the proposed action,*
23 *these OMR flow requirements and the south Delta export*
24 *restrictions were removed.”*

25 The Petitioners have not explained why these south Delta export restrictions,
26 based on OMR flows, were removed, or whether CWF H3+ model study accurately
27 simulates the 14-day shut down in south Delta exports during the October pulse flow on
28 the San Joaquin River. What is apparent, however, is that removing these October and

1 November OMR restrictions reduces Delta outflows in October in particular, and causes
2 significant adverse increases in EC and chlorides concentrations in the Delta in the fall,
3 relative to the NAA.

4 As shown in Figure 1 in Exhibit CCC-SC-58, the outflows in October for
5 Scenarios H3 and H4 are generally higher than the NAA, but the CWF H3+ outflows are
6 lower. November Delta outflows for Scenarios H3 and H4 and CWF H3+ are all
7 generally lower than the NAA. (Figure 2 in Exhibit CCC-SC-58.)

8 The Petitioners have failed through the CEQA/NEPA process, and through this
9 Change Petition hearing process, to fully disclose the degradation of water quality in the
10 Delta (increased EC and chloride concentrations) that would occur with the WaterFix
11 CWF H3+ version of the proposed project.

12 For example, in Exhibit DWR-1027, Slide 4, the Petitioners present the following
13 bullets:

- 14 • CWF H3+ EC results generally fall between H3 and H4
- 15 • CWF H3+ D-1641 M&I and Ag Water Quality Objectives are met the
16 majority of the time
- 17 • Any small percentage of probability of exceedance is equal to or less than
18 the NAA except at Emmaton which has a slightly higher probability

19 In Slide 5 (Exhibit DWR-1027), the Petitioners merely acknowledge that
20 exceptions to CWF H3+ falling between H3 and H4 occur when (Petitioners' bullets):

- 21 • Higher spring outflow requirements resulted in less exports and as a result
22 higher interior Delta salinity (south of the SJR)
- 23 • Removal of export constraints in the fall results in lower Delta Outflow and
24 higher salinity.

25 The Petitions fail to disclose significant adverse water quality impacts in the
26 Delta. It is not sufficient to state that the proposed project will meet legally required D-
27 1641 water quality objectives a majority of the time. The Petitioners should have
28 acknowledged that there will be large increases in EC at Emmaton relative to the NAA

1 from October through December (Exhibit DWR-1027, Slide 18).

2 The elimination of the OMR limits for October-November result in large increases
3 in chloride concentration at the intake to the Contra Costa Canal relative to the version
4 of the WaterFix project presented in Part 1 of this hearing, Alternative 4A, Scenarios H3
5 and H4 (Exhibit DWR-1027, Slide 24). The largest increases occur in October and
6 November, but the chloride concentrations for CWF H3+ are outside the range of, and
7 higher than, the chlorides for H3 and H4 for October through April (Exhibit DWR-1027,
8 Slide 24).

9 The Responses to Comments on the WaterFix Final EIR/EIS (Exhibit SWRCB-
10 102) also appear to be based on the earlier BA H3+ modeling and not on the CWF H3+
11 modeling that was supposed to represent the adopted project in the certified WaterFix
12 Final EIR/EIS. By changing their project between the public release of the WaterFix
13 Final EIR/EIS and the certification of the WaterFix Final EIR/EIS, and by not
14 acknowledging these changes in their Responses of Comments, the Petitioners have
15 failed to disclose these significant adverse water quality impacts to the public and the
16 SWRCB.

17 The ADSEIR/EIS, released on June 12, 2018 (Exhibit CCC-SC-66¹⁷), further
18 exacerbates this failure to disclose and adequately mitigate significant adverse water
19 quality impacts. The water quality chapter, Chapter 8, only consists of three pages
20 (Exhibit CCC-SC-65¹⁸) and compares the new proposed project with modified facilities
21 with the adopted project CWF H3+. The adverse impacts of CWF H3+ relative to both
22 the public WaterFix Final EIR/EIS (BA H3+) and the NAA are not disclosed.

23 The environmental documents prepared by the Petitioners fail to adequately
24 disclose the significant adverse impacts of the proposed WaterFix project on Delta
25 water quality and fail to provide the basis for the SWRCB to make an accurate or fully
26 informed decision on the municipal, industrial and environmental water quality impacts

27 _____
28 ¹⁷ Exhibit CCC-SC-66 is a true and correct copy of this document.

¹⁸ Exhibit CCC-SC-65 is a true and correct copy of this document.

1 of the WaterFix project.

2
3 **11. Petitioners do not Disclose Whether CWF Delta Inflows and Outflows**
4 **Are Consistent with the SWRCB's 2009 Delta Flow Criteria**
5 **Recommendations.**

6 In my case-in-chief written testimony (Exhibit CCC-SC-3, Page 36), I discussed
7 how the Petitioners have previously failed to disclose how the ratios of Delta inflows and
8 outflows to unimpaired flow for the WaterFix alternatives compare with the SWRCB's
9 2010 Delta Flow Criteria (Exhibit SWRCB-25). I provided evidence based on an earlier
10 WaterFix modeling study, BA H3+, that showed the simulated WaterFix Delta outflows
11 are typically well below SWRCB's recommendation of 75 percent of unimpaired flow
12 during January through June (Exhibit CCC-SC-35.)

13 California Water Code section 85086(c)(2) states: "*Any order approving a change*
14 *in the point of diversion of the State Water Project or the federal Central Valley Project*
15 *from the southern Delta to a point on the Sacramento River shall include appropriate*
16 *Delta flow criteria and shall be informed by the analysis conducted pursuant to this*
17 *section. The flow criteria shall be subject to modification over time based on a science-*
18 *based adaptive management program that integrates scientific and monitoring results,*
19 *including the contribution of habitat and other conservation measures, into ongoing*
20 *Delta water management.*"

21 The Petitioners case-in-chief for Part 2 of this hearing again failed to provide
22 evidence in a form (e.g., percentages of unimpaired flow) that would allow the SWRCB
23 to determine whether CWF H3+ is consistent with the 2010 inflow and outflow
24 recommendations of the SWRCB and California Department of Fish and Wildlife
25 (Exhibits SWRCB-25 and SWRCB-66, respectively).

26 The Petitioners acknowledge that this hearing will include consideration of
27 "appropriate Delta flow criteria" as described in the Delta Reform Act and stated by
28 Hearing Officers in the California WaterFix Hearing Ruling Regarding Scheduling of Part

1 2 and Other Procedural Matters, August 31, 2017, page 12. (Exhibit DWR-1010, Page
2 10, Line 17.)

3 The Petitioners offer the increased spring Delta outflow criteria in CWF H3+ as
4 benefiting aquatic resources consistent with the USFWS and NMFS Biological Opinions
5 and the Delta Reform Act. (Exhibit DWR-1010, Page 10, Line 21.) However, no
6 evidence is provided that discloses whether these increases in CWF H3+ are sufficient
7 to match the SWRCB's 2010 Delta Flow Criteria recommendations.

8 In fact, the 82-year average Delta outflows in March in CWF H3+ are lower than
9 the outflows in Alternative 4A, scenario H4. (Exhibit CCC-SC-58, Figure 3.)

10 Unless the Petitioners provide evidence and testimony regarding the
11 percentages of unimpaired flow that apply to different WaterFix alternatives, the
12 SWRCB will lack the basis to make accurate or fully informed decisions about the
13 whether the flows are sufficient to full protect fish species and about other key issues for
14 this hearing.

15
16 **12. Excessive Exceedances of Water Quality Standards Render the**
17 **Water Quality Modeling Useless for Analyzing and Disclosing Water**
18 **Quality Impacts of Proposed WaterFix Projects.**

19 Figure 1 of Exhibit CCC-SC-60 shows the full 82-year subset of daily-averaged
20 Old River at Bacon EC data from the WaterFix proposed project CWF H3+ modeling for
21 the month of November. As was shown in Exhibit CCC-SC-55, Figure 2, the long-term
22 averaged salinities for CWF H3+ at this location were the highest in November
23 compared to all other months.

24 The data plotted are for the water years 1922 through 2003 (82 x 30 = 2,460 data
25 points). Data above the 1:1 diagonal line represent adverse water quality impacts of the
26 proposed WaterFix project. Data points below the diagonal line represent improvements
27 in water quality.

28 My case-in-chief testimony was based on the Biological Assessment modeling

1 for the Proposed Action, BA H3+ (Exhibit CCC-SC-28, Figure 5). That earlier WaterFix
2 alternative assumed OMR minimum flows of -5,000 cfs in October and November. This
3 resulted in artificially high outflows in the fall which resulted in an unrealistic
4 improvement in water quality. The current WaterFix proposed project CWF H3+
5 eliminated these OMR restrictions in October and November. The Delta outflows were
6 much lower resulting in significant water quality degradation in the Delta with respect to
7 salinity (Exhibit CCC-SC-55, Figure 2.)

8 Figure 1 in Exhibit CCC-SC-60¹⁹ shows based upon the water quality modeling
9 for the WaterFix project that the project is still fatally flawed. The daily EC values are
10 often well in excess of 1,053 $\mu\text{S}/\text{cm}$, which is the equivalent of 250 mg/L chloride
11 concentration (according to the conversion equations in Exhibit DWR-509). The D-1641
12 compliance location in this area for both the 250 and 150 mg/L chloride standards is off
13 Rock Slough at the intake to the Contra Costa Canal. The water quality at this
14 compliance location is strongly influenced by the water quality at the Bacon Island
15 station. The highest EC value for the No Action Alternative is 2,846 $\mu\text{S}/\text{cm}$, which is the
16 equivalent of 761 mg/L chloride concentration.

17 These extremely high EC values should not be dismissed as anomalies as the
18 Petitioners have suggested (Exhibit DWR-66, Page 3, Line 7.) They are too frequent
19 and persistent. Having chloride concentrations as high as 761 mg/L in an area where
20 the maximum allowable daily value is 250 mg/L renders the water quality impact
21 analysis invalid.

22 In real-time operations of the Delta by the SWP and CVP project operators, the
23 250 mg/L standard would be met, by among other things, increasing Delta outflow. To
24 reduce chloride concentrations from 700 mg/L or more down to 250 mg/L would require
25 a significant amount of additional outflow which would typically reduce the amount of
26 water that could be exported at that time. Those export losses are often made up in
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¹⁹ Exhibit CCC-SC-60 is a true and correct copy.

1 subsequent months in real-time Delta operations or by additional reservoir releases.
2 This could then shift adverse impacts to subsequent months, something that is not
3 disclosed in this flawed modeling study.

4 Unless the daily D-1641 Municipal and Industrial water quality standards are met
5 in the WaterFix operations and water quality modeling, the SWRCB will lack the basis to
6 make an accurate or properly informed decision about the key hearing issues.

7
8 **13. Petitioners do not Present an Operations and Water Quality Analysis**
9 **of the Proposed WaterFix Project When the Enhanced Spring**
10 **Outflows Are Provided Through Contracts with Willing Sellers.**

11 The enhanced Spring outflows that were incorporated into CWF H3+ require that
12 water to meet these outflow targets be purchased from willing sellers in the tributaries
13 upstream of the Delta (Transcript, February 22, 2018, Page 69, starting at Line 16.) The
14 Petitioners have not presented any evidence that there are any willing sellers who will
15 contribute to compliance with the Biological Opinion Spring Outflow Criteria and have
16 contracted with DWR to provide that water. The Petitioners have also failed to identify a
17 dedicated funding source for these water purchases.

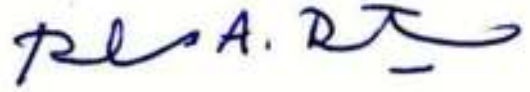
18 The Petitioners modeled the enhanced Spring flows by reducing exports, not as
19 less local diversion or additional reservoir releases upstream (which would result if there
20 were voluntary water transfers). The Petitioners need to present modeling showing the
21 environmental impacts of the WaterFix project for a range of conditions from full access
22 to willing sellers to no willing sellers. The Petitioners should also clarify how the SWP
23 and CVP will share the responsibility for meeting these enhanced Spring flows.

24 (Transcript, February 22, 2018, Page 72, Line 1.)

25 Without this information, the SWRCB will lack the basis to make an accurate or
26 fully informed decision about the WaterFix project will have adverse impacts on key fish
27 species, the Delta ecosystem and legal users of water.

28

Executed on this 11th day of July, 2018, in Oakland, California.

A handwritten signature in blue ink, appearing to read "R.A. Denton", with a horizontal line underneath.

Richard A. Denton, Ph.D., P.E.

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