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12 **BEFORE THE**
13 **CALIFORNIA STATE WATER RESOURCES CONTROL BOARD**

14
15 HEARING IN THE MATTER OF
16 CALIFORNIA DEPARTMENT OF WATER
RESOURCES AND UNITED STATES
17 BUREAU OF RECLAMATION
REQUEST FOR A CHANGE IN POINT
18 OF DIVERSION FOR CALIFORNIA
WATER FIX

TESTIMONY OF WILLIAM KIER
(Part 2 Sur-Rebuttal)

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Attorneys for California Sportfishing Protection Alliance,
California Water Impact Network, and AquAlliance

1 **I. INTRODUCTION**

2 My name is Bill Kier. I am a certified fisheries scientist and a member of the
3 American Institute of Fishery Research Biologists.

4 I began my professional fisheries work in 1957 as a scientific aide on the
5 California Department of Fish and Game's San Francisco Bay-Delta Estuary striped
6 bass and sturgeon life history study. Between 1959 and 1967 I worked for the California
7 Department of Fish and Game, based in Sacramento, as a fisheries scientist, fisheries
8 program manager and as chief of the Department's Water Projects Branch.

9 From 1967 to 1983 I served, first, as the principal committee consultant to the
10 California State Senate committees on Fish and Game, Natural Resources and Water
11 Resources; and, then, following my committee service, as director and principal
12 environmental policy specialist of the Senate Office of Research and Policy
13 Development (Sacramento).

14 I would like to interject a quick history note here: between early 1964 and
15 December 1966 I was a program advisor, on loan from the Department of Fish and
16 Game, to the newly-created State Resources Agency. My immediate supervisor was Bill
17 Grader who had left his job as executive officer of the North Coast Regional Water
18 Quality Control Board to become what we would now call Deputy Natural Resources
19 Secretary.

20 Because of our shared interest in salmon conservation - I as a Fish and Game
21 conservation biologist and Bill as a North Coast salmon wholesaler and a State water
22 quality manager - we discussed the need for strengthening the State's water pollution
23 control capabilities and specifically the need to merge the State's water rights allocation
24 and water pollution control functions into a single water quality management agency.

25 Bill Grader would host and I would serve as informal recorder for meetings that
26 involved Assembly Committee on Water Chair Carley Porter's committee consultant,
27 Ron Robie, and Senate Committee on Water Resources Chair Gordon Cologne's
28

1 committee consultant, 'Mickey' Allen, State Water Quality Control Board executive
2 officer Paul Bonderson, the Department of Water Resources' chief counsel and other
3 interested officials to discuss the state's water quality management future.

4 By mid-1966 we had captured our ideas in a Legislative Counsel's draft bill to
5 create the State Water Resources Control Board. That draft, after wide circulation
6 among the State's interested agencies and affected parties, became the SWRCB's
7 organic act, adopted by the Legislature and signed into law in the summer of 1967 by
8 Governor Ronald Reagan.

9 Throughout our discussions at the Agency and the Legislature's 1967
10 deliberations, protection of the health of the San Francisco Bay-Delta Estuary was of
11 paramount concern. My work as a consultant has taken me to the Pacific Northwest,
12 Alaska, the Gulf of Maine, to France's Loire River and the coastal estuaries of eastern
13 Australia but I have continued to follow San Francisco Bay-Delta Estuary conditions
14 closely over the 50-plus years since creation of the State agency that we entrusted with
15 the Estuary's health.

16 Since 1986 I have served as developer and principal of Kier Associates,
17 Fisheries and Watershed Professionals, now headquartered in San Rafael.

18 Prior to my service as science advisor to the Institute for Fisheries Resources, I
19 served as one of the founding directors of that 501(c)(3) public service research
20 organization.

21 My responsibilities at Kier Associates have evolved from field investigations to
22 project management and editing of scientific reports for State and federal agency
23 clients, Tribes, NGOs and others concerning the protection and restoration of Pacific
24 salmon resources in the San Francisco Bay-Delta watershed, the Klamath River basin,
25 the Pacific Northwest and Alaska.

26 I have provided expert testimony, written and oral, in numerous informational and
27 adversarial proceedings, including the California State Water Resources Control
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1 Board's 2010 Delta Flow Criteria proceeding, that which resulted in the Board's 2010
2 Report "Development of Flow Criteria for the Sacramento-San Joaquin Delta
3 Ecosystem" ("2010 Delta Flow Criteria Report" – Exhibit. SWRCB-25). My written
4 testimony in that proceeding, designated then as Exhibit PCFFA-2, was entitled "San
5 Francisco Bay-Delta Estuary Water Quality and Flow Criteria Necessary to Protect
6 Sacramento River Fall-Run Chinook Salmon" (admitted into evidence in this Hearing as
7 Exhibits PCFFA-147 & PCFFA-148).

8 My Statement of Qualifications (**SJC-363**), submitted concurrently herewith,
9 contains additional information.

10 **II. OVERVIEW OF TESTIMONY**

11 My Part 2 Sur-Rebuttal Testimony responds to statements and positions with
12 respect to the Board's 2010 Delta Flow Criteria Report as set forth in the Part 2 Rebuttal
13 Testimony of DWR witnesses Dr. Charles Hanson (DWR-1223-R), Dr. Paul Hutton
14 (DWR-1224-R), and Dr. Shawn Acuña (DWR-1211-R).

15 In his written testimony, Dr. Hanson testified:

16 *Since 2010, there has been a large body of highly relevant scientific*
17 *investigation, and this testimony is intended to identify some of that new*
18 *information. This information suggests that the 2010 Flow Criteria Report*
19 *and the Phase II Technical Basis Report should not be accepted by the*
20 *SWRCB as the best available science without further consideration of*
21 *current science.*

22 (DWR-1223-R, p. 3:6-10.) Following through on his argument that the 2010 Delta Flow
23 Criteria Report must be viewed through the lens of post-2010 studies, Dr. Hanson
24 opined: "Multiple authors have concluded that flow alone cannot be used to restore the
25 Delta." (DWR-1223-R, p. 3: 25-26.) Throughout the remainder of his written testimony,
26 Dr. Hanson focuses on flow criteria, often citing post-2010 information, as intimated at
27 the beginning of his testimony. (See, e.g., DWR-1223-R, p. 22:18-24.)
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1 Similarly, Dr. Acuña testified:

2 *Since 2010, there has been a large body of highly relevant scientific*
3 *investigation, and this testimony is intended to identify some of that new*
4 *information. This information suggests that the 2010 Flow Criteria Report*
5 *and the Phase II Technical Basis Report should not be accepted by the*
SWRCB as the best available science without further consideration of
current science.

6 (DWR-1211-R, p. 3:2-7.) Arguing primarily from post-2010 studies, he opined that “The
7 extent that Delta Smelt feeding success is influenced by flow is uncertain.” (DWR-1211-
8 R, p. 9:26-27, and see discussion at pp. 9:28 – 10:28.)

9 Dr. Hutton stated: “My testimony is intended to identify new information, including
10 seven peer-reviewed publications I personally authored or co-authored, suggesting that
11 the 2010 Flow Policy Report and the Phase II Technical Basis Report should not be
12 implemented without further consideration of the current best available science.”

13 (DWR-1224-R, p. 2:25-3:2.) He emphasized his reliance on studies that post-date the
14 2010 Flow Criteria Report (see DWR-1224-R, p. 3:3-20), opining that “[t]his new body of
15 work allows for the exploration of longer-term trends and more nuanced interpretation of
16 the effects of drivers (including the CVP-SWP) on Delta flows and salinity.” (DWR-
17 1223-R, p. 3:21-23.)

18 My testimony rebuts these general statements, other statements of these
19 witnesses as cited below, and, more broadly, these witnesses’ overall approach to the
20 Board’s 2010 Delta Flow Criteria Report in the context of this Hearing.

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23 **III. REBUTTAL OF TESTIMONY OFFERED BY DR. HANSON, DR. HUTTON AND**
24 **DR. ACUÑA**

25 Dr. Hanson’s, Dr. Hutton’s and Dr. Acuña’s suggestions that this Board’s 2010
26 Delta Flow Criteria Report and its conclusions have somehow been superseded or
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1 undermined by post-2010 studies are inaccurate and misplaced. As I stated in my
2 testimony in the 2010 Delta flow criteria proceeding, we have been here before. (Exh.
3 PCFFA-147, p. 3.) Substantially more flow is needed into and through the Bay-Delta
4 estuary. The State and Federal water projects and their contractors continuously
5 update their citations, but their conclusions that additional flows are not warranted
6 never, ever change. Focus on the condition of the estuary since the late 1960s, when
7 the State Water Project came online and the collapse of the Delta's fisheries began, is
8 as relevant today as it was in 2010. The Board knows enough to act now.

10 **Opinion 1: Scientific investigation since 2010 does not contradict the finding of**
11 **the 2010 Delta Flow Criteria Report that substantially more Delta through-flow is**
12 **needed to protect and recover fishes that live in and pass through the Delta.**

13 With the exception of the Department of Water Resources (DWR), the Bureau of
14 Reclamation (BOR) and their water contractors, there was consensus in the Delta Flow
15 Criteria proceeding in 2010 that additional Delta through-flow is needed. The rebuttal
16 testimony of Drs. Hanson, Hutton and Acuña in this proceeding is a reprise from the
17 proceeding the Board held eight years ago when the state and federal contractors
18 submitted over 100 exhibits. The Board and its staff considered those arguments in
19 developing the Delta Flow Criteria Report. Those arguments lost on the facts.

20 I testified in the 2010 Delta flow criteria proceeding. So did dozens of others
21 from resource agencies, academia, and NGOs. The 2010 flow criteria proceeding was
22 the culmination of decades of science and understanding of the Delta and its fisheries,
23 the Delta Flow Criteria Report was the amalgamation of 50 years of science.

24 In my testimony in the 2010 flow proceeding (submitted in this proceeding as
25 Exhibit PCFFA-147 & PCFFA-148), I relied heavily on the work of Dr. Martin Kjelson,
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1 who conducted a 10-year study of outmigration of salmon smolts through the Delta. Dr.
2 Kjelson presented this work in his testimony in the 1987 Bay-Delta hearings before this
3 Board, as exhibit FWS-31. This exhibit was submitted in the 2010 hearings as well on
4 behalf of the Pacific Coast Federation of Fishermen's Associations, and is submitted in
5 this proceeding as Exhibit PCFFA-149. Dr. Kjelson found that the magnitude of flow
6 was highly correlated to the success of the outmigration of Sacramento River salmon
7 smolts in the April through June period when flow levels are greater than 20,000 cfs.
8 (PCFFA-149, pdf pp. 43-46). Dr. Kjelson recommended an April-June minimum flow
9 past Rio Vista of 20,000 to 30,000 cfs. In 2010, I proposed splitting the difference at
10 25,000 cfs. (Exh. PCFFA-147, p. 8.)

12 Dr. Kjelson also found, similar to Dr. Hanson in this proceeding (DWR-1223-
13 revised, p. 23:17 through p. 26) that flow increases did not appear to correlate with
14 reduced transit time through the Delta and Bay. (PCFFA-149, pdf. pages 46-48).
15 However, this finding did not affect Dr. Kjelson's recommendation about the need for
16 increased flow.
17

18 The fact that Dr. Hanson cites acoustic tagging studies rather than studies that
19 relied on coded-wire tagging on which Dr. Kjelson and others based their conclusions in
20 the 1980's does not negate the earlier science, which had the benefit of much larger
21 sample sizes.
22

23 **Opinion 2: Something that has not changed since 2010 is the argument of DWR,**
24 **BOR and their water contractors that they should not reduce project diversions to**
protect and recover fish.

25 This argument in fact pre-dates the 2010 Delta Flow Criteria Report by decades.
26 Its proponents find or create new information to support the same position year after
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1 year. The exhibits of the state and federal contractors in the 2010 proceeding stand
2 today as a minority report. The WaterFix testimony of Dr. Hanson, a major participant in
3 the 2010 proceeding, is another bite at the apple, but is no more than an appendix to
4 what remains a minority report.

5 The U.S. Fish and Wildlife Service in the SWRCB's 1987 San Francisco Bay-
6 Delta water quality plan proceeding presented the testimony of Dr. Martin Kjelson. This
7 testimony identified the springtime Delta through-flow levels needed for successful
8 juvenile salmon outmigration and survival. This testimony so worried the State Water
9 Contractors they hired D. W. Kelley & Associates to rebut it. The D. W. Kelley &
10 Associates' testimony boiled down to the following: "The resulting analysis provides
11 evidence that through 1967 there was a positive relationship between upper
12 Sacramento River salmon production and spring Sacramento River flow and Delta
13 outflow, but that since 1968 no such relationships are observable." (SJC-422, p. 2 [pdf
14 p. 11].)

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17 The SWRCB found Dr. Kjelson's testimony more convincing than Mr. Kelley's,
18 apparently, and adopted a draft San Francisco Bay-Delta water quality plan in 1988 that
19 included Delta through-flows for salmon conservation that reflected Dr. Kjelson's
20 recommendations, not Mr. Kelley's. This quibbling over Delta through-flows, their timing
21 and amount, has been going on for 40 years.

22
23 Dr. Hanson was asked by Michael Jackson following his rebuttal testimony: "Is it
24 true that your view in 2010 expressed to the Board is essentially the same as your view
25 today?" To which Dr. Hanson answered, "Essentially the same. You know we've
26 certainly gained knowledge through the acoustic tag studies and it's helped better
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28

1 understand some of the underlying mechanisms through which flow and other factors
2 like tidal-driven processes affect migration and survival. But other than being eight
3 years older, I think my findings are fairly similar.” (Hearing Transcript, August 30, 2018.
4 p. 10:17-25; p. 11:1)

5 And so it goes. While the state and federal contractors have consistently
6 maintained the need for more studies, the inescapable fact is that by the 1980s we
7 understood the basic needs of fish in the estuary and the causes of their population
8 declines. Subsequent science has improved our understanding but the basic underlying
9 science has remained remarkably consistent over the decades.

10
11 **Opinion 3: It is appropriate to make biological inferences based on the period**
12 **since the 1960s because this is the period in which Delta fisheries have**
13 **collapsed, and it is concurrent with the operation of the State Water Project.**

14 In Dr. Hutton’s Part 2 rebuttal testimony, he states:

15 *A key challenge associated with interpreting results from ecosystem-oriented*
16 *data analyses is the absence of biological data for the Delta prior to the 1960s.*
17 *Thus, biological inferences are based on a truncated subset of the flow and*
salinity record which, as my testimony has shown, are not representative of the
trends associated with the full period of observed data.

18 (DWR-1224-revised, p. 34:17-21)

19 I agree that biological trends since the 1960s are not representative of the
20 longer-term trends. That is precisely the problem. The collapse of Delta fisheries
21 happened before my eyes. When Pete Chadwick, Marty Kjelson and I were on the
22 water in the Delta in the early sixties, Delta fisheries were in much better condition than
23 they are today. Trawl data conducted by the Department of Fish and Game (now Fish
24 and Wildlife) graphically illustrates the continued decline of pelagic species. Exhibit
25 CSPA-232 shows the decline of Delta smelt over this period of record. Exhibit CSPA-
26 233 shows the decline of striped bass over this period of record. Exhibits CSPA-231
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1 and NRDC-103 further demonstrate the decline of multiple pelagic species over this
2 period of record. Exhibits CSPA-239 and NRDC-104 show the decline of salmonids
3 over this period of record.

4 Since the beginning of the operation of the State Water Project in 1967, pelagic
5 fish that live in the Delta and fish populations that migrate through the Delta have
6 collapsed. Regardless of what happened to these species before the State Water
7 Project came on line, it is entirely appropriate to draw conclusions based on the
8 precipitous biological decline of Delta fishes from 1967 to the present.

9
10 **Opinion 4: As was stated by multiple parties representing multiple interests in the**
11 **Delta Flow Criteria proceeding, we know enough to act to protect and recover**
12 **Delta fisheries. It is imperative that we act now.**

13 In Dr. Acuña's Part 2 rebuttal testimony, he states:

14 *Over the last decade, it has been increasingly clear that Delta Smelt life*
15 *history is complex, and that several factors are interacting to affect Delta*
16 *Smelt and their habitat in ways we don't fully understand. Much has been*
17 *discovered but as we uncovered new understandings of how Delta smelt*
18 *use and respond to their environment many more questions and new*
19 *conceptual models were formed. What we do know is that our simplistic*
20 *understanding of Delta smelt is much more nuanced than was described*
21 *in the conceptual models in the 2008 BiOp.*

22 (DWR-1211-revised, p. 12:6-12)

23 Since 2008, smelt populations in the Delta have plummeted. In the early 1970's,
24 the DFW Fall Midwater Trawl index for Delta smelt averaged over 1000. Since the early
25 1970's, this index has gone from four digits to single digits, a decline of three orders of
26 magnitude. (Exhibit CSPA-231) DFW's Summer Towner surveys for Delta smelt show
27 similar declines. (Exhibit CSPA-232). Despite the testimony of Dr. Acuña, there is not a
28 lot of complexity to these statistics. It is about as close to absolute as one could

1 imagine, or fear. In addition, there is not a lot of nuance to a Delta smelt index at or
2 close to zero. It is also very difficult to adjust models with a sample size close to zero.

3 On rebuttal cross-examination, Mr. Jackson asked Dr. Hanson: “Is it your position
4 that the Board should not make a decision on water management until this uncertainty
5 is resolved?” Dr. Hanson responded, “No, the Board has been making decisions on
6 flow and water quality in the face of uncertainty. I don’t advocate that we wait.” (Hearing
7 Transcript, August 30, 2018. P. 7-12)
8

9 I have submitted as exhibits in this proceeding many of the documents cited in
10 the 2010 Delta Flow Criteria Report itself, in addition to some of 2010 documents that
11 have already been submitted as exhibits in this proceeding. (See Exhs. SJC-367-537;
12 see also, Exhs. PCFFA 145 and 146.)
13

14 Among the exhibits I have submitted is the conclusion of the Delta expert panel
15 (William Bennett, Jon Burau, Cliff Dahm, Chris Enright, Fred Feyrer, William Fleenor,
16 Bruce Herbold, Wim Kimmerer, Jay Lund, Peter Moyle, Matthew Nobriga), which can be
17 found at

18 https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/deltaf
19 [low/docs/presentations/intro_6.pdf](https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/deltaflow/docs/presentations/intro_6.pdf). This conclusion states:

- 20 • **“Current science provides enough insight to act”**
- 21 • **“Uncertainty always exists but science can reduce key uncertainties.”**
- 22 • **“Recent flow regimes both harm native species and encourage non-native species.”**
- 23 • **“Flow is a major determinant of habitat and transport”**
- 24 • **“Floodplain activation – flows that connect floodplains and channels are beneficial”**
- 25 • **“In-Delta net channel flows – dominated by tides but net flows biologically relevant”**
- 26 • **“Net Delta outflow – higher seasonal outflows provide variable habitats favorable for native fish communities”**
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- 1 • “Recent Delta environmental flows are insufficient to support native Delta
- 2 fishes for today’s habitats”
- 3 • “Adequate winter-spring inflows and outflows benefit native fish
- 4 • “Flow and physical habitat interact but are not interchangeable”

5 (Exh. SJC-381.)

6 In summary, the 2010 Delta Flow Criteria proceeding considered and rejected
7 delay in the fact of uncertainty. We don’t have time to wait for more science before we
8 take management actions.

9 **IV. THE BOARD’S 2010 FLOW CRITERIA REPORT WAS THE PRODUCT OF A**
10 **PROTRACTED AND INTENSE PROCEEDING INVOLVING THE MOST**
11 **DISTINGUISHED GROUP OF SCIENTISTS AND DELTA EXPERTS EVER**
12 **ASSEMBLED**

13 As previously noted, the Board commissioned an impressive 11-member expert
14 panel of fishery and hydrologic scientists who testified and submitted more than 140
15 scientific papers. Other parties to the proceeding provided almost 90 recognized
16 experts and more than 480 technical exhibits. Additionally, numerous exhibits from
17 previous Board hearings on Delta issues were included. The flow hearing was the
18 outcome of decades of scientific research on fishery issues by state and federal
19 resource agency and academic scientists. It was the most inclusive, extensive and
20 comprehensive proceeding to determine instream flows necessary to protect Delta
21 fisheries and public trust resources in my 60 years of involvement in fishery issues in
22 the Bay-Delta estuary.

23 **V. THE STUDIES AND TESTIMONY UPON WHICH THE WATER BOARD**
24 **RELIED IN ITS 2010 DELTA FLOW CRITERIA REPORT HAVE NOT BEEN**
25 **SUPERSEDED OR DISCREDITED.**

26 While scientific investigation concerning fishery issues in the Bay-Delta has
27 continued since the 2010 flow hearing, more recent studies do not supersede or
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1 discredit the culmination of the more than 40 years of preceding research. Recent
2 studies may tweak our understanding or provide somewhat better insight, but they
3 clearly do not refute the conclusions of myriad fishery scientists regarding the effects of
4 flow on fisheries.

5 The rebuttal testimony of Drs. Hanson, Hutton and Acuña, which is based on
6 cherry-picked information from the large array of post-2010 studies, clearly fails to
7 discredit the vast body of scientific evidence that supports the Board's Flow Criteria
8 Report, much of which is expressly referenced in the 2010 Delta Flow Criteria Report
9 itself. (See Exh. SWRCB-25, pp. 137-151; Exhs. SJC-367--SJC-537 and PCFFA-145
10 and PCFFA-146.) Indeed, the testimony of Drs. Hanson and Hutton are strikingly
11 similar to their testimony presented during the 2010 proceeding on behalf of the state
12 and federal water contractors. The Board considered that testimony in 2010, weighed it
13 against the body of testimony from the appointed expert panel, state and federal fishery
14 agency and academic scientists and scientists representing NGOs, and concluded that
15 fisheries needed significantly greater instream flow. Uncertainty has always existed and
16 will continue to exist in highly complex ecosystems. Uncertainty cannot be employed,
17 however, as an excuse to delay efforts to protect fisheries in light of the collapse of the
18 Estuary's pelagic and salmonid species, many of which are now on the lip of extinction.

21 **VI. CONCLUSION**

22 By the late 1980s, resource agency biologists understood the fundamental needs
23 of fish in the estuary and the principal reasons for their decline. Increased Bay-Delta
24 through-outflow was regarded as essential to the protection of the native aquatic
25 ecosystem. That understanding of the need for increased through-flow is consistent
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1 with subsequent science developed through 2010 and it continues to be true today. As
2 native fisheries have continued to precipitously decline, it is imperative that the Board
3 implement measures to ensure their survival and recovery.

4 I spent 16 years assisting the development of legislation by the California
5 Legislature. To me, the language of Water Code Section 85086 is clear. It directs your
6 Board to develop flow criteria for the protection of the Bay-Delta Estuary's public trust
7 resources - which you have done. Those criteria, then, are to inform any order
8 approving a change in the point of diversion of the SWP or the CVP.

9 The Board knows what fish need, thanks to a lot of thoughtful work by a lot of
10 Delta science experts and by the hard work of your Board's members and staff. Please
11 apply the unprecedented work in your 2010 report, including its unimpaired flow
12 recommendations (SWRCB-25, p. 5 and Tables 20-23) to your "Water Fix" decision-
13 making, as the Legislature directed. (See Water Code § 85086, subd. (c)(2) [requiring
14 that any order approving a change in the point of diversion of the State Water Project or
15 the Central Valley Project from the southern Delta to a point on the Sacramento River
16 include "appropriate flow criteria" and be "informed by the analysis conducted pursuant
17 to this section"]; see, also, § 85084.5 [mandating development and recommendation to
18 the Board, based on best available science, of "Delta flow criteria and quantifiable
19 biological objectives for aquatic and terrestrial species of concern dependent on the
20 Delta"].)

21 Executed on the 21st day of September, 2018, at San Rafael, California.

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WILLIAM M. KIER