SOMACH SIMMONS & DUNN
A Professional Corporation
Andrew M. Hitchings, Esq. (SBN 154554)
Aaron A Ferguson, Esq.. (SBN 271427)
Kristian C. Corby (SBN 296146)
500 Capitol Mall, Suite 1000
Sacramento, CA 95814
Telephone: (916) 446-7979
Facsimile: (916) 446-8199
ahitchings@somachlaw.com
aferguson@somachlaw.com
kcorby@somachlaw.com

Attorneys for Sacramento County Water Agency

BEFORE THE

CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

HEARING ON THE MATTER OF CALIFORNIA DEPARTMENT OF WATER RESOURCES AND UNITED STATES BUREAU OF RECLAMATION REQUEST FOR A CHANGE IN POINT OF DIVERSION FOR CALIFORNIA WATER FIX.	**TESTIMONY OF STEFFEN MEHL**

I, Steffen Mehl, declare:

I. INTRODUCTION

I, Steffen Mehl, submit this testimony on behalf of Sacramento County Water Agency (SCWA) in the above-referenced matter. I am a professor of Civil Engineering at California State University Chico where I routinely teach courses in fluid mechanics, hydrology, and hydraulics. Previously, I worked as a hydrologist for the USGS National Research Program. I have a BS in Environmental Resources Engineering from Humboldt State, and a MS and a PhD in Civil Engineering from the University of Colorado, Boulder. I have 18 years of experience in groundwater flow and transport modeling in both government and academic sectors. I am part of the development team for MODFLOW-OWHM, an integrated groundwater/surface water modeling tool, and UCODE, a universal code for parameter estimation, sensitivity, and uncertainty analysis. I have applied these methods in situations ranging from regional systems to laboratory

II. PURPOSE AND SUMMARY OF TESTIMONY

In this testimony, I review the testimony submitted by the DWR and Reclamation (collectively, "Petitioners") to examine whether the information provided adequately and correctly evaluates the potential impact of the CWF on interconnected groundwater supplies in the South American Subbasin. I identify gaps in Petitioners' analyses that raise serious questions regarding the adequacy of their assessment of groundwater impacts associated with implementation of the CWF.

III. BACKGROUND

A. Interconnected Groundwater Supplies

SCWA is a water purveyor that currently serves approximately 149,000 people about 34,500 acre-feet per year throughout its Zone 40 service area. SCWA serves its customers a combination of groundwater and surface water as part of a conjunctive use plan, using surface water during wet years when it is available, and relying on groundwater during dry years. In addition to use of surface water, SCWA extracts groundwater from the South American Subbasin to serve municipal and industrial demands throughout Zone 40. (The location of SCWA's wells is shown in Exhibit SCWA-40.) SCWA has recently produced between 20,000 – 29,000 acre-feet per year (AF/YR) from the South American Subbasin. (See Exhibit SCWA-42.) At buildout, I understand that SCWA anticipates producing between about 25,000-63,000 AF/YR, depending on hydrologic year type. (See Exhibit SCWA-27.)

The "Central Basin" is located entirely within Sacramento County and partially within the South American Subbasin (DWR 118), and is bounded on the north by the American River, on the west by the Sacramento River and Interstate 5 and on the south roughly by the Cosumnes River. (See Exhibit SCWA-26.) According to the Central Basin Groundwater Management Plan (GMP), the majority of the Central Basin is collaboratively managed through the Sacramento Central Groundwater Authority in accordance with the GMP. According to the GMP, the Central Basin is interconnected with the Sacramento River. (See Exhibit SCWA-45, p. 2-26.)

on "computer modeling performed to evaluate changes in the water quality and water levels associated with the CWF and any possible effects on legal users of water. This modeling provides information in support of how the CWF can be operated while continuing to meet DWR and Reclamation's responsibilities under the Water Rights Decision 1641 objectives (D-1641)" (DWR 66, p. 2, 18-22.) Based on modeling results from CalSim II and DSM2, Dr. Tehrani states that "[t]he highest changes to water levels correspond to locations close to the proposed North Delta Diversion (NDD) intakes and can be up to 1.2 ft (during high flows) to 0.5 ft (during low flows)." (Exh. DWR 513, pp. 11-15, Figures W1-W5)". "Petitioners expect that the highest impact to water levels happens just downstream of the diversion and not toward the Delta." (Exh. DWR-66, pp.9-10, and Exh. DWR-513, W1-W2-W3-W4-W5.) Dr. Tehrani states, at Exh. DWR-66, p. 9, that the frequency distribution of water levels is similar for the scenarios analyzed, except for the NAA. Regarding water levels, the testimony focuses on how the minimum stage is affected. The impact of these changes in water levels on stream/aquifer interactions, and in particular, effects on flows between the steam and the adjacent aquifer (stream leakage), was not included in Dr. Tehrani's testimony.

- Mr. Munevar's testimony (Exh. DWR-71), presented in conjunction with Dr. Tehrani's testimony (Exh. DWR-66), "provides an overview of the computer modeling performed to evaluate changes in the water supply, water quality, and water levels in the Delta associated with the CWF Alternative 4A, the preferred alternative from the Recirculated Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement (RDEIR/SDEIS)." (Exh. DWR-71, pp. 2, 12-16.) My review of Exh. DWR-71 for potential impacts on interconnected groundwater supplies did not produce definitive results. Groundwater is mentioned as

impacts to groundwater caused by the reductions in stream levels in the area directly downstream of the three proposed new points of diversion.

- Exh. DWR-218: Updated information for final EIR/EIS, CH2M Hill. The primary focus of this document is to explain how the use of specific construction techniques may alleviate localized groundwater impacts in and around the intake facilities during construction and operation of the CWF. Similar to the documents discussed above, analysis of short-term and long-term impacts to surface water/groundwater fluxes in the SCWA service area due to a reduction in stream flows is not provided. Only impact on groundwater levels in the proximity of the dewatering wells is analyzed.
- RDEIR/SDEIS chapter 14. The impacts on groundwater are focused on construction and operations of the forebays and there is no mention of impacts on stream/aquifer interactions or groundwater levels in the long term after the construction period.

V. AVAILABLE MODELS AND TOOLS

Based on our review of the above mentioned documents, the remainder of this testimony focuses on the missing information regarding the potential impact that the CWF may have on stream/aquifer fluxes and consequently on the groundwater system in the South American Subbasin.

Different approaches can be considered to evaluate the impact of the CWF on the groundwater basin including stream/aquifer interactions. These include simple analytical tools which can provide an initial qualitative understanding, and existing available numerical models that can help quantify the impact and develop future scenarios.

A. Basic Aquifer Response.

Simple analytical approaches help conceptualize the system physics and how the diversion may affect groundwater heads and stream leakage. However, the system is more complicated than the idealization of the analytic solution, so quantification should

3. Sac-IGSM is a finite element model built on the Integrated Groundwater and Surface-Water Model (IGSM) platform. It is calibrated and the model domain includes the area directly downstream of the diversions. The element size varies from one quarter mile to a half mile, with an average of 0.18 sq.mi. per element over the model domain. Each layer of the model consists of an aquiclude and aquifer pair.

4. CVHM-D is a refined version of the CVHM in the delta area with a grid resolution of one quarter of a mile. Additional modifications include more detailed representation of the water balance regions, streams and sloughs, and was used to simulate various scenarios of the CWF. (Exhibit SWRCB-4, DEIR/DEIS, Ch. 7, p. 7-37, 2013.)

These tools, after proper modification considering the purpose of the modeling investigation, as discussed in the next section, could be used to characterize and quantify the impacts of the diversions on stream/aquifer interactions.

VI. ANALYSIS OF THE INFORMATION PRESENTED BY PETITIONERS AND GAPS IN THE INFORMATION REQUIRED

The potential impacts of the CWF on groundwater in the South American Subbasin that need to be analyzed and quantified to determine the long-term impact to ground water supplies are:

- changes in groundwater/surface water interactions
- potential decrease in available groundwater supplies

The testimony reviewed does not directly address the quantification of the impacts mentioned above. Exh. DWR 71 does not provide the required details on how CalSim II handles groundwater hydraulics and therefore impact on stream aquifer fluxes and/or on groundwater levels cannot be assessed. Furthermore, not only the effect on minimum stage should be considered (DWR-66 pp.3, 10-19), but also the changes in the average conditions. Groundwater flows move at much slower time-scales than surface water flows. Therefore, the response of interconnected groundwater is often more representative of average conditions in the stream rather than the extremes.

VII. CONCLUSIONS

In the Sacramento Valley there is substantial variability in surface water groundwater interaction and leakage rates both seasonally and yearly, which could be altered by the North Delta Diversions. There is no mention of the impact on stream/aquifer interactions in the area directly downstream of the diversions where the CWF will cause the greatest effect on water levels in the stream according to Exhibit DWR-66, p.2. In the long term, small changes in river stage can result in major effects on the general water balance for the area. The existing models available and used by the Petitioners, like CVHM and CVHM-D, are inadequate in their current form to assess the general water balance in the area around the proposed new points of diversion on the Sacramento River. These tools could be appropriately modified to evaluate and report the long-term impacts on stream/aquifer interactions due to the reduced stream flows and levels caused by the diversions.

I declare under penalty of perjury under the laws of the State of California that the facts recited above are true and correct. Executed on this 31st day of August, 2016 in Sacramento, California.

Steffen Mehl