

AQUALLIANCE

DEFENDING NORTHERN CALIFORNIA WATERS

Hearing in the Matter of California Department of Water Resources and United States Bureau of Reclamation Request for a Change in Point of Diversion for California WaterFix, Part II

Testimony of Barbara Vlamis on behalf of AquAlliance

I, Barbara Vlamis, do hereby declare:

I. Introduction

I am the Executive Director of AquAlliance and have 26 years of experience in environmental advocacy and education. AquAlliance is a not-for-profit California corporation that was formed in 2009. Its mission is to defend northern California waters and the ecosystems these waters support and to challenge threats to the hydrologic health of the northern Sacramento River Watershed, including escalating attempts to divert and withdraw more water from the northern Sacramento River hydrologic region. AquAlliance's members include farmers, scientists, businesses, educators, and residents who have significant financial, recreational, scientific, aesthetic, educational, and conservation interests in the aquatic and terrestrial environments that rely on waters of the Sacramento River Watershed. This hydrologic system provides water for orchards, homes, gardens, businesses, schools, wetlands, streams, rivers, terrestrial habitat, and myriad species, which in turn allows AquAlliance members to reside, farm, fish, hunt, cycle, photograph, camp, swim, learn, and invest in the economy of the region.

AquAlliance was formed because it was clear that “we,” the public and the environment of the Sacramento Valley, were on our own when it came to repercussions from large water transfers to buyers south of the Delta. We reached this conclusion after a committed handful of people tried over 15 years to prevent the repetition of the 1994 Drought Water Bank (“DWB”). The 1994 DWB led water districts in Butte and Yuba counties to sell Feather River water and pump groundwater. The two Butte County Districts, Western Canal Water District and Richvale Irrigation District, sold 100,000 acre-feet (“af”)¹ of the 115,000 af total.² This led to an increase in groundwater withdrawals used for irrigating rice. This early experiment in the conjunctive use of the groundwater resources precipitated a significant and immediate adverse impact to upslope wells.³ It caused the water levels to fall suddenly in shallow domestic wells,⁴ water quality to deteriorate in the wells serving the town of Durham,⁵ irrigation wells to fail on several orchards, and one farm to enter bankruptcy because it did not recover from the loss of its crop.

¹ Thomas, Gregory A. 2001. *Designing Successful Groundwater Banking Programs in the Central Valley: Lessons from Experience*. p. 30.

² Msangi, Siwa, 2006. *Third Party Effects and Asymmetric Externalities in Groundwater Extraction: The Case of Cherokee Strip in Butte County, California*. p. 9.

³ *Id.* p. 3.

⁴ Barris, Lynn, 1995. Personal communication.

⁵ Scalmanini, Joseph, 1995. Memo to Don Gilbert and Sandra Dunn, *VWPA SUBSTANTIATION OF DAMAGES*. p. 4

The apparent impacts reported from 1994 Drought Water Bank were challenged by state government and the water districts. Affected farms and homeowners were told they must prove that they and/or their farms had been impacted – something for which there was no preparation. Local government allied itself with the water sellers in the region. Legal remedies were extremely limited and very costly. People who were harmed discovered how vulnerable their farming and rural communities were to water mining. After this experience, local groundwater dependent farmers and activists tried engaging with the CalFed program, attempted to ignite protective policies at the county level, and took the 1994 story on the road for over a decade. Despite valiant efforts, the interests south of the Delta and the agencies that provide them with water were able to obscure the impacts from 1994 and continued with business as usual. Exhausted, most of the farmers and activists dropped out of the water justice struggle about a decade later. AquAlliance was founded to continue and build upon their work to stop the decimation of the stunningly beautiful and prosperous northern Great Valley and its bountiful watershed.

II. WaterFix Project

The Bay Delta Conservation Program (“BDCP”) Draft Environmental Impact Statement/Environmental Impact Report (“DEIS/EIR”) and the WaterFix Supplemental Draft Environmental Impact Statement and Partially Recirculated Draft Environmental Impact Report (“SDEIS/RDEIR”) are completely inadequate. AquAlliance submitted comments for each phase of the BDCP and the WaterFix (“Project”) and found significant failures to disclose, analyze, and therefore propose mitigation for the Project in the DEIS/EIR and the SDEIS/RDEIR such as:

- Groundwater conditions in the source watershed.
- The age of groundwater and what little is known about recharge in the Sacramento River Watershed. Despite the fact that the DEIS/EIR discusses the potential to transfer up to 1 million acre-feet (“MAF”) per year with 400,000 af coming from groundwater substitution transfers.⁶
- Impacts from the Project that “would increase water transfer demand compared to existing conditions.”⁷
- The source water for the Project, which most definitely segments the project.

My testimony in part summarizes the information that was provided in my comments on past water transfers and BDCP/WaterFix. These previous letters contain detailed material on potentially significant impacts to the Sacramento Valley groundwater and surface water systems from water transfers and should be considered in the Petition record.

- AquAlliance comments on the *2010-2011 Water Transfer Program*. (AquAlliance Exhibit 231)
- AquAlliance comments on the *2013 Water Transfer Program*. (AquAlliance Exhibit 232)
- AquAlliance comments on the *2014 Water Transfer Program*. (AquAlliance Exhibit 233)
- AquAlliance comments on the *2015 Long-Term Water Transfers* (aka 10-Year Water Transfer Program) (AquAlliance Exhibit 234)
- AquAlliance’s comments on the Bay Delta Conservation Plan’s DEIS/EIR. (AquAlliance Exhibit 235a)
- AquAlliance’s comments on the WaterFix’s SDEIS/RDEIR. (AquAlliance Exhibit 235b)

⁶ DWR and USBR, 2013. Bay Delta Conservation Plan Draft Environmental Impact Statement/Environmental Impact Report. p. 5C-23.

⁷ DWR and USBR, 2015. WaterFix Supplemental Draft Environmental Impact Statement/Recirculated Draft Environmental Impact Report. p. 4.3.1-9.

In addition, we submit the following comments previously submitted for water transfer projects and programs, attached hereto, as fully bearing upon the WaterFix Petition to Change the Point of Diversion:

- AquAlliance comments. Bureau of Reclamation’s Coordinated Long-Term Operation of the Central Valley Project and State Water Project Draft Environmental Impact Statement. (AquAlliance Exhibit 236)
- Mish, Kyran D., Comments BDCP DEIS/EIR. (AquAlliance Exhibit 237)
- Mish, Kyran D., 2014. Comments for AquAlliance on Long-Term Water Transfers Draft EIR/EIS. (AquAlliance Exhibit 238)

A. Hydrology

1. Capacity of the Project

What does it mean for the Sacramento River if the Twin Tunnels are constructed as planned with the capacity to take from 9,000 to 15,000 cubic feet per second (“cfs”)? That kind of capacity could drain between 38% - 63% of the Sacramento River’s average annual flow of 23,490 cfs at Freeport⁸ (north of the planned Twin Tunnels). As proposed, the Twin Tunnels will also increase water transfers when the infrastructure for the Project has capacity:

Alternative 4 provides a separate cross-Delta facility with additional capacity to move transfer water from areas upstream of the Delta to export service areas and provides a longer transfer window than allowed under current regulatory constraints. In addition, the facility provides conveyance that would not be restricted by Delta reverse flow concerns or south Delta water level concerns. As a result of avoiding those restrictions, transfer water could be moved at any time of the year that capacity exists in the combined cross-Delta channels, the new cross-Delta facility, and the export pumps, depending on operational and regulatory constraints, including BDCP permit terms as discussed in Alternative 1A.⁹ [This paragraph failed to remove “BDCP” from the SDEIS/RDER.]

2. Groundwater Existing Conditions

a) **Groundwater Elevation**

As you have heard before, the proponents for the WaterFix ignored the source of the water for the Project in their NEPA/CEQA documents, which is the Sacramento River watershed. What you also know is that many California counties and communities have serious, historic groundwater declines, more recent significant groundwater declines, or both including in the source areas. Sacramento Valley groundwater is experiencing the most serious and persistent declines since the CVP and SWP projects were built. Despite this fact, DWR hasn’t provided a comprehensive assessment of groundwater overdraft in California for 35 years!¹⁰ Undaunted by such a dearth of information, DWR produced an *estimate* in 2003 that “[o]verdraft is estimated at between 1 to 2 million acre-feet annually” in California.¹¹ The Bureau acknowledged these errors of omission in the 2015 *Coordinated Long-Term*

⁸ USGS 2009. <http://wdr.water.usgs.gov/wy2009/pdfs/11447650.2009.pdf>

⁹ USBR and DWR, 2015. SDEIS/RDEIR Appendix A, pp. 5-15, 5-16.

¹⁰ USBR, 2015. *Coordinated Long-Term Operation of the Central Valley Project and State Water Project Draft Environmental Impact Statement*. p. 7-12.

¹¹ (*Id.*)

Operation of the Central Valley Project and State Water Project Draft Environmental Impact Statement.

DWR’s knowledge of groundwater conditions exists even if it was not disclosed in the Project’s CEQA documents. For example, the 2009 Water Plan contains Table SR-3, a summary of the Sacramento River Hydrologic Region’s water balance for the years 1998-2005. The “Change in Groundwater Storage” row indicates declines in every year from 1999 to 2005, even in robust precipitation years. Six of those years have deficits over 1.2 million af with 1999 containing the largest deficit at 1.7 MAF with 101% of normal precipitation (p. SR-18). What this reveals about the WaterFix is that both DWR and the Bureau cherry pick data regarding groundwater while they pursue transfers and the WaterFix.

AquAlliance believes that it is important that the SWRCB have some actual understanding of the conditions of our region in the Sacramento Valley. To highlight our concerns, we created Table 1 to provide a summary of fall, county-level groundwater monitoring results from our region in the northern Sacramento Valley.¹² Kit Custis presented the spring numbers in Part I of this hearing, so you have the bookends of stress on the aquifers. Table 1 shows the tremendous declines and the Custis material illustrates the recovery or lack thereof.

Table 1.

County	Deep Wells (Max decrease gwe) Fall '04 - '15	Deep Wells (Max decrease gwe) Fall '04 - '16	Deep Wells (Avg. decrease gwe)** Fall '04 - '15	Deep Wells (Avg. decrease gwe)** Fall '04 - '16
Butte	-20.6 (-12.7)*	-28.3	-12.8 (-10.5)*	-10.9
Colusa	-87.3 (-59.5)*	-66.4	-35.0 (-59.5)* (only 1 well monitored in 2014)	-26.3
Glenn	-89.9 (-79.7)*	-65.8	-40.1 (-44.3)*	-27.3
Tehama***	-44.0 (-34.6)*	-35.8	-11.6 (-10.9)*	-10.3

County	Intermediate Wells (Max decrease gwe) Fall '04 - '15	Intermediate Wells (Max decrease gwe) Fall '04 - '16	Intermediate Wells (Avg. decrease gwe)** Fall '04 - '15	Intermediate Wells (Avg. decrease gwe)** Fall '04 - '16
Butte	-26.0 (-23.0)*	-28.3	-12.9 (-9.4)*	-11.6
Colusa	-125.4 (-40.6)*	-78.9	-32.4 (-22.6)*	-23.2
Glenn	-58.0 (-57.2)*	-58.3	-26.7 (-25.0)*	-20.0
Tehama***	-35.9 (-30.2)*	-29.3	-13.6 (-12.4)*	-12.7

County	Shallow Wells (Max decrease gwe) Fall '04 - '15	Shallow Wells (Max decrease gwe) Fall '04 - '16	Shallow Wells (Avg. decrease gwe)** Fall '04 - '15	Shallow Wells (Avg. decrease gwe)** Fall '04 - '16
Butte	-19.2 (-17.6)*	-18.3	-8.0 (-5.9)*	-5.2
Colusa	-51.4 (-36.7)*	-51.7	-10.5 (-7.6)*	-9.2
Glenn	-58.0 (-53.5)*	-59.6	-15.8 (-15.1)*	-12.7
Tehama***	-34.1 (-30.2)*	-36.3	-11.1 (-9.5)*	-10.5

- * 2004-2014 monitoring results are in parentheses for comparison with 2015 results.
- ** Some average well depth numbers are not accurately comparable between 2004-2014 and 2004-2015 due to a change in the number of wells monitored.
- *** Tehama in the Sacramento Valley groundwater basin.
- Highlighted in yellow are negative changes of over 10 feet from 2014 to 2015.

¹²http://www.water.ca.gov/groundwater/data_and_monitoring/northern_region/GroundwaterLevel/gw_level_monitoring.cfm#Well%20Depth%20Summary%20Maps

Significant concerns about fall 2015 groundwater levels were summarized in the Northern Sacramento Valley Integrated Regional Water Management Board meeting: “Bill Ehorn (Chief of Groundwater Section in Northern Region Office, DWR) gave an update on groundwater levels within the NSV region. Change maps for October groundwater levels show that in much of the northern valley the groundwater levels are lower than 2011 – going from bad to worse. Historic groundwater level hydrograph maps show that groundwater levels are the lowest ever on record. A wet winter will help the water tables rebound but deeper aquifers will take longer to rebound.”¹³ [emphasis added]

Added to what we prepared for Part I of the WaterFix hearing in Table 1 are the 2004-2016 numbers. The results are mixed:

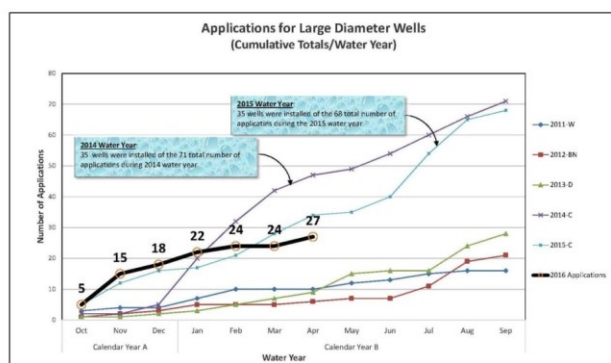
- Deep wells appear to have improved in Colusa and Glenn counties from the 2004-2015 figures, but they were worse in Butte County. Tehama and Colusa counties’ maximum decrease is still below the measurements for the 2004-2014 period.
- The intermediate wells maximum decrease worsened in Butte and Glenn counties from the 2004-2015 figures, Colusa’s maximum improved by 45 feet, but still remained 80 feet below the 2004 level and Tehama’s maximum improved slightly.
- The shallow wells maximum decrease worsened in Colusa, Glenn, and Tehama counties from the 2004-2015 figures and Butte’s maximum improved slightly.

The absence of current scientific research in the Project’s DEIS/EIR regarding groundwater conditions in the source watershed and the failure to correct it in the SDEIS/RDEIR leaves the documents exceedingly deficient under NEPA and CEQA.

b) Groundwater Demand

Sadly, many local jurisdictions continue to ignore these serious threats to aquifers while others are taking preliminary steps to grapple with the increased extraction of groundwater. The responses to groundwater conditions have varied greatly by the four counties in Table 1. Colusa County initiated a well moratorium in 2015, but chose to end it in January 2016. They believe that the significantly depleted groundwater is mostly due to lack of precipitation since 2007. Due to dire conditions, Glenn County extended its 2015 well moratorium that ended August 3, 2016. Butte and Tehama counties are looking toward the Sustainable Groundwater Management Act (“SGMA”) process to make decisions regarding groundwater sustainability, despite the fact that well levels have continued to decline and, at least in Butte County, permits for new deep wells continue to escalate (see Figure 2).

Figure 2. Butte County Applications for Large Diameter Wells.¹⁴



¹³ December 7, 2015. Minutes from Northern Sacramento Valley Integrated Regional Water Management Board Meeting, p. 4 of 23.

¹⁴ Butte County Environmental Health Department. May 2016.

c) Groundwater Age and Implications for Recharge

Nowhere in BDCP or WaterFix environmental documents did I encounter material discussing the age of groundwater or recharge in the Sacramento River Watershed despite the fact that the DEIS/EIR discusses the potential to transfer up to 1 MAF per year with 400,000 af coming from groundwater substitution transfers.¹⁵ Notwithstanding the absence of disclosure in WaterFix documents regarding the age of groundwater or recharge in the Sacramento River Watershed, research by the academic community exists. For example, according to Professor Jean Moran regarding the mid Sacramento Valley, “Wells with top perforations below 300 ft bgs do not contain tritium. The large volume of old groundwater produced at drinking water wells has implications for groundwater management since recharge to these wells takes place over periods greater than 50 years. Relatively rapid groundwater flow is limited to the shallow regime in localized areas near the major streams and in fan sediments.”¹⁶

Dr. Moran’s Groundwater Ambient Monitoring Assessment report also demonstrated that except for fairly rapid recharge near streams in Chico, “Drinking water wells that back up to the foothills to the east, and wells to the north of Lindo Channel produce almost exclusively pre-modern groundwater.”¹⁷ This was also the case for “[d]eep monitoring wells, especially to the west of the Sacramento River, [that] produce paleowater that recharged more than ten thousand years ago.”¹⁸ “This implies that there is currently no active recharge to the Lower Tuscan aquifer system (M.D. Sullivan, personal communication, 2004),” explained Dr. Karin Hoover. She continued by stating, “If this is the case, then water in the Lower Tuscan system may constitute fossil water with no known modern recharge mechanism, and, once it is extracted, it is gone as a resource.”¹⁹

d) Groundwater Quality

A number of pollutants in Sacramento Valley groundwater have considerable potential to affect public health. The WaterFix environmental review documents failed to consider that increased groundwater extractions for water transfers might:

- Mobilize PCE, TCE, and nitrate plumes under the City of Chico.²⁰
- Mobilize arsenic and iron in domestic and public wells in part of Tehama County where "Fourteen percent of the wells had concentrations of both arsenic and iron above their associated CDPH MCLs or secondary MCLs."²¹

¹⁵ DWR and USBR, 2013. Bay Delta Conservation Plan Draft Environmental Impact Statement/Environmental Impact Report. "If all of these sources could be contracted with willing sellers in the same year, about 1,000,000 acre-feet of cross-Delta transfer water might be generated. This estimate is approximately the same as that referenced in Reclamation’s Biological Assessment of the OCAP at Page 12-39: Water transfers would increase Delta exports from about 0 to 500,000 acre-feet (af) in the wettest 80 percent of years and potentially more in the driest 20 percent years, and up to 1,000,000 af in the most adverse Critical year water supply conditions.” p. 5C-23

¹⁶ Moran, Jean et al., 2005. *California GAMA Program: Groundwater Ambient Monitoring and Assessment Results for the Sacramento Valley and Volcanic Provinces of Northern California*, p. 46.

¹⁷ *Id.* p. 34.

¹⁸ *Id.* p. 46.

¹⁹ Hoover, Karin A. 2008. *Concerns Regarding the Plan for Aquifer Performance Testing of Geologic Formations Underlying Glenn-Colusa Irrigation District, Orland Artois Water District, and Orland Unit Water Users Association Service Areas, Glenn County, California*. White Paper. California State University, Chico.

²⁰ Moran, Jean et al. 2005. *California GAMA Program: Groundwater Ambient Monitoring and Assessment Results for the Sacramento Valley and Volcanic Provinces of Northern California*, p. 4.

²¹ 2010. *GAMA Domestic Well Project, Groundwater Quality Data Report, Tehama County Focus Area*. p. 5.
http://www.waterboards.ca.gov/gama/docs/tehama/tehama_summary_report.pdf

In addition, the WaterFix environmental review failed to describe a significant saline portion of the aquifer stratigraphy of the project area. According to Toccoy Dudley, former Groundwater Geologist with the Department of Water Resources and former director of the Butte County Water and Resources Department, saline groundwater aquifer systems of marine origin underlie the various freshwater strata. The approximate contact between fresh and saline groundwater occurs at a depth ranging from 1,500 to 3,000 feet.²²

Research that is more recent has documented threats of contamination. “The BFW [base of fresh water] boundary occurs primarily in late Tertiary to Quaternary unconsolidated sediments at depths near land surface to more than 3,500 feet below ground surface. The BFW is an uneven boundary that in some places reflects the major geologic structures underlying the Sacramento Valley, and in other areas, transgresses underlying geologic structures. In some areas, the BFW boundary is well above the base of post-Eocene marine strata. This is most likely caused by high artesian pressures and upward vertical gradients in deep aquifers in the Sacramento Valley, which have been documented in DWR monitoring wells. This suggests that migration of poor quality water into continental sediments that previously contained freshwater has occurred over geologic time. This finding has implications for brackish and saline water upconing beneath areas of prolonged groundwater pumping in the Sacramento Valley.”²³

3. Water Transfers

AquAlliance and its members are deeply concerned about water transfers supplying significant water for the WaterFix. The source of water that is integral to the Project was mentioned, but not analyzed, in the environmental review documents. Appendix 5C revealed that there is the potential to transfer up to 1 million acre-feet per year with 400,000 af coming from groundwater substitution transfers.²⁴

Additionally, internal BCDP communication indicated that the purchase of approximately 1.3 MAF of water is being planned as a means to make up for flows that would be removed from the Sacramento River by the BDCP tunnels.²⁵ As provided above, it is possible that the Twin Tunnels may extract almost two-thirds of the average annual flow from the Sacramento River, which is what creates the drive for the 1.3 MAF. Notwithstanding the tremendous demand that will be placed on the Sacramento River Watershed, the Applicants (lead agencies) improperly concluded that, “The analysis of any potential upstream impacts from transfers is not a part of this EIR/EIS and must be covered pursuant to separate laws and regulations once the specific transfer has been proposed.” (DEIS/EIR p. 5-77)

During these hearings, I heard the Applicants’ representatives unable to answer questions regarding whether or not transfers will increase. Nevertheless, the SDEIS/RDEIR acknowledged that the Project would deliver less water south of the Delta (SDEIS/RDEIR 4.3.1-9) and preferred Alternative 4A “would increase water transfer demand compared to existing conditions.” (*Id.*) The Project document also demonstrated that past transfers have taken place in all water year types and when SWP and CVP

²² *Id.*

²³ Springhorn, Steven T., et al, May 2013. *Base of Fresh Groundwater in the Sacramento Valley, California*, Geological Society of America Abstracts with Programs. Vol. 45, No. 6, p.51.

<https://gsa.confex.com/gsa/2013CD/webprogram/Paper219191.html>

²⁴ DWR and USBR, 2013. Bay Delta Conservation Plan Draft Environmental Impact Statement/Environmental Impact Report. "If all of these sources could be contracted with willing sellers in the same year, about 1,000,000 acre-feet of cross-Delta transfer water might be generated. This estimate is approximately the same as that referenced in Reclamation’s Biological Assessment of the OCAP at Page 12-39: Water transfers would increase Delta exports from about 0 to 500,000 acre-feet (af) in the wettest 80 percent of years and potentially more in the driest 20 percent years, and up to 1,000,000 af in the most adverse Critical year water supply conditions.” p. 5C-23

²⁵ Belin, Lety, 2013. Department of Interior e-mail regarding Summary of Assurances.

south-of-Delta contractors receive allocations of all kinds (DEIS/EIR p. 5-51), notwithstanding that the Applicants downplay this by stating that, “Little demand exists in wetter years due to greater SWP and CVP deliveries and availability of alternative local supplies,” and then clarifies that, “Some water agencies in the export service area have suffered from chronic water supply reductions, especially the San Luis and Delta-Mendota Water Authority, representing numerous CVP contractors in the export service area,” (DEIS/EIR p. 5-50). I emphasize again that there is no analysis of the significant impacts that will accompany increased transfers due to the Project in clear violation of NEPA and CEQA.

The DEIS/EIR continued asserting that north-to-south water transfers will occur during dry years when State Water Project (“SWP”) contractor allocations drop to 50 percent of Table A amounts or below or when Central Valley Project (“CVP”) agricultural allocations are 40 percent or below, or when both projects’ allocations are at or below these levels (p. 5-52). However, the DEIS/EIR itself demonstrated that this has not been the historic pattern. In Table 5-2, it is clear that past water transfers have regularly occurred when SWP and CVP San Joaquin Ag allocation percentages have been much higher such as:

- 2002 when SWP and CVP San Joaquin Ag allocations were 70 percent each.
- 2003 when allocations were 90 (SWP) and 75 (CVP SJ Ag) percent.
- 2004 allocations were 65 (SWP) and 70 (CVP SJ Ag) percent.
- 2007 allocations 60 (SWP) and 50 (CVP SJ Ag) percent.

(DEIS/EIR p. 5-51). You should know that the SDEIS/RDEIR did not correct this narrative or disclose what sector received the lion’s share of the transfer water.

The SDEIS/RDEIR also fails to illustrate the early history of water transfers and to provide more current information through 2014. AquAlliance expands upon our previous comments providing more context and history that should be presented in another recirculated SDEIS/RDEIR.

- 1991. WY – Critical. Reported transfers amounted to 820,000 af.²⁶
- 1992. WY – Critical. Reported transfers amounted to 193,000 af. (*Id.*)
- 1993. WY – Above Normal. No transfers appear to have occurred. (*Id.*)
- 1994. WY – Critical. Reported transfers amounted to 220,000 af. (*Id.*)²⁷
- 2002. WY - Dry. Settlement Contractors in the Sacramento Valley received 100% of their allocation. Reported transfers amounted to 172,000 af.²⁸

²⁶ USBR, 2008. Draft Environmental Assessment for the *Option Agreement Between Glenn-Colusa Irrigation District, Bureau of Reclamation, and the San Luis & Delta-Mendota Water Authority for 2008 Operations*. (p.17)

²⁷ In 1994, following seven years of low annual precipitation, the state continued a Drought Water Bank program, which allowed water districts to sell surface water and continue growing rice with ground water. Western Canal Water District and Richvale Irrigation District exported 105,000 af of river water to buyers outside of the area and substituted groundwater from the Tuscan aquifer to continue growing rice. This early experiment in the *conjunctive use* of the groundwater resources – conducted without the benefit of project specific environmental review – caused a significant and immediate adverse impact to orchards, residents, and the environment (Msangi 2006). Until the time of the 1994 water transfers, groundwater levels had dropped, but the Tuscan aquifer had sustained the normal demands of domestic and agricultural users. The water districts’ extractions, however, an abnormal demand on the groundwater, lowered groundwater levels throughout the Durham and Cherokee areas of eastern Butte County (Msangi 2006). The water level fell and the water quality deteriorated in the municipal wells serving the town of Durham (Scalmanini 1995) and even shallow residential wells dried up tens of miles away from the pumping. Irrigation wells failed on several orchards in the Durham area. One farm never recovered from the loss of its crop and later entered into bankruptcy.

²⁸ Western Canal Water District, 2012. *Initial Study and Proposed Negative Declaration for Western Canal Water District*

- 2003. WY - Above Normal. Settlement Contractors in the Sacramento Valley received 100% of their allocation. Reported transfers amounted to 206,000 af. (*Id.*)
- 2004. WY - Below Normal. Settlement Contractors in the Sacramento Valley received 100% of their allocation. Reported transfers amounted to 120,500 af. (*Id.*)
- 2005. WY – Above Normal. Settlement Contractors in the Sacramento Valley received 100% of their allocation. Reported transfers amounted to 5 af. (*Id.*)
- 2006. WY – Wet. Settlement Contractors in the Sacramento Valley received 100% of their allocation. No transfers were reported. (*Id.*)
- 2007. WY – Dry. Settlement Contractors in the Sacramento Valley received 100% of their allocation. Reported transfers amounted to 147,000 af. (*Id.*)
- 2008. WY - Critical. Settlement Contractors in the Sacramento Valley received 100% of their allocation. GCID alone planned an 85,000 af transfer²⁹ of an expected cumulative total from the Sacramento Valley of 360,000 af.³⁰ Another source revealed that the actual transfers for that year were 233,000 af.³¹
- 2009. WY-Dry. Settlement Contractors in the Sacramento Valley received 100% of their allocation. The Bureau approved a 1 year water transfer program under which a number of transfers were made. Regarding NEPA, the Bureau issued a FONSI based on an EA. DWR opined that, “As the EWA’s exclusive mechanism in 2009 for securing replacement water for curtailed operations through transfers, the DWB is limited to the maximum 600,000 acre feet analyzed in the EIS/EIR for the program.”³² Reported transfers amounted to 274,000 af.³³
- 2010/2011. WYs – Below Normal/Wet. Settlement contractors in the Sacramento Valley received 100% of their allocation for both years. The Bureau approved a 2 year water transfer program through an Environmental Assessment/FONSI. The *2010-2011 Water Transfer Program* sought approval for 200,000 AF of CVP related water transfers and suggested there would be a cumulative total of 395,910 af of CVP and non-CVP water.³⁴ The Bureau asserted in that no actual transfers were made under the *2010/2011 Water Transfer Program*, however, a Western Canal Water District Negative Declaration declared that 303,000 af were transferred from the Sacramento Valley and through the Delta in 2010.³⁵
- 2012. WY – Below Normal. Settlement contractors in the Sacramento Valley received 100% of their allocation. The Bureau planned 2012 water transfers of 76,000 AF of CVP water all

2012 Water Transfer Program. (p. 25)

²⁹ GCID, 2008. Initial Study and Proposed Negative Declaration for *Option Agreement Between Glenn-Colusa Irrigation District, San Luis & Delta-Mendota Water Authority and the United States Bureau of Reclamation for 2008 Operations, and Related Forbearance Program*.

³⁰ USBR, 2008. Draft Environmental Assessment for the *Option Agreement Between Glenn-Colusa Irrigation District, Bureau of Reclamation, and the San Luis & Delta-Mendota Water Authority for 2008 Operations*. (pp. 4 and 17)

³¹ Western Canal Water District, 2015. *Initial Study and Proposed Negative Declaration for Western Canal Water District 2015 Water Transfer Program*. (p. 21)

³² DWR, 2009. Addendum to the Environmental Water Account Environmental Impact Statement/Environmental Impact Report http://www.usbr.gov/mp/nepa/nepa_projdetails.cfm?Project_ID=107 Re: 2009 Drought Water Bank Transfers State Clearinghouse #1996032083. (p. 3)

³³ Western Canal Water District, 2012. *Initial Study and Proposed Negative Declaration for Western Canal Water District 2012 Water Transfer Program*. (p. 25)

³⁴ AquAlliance, 2010. Comments on the Draft Environmental Assessment and Findings of No Significant Impact for the *2010-2011 Water Transfer Program*. (pp. 1-2)

³⁵ Western Canal Water District, 2012. *Initial Study and Proposed Negative Declaration for Western Canal Water District 2012 Water Transfer Program*. (p. 25)

through groundwater substitution, but it is unclear if CVP transfers occurred.³⁶ SWP contractors and the Yuba County Water Agency (“YCWA”) did transfer water and the cumulative total transferred is stated to be 190,000 af.³⁷

- 2013. WY – Dry. Settlement contractors in the Sacramento Valley received 100% of their allocation. The Bureau approved a 1 year water transfer program, again issuing a FONSI based on an EA. The EA incorporated by reference the environmental analysis in the 2010-2011 EA. The *2013 Water Transfer Program* proposed the direct extraction of up to 37,505 AF of groundwater (pp. 8, 9, 11, 28, 29, 35), the indirect extraction of 92,806 AF of groundwater (p. 31), and the cumulative total of 190,906 (p. 29).³⁸ Reported transfers amounted to 210,000 af.³⁹
- 2014. WY – Critical. Federal Settlement Contractors in the Sacramento Valley received 75% and State Settlement Contractors received 100% of their allocations. Total maximum proposed north-to-south transfers were 378,733 af and total maximum proposed north-to-north transfers were 295,924 af.⁴⁰ Reported north-to-south transfers amounted to 198,000 af.⁴¹

The SDEIS/RDEIR acknowledges that less water will be available for delivery south of the Delta with the Project⁴² preferred Alternative 4A “would increase water transfer demand compared to existing conditions,”⁴³ and past transfers have taken place in all water year types and when SWP and CVP south-of-Delta contractors receive allocations of all kinds.⁴⁴ Nowhere in the BDCP or WaterFix environmental review documents is there any analysis of the significant impacts that will accompany increased transfers due to the Project – a violation of NEPA and CEQA.

The WaterFix is a clear danger to the people, flora, and fauna of the Sacramento Valley and surrounding foothills. The increased likelihood of groundwater substitution transfers under the WaterFix will deplete water tables, increase costs to groundwater dependent homes, farms, and businesses, cause more losses to rivers and streams upstream of the Twin Tunnels, mobilize polluted plumes, and negatively influence terrestrial habitat upstream and downstream of the Project. Essential water for wildlife (including special status species), refuges, recreation, tourism, and local economies that benefit from tourism in the area of origin is treated as a non-issue for this water dependent Project. Simply because the Applicants have not adequately studied, presented, or analyzed impacts from current and planned transfers, and only played lip service to modeling, albeit with a model that assumes unlimited groundwater,⁴⁵ does not mean there are no highly probable impacts to

³⁶ USBR 2012. Memo to the Deputy Assistant Supervisor, Endangered Species Division, Fish and Wildlife Office, Sacramento, California regarding Section 7 Consultation.

³⁷ Western Canal Water District, 2015. *Initial Study and Proposed Negative Declaration for Western Canal Water District 2015 Water Transfer Program*. (p. 21)

³⁸ USBR, 2013. Draft Environmental Assessment and Findings of No Significant Impact for the *2013 Water Transfers*. (p. 29)

³⁹ Western Canal Water District, 2015. *Initial Study and Proposed Negative Declaration for Western Canal Water District 2015 Water Transfer Program*. (p. 21)

⁴⁰ AquAlliance, 2014. *2014 Sacramento Valley Water Transfers*. (Data from: 1) USBR, 2014 EA for *2014 Tehama-Colusa Canal Authority Water Transfers*; 2) USBR and SLDMWA, 2014. EA/Negative Declaration, *2014 San Luis & Delta Mendota Water Authority Transfers*.)

⁴¹ Western Canal Water District, 2015. *Initial Study and Proposed Negative Declaration for Western Canal Water District 2015 Water Transfer Program*. (p. 21)

⁴² DWR and USBR, 2015. WaterFix SDEIS/RDEIR p. 4.3.1-9.

⁴³ *Id.*

⁴⁴ DWR and USBR, 2013. Bay Delta Conservation Plan DEIS/EIR p. 5-51.

⁴⁵ AquAlliance 2014. Comments for the DEIS/EIR for the 10-Year Water Transfer Program. “As an optimization model, CalSim II is hardwired to assume perfect supply and perfect demand. The notion of perfect supply is predicated on the erroneous assumption that groundwater can always be obtained to augment upstream supply. However, the state and federal

AquAlliance's members, the general public, visitors to the Sacramento Valley, and the environment on which all life depends. The 1994 Drought Water Bank discussed above was the grand experiment and it failed. The WaterFix is 1994 on steroids. I am here to tell you again that the people, farms, and businesses of the NorthState will not go quietly into the night as water players from Washington to Sacramento to Fresno try to replicate the egregious mistakes from the Owens and San Joaquin valleys.

a) Cumulative Transfers Not Disclosed

Potential cumulative impacts from the Project and the numerous existing plans and programs that extract NorthState water for sales within and without the Sacramento Valley have either not been provided to the public by the Applicants or, if already disclosed, were considered in only a cursory manner. I provide you with a list of what I am aware of that most certainly needs to be thoroughly considered and reviewed in another WaterFix NEPA/CEQA document.

(i) *Water Transfer Plans, Projects, and Programs*

The Bureau, DWR, the SWRCB, and individual water districts have claimed for decades that much of the transfer water market was “one-year,” “short-term,” or an “emergency.” The serial and escalating nature of water transfers from the Sacramento Valley to south-of-Delta fit none of those descriptions. Examples of the type of material that *should* have been provided and analyzed cumulatively in WaterFix environmental review, and has a direct bearing on the hydrologic foundation that the NorthState environment, residents, businesses, farms, tourists, and recreational consumers depend, includes:

- Environmental Assessment and Findings of No Significant Impact (“FONSI”) for the *2008 Option and Forbearance Agreement Between Glenn-Colusa Irrigation District, San Luis & Delta-Mendota Water Authority and the United States Bureau of Reclamation, and Related Forbearance Program*. The proposed project planned to transfer Sacramento River water, up to 85,000 acre-feet (AF), in accordance with a forbearance program undertaken by Glenn Colusa Irrigation Project (“GCID”) through voluntary crop idling or crop shifting (82,500AF), and to provide up to 2,500 acre-feet with groundwater substitution produced from two GCID-owned groundwater wells located near the western edge of Butte County.
- Environmental Assessment and FONSI, *2009 Drought Water Bank*. The Bureau and 20 of its contractors planned to sell 199,885 af through a combination of crop idling, crop substitution, groundwater substitution, and reservoir reoperation.⁴⁶ “The cumulative total amount potentially transferred under the DWB from all sources would be up to

projects have no right to groundwater in the adjudicated Sacramento River basin. Operating under this assumption risks causing impacts to ecosystems dependent upon groundwater basins in the areas of origin. The notion of perfect demand is also problematic, as it cannot account for the myriad of flow, habitat and water quality requirements mandated by state and federal statutes. Perfect demand assumes water deliveries constrained only by environmental constraints included in the code. In other words, CalSim II never truly measures environmental harm beyond simply projecting how to maximize deliveries without violating the incorporated environmental constraints. As a monthly time-step model, CalSim II cannot determine weekly, daily or instantaneous effects; i.e., it cannot accurately simulate actual instantaneous or even weekly flows. It follows that CalSim II cannot identify real-time impacts to objectives or requirements. Indeed, DWR admits, ‘CalSim II modeling should only be used in ‘comparative mode,’ that is when comparing the results of alternate CalSim II model runs and that ‘great caution should be taken when comparing actual data to modeled data.’” (Answering Brief for Plaintiff-Intervenor-Appellee California Department of Water Resources, Appeal from the United States District Court for the Eastern District of California, No. 1:09-cv-407, Case: 11-15871, 02/10/2012, ID: 8065113, page 15)

⁴⁶ Bureau, 2009. Final FONSI. pp. 2-3.

370,935 af.” (*Id.* p. 10) However, DWR and the Bureau allowed up to a maximum 600,000 af.⁴⁷

- Environmental Assessment and FONSI for the *2010-2011 Water Transfer Program*. 395,910 AF of CVP and non-CVP water. AquAlliance sued over the inadequate Environmental Assessment.
- For 2012 and 2013, the Bureau disclosed the amount of water that was actually transferred in their 2015 Operations DEIS, but failed to reveal that significantly more water was planned for south-of-Delta transfers.⁴⁸ This is a crucial point when considering a growing dependence on transfers as demand escalates and in analyzing cumulative impacts.
 - Initiating Section 7 Consultation letter 2012. “For 2012 water transfers, Reclamation anticipates a maximum of approximately 76,000 acre-feet of water could be transferred. The 76,000 acre-feet of transfer water would be made available through groundwater substitution.” (p. 2) The Operations DEIS revealed that 47,420 af were actually transferred, but the uppermost potential for the 76,000 af transfer all from groundwater substitution combined with all other transfers was not disclosed.
 - The 2015 Operations DEIS disclosed that in 2013 63,790 af were transferred. The amount of water planned for transfer from all sources was not provided.
- The Bureau and the San Luis Delta Mendota Water Authority’s (“SLDMWA”) 2014 Water Transfer Environmental Assessment/Initial Study. “The Proposed Action is for sellers to potentially make available up to 175,226 AF of water based on a 75 percent CVP water supply forecast for Settlement Contractors. Sellers could make water available for transfer through groundwater substitution, cropland idling, or crop shifting. Other transfers not involving the SLDMWA and its participating members could occur during the same time period. AquAlliance sued the Bureau over the inadequate EA/IS/Negative Declaration. The Tehama Colusa Canal Authority (TCCA) released a separate EA/IS to analyze transfers from a very similar list of sellers to the TCCA Member Units.”
- The Bureau and SLDMWA’s *Environmental Impact Statement and Environmental Impact Report* for the *2015-2024 Long Term North-to-South Water Transfer Program*. The DSEIS/REIR mentioned the 10-year water transfer program and disclosed the uppermost amount of water that may be transferred: 600,000 af each year. This amount of water over the 10-Year period is equivalent to 200 years of water needs by a city the size of Chico with 100,000 people. AquAlliance and partners filed a lawsuit on federal and state claims in May 2015.
- Bureau and Tehama Colusa Canal Authority, multiple years (e.g. 2014, 2015, 2016): Draft Environmental Assessment, Initial Study, and Mitigated Negative Declaration for the *Tehama Colusa Canal Authority In Basin Water Transfers*.
- Bureau 2016 Environmental Assessment for the *Accelerated Water Transfer and Exchange Program for Sacramento Valley Central Valley Project Contractors – Contract Years 2016-2020*.

⁴⁷ Bureau & DWR 2009. *Addendum to the Environmental Water Account Environmental Impact Statement/Environmental Impact Report* p. ES-5.. http://www.usbr.gov/mp/nepa/nepa_projdetails.cfm?Project_ID=107

⁴⁸ USBR, 2015. *Coordinated Long-Term Operation of the Central Valley Project and State Water Project Draft Environmental Impact Statement*. p. 5-59. “Water transfers involving CVP and SWP water: -2012: 47,420 acre-feet of water transfers... - 2013: 63,790 acre-feet of water transfers...”

- The *Western Canal Water District and Richvale Irrigation District Water Transfers from 2018 to 2022* where they may transfer up to 60,000 af per year. This project was proposed outside of the *Long Term North-to-South Water Transfer Program*.
- The Bureau should disclose how it and DWR began programmatic environmental review for the SVWMA to facilitate water transfers from the Sacramento Valley, but never completed it. The interconnected actions that were integrally related to it were impermissibly separated from the annual transfers for piecemeal review as AquAlliance presents above.⁴⁹

(ii) *Other Projects*

Additional projects with cumulative impacts upon groundwater and surface water resources that were not part of Project environmental review include:

- Court settlement discussions between the Bureau and Westlands Water District over provisions of drainage service. Case # CV-F-88-634-LJO/DLB will further strain the already over allocated Central Valley Project with the following conditions:
 - A permanent CVP contract for 890,000 acre-feet of water a year exempt from acreage limitations.
 - Minimal land retirement consisting of 100,000 acres; the amount of land Westlands claims it has already retired (115,000 acres) will be credited to this final figure. Worse, the Obama administration has stated it will be satisfied with 100,000 acres of “permanent” land retirement.
 - Forgiveness of nearly \$400 million owed by Westlands to the federal government for capital repayment of Central Valley Project debt.
- Five-Year Warren Act Contracts for Conveyance of Groundwater in the Tehama-Colusa and Corning Canals – Contract Years 2013 through 2017 (March 1, 2013, through February 28, 2018).
- The DWR Dry Year Purchase Agreement for Yuba County Water Agency water transfers from 2015-2025 to SLDMWA.⁵⁰
- GCID’s *Stony Creek Fan Aquifer Performance Testing Plan* to install seven production wells in 2009 to extract 26,530 AF of groundwater as an experiment. It was subject to litigation due to GCID’s use of CEQA’s exemption for research.
- Installation of numerous production wells by the water districts and their members. Many wells were installed with the use of public funds such as Butte Water District,⁵¹ GCID, Anderson Cottonwood Irrigation District,⁵² and Yuba County Water Authority⁵³ among others.

⁴⁹ See 68 Federal Register 46218 (Aug 5, 2003) (promising a Programmatic EIS on these related activities, “include[ing] groundwater substitution in lieu of surface water supplies, conjunctive use of groundwater and surface water, refurbish existing groundwater extraction wells, install groundwater monitoring stations, install new groundwater extraction wells...” Id. At 46219. See also http://www.usbr.gov/mp/nepa/nepa_projdetails.cfm?Project_ID=788 (current Bureau website on Short-term Sacramento Valley Water Management Program EIS/EIR).

⁵⁰ SLDMWA Resolution # 2014 386

http://www.sldmwa.org/OHTDocs/pdf_documents/Meetings/Board/Prepacket/2014_1106_Board_PrePacket.pdf

⁵¹ DWR. *Proposition 13 Groundwater Grants and Loans: Program Summary. 2000-2004*. “Develop two production wells and a monitoring program to track changes in groundwater levels due to groundwater extraction & natural recharge. \$1,397,149. p. 7.

⁵² Bureau, 2011. *Anderson-Cottonwood Irrigation District Integrated Regional Water Management Program – Groundwater Production Element Project EA/IS/FONSI*. “The ACID Groundwater Production Element Project includes

- GCID's 10 Wells Project proposed to install five new production wells and continue operating five additional production wells during dry and critically dry years for 8.5 months from approximately February 15-March 15 and April 1-November 15. The annual, maximum, cumulative total pumping is 28,500 af and is more water than the annual use of the Chico district of California Water Service Company that serves over 100,000 people.⁵⁴ GCID abandoned this project after intense public and legal pressure.

4. Streamflow Depletion

With all the projects, plans, and programs seeking to extract massive amounts of water from the Sacramento River Watershed, you would think there would have been some intense scientific scrutiny over decades of numerous topics, but particularly hydrology. The depletion of streamflow and the interaction between streams, rivers, and groundwater all seemed ripe for study since our laws require disclosure, documentation, analysis, and avoidance of impacts. I finally had it pounded into my head that this was *not* going to happen almost a decade ago. It is an important factual story.

I called the Bureau to find out what was the status of the Sacramento Valley Water Management Agreement ("SVWMA") draft EIS/EIR that the Applicants initiated, theoretically, after the 2003 federal register notice.⁵⁵ I was referred to a Bureau employee who I had never spoken with before. He was terse from the start and told me that the Bureau and DWR had both spent a million dollars each on the project, but when I pressed him for the third time for an answer to my question – why isn't the draft environmental review finished – he yelled over the phone, "Because the science isn't there!" Finally a clear answer from the Bureau. Moreover, since the science *still isn't there*, AquAlliance hired Mr. Kit Custis to help us not only understand the facts, but present them in usable form – something the Applicants have refused to do despite the fact that Mr. Custis uses their data.

As mentioned many times already, the Applicants denied the public full disclosure, analysis, and mitigation measures to the watershed of origin for the source water to fill the Twin Tunnels in the NEPA and CEQA documents. This deficiency strikes at the core of our critique, which views the CVP and the SWP as originally intending to operate within the law, although with more water on paper than could ever be available. Once the limits of hydrology became apparent it caused the Agencies and some of their contractors to look for tools to game the law and the hydrology of California.

The CVP and SWP have extended water far from the areas of origin for agricultural, urban, and industrial uses. In so doing, particularly with paper water, the state and federal governments have facilitated a destructively unrealistic demand for water. Ever willing to destroy natural systems to meet demand for profit, the San Joaquin River dried up and subsidence caused by groundwater depletion in the San Joaquin Valley is even cracking water conveyance facilities.⁵⁶ The continual, long-term

the installation of two groundwater wells to supplement existing district surface water and groundwater supplies." p. 1-1. http://www.usbr.gov/mp/nepa/nepa_projdetails.cfm?Project_ID=8081

⁵³ DWR. *Proposition 13 Groundwater Grants and Loans: Program Summary. 2000-2004*. "Install eight wells in the Yuba-South Basin to improve water supply reliability for in-basin needs and provide greater flexibility in the operation of the surface water management facilities. \$1,500,000. p. 10.

⁵⁴ California Water Service Company *2010 Urban Water Management Plan Chico-Hamilton City District*, p. 32.

⁵⁵ Federal Register /Vol. 68, No. 150 /Tuesday, August 5, 2003 /Notices.

⁵⁶ Sneed, et al., 2012. Abstract: *Renewed Rapid Subsidence in the San Joaquin Valley, California*.

"The location and magnitude of land subsidence during 2006–10 in parts of the SJV were determined by using an integration of Interferometric Synthetic Aperture Radar (InSAR), Global Positioning System (GPS), and borehole extensometer techniques. Results of the InSAR measurements indicate that a 3,200-km² area was affected by at least 20 mm of subsidence during 2008–10, with a localized maximum subsidence of at least 540 mm. Furthermore, InSAR results indicate subsidence rates doubled during 2008. Results of a comparison of GPS, extensometer, and groundwater-level data

groundwater overdraft in the San Joaquin Valley, the expansion of new permanent crops in both the San Joaquin and Sacramento valleys, and groundwater substitution transfers by CVP and SWP contractors *all* cause streamflow depletion. Enter conjunctive use in the Sacramento Valley starting during the 1991-1994 Drought Water Bank and again with the SVWMA with the Applicants facilitating, and their contractors implementing, river water sales and groundwater substitution to continue crop production. Over 25 years the Applicants have failed to present to the public how the CVP and SWP caused and currently cause streamflow depletion. This is equally true for the WaterFix and is a major omission that leaves the SWRCB without a CEQA document on which to rely.

The 2014 work of Mr. Custis made it clear what are the historic and current trends in the Sacramento Valley. AquAlliance's Exhibit 256 provides a comprehensive picture of the destructive past and present impacts to the groundwater and streams of the Sacramento River that should have been revealed in the NEPA and CEQA documents. It encapsulates all that the Lead Agencies seek to obfuscate from the public and policy makers.

In addition, DWR's own consultant demonstrated that the impacts are significant. Peter Lawson of CH2MHILL wrote in a 2010 memo to DWR, "The effect of groundwater substitution transfer pumping on stream flow, when considered as a percent of the groundwater pumped for the program, is significant. The impacts were shown to vary as the hydrology of the periods following the transfer program varied. The three scenarios presented here estimated effects of transfer pumping on stream flow when dry, normal, and wet conditions followed transfer pumping. Estimated stream flow losses in the five-year period following each scenario were 44, 39, and 19 percent of the amount of groundwater pumped during the four month transfer period."⁵⁷ The results of the model run was the best prediction available to Applicants and suggested caution above all else, even though they are preliminary and the model subject to modification.⁵⁸ Instead of implementing the conservative result from 2010 that used a model the Applicants rely on for other analysis, the Applicants continue to use a 12 or 13 percent deduction for streamflow and may be causing considerable legal injury to other users and the environment. Furthermore, there isn't any factual justification for the lowball percentages.

Dan Wendell of The Nature Conservancy presented a similar picture as a panelist at a workshop held by the California Natural Resources Agency, the California Department of Food and Agriculture, and California EPA on March 24, 2014. Moreover, he also raised the alarm about how long it takes for streamflow losses to appear:

The Sacramento Valley still has water levels that are fairly shallow," he said. "There are numerous perennial streams and healthy ecosystems, and the basin is largely within a reasonable definition of sustainable groundwater yield. However, since the 1940s, groundwater discharge to streams in this area has decreased by about 600,000 acre-feet per year due to groundwater pumping and it's going to decrease an additional 600,000 acre-feet in coming years under 2009 status quo conditions due to the time it takes effects of groundwater pumping to reach streams. It takes years to decades, our work is showing.

suggest that most of the compaction occurred in the deep aquifer system, that the critical head in some parts of the deep system was exceeded in 2008, and that the subsidence measured during 2008–10 was largely permanent." Conference presentation at *Water for Seven Generations: Will California Prepare For It?*, Chico, CA.

⁵⁷ Lawson 2010. *Groundwater Substitution Transfer Impact Analysis, Sacramento Valley*.

⁵⁸ WRIME 2011. *Peer review of Sacramento valley Finite Element Groundwater Model (SacFEM)*

B. Subsidence

As with other potential impacts in the Sacramento River Watershed that were not addressed in the BDCP and WaterFix environmental review, subsidence is also lacking. The Applicants are well aware of subsidence issues in the Central Valley and their WaterFix project proposes up to 400,000 af of groundwater substitution transfers, as mentioned above, in the very the regions of the Sacramento Valley experiencing more recent subsidence. And of course, the WaterFix plans to continue business as usual in the San Joaquin Valley that has been devastated by subsidence.

Without explanation or apology, the DEIS/EIR omitted current and historic analysis, mentioned “overall subsidence” in the Mendota area of 28 feet (without a citation or timeframe). Next the DEIS/EIR recounted older research: “Most San Joaquin Valley subsidence is thought to have been caused primarily by deep aquifer system pumping during the 1950s and 1960s, but is considered to have largely abated since 1974 because of the development of more reliable agricultural surface water supplies from the Delta-Mendota Canal and Friant-Kern Canal (U.S. Geological Survey 1999).” The absence of current scientific research regarding groundwater mining and subsidence in the DEIS/EIR and the failure to correct it in the SDEIS/RDEIR leaves the documents exceedingly deficient under CEQA and NEPA and the agencies exposed to charges of incompetence

Relevant information regarding subsidence from other documents produced by the Applicants includes:

- “Land subsidence has not been monitored in the Redding Area Groundwater Basin. However, there would be potential for subsidence in some areas of the basin if groundwater levels decline below historic low levels. The groundwater basin west of the Sacramento River is composed of the Tehama Formation; this formation has exhibited subsidence in Yolo County and the similar hydrogeologic characteristics in the Redding Area Groundwater Basin could be conducive to land subsidence.”⁵⁹ (emphasis added)
- “Out of the 11 [DWR] extensometers five show potential subsidence over time:
 - “09N03E08C004M, in Yolo County within Conaway Ranch: DWR observed inelastic land subsidence estimated at approximately 0.2 foot from 2012 to 2013 and an additional 0.6 foot from 2013 to 2014 (DWR 2014b). In comparison, slightly less than 0.1 feet foot of subsidence occurred over the previous 22 years (1991-2012);
 - “11N01E24Q008M, in Yolo County near the Yolo-Zamora area: 0.5 to 0.6 foot decline from 1992 to present;
 - “11N04E04N005M, in Sutter County: approximately 0.01 foot decline from 1994 to present;
 - “21N02W33M001M, in Glenn County: 0.05 foot decline from 2005 to present; this extensometer is located in areas in which the Tehama Formation is mapped in the subsurface and indicates the potential for inelastic subsidence (West Yost Associates 2012); and
 - “16N02W05B001M, in Colusa County: 0.04 foot decline from 2006 to present.

“Historically, land subsidence occurred in the eastern portion of Yolo County and the southern portion of Colusa County, due to extensive groundwater extraction and that region’s geology. The earliest studies on land subsidence in the Sacramento Valley occurred in the early 1970s when the U.S. Geological Survey (USGS), in cooperation with DWR, measured elevation changes along survey lines containing first and second order benchmarks. As much as four feet

⁵⁹ USBR and SLDMWA, 2015. Final EIS/EIR *Long-Term Water Transfers*. p. 3.3-23.

- of land subsidence due to groundwater withdrawal occurred east of Zamora over the last several decades. The area between Zamora, Knights Landing, and Woodland has been most affected (Yolo County 2009). Subsidence in this region is generally related to groundwater pumping and subsequent consolidation of compressible clay sediments.”⁶⁰
- DWR has a continuous global positioning system (“GPS”) network for periodic monitoring of changes in ground elevation. A baseline GPS survey was performed in 2004 and DWR and the Bureau conducted a second survey jointly in 2008.⁶¹ The Bureau’s SWP partner, DWR, presented the results of the 2004 and 2008 GPS subsidence monitoring to the Glenn County Water Advisory Committee in February 2015, which identified an area of subsidence east of the GCID wells at an average of -0.38 feet.⁶²

More recent documentation of Central Valley subsidence was conducted by the National Aeronautics and Space Administration and funded by DWR (AquAlliance Exhibit 264).⁶³ DWR’s press release summarizes the results well, but, sadly, fails to acknowledge state’s complicity in the abuse of groundwater (AquAlliance Exhibit 265). In addition, this information was not considered in the NEPA/CEQA documents for the BDCP/WaterFix.

- “...a new NASA report showing land in the San Joaquin Valley is sinking faster than ever before, nearly two inches per month in some locations.”⁶⁴
- “Sinking land, known as subsidence, has occurred for decades in California because of excessive groundwater pumping during drought conditions, but the new NASA data shows [sic] the sinking is happening faster, putting infrastructure on the surface at growing risk of damage. NASA obtained the subsidence data by comparing satellite images of the Earth’s surface over time.”⁶⁵
- “The increased subsidence rates have the potential to damage local, state, and federal infrastructure, including aqueducts, bridges, roads, and flood control structures. Long-term subsidence has already destroyed thousands of public and private groundwater well casings in the San Joaquin Valley. Over time, subsidence can permanently reduce the underground aquifer’s water storage capacity.”⁶⁶

Added to this is personal experience by a farmer in Glenn County in 2015:

My Grandmother’s historic brick and beam Ranch Style house started cracking 3 years ago, after 60 years of none. In the confluence of the GCID pumps, subsidence has dropped one of my well pads. A 30 year old PVC pipeline buried 5 feet deep decided to shift and break for no reason, this spring.

I am facing the immediate replacement of at least 3 wells. The local farmers in the area of your [GCID’s] influence have all been paying more money for the same water. Water quality changes in 2 of my other wells have cost me a

⁶⁰ *Id.* p. 3.3-69 to 3.3-70.

⁶¹ Department of Water Resources and United State Bureau of Reclamation, 2008, Project Report, *2008 DWR/USBR Sacramento Valley GPS Subsidence Report, September 30, 2008*, 7 pp., Appendices A to F.

⁶² Ehorn, B., 2015, Letter to Glenn County Board of Supervisors, and Glenn County Water Advisory Committee, on results of 2004 to 2008 land subsidence GPS surveys performed in Glenn County, dated February 3, 2015, presented at February 10, 2015 Water Advisory Committee meeting, Willows, CA, 3 pp., 1 Figure.

⁶³ Farr, Tom G., et al. 2015. *Progress Report: Subsidence in the Central Valley, California*.

⁶⁴ *Id.* p. 1.

⁶⁵ *Id.*

⁶⁶ *Id.* pp. 1-2.

fortune this year to keep the systems clean. I believe because of your drawing down the aquifers.⁶⁷

III. NorthState Communities

As mentioned above, AquAlliance represents many residents, businesses, and farms that depend on the health of the Sacramento River foothill and valley watershed. The Central Valley Project and the State Water Project impacted counties presented below are where water selling water districts are prominent. As you will see, the majority of the human population, significant natural habitats, and special status species depend on groundwater and its support of wetlands, creeks, and rivers. The impacts from the Project to the many hundreds of thousands of people, habitats, and species in the Sacramento Valley and foothills are not disclosed or analyzed because the Applicants have separated the Project from its source water. The Applicants' decision to avoid disclosure and analysis of the water source areas violates NEPA's and CEQA's prohibition against segmenting a project.

The information below is not exhaustive, but it provides examples of the vulnerable human and natural communities at great risk from the WaterFix.

A. Butte County

Estimated Population - 224,601⁶⁸

There are over 12,699 domestic wells alone in Butte County and approximately 2,579 irrigation wells.⁶⁹ The Chico Urban Area is the largest urban center north of Sacramento with a population of approximately 102,000.⁷⁰ It is nestled against the foothills of the Cascade and Sierra mountain ranges and is entirely dependent on groundwater. Seven streams traverse Chico and carry significant water from the eastern watershed to the Sacramento River.

The majority of wells used in Butte County and throughout the Sacramento Valley are individual wells that pump from varying strata in the aquifers. The thousands of domestic wells in the Project's source area are vulnerable to groundwater manipulation and lack historic monitoring. While the Applicants have not divulged the vulnerability of wells in the mid and northern Sacramento Valley, the Bureau's 2009 Drought Water Bank Environmental Assessment elaborated on this critical point regarding Natomas Central MWC (p. 39) stating that, "Shallow domestic wells would be most susceptible to adverse effects. Fifty percent of the domestic wells are 150 feet deep or less. Increased groundwater pumping could cause localized declines of groundwater levels, or cones of depression, near pumping wells, possibly causing effects to wells within the cone of depression." This understanding of shallow well vulnerability should have been applied to the area of origin for the Project's water, included in the BDCP/WaterFix NEPA/CEQA documents, and used to formulate mitigation measures. AquAlliance additionally provides you with personal communication from a number of groundwater dependent farmers in Butte County who believe that the escalating costs to maintain, rehabilitate, and at times drill new wells will eventually put them out of business.

⁶⁷ Billiou, Michael, 2015. Written comments on the draft EIR for the Glenn Colusa Irrigation District 10-Wells Project.

⁶⁸ Department of Finance, 2016. E-1: City/County Population Estimates with Annual Percent Change.

<http://www.dof.ca.gov/Forecasting/Demographics/Estimates/e-1/>

⁶⁹ DWR, 2016. Spreadsheet.

⁷⁰ Department of Finance, 2016. E-1: City/County Population Estimates with Annual Percent Change.

<http://www.dof.ca.gov/Forecasting/Demographics/Estimates/e-1/> and personal communication with Chico Planning Department.

Numerous creeks flow through Butte County. The healthy groundwater table is necessary to maintain flows and riparian habitat that in turn are essential for many special status aquatic, avian, and terrestrial species. The Applicant's failure to identify, analyze, and discuss the short and long-term sources of water for the Twin Tunnels and the numerous cumulative water transfer plans and projects that will further exploit Sacramento Valley water because of the Tunnels, leaves NorthState residents, businesses, groundwater dependent farms, recreationists, habitats, and species vulnerable.

Bidwell Park is an ideal example of a significant cultural feature⁷¹ that is bisected by a local stream, Big Chico Creek, which could be seriously impacted by the long-term operation of the Project. The park is a regional park that is adored by residents, tourists, scientists, and myriad recreational enthusiasts. Its tree canopy, riparian habitat, and aquatic ecosystem are dependent on a robust groundwater table to support the creek and many ancient oak and sycamore trees. It also serves as a haven for species such as, "A variety of native and nonnative fish inhabit the streams of the Big Chico drainage basin within the Plan Area (Big Chico Creek Watershed Alliance 1999). Native species include Chinook salmon (Central Valley spring-run and fall-/late fall-run ESUs), steelhead and rainbow trout, Sacramento pikeminnow, California roach, Sacramento sucker, hardhead, riffle sculpin, and Pacific lamprey, while nonnative species include smallmouth bass, green sunfish, and brown trout."⁷²

Chico's 2011 General Plan provides many insightful passages about the human and environmental benefits of Bidwell Park:

- "The presence of Bidwell Park extending from Downtown Chico to the foothills serves as a well used east-west pedestrian corridor." p. 4-15
- "Open space corridors are natural areas providing visual and physical linkages and habitat along creeks and designated open spaces and parks. Open space corridors include creekside greenways such as Lindo Channel and linear parks such as Bidwell Park." p. 5-6
- "The City owns significant open space resources, including Bidwell Park, which provides an exceptional open space corridor that runs throughout the community and into the foothills." p. 10-4

Other streams that are vital to special status fish species are also noted in the Butte Regional Conservation Plan.

- "Chinook salmon (fall-run and spring-run) and steelhead migrate into Butte Creek to spawn, moving as far upstream as Centerville Head Dam."⁷³

⁷¹ Chico Real Estate, Inc., 2017. "Upper Bidwell Park offers amazing views and a beautiful canyon with Big Chico Creek flowing through it. Many people park at Horseshoe Lake and then take one of the trails going into the park so they can enjoy the unique flora, fauna, and geology. The Yahli trail is only open to those on foot but the rest of the trails are open to bicyclists, equestrians, and pedestrians. The park is a great place to get a workout, fresh air, and amazing views. Upper Park is located in the foothills of the Sierra Nevada Mountains. There are several swimming holes located along the creek, a disc-golf course, and places to go paragliding. At the southern end of Upper Park, in an area sometimes referred to as Middle Park, you will find Hooker Oak Park, Five Mile Recreation Area, Horseshoe Lake, The Chico Community Observatory for star gazing, and the Bidwell Park Municipal Golf Course. John and Annie Bidwell generously donated the land for Bidwell Park in 1905 to the City of Chico. They wanted this land to be available for public use. Since then the City of Chico has purchased additional land making the current size of Bidwell Park 3,670 acres. Bidwell Park is the second largest municipal park in the United States and is known as the Jewel of Chico."

https://www.chicorealestate.net/area/upper_bidwell_park

⁷² Butte County Association of Governments, 2015. Butte Regional Conservation Plan, Formal Public Draft. p. 3-62.

⁷³ *Id.* p. 3-63.

- “Several smaller permanent and ephemeral creeks flow through the Plan Area, including Little Chico Creek, Mud Creek, Rock Creek, and Little Dry Creek, that support one or more life stages of a number of native and nonnative fish species (Walther 2009). These smaller waterways can be important nonnatal rearing grounds for salmonids, providing ample food for rapid growth rates of salmonids that improve juvenile survival during their downstream migration towards the ocean (Limm and Marchetti 2009).”⁷⁴

We repeat again, that the Applicants failed to disclose, analyze, or propose mitigation for the possible impacts from increased extraction of water from the Sacramento Valley. Dan Wendell of The Nature Conservancy provided what DWR and the Bureau have not: foresight about what happens to groundwater dependent ecosystems and streamflow as groundwater diminishes.

*If we want to avoid problems in areas that are reasonably healthy today, it is imperative that we consider the overall value of the hydrologic system, both to man and to nature. Time is of the essence in these cases, since the environmental and surface water rights impacts occur very early in groundwater development, when modest water level declines of only 20 to 40 feet can result in significant depletion of streamflow and even perhaps loss of perennial flow and the impact of surface water rights.*⁷⁵

B. Colusa County

Estimated Population – 21,948⁷⁶

- The largest City in Colusa County is Colusa with a population of 6,315.
- There are 1,337 domestic wells, 57 public supply wells, and 1,131 irrigation wells in Colusa County to date.⁷⁷

Colusa County benefits from the presence of wildlife refuges that are very vulnerable to CVP operations as witnessed during the 2013-2015 drought years. The Sacramento Wildlife Refuge “...Complex maintains nearly 70,000 acres of wetland, upland and riparian habitats.”⁷⁸ As the CVP and SWP search for more water, since their ‘paper water’ is but a dream, species that have already been pushed to extreme vulnerability whether they are or are not listed under the state of federal endangered Species Acts, suffer inordinately. For example, another species besides the fish that are struggling in the source area for the Twin Tunnels’ water, the Sacramento River watershed, finds it ever more difficult despite its ESA status. “Tricolored blackbirds, which live only in California, have traded permanent marshes for farm fields where nests are destroyed during harvests. Numbering in the millions a half century ago, the San Joaquin Valley’s tricolored blackbirds plummeted by around 75 percent since 2011, triggering an endangered listing by the state last December [2014].”⁷⁹ Nowhere in

⁷⁴ *Id.* p. 3-65.

⁷⁵ Wendell, Dan, 2014. Presentation at the March 24, 2014 workshop held by the California Natural Resources Agency, the California Department of Food and Agriculture, and the Ca Environmental Protection Agency on sustainable groundwater management actions. <http://mavensnotebook.com/2014/04/28/groundwater-management-workshop-part-1-sustainable-groundwater-management-panel/>

⁷⁶ Department of Finance, 2016. E-1: City/County Population Estimates with Annual Percent Change. <http://www.dof.ca.gov/Forecasting/Demographics/Estimates/e-1/> and personal communication with Chico Planning Department

⁷⁷ DWR, 2016. Spreadsheet.

⁷⁸ <https://www.fws.gov/refuge/Sacramento/habitats.html>

⁷⁹ National Geographic, 2015. *Birds Are Dying As Drought Ravages Avian Highways.*

<https://news.nationalgeographic.com/2015/07/1579-birds-snowpack-drought-flyway-wetlands-California/>

the NEPA/CEQA documents are impacts such as these disclosed, analyzed, or proposed for mitigation measures. This is only one example of neglected impacts to special status species in the area of origin.

C. Glenn County

Estimated Population – 28,668⁸⁰

- The City of Orland has a population of 7,676 people⁸¹ and is located on the west side of the Sacramento River.
- The City of Willows has a population of 6,154 people⁸² and is located on the west side of the Sacramento River.
- There are 2,923 domestic wells, 34 public supply wells, and 1,849 irrigation wells in Glenn County to date⁸³

Glenn County also benefits from the presence of wildlife refuges that are very vulnerable to CVP operations. See more detail above under Colusa County.

D. Shasta County

Estimated Population – 178,952⁸⁴

- Shasta County's largest city is Redding with a population of 90,230. Redding is in the northern Sacramento Valley and is bifurcated by the Sacramento River.
- There are 11,253 domestic wells, 219 public supply wells, and 363 irrigation wells in Shasta County to date⁸⁵

E. Tehama County

Estimated Population - 63,934⁸⁶

- Tehama County's largest city is Red Bluff with a population of 14,048.⁸⁷ Red Bluff is bifurcated by the Sacramento River. "Groundwater use for irrigated agriculture increased to two-thirds of the irrigated agriculture supply in the 1990s and continues at a similar rate to the present day (FCWCD 1996). "Other factors have also contributed to an increasing reliance of groundwater, including local and statewide population growth, changing land use patterns, increased environmental water use, and water supply reliability. Increased municipal and industrial uses within the County rely almost entirely on groundwater as a water source."⁸⁸
- There are 10,589 domestic wells, 111 public supply wells, and 1,591 irrigation wells in Tehama County to date⁸⁹

⁸⁰ Department of Finance, 2016. E-1: City/County Population Estimates with Annual Percent Change. <http://www.dof.ca.gov/Forecasting/Demographics/Estimates/e-1/>

⁸¹ City of Orland Department of Finance. 2016. http://cityoforland.com/business/city_demographics.asp

⁸² City of Willows 2015. Housing Element. http://www.cityofwillows.org/vertical/sites/%7B7D6DB31A-99CB-469D-88CF-327433878F6D%7D/uploads/Housing_Element_Adopted_2015.pdf

⁸³ DWR, 2016. Spreadsheet.

⁸⁴ Department of Finance, 2016. E-1: City/County Population Estimates with Annual Percent Change. <http://www.dof.ca.gov/Forecasting/Demographics/Estimates/e-1/>

⁸⁵ DWR, 2016. Spreadsheet.

⁸⁶ *Id.*

⁸⁷ *Id.*

⁸⁸ Tehama County Flood Control and Water Conservation District, 2003. *Water Inventory and Analysis. Water Inventory and Analysis*. p. ES-1.

⁸⁹ DWR, 2016. Spreadsheet.

IV. Conclusion

As demonstrated in our testimony, there is a great deal omitted from the WaterFix NEPA/CEQA documents on which you must rely for this Petition. The Applicants ignored the requirements of NEPA and CEQA that demand entire project disclosure and analysis with impacts avoided or mitigated. They couldn't even disclose the source of the water for the Project, which, as noted above, violates NEPA's and CEQA's prohibition against segmenting and piecemealing review of the whole of a project to evade proper environmental review.^{90, 91, 92} However, the Project purpose remains the same: drain as much water as possible from the Sacramento River Watershed and the Delta to continue some of the most destructive forms of desert agriculture, urban sprawl, and industrial extraction.

In the pursuit of massive private profits, powerful and politically connected people in California have devastated the hydrology and the environment of the state. The SWRCB clearly knows that the Sacramento River watershed, California's largest, does not have an endless supply of water, so AquAlliance asks the SWRCB: will you allow the Sacramento River watershed to wither and die from over-extraction like the watersheds of the San Joaquin and Owens rivers, but in someone else's lifetime? You only have to look at California's list of endangered and threatened species, the remnants of wetland and riparian habitat throughout the state, and the extent of subsidence in the San Joaquin Valley to know that state and federal leaders have made monstrous mistakes in the last century. If you chose a different path that doesn't repeat past mistakes and crimes, you must hold the Applicants accountable for their BDCP/WaterFix errors and omissions. Until the Applicants are challenged – before the SWRCB and in court – they will ignore the water, the land, the flora, the fauna, and the people that will be sacrificed for the dreams of three governors, numerous speculators, and less than 2% of the NorthState population that stands to make money mining water (see Figure 3).

Executed on the 28th day of November, 2017 in Chico, California



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⁹⁰ The Council on Environmental Quality (CEQ) under NEPA, as found in Title 40 Code of Federal Regulations §§ 1500-1517, discusses the implications of piece-mealing projects. NEPA requires that “[p]roposals or parts of proposals which are related to each other closely enough to be, in effect, a single course of action shall be evaluated in a single impact statement” (40 CFR § 1502.4)

⁹¹ Laurel Heights Improvement Association v. Regents of the University of California, 1988, 47 Cal.3d 376

⁹² CEQA defines a project as “the whole of an action, which has a potential for resulting in either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment” (Public Resources Code § 21065). The segmenting and consecutive assessments also result in a failure to disclose to the public the full impacts to the environment from the proposed project (Public Resources Code § 21003(a)).

Figure 3. Selling Water Districts in the Sacramento Valley.

Bureau of Reclamation Water Transfer Program
Agencies Proposing to Transfer Water

