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Comments on Upper San Joaquin River Basin Storage Project DEIS

Soil salinization

The analysis of projected agricultural demand in the Friant service area relies on SWAP. SWAP has limitations in its application to the Tulare Lake Basin, in that it does not explicitly account for land retirement due to soil salinization. Soil salinity was recognized as a major problem in the basin in the 1980s, resulting in the "Rainbow Report" study in 1990.[1] The study projected that drainage would be a problem in 348,000 acres in the Tulare Lake Region by 2040, and that 190,000 acres would be abandoned in the No Action alternative. In Westlands Water District, the study projected that drainage would be a problem in 204,000 acres by 2040, and that 140,000 acres would be abandoned in the No Action alternative. [See map on next page.]

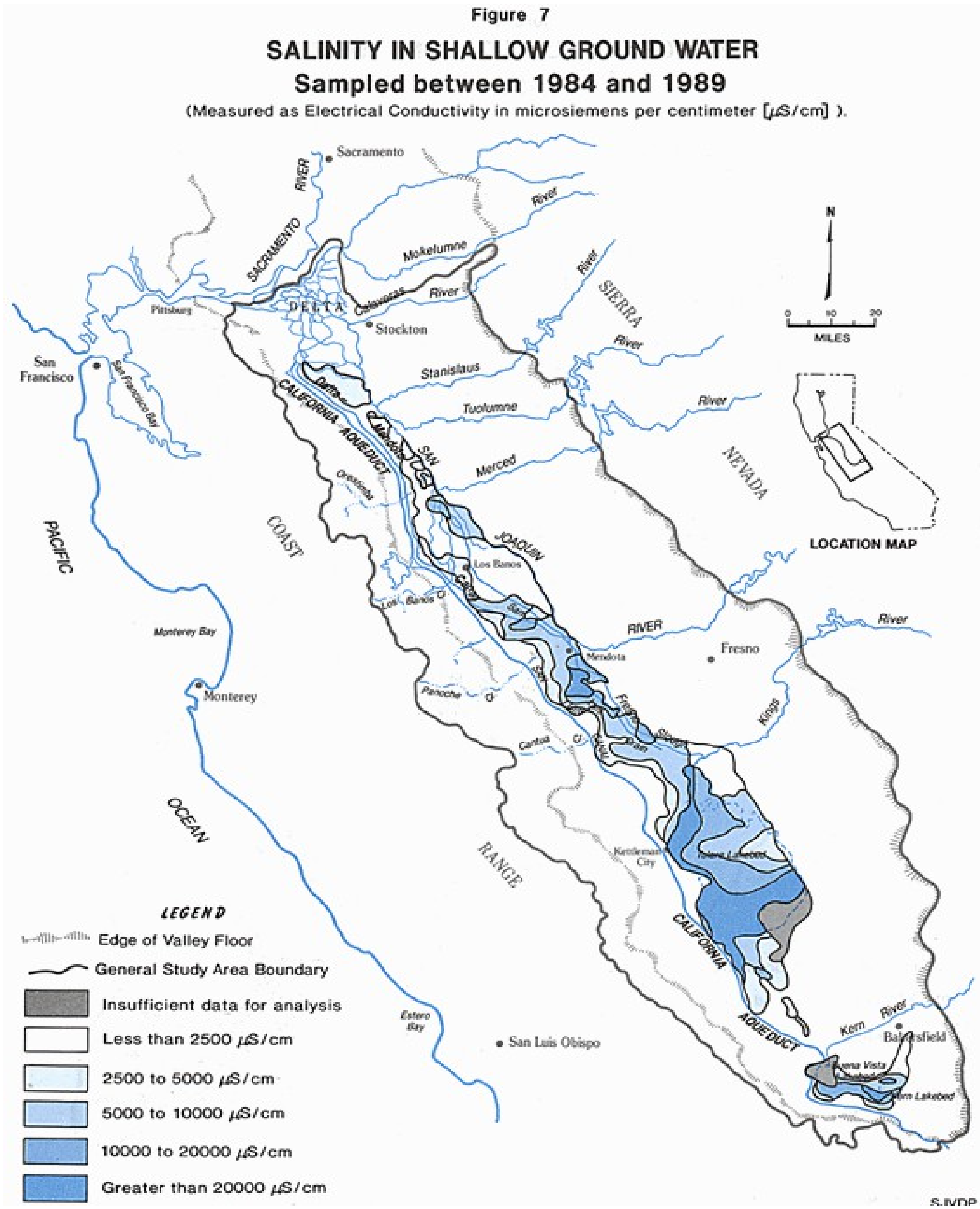
Problems with shallow, saline groundwater, and resulting land retirement appear to have been spreading at rate greater than that predicted by the Rainbow Report. About 100,000 acres of land in the western Tulare Lake region has been retired from irrigated production, and over 100,000 acres in Westlands Water District.

According to mapping by the state Department of Land Conservation,[2] between 1984 and 2008, Fresno lost 93,426 acres of "prime farmland" and "farmland of statewide importance" and gained 77,555 acres of "farmland of local importance" and 16,339 acres of "other land."

In the same time period, Kings County lost 96,400 acres of "prime farmland" and "farmland of statewide importance" and gained 48,491 acres of grazing land and 11,138 acres of "farmland of local importance" and 22,686 acres of "other land." Tulare lost 59,498 acres of "prime farmland" and "farmland of statewide importance" and gained 44,508 acres of "farmland of local importance" and 3,629 acres of "other land."

1 A Management Plan for Agricultural Subsurface Drainage and Related Problems on the Westside San Joaquin Valley, US Department of Interior and California Resources Agency, 1990. Incorporated by reference.

2 California Department of Land Conservation, Farmland Conversion Reports, Fresno, Kern, Kings, and Tulare Counties, 1984-2008.



Source: A Management Plan for Agricultural Subsurface Drainage and Related Problems on the Westside San Joaquin Valley, US Department of Interior and California Resources Agency, 1990.

Farmland of local importance may be very marginal in the crops that can be profitably grown, and may be brought into production in only very wet years.

To the extent that SWAP is based on land use patterns prior to land retirement, it is assuming that land within the CVP service area that has been retired from irrigated production due to soil degradation will be brought back into production.   This is unlikely.

Salt evaporation pond, Western Tulare Lake, April 2012.

Source: California Water Research

Effects of Climate Change on Crop Production

The modelling of effects of climate change on crop production in the EIS also seem overly simplistic. It is not clear if they incorporate any of the lessons learned from the widespread drought and heat waves in 2012, or from recent research on likely effects of temperature change on crop production. John Sanderson, from the Agriculture and Natural Resources Extension of the University of North Carolina, had this to say about the effects of heat on cotton production in 2012[3]:

> When temperatures reach 95 degrees or higher most of our crops and plants go into survival mode. Some plant species handle high temperatures and drought conditions better than others. For example, cotton handles high temperatures better than corn but both are negatively affected. When temperatures reach 95 degrees and higher the plant cannot move enough water to keep up with the evapotranspiration demand, so they close their stomates in the leaves to conserve the moisture they have within the plant and available to the roots. Some of the effects of this would be wilting of leaves, when the leaves wilt this is a response to drought and excessive heat. The wilting is causing the leaf to loose less water and is reducing the surface area. Reducing the surface area allows less direct heat and light on the leaf surfaces. The plant basically shuts down and stops all vegetative growth, aborts flowers, aborts small seeds or squares in the case of cotton, and reduces the size of the seeds. Crops are generally more sensitive to drought and/or heat stress during reproductive stages of development, which mainly influences crop yields and quality. However, plants are remarkable and produce many more flowers than the plant can support to become a seed at harvest. Plants can compensate in this manner for adverse environmental conditions. If rainfall returns and temperatures are in a more normal range within a reasonable amount of time the plants have the ability recover and produce a normal crop.
>
> Wayne County farmers have experienced an unprecedented heat wave this summer. In a 20 day period starting on June 20th, we had 12 days that the temperature was greater than 95 degrees and six days that the temperature was greater than 100 degrees. With extended high temperatures, our crops and plants have suffered greatly. Crops and plants will compensate for the conditions to survive, but under extreme conditions injury or death will occur.

Emphasis added.

Simulations of crop production in the California's Central Valley have also shown a significant reduction in crop productivity under climate change, and particularly under the warmer scenarios. The figure on the following page is from a 2009 study of field crop productivity by Juhwan Lee, Stephen De Gryze, and Johan Six.[4] It shows very significant declines in productivity of most field crops by the end of the century.

3 John Sanderson, Heat and Drought Effects on Plants, July 2012. Available at http://wayne.ces.ncsu.edu/2012/07/heat-and-drought-effects-on-plants/

4 Juhwan Lee, Stephen De Gryze, Johan Six, Effects of climate change on field crop production in the Central Valley of California. California Climate Change Center, 2009. Available at http://www.energy.ca.gov/2009publications/CEC-500-2009-041/CEC-500-2009-041-D.PDF. Incorporated by reference.

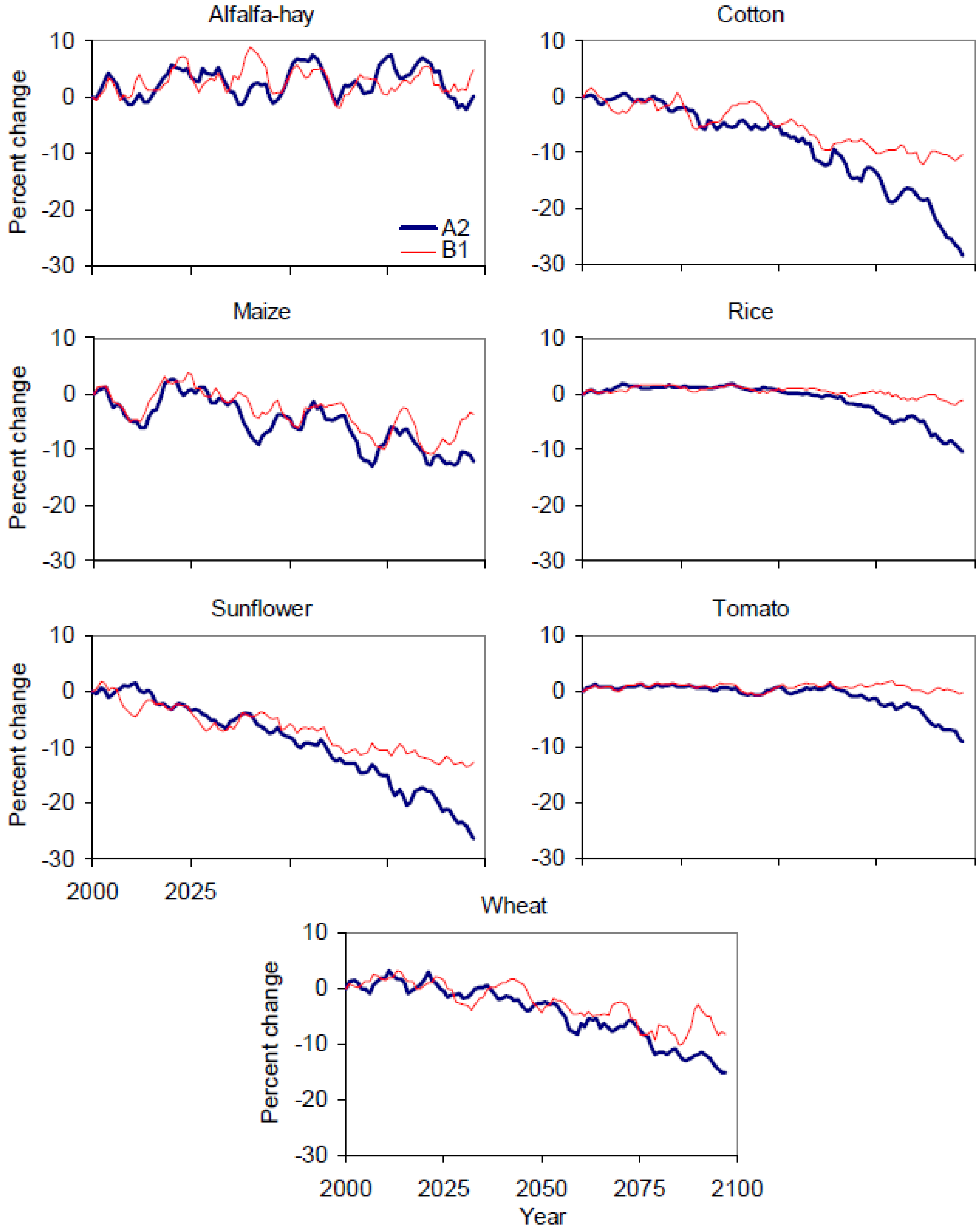


Figure 4. Changes in yield under A2 (medium-high) and B1 (low) emission scenarios. Five-year moving averages are calculated for the period 2000–2097. Yield changes are then expressed as percent deviation from the five-year moving averages in 2000.

Another study by Schlenker and Roberts also projected severe reductions in field crop yields across the U.S.[5] For the Tulare Lake Basin, the cumulative reductions in crop yields from soil salinity and increasing temperatures may make much of the land increasingly unprofitable.

5 Wolfram Schlenker and Michael Roberts, Nonlinear temperature effects indicate severe damages to U.S. crop yields under climate change, Proceedings of the National Academy of Sciences, July 2009, 15594-15598. Available at http://www.pnas.org/content/106/37/15594.short