



Pacific Gold Agriculture, LLC  
P.O. Box 29, Colusa, California 95932

May 26, 2023

Delta Independent Science Board  
715 P Street  
Sacramento, California 95814

**Re: Exploring Scientific and Management Implications of Upper Trophic Level Interactions in Delta Food-Webs (“Draft Prospectus”)**

Dear Delta Independent Science Board,

Pacific Gold Agriculture, LLC is a family farming entity based in Colusa County with a continuous farming legacy dating back to 1860 near College City. We also are a small Settlement Contractor with a diversion history from the Sacramento River from 1911 at the edge of family orchard near the City of Colusa.

We have been active Stakeholders and commenters on the development of the Groundwater Sustainability Plan for the Colusa Subbasin and have participated in the most recent comment solicitation for Draft Scientific Basis Report for the Bay Delta Plan. Our primary concern for the Delta and for the long term sustainability of the Sacramento Valley environmental and agricultural sustainability is the contamination of the Sacramento Valley’s groundwater aquifer due to naturally occurring contaminants which are being aggravated by over pumping in certain portions of the aquifer. Groundwater over – pumping is aggravating the phenomenon of salient water upconing and the desorption of arsenic, manganese and iron from groundwater redox conditions. Poor drainage has most likely led to groundwater contamination by surface water transport of mercury and chromium to low lying environmentally sensitive areas. Our concern also extends to the Delta and its food web since these contaminants are commingled with surface water flows into the Sacramento River and the Delta region which may also materially degrade the Delta food-web as discussed below.

The Data Gap that seems most apparent in the Draft Prospectus is the need for a detailed scientific investigation on the source and materiality of both: (i) elevated EC concentrations in Sacramento River flows and flows from the Colusa Trough via the Yolo Bypass and (ii) naturally occurring contaminants from groundwater redox desorption such as arsenic, iron or manganese and (iii) mercury and chromium that may be transported from foothill surface water run-off.

We would suggest that although the Durand publication mentioned the potential for food-web benefit from Yolo Bypass flows on page 22 of the cited paper “ *A Conceptual Model of the Aquatic Food Web of the Upper San Francisco Estuary*”, he did not expand on the impact of these flows and any water quality concerns. The Sacramento Valley flows from the Colusa Trough and Sutter Bypass have great potential for significant food -web and flow management enhancement but could presently be causing food-web trauma due to naturally occurring contamination.

In order to adequately consider the water quality issues, we would urge the Delta Independent Science Board to review the findings found in the 2023 publication “ *Investigating Factors that Contribute to Phytoplankton Biomass Declines in the Lower Sacramento River* “ by Timothy D. Mussen et.al. and focus



on the finding set out in the last Paragraphs of Page 19 and the Conclusion. Here are are couple cites relating to water quality at the site of the confluence of the Sacramento and American Rivers:

**“ In addition to these physical factors, there may be changes in the Sacramento River’s water chemistry that result from mixing with water from the American River. Past Studies have shown that the alkalinity of the Sacramento River can be as high as 72 mg L-1 whicl the alkalinity of the American River can be as low as 20mg L-1 (cite). ..... Whether this mixing of water with different chemistries plays a role in causing stress to the phytoplankton community and the ensuing decline of Chl-a below the confluence of the American River is not known. However, recent investigations have demonstrated that diatoms in particular ar sensitive to fluctuations in pH and alkalinity, and that such changes can lead to mass population mortalities (cite). Sudden declines in phytoplankton biomass (i.e. “crashing “of a bloom) may be induced by physiological stress followed by compromised integrity of the cells and subsequent loss in buoyancy (cite).”**

In the Conclusion of the Murren et. al publication:

**“ Phytoplankton decline in the lower Sacramento River was the result of a combination of physical and biological factors, which differen among regions and seasons. In the upper reach, the largest contributors to the declines in phytoplankton biomass were dilution by the Feather River and grazing by clams. In the lower reach, the largest contributor were an unknown factor ( bold emphasis added), followed by dilution from the American River and slowed phytoplankton growth because of light limitation. ....**

**Further research to help evaluate the unexplained decline of Chl-a concentrations occurring below RM 63 in the Sacramento River could include conducting additional studies to evaluate micozooplankton grazing rates ( cite) conducting comprehensive suspect screening analyses to identify the presence of currently undetected toxic chemicals ( Moschet et al. 2017), surveying the biovolume and re-suspension rates of bentic diatoms at the sediment surface (cite) and investigating phytoplankton physiological stress and buoyancy in mixtures of American and Sacramento River water. ...”**

We would like to point out that Murren cites the 2017 publication by Moschet et. al *“LC- and GC-QTOF-MS as Complementary Tools for a Comprehensive Micropollutant Analysis in Aquatic Systems.”* We would like to point out that the research by Moshet was actually done on Cache Creek surface flows which are tributary to the Yolo Bypass and Sacramento River but were focused on anthropogenic sources. We would suggest that excessive salts and other naturally occurring contaminants may be more problematic or detrimental and may be identified as being so with a research methodology such as that completed by Moshet and his colleagues.

We have made several references to excessive salt levels and contamination from redox related desorption and run off. In order to appreciate the magnitude and scope of these naturally occurring contaminants in the Sacramento Valley we would like to attach three Exhibits which comprise two Letters and one recent report disclosing mercury and chromium contamination in environmentally sensitive groundwater as background for our concern and focus of this Comment Letter. The three Exhibits Comprise:

Exhibit A – February 7, 2023 Comment Letter for Draft Scientific Basis Report for the Bay Delta Plan

Exhibit B - September 5, 2022 Letter to City of Colusa Mayor Thomas Reische regarding Potential Arsenic Contamination For the City of Colusa Public Water Supply System

Exhibit C - Excerpt from 2011 Colusa National Wildlife Water Management Plan detailing the discover of Mercury contamination in the groundwater below the Colusa National Wildlife Refuge and



Mercury and Chromium contamination in the groundwater below the Sacramento National Wildlife Refuge.

Thank you for the opportunity to provide this Comment Letter for the Draft Prospectus. I believe you will see from the attached Exhibits that there is a significant scientific basis to consider naturally occurring contaminants for the Sacramento Valley watershed having a material negative impact on the food-web for the Delta.

Best Regards,

Ben King  
Managing Principal