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Delta Independent Science Board
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Delivered via email: disb@deltacouncil.ca.gov

RE: Comments on the Draft Subsidence Review

Dear Members of the Delta Independent Science Board:

The Delta Science Program would like to transmit its comments on the Delta Independent Science Board's (Delta ISB's) draft review, "Science to Inform Management of Subsided Lands in the Sacramento-San Joaquin Delta." Overall, it is an excellent review, and captures the diversity of perspectives from the subsidence workshop. We appreciate the challenge of synthesizing the information gathered at the workshop into a brief findings and recommendations section. The broad focus on subsidence and the complexity of impacts of subsidence (as well as benefits of subsidence reversal) are well drawn. The science gaps identified will be useful in helping the Delta Science Program prioritize research and aligns well with the 2022-2026 Science Action Agenda. In fact, the Delta Science Program recently awarded a Delta Research Award to HyrdoFocus to improve subsidence and carbon emissions modeling, which can help address some of the gaps mentioned in the review.

However, we have a few comments for your consideration that can improve the report. If you have any questions, please let us know.

Major Comments

- We think the flood, community and economic risks of subsidence could be better emphasized in the high-level findings and recommendations, for those who will not read the whole proceedings.

- **Discussion of flux tower funding, management, infrastructure, personnel.** Reductions in NSF support for technical staff and AmeriFlux infrastructure present challenges to the continued advancement of this research. It is appropriate to clearly describe the implications of these changes, identify how resulting gaps are currently being addressed, and outline specific recommendations to ensure research continuity and progress.

- Perhaps beyond the scope of this review, but something to recommend may be a review of current models and their limitations and what we need to improve them (page 43 begins to mention this but more can be done here). For example, the current biogeochemical models can model CO2 and soil carbon, but do not capture methane dynamics. The management actions and the carbon market will only be as good as the models and more emphasis on these specific needs would be valuable.

- There needs to be a more detailed and nuanced discussion in the findings/recommendations section on avoided emissions and their relationship to radiative balance and crossover time. Crossover time is discussed, but we suggest it is important to convey clearly that:

    - Rewetting oxidizing peat soils retards CO2 emissions while promoting CH4 emissions
    - And so yes, the land remains a net positive emitter of CO2e after rewetting
    - However, there is still almost certainly an immediate climate benefit versus before rewetting, because the warming effect of the now-avoided CO2 emissions was likely greater than the warming effect of

the new CH4 emissions (even if we use a higher GWP for CH4 of e.g. 45)
    - This is a different issue than crossover time, which is the point decades in the future where the cooling effect of the carbon that has been slowly sequestering since rewetting overtakes the warming effect of the (probably declining) CH4 emissions and the land finally becomes a net negative CO2e emitter.

  While this is touched on briefly and obliquely in the background section (e.g. page 42 and again, more clearly, on page 55), it's a hard thing to wrap your head around if you aren't already familiar with GHG accounting. We think it is important to set this context up front, otherwise it's easy to think that the initial methanogenesis is actually making emissions worse than they were before.

- We appreciate the recommendations highlighting the need to better understand the processes controlling CH4 and N2O emissions. But, we would like to see a bit more detail on nitrous in particular, how might we get a handle on N2O emissions on the Delta when the Eddy Covariance towers don't measure it. This topic seems especially important given how potent a GHG it is, the potential for N-enriched agricultural run-off, and the move toward rice cultivation (and presumably, therefore, some level of fertilization). We recognize that in wetlands it's NO3- that is reduced to produce N2O, and that fertilizer tends to contain nitrogen as NH4+ vs NO3-, but my understanding is that N speciation in wetlands is controlled by a bunch of factors, so (perhaps) the less nitrogen we put in the better. And on that note, is a brief discussion of the redox ladder warranted, especially since that also helps explain how sulfate retards methanogenesis?

- Finally, a discussion of carbon sequestration permanence, and in particular the potential for lateral flux of DOC and DIC in tidally connected wetlands, seems worth considering, especially in the context of carbon crediting.

Specific Comments

Page 6, under findings

State that restoration of Twitchell and Sherman islands led to large net reductions of ghg, but doesn't specify net reduction in what? Seems a bit misleading and should be clearer as to under what conditions and timeframes these ghg benefits are estimated. Was this a reduction in total emissions but they are still net sources? For example, Sherman island is still a net source of ghg due to the methane fluxes, according to Dr. Kyle Delwiche's research.

Page 7, first paragraph

Again, discussion of ghg benefits of restored wetlands should include the whole picture to avoid misleading managers and decision makers as to the timeframe and conditions that create a net sink or net reduction in radiative forcing. This avoidance of 145,000 tons of CO2 emissions does not consider that massive flux of methane that followed Sherman restoration and possibly others on this list.

Page 9, recommendations

Is it worth being more specific here? Such as what kind of monitoring and measurements would achieve these goals. Or adding into the findings more about how federal support for Ameriflux is being cut and the need to support flux towers, specifically?

Page 13, figure 5

Missing x-axis label. Have to read caption to know what x axis represents, currently.

Pages 19-21, changing Delta landscape and discussion on carbon market

It would be great to see some discussion on the equity and social impacts of an expanding carbon market in the Delta. How carbon credits would compete with other land uses, who would benefit (vs who would not benefit) from these projects, how giving up carbon rights on land to a carbon development company at a low rate could present financial risk to landowners and farmers in the future (who owns the risk?), etc. This is an often under-emphasized aspect of the carbon market, which focuses on financing as a climate solution as opposed to climate mitigation and environmental justice-first approaches to mitigating and adapting to climate change. There is a race to the bottom in emerging markets such as the carbon

market as opposed to using this high-demand "product" of a carbon credit to advance other Delta as place or other community goals.

Page 23, context of ghg contribution of Delta

The SFEI hypothetical if all carbon is lost is reported in tons co2e. The annual contribution of the Delta to co2 emissions is reported as a %. We would rather read the percentage and actual tonnage of co2 emissions from the delta annually, is this increasing or decreasing, in the context of CA's state carbon footprint. The hypothetical loss of all carbon feels irrelevant and distracting.

Page 30, Twitchell island project

States that rice needs subsidies to cover costs. Is this just for the Twitchell project or for rice farming in the Delta at large? If beyond Twitchell, this is important context that could be included in the findings and recommendations sections above.

Page 41, Box 2

Typo. Should it read, "What is this wetland is drained…"?

Page 42, last paragraph

We are not sure what is meant by, "However, any management action that reduces the radiative balance (e.g., reduce methane emissions), will have an immediate climatic impact with time." I don't understand how "immediate" is used when the climate benefit comes some 200 years down the line.

Page 43

"Developing integrated models that include risk factors such as levee failure will require working…" We don't quite understand how risk factors and levee failure fit in here. Maybe a more direct connection can be made for readers.

Sincerely,

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