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Subject: Emerging Climate Research - Prospectus comments

To the Delta ISB:

I have reviewed the draft prospectus for the upcoming Emerging Climate Research Symposium. First I want to say “thank you” for prioritizing this subject as it is affecting every aspect of the Delta and yet is still being treated (in my opinion) as a separate field of study. For some background: I am co-chair of the IEP Climate Change PWT and on the editorial board (and author) on the State of Bay-Delta Science (SBDS) “Extreme Events” special edition that will be released in the Spring and Summer SFEWS issues (March and June 2025). Second I’ll provide some background on IEP climate related activities.

The IEP Climate Change PWT has accomplished two major goals so far: a technical report and a SFEWS literature review.

- (1) Climate Change MAST (Climate Change - Management, Analysis and Synthesis Team). 2022. Synthesis of data and studies related to the effect of climate change on the ecosystems and biota of the Upper San Francisco Estuary. *IEP Technical Report 99*. URL: <https://iep.ca.gov/Publications/Technical-Publications>
- (2) Herbold, B., Bush, E., Castillo, G., Colombano, D., Hartman, R., Lehman, P., Mahardja, B. and Sommer, T., 2022. Climate change impacts on San Francisco estuary aquatic ecosystems: A review. *San Francisco Estuary and Watershed Science*, 20(2). URL: <https://escholarship.org/uc/item/2xb097t7>

However, we have faced some issues with recruiting people to participate in the PWT and MAST; we get about 12 regular attendees at our quarterly meetings. Most of them would like to work on climate change related MAST projects but don’t have the time required to take on detailed analyses. For instance, we would really like to fulfill Larry Brown’s vision of creating habitat suitability maps that combine historical changes in salinity, temperature, and Secchi depth over space and time using discrete boat-based observations (similar to [Sam Bashevkin’s work on temperature changes](#):

<https://aslopubs.onlinelibrary.wiley.com/doi/full/10.1002/lno.12057>). This is currently on our “backburner” until more people can dedicate the time (dependent on their bosses’ approval or on funding—in the case of USGS who relies on soft money). This is a long way of saying that I really appreciate the push to highlight the importance of climate change

research, especially collaborative interagency synthesis projects, that directly inform research and management needs.

Third, I wanted to share that the SBDS editorial board is writing a synthesis essay for the special edition that highlights recommendations for “best possible extreme event science”. I can share the manuscript when we submit it to SFEWS around December 21st. In it we have two main messages. (1) The Delta is not a stationary system (from Milly et al., 2008’s “Stationarity is dead” paper: <https://www.science.org/doi/abs/10.1126/science.1151915>). We outline various time series analysis methods that can be applied to long-term monitoring data, including Fourier analysis, wavelet analysis, noise color, multivariate autoregressive state space (MARSS) models, dynamic linear models, etc. We feel that these types of methods have received lots of attention in the hydrologic world (e.g., Southwestern desert streams) but not as much attention in the Delta. Therefore, to continue pulling on this thread, I recommend that the DISB recruit speakers who specialize in time series analysis—both in hydrological and ecological datasets. (2) Now that the Delta research community is detecting early climate change signals, more than ever that the continuity of observations is critical (also Milly et al. 2008) to detect changes in trends, variance, and periodicity. Overall, we think that educating the Delta research and management community on what time series analysis can (and can’t) do is of utmost importance. This ties in well with the DMDU work, of course, and the uncertainty involved in projections of future scenarios. Specific speakers I recommend are my postdoc advisor Professor Albert Ruhi at UC Berkeley (albert.ruhi@berkeley.edu), and Jon Walter at UC Davis (jawalter@ucdavis.edu).

Unfortunately, I’ll be on medical leave from January 1st to April 7th, but I am happy to participate in anything related to this effort after I return, although I realize I may miss the bulk of the planning and even the symposium itself. In my absence, I recommend contacting Maggie Christman (my supervisor), Cliff Dahm, Jan Thompson, and of course, Lisamarie Windham-Myers, who are also on the editorial board and share this vision regarding the messages about stationarity and the need for time series analysis.

Thank you and I look forward to learning more about the symposium!

Denise Colombano

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