



Mr. Al Vargas
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Via E-mail: avargas@calwater.ca.gov

RE: Framework for research addressing the role of ammonia/ammonium in the Sacramento-San Joaquin Delta and the San Francisco Bay Estuary Ecosystem

Dear Mr. Vargas:

We are pleased to have the opportunity to offer our comments on the Draft Report entitled, "A framework for research addressing the role of ammonia/ammonium in the Sacramento-San Joaquin Delta and the San Francisco Bay Estuary Ecosystem," prepared by Drs. Meyer, Mullholland, Paerl, and Ward (the Panel). The report offers a succinct summary of the issues that the San Francisco Bay Estuary ecosystem is facing, as well as offering a well thought out research program to begin to understand the role that ammonia/ ammonium nitrogen may play in determining changes in primary production, phytoplankton species composition, and food web effects. The proposed research program is comprehensive and multi-faceted. The Panel strongly encourages CALFED to build the research program on existing field monitoring programs, existing research and existing tools such as the DSM-2 hydrodynamic model and we strongly encourage this.

We also offer the following comments on specific Research Topics identified by the authors in their report.

Research Topic 1:

The development of a comprehensive modeling framework that includes site specific information in order to determine species composition and grazing effects is dependent on other proposed Research Topics, specifically Topics 4 through 10. Would the Panel comment on whether and how the modeling effort should be staged, i.e., What modeling work could proceed while others Research Topics are being conducted? Would it make sense to utilize the particle tracking component of DSM-2 to address residence time issues for the spring algal bloom in Suisun Bay and perhaps the potential for using

freshwater flow management strategies to determine if *Microcystis* could be flushed from the Delta system?

The Panel did not mention including aquatic macrophytes in the modeling framework, perhaps recognizing the complexity and difficulty of performing such a task. Would the Panel offer any comments about how the impact of aquatic macrophytes on nutrient dynamics be parameterized in the modeling framework?

Research Topic 2:

The panel offers three approaches to fill data gaps concerning sources and fate of nitrogen and phosphorus in the Delta. Recognizing potential budget limitations of conducting more than one of these approaches would the Panel comment on the prioritization of the approaches.

Research Topic 3:

Would the panel offer any comments on how changes in aquatic macrophytes might result in changes in habitat for POD species and whether any additional research should be conducted in conjunction with this Research Topic?

Research Topic 7:

The Panel offers an interesting research question, “Could threshold responses to changes in nutrient (N and P) loading also play a role in these recent “state changes” – instead of or in addition to the roles of invasive filter feeders and hydrologic changes?” Does the Panel have any suggestions as to how or what research could be conducted to address this question other than perhaps the use of mathematical modeling?

Research Topics 8-10:

These Research Topics are all closely related and to some degree address potential artifacts of analysis conducted by Dugdale et al. (2007) and Wilkerson et al. (2006). While the Panel suggests conducting nutrient addition bioassays using water samples from the Delta and Suisun Bay, would the Panel offer specific recommendations as to the magnitude of the nutrient additions recommended. For example, Pennock et al. (2006) and Takabayashi et al. (2006) performed such bioassays using significant additions of ammonium versus the relatively small ammonium addition of Dugdale (2007).

One last thought about the framework and the potential scientific inquire that it proposes; BACWA recommends that the monitoring of pH be re-instituted within the existing monitoring programs for the Delta system to provide this basic and necessary piece of information which can help us understand overall toxicity.

BACWA appreciates the opportunity not only to comment on this framework, but to be invited to engage in the Science Summit. We look forward to many years of collaboration on these issues and other which impact our Bay and Delta system.

Sincerely;

A handwritten signature in blue ink that reads "Michele M Pla". The signature is fluid and cursive, with a long horizontal stroke at the end.

Michele M Pla
Executive Director

cc: BACWA Executive Board
James Fitzpatrick
Nirmela Arsem, BACWA Lab Committee Chair
Tom Mumley, SF Bay Regional Water Quality Control Board
Rainer Hoenicke, SFEI
Darrin Polhemus, Aquatic Science Center Board Member
Pamela Crendon, Aquatic Science Center Board Member

Bay Area Clean Water Agencies Comments on a Framework for research addressing the role of ammonia/ammonium in the Sacramento-San Joaquin Delta and the San Francisco Bay Estuary Ecosystem

Attachment A - References

- Dugdale, R.C., F.P. Wilkerson, V.E. Hogue, and A. Marchi. 2007. The role of ammonium and nitrate in spring bloom development in San Francisco Bay. *Estuarine, Coastal and Shelf Science* 73(1-2):17-29.
- Pennock, J.R. D.J. Velinsky, J.M, Ludlam, and J.H. Sharp, 1996. Isotopic fractionation of ammonium and nitrate during uptake by *Skeletonema costatum*: Implications for $\delta^{15}\text{N}$ dynamics under bloom conditions. *Limnol. Oceanogr.* 41(3): 451-459.
- Takabayashi, M., K. Lew, A. Johnson, A. Marchi, R. Dugdale and F.P. Wilkerson, 2006. The effect of nutrient availability and temperature on chain length of the diatom *Skeletonema costatum*. *J. Plank. Res.* 28(9): 831-840.
- Wilkerson, F.P., R.C. Dugdale, V.E. Hogue, and A. Marchi. 2006. Phytoplankton blooms and nitrogen productivity in the San Francisco Bay. *Estuaries and Coasts* 29(3):401-416.