

Comments on the Adequacy of C. Dahm's Discussion of
Delta Eutrophication Issues & Delta N/P Ratios as a
Cause of Adverse Impact on Delta Fish

G. Fred Lee, PhD, PE, BCEE, F.ASCE Anne Jones-Lee PhD
G. Fred Lee & Associates
El Macero, California
gfredlee@aol.com www.gfredlee.com

November 17, 2011

~~~~~

Cover Letter:

Via email on November 17, 2011 [joe.grindstaff@deltacouncil.ca.gov](mailto:joe.grindstaff@deltacouncil.ca.gov),  
Joe Grindstaff Executive Officer Delta Stewardship Council

Joe, I am contacting you to provide the members of DSC with information on significant deficiencies in C. Dahm's discussion of the literature pertinent to Delta nutrient eutrophication issues and in particular, on the nutrient N/P ratio approach for assessing the impact of nutrients on Delta fish resource management. As documented in our previous comments on the staff draft DSC plans, important literature on these issues has been ignored by the DSC staff in updating the versions of the Plan; again today, C. Dahm's discussion neglected to include a number of key issues and findings reported in the technical literature. It was clear from the discussion of these issues this morning that the DSC remains unaware of substantial professional literature by experts on these issues.

Background to the attached comments is provided on our website [www.gfredlee.com](http://www.gfredlee.com) where many of the approximately 1100 papers and reports that we have developed over the past six decades on water quality management issues – including eutrophication and aquatic plant nutrients – are available. Our website also makes available more than 120 papers and reports that we have developed during our 20 years of work specifically on Delta water quality issues. As discussed in the attached comments, the March 2008 CWEMF Delta Nutrient Workshop presentations by experts on Delta nutrient water quality issues provide an important resource for technical information and perspective on Delta eutrophication issues of which the DSC should be made aware.

Further, Glibert's position, based on her statistical approach, that N/P ratios are an important factor in influencing Delta fish populations has been found by a number of Delta ecosystem experts to be technically unreliable.

I request that you specifically bring these comments to the attention of DSC and indicate that I will be happy to answer questions on these issues.

G. Fred Lee, PhD, PE, AAEE Bd Cert. Env. Eng., F.ASCE

## Attachments

- Email discussion of the deficiencies in C. Dahm discussion and the DSC staff reporting of information provided on the deficiencies in the Staff drafts of DSC Plan
- Copy of paper by Cloern et al review of the unreliability of the Glibert's Delta N/P ratios as a factor in influencing Delta fish populations
- GFL website first page

~~~~~

At today's Delta Stewardship Council public meeting, there was considerable discussion of Delta eutrophication water quality/resource issues and the impact of N/P ratios in the Delta as presented in Glibert et al.'s recent paper:

Glibert, P. M., D. Fullerton, J. M. Burkholder, J. C. Cornwell and T. M. Kana. 2011. Ecological stoichiometry, biogeochemical cycling, invasive species, and aquatic food webs: San Francisco Estuary and comparative systems. *Reviews in Fisheries Science* 19:4, 358-417.

The current DSC staff draft versions of the Plan and C. Dahms's presentation today continue to fall significantly short of reliably and adequately informing the DSC on the professional literature on these issues.

In our comments on the third draft of the DSC Plan,

Lee, G. F., and Jones-Lee, A., "Comments on the Delta Stewardship Council's Third Staff Draft Delta Plan – Chapter 6 Improve Water Quality to Protect Human Health and the Environment – Released April 22, 2011," Submitted to Delta Stewardship Council, Sacramento, CA, Report of G. Fred Lee & Associates, El Macero, CA, Updated May 1 (2011). <http://www.gfredlee.com/SJR-Delta/DSCThrdStaffDraft-Com.pdf>

we reported the following:

"Impact of N/P Ratios on Delta Aquatic Life Resources

The DSC third staff draft Chapter 6 devotes considerable attention to the writings that discuss N/P ratios in the Delta as a cause of ecosystem changes, the pelagic organism decline (POD), and of other resource problems in the Delta. The third staff draft Chapter 6 fails to mention a number of technical issues related to that concern that are discussed in the literature. For example, in his presentation cited below, Cloern discussed the lack of technical validity in the Glibert's claim that changes in N/P ratio are a cause of changes in the Delta ecosystem that has occurred in recent years.

Cloern, James "Historical Perspective on Human Disturbance in the Sacramento-San Joaquin Delta Ecosystem", Senior Research Scientist, U.S. Geological Survey Menlo Park, CA presented at National Academies of Science (NAS) National Research Council (NRC) meeting, "Sustainable Water and Environmental Management in the California Bay-Delta" held on July 13-15, 2010 in Sacramento, Ca, PowerPoint slides obtained from the NRC Public Access Records Office at www.nrc.gov/reading-rm/foia/foia-privacy.html.

In his CWEMF nutrient workshop presentation entitled, "Impact of Sacramento River Input of Phosphorus to the Delta on Algal Growth in the Delta," Dr. Erwin Van Nieuwenhuysse

summarized his recent paper describing the response of average summer chlorophyll concentration in the Delta to an abrupt and sustained reduction in phosphorus discharge from the Sacramento County Regional Sanitation District wastewater treatment facility. His presentation provides important information on the impact of Sac Regional phosphorus discharge on Delta planktonic algae in the Delta, and is available at, <http://www.cwemf.org/workshops/DeltaNutrientsWrkshp/VanNieuwenhuysse.pdf>.”

In our comments on the fifth draft DSC staff Plan, Lee, G. F., and Jones-Lee, A., “Comments on the DSC Staff Fifth Draft of Chapter 6 Devoted to Delta Water Quality Issues in the Delta Plan,” Comments Submitted to Delta Stewardship Council, Sacramento, CA, by G. Fred Lee & Associates, El Macero, CA, August 21 (2011). <http://www.gfredlee.com/SJR-Delta/DeltaPlan5DraftCh6Comm.pdf>

on Page 142 line 27 and following: In our comments on technical deficiencies in the third staff draft Chapter 6 (cited above) we stated,

“The California Water Environmental Modeling Forum (CWEMF) develops peer reviews of modeling approaches and develops workshops on water modeling issues; Dr. Lee was asked to serve as a member of the CWEMF steering committee. With Dr. Jones-Lee he developed for the CWEMF a workshop entitled, “Overview of Delta Nutrient Water Quality Problems: Nutrient Load - Water Quality Impact Modeling,” which was presented to an audience of about 100 in March 2008. Information on that workshop is available on the CWEMF website

[<http://www.cwemf.org>] at:

<http://www.cwemf.org/workshops/NutrientLoadWrkshp.pdf>. Additional information on the workshop is available at:

Lee, G. F., and Jones-Lee, A., “Delta Nutrient-Related Water Quality Problems,” PowerPoint Slides Presented at CALFED Science Conference, Sacramento, CA, October 24 (2008). http://www.gfredlee.com/SJR-Delta/CALFED_SciConf10-08.pdf

Lee, G. F., and Jones-Lee, A., “Synopsis of CWEMF Delta Nutrient Water Quality Modeling Workshop – March 25, 2008, Sacramento, CA,” Report of G. Fred Lee & Associates, El Macero, CA, May 15 (2008). http://www.gfredlee.com/SJRDelta/CWEMF_WS_synopsis.pdf

“Overview of Delta Nutrient Water Quality Problems: Nutrient Load – Water Quality Impact Modeling,” Agenda for Technical Workshop sponsored by California Water and Environmental Modeling Forum (CWEMF), Scheduled for March 25, 2008 in Sacramento, CA (2008). http://www.gfredlee.com/SJR-Delta/CWEMF_Workshop_Agenda.pdf

Lee, G. F., and Jones-Lee, A., “Delta Nutrient-Related Water Quality Problems,” PowerPoint Slides Presented at CALFED Science Conference, Sacramento, CA, October

As noted in our review of DSC third draft Chapter 6 the work of Dr. Van Nieuwenhuysse should be mentioned at this location in Chapter 6. We stated in our comments on the third staff draft of Chapter 6:

“In his CWEMF nutrient workshop presentation entitled, “Impact of Sacramento River Input of Phosphorus to the Delta on Algal Growth in the Delta,” Dr. Erwin Van Nieuwenhuysse summarized his recent paper describing the response of average summer chlorophyll concentration in the Delta to an abrupt and sustained reduction in phosphorus discharge from the Sacramento County Regional Sanitation District wastewater treatment facility. His presentation provides important information on the impact of Sac Regional phosphorus discharge on Delta planktonic algae in the Delta, and is available at, <http://www.cwemf.org/workshops/DeltaNutrientsWrkshp/VanNieuwenhuysse.pdf>.

*“As discussed in the van Nieuwenhuysse workshop presentation and published paper, vanNieuwenhuysse, E., “Response of Summer Chlorophyll Concentration to Reduced Total Phosphorus Concentration in the Rhine River (Netherlands) and the Sacramento–San Joaquin Delta (California, USA),” *Can. J. Fish. Aquatic, Sci.* 64(11):1529-1542 (2007). [<http://www.ingentaconnect.com/content/nrc/cjfas/2007/00000064/00000011/art00006>]*

and the Lee and Jones-Lee workshop presentation, backup information, and papers referenced in their presentations, it is well-established that reducing the phosphorus loads and in-waterbody concentrations effects reductions in the phytoplankton biomass in Delta waters. This occur even in situations in which the available phosphorus concentrations in the waterbody remain surplus compared to growth-rate-limiting concentrations. The decrease in planktonic algae in the Delta associated with decreased phosphorus loads to the Delta is important information that must be discussed in a creditable discussion of the impact of nutrients on Delta water quality.

The changes in the Delta ecosystem that occurred associated with Sac Regional decreased phosphorus discharges rather than the change in N/P ratios as discussed in the DSC staff third draft are a more likely cause of changes in the fish production than the change in the N/P ratios discussed by the staff in the third draft.”

In our comments on the fourth draft of Chapter 6

Lee, G. F., and Jones-Lee, A., “Comments on Revised Delta Plan Staff Draft Chapter 6 ‘Improve Water Quality to Protect Human Health and the Environment’ as Presented in the Fourth Staff Draft of the Delta Plan,” Comments Submitted to Delta Stewardship Council, Sacramento, CA, by G. Fred Lee & Associates, El Macero, CA, June 14 (2011). <http://www.gfredlee.com/SJR-Delta/DeltaPlan4DraftCh6Comm.pdf>

we stated,

“Impact of N/P ratios

We discussed the inadequate coverage of the issue of the impact of N/P ratios on Delta aquatic life resources (beginning on page 21 of our comments on the third staff draft). The fourth staff draft discussion has been expanded to include the reference to the report by Cloern on this issue that we noted in our comments. However the revised Chapter 6 fails to mention a very important reference to the work of Dr. Erwin Van Nieuwenhuysse on phosphorus reduction issues, also noted in our previous comments.”

“The importance of nutrients as a cause of water quality problems in the Delta is discussed in the revised third staff draft, now the fourth staff draft of Chapter 6. While considerable information on these problems is provided in the revised chapter, the draft fails to discuss and provide adequate reference to the most comprehensive review of the nutrient issues, i.e., the 2008 CWEMF Delta Nutrient workshop. Nutrient issues were discussed in our comments on the third staff draft, from page 19 through part of page 21. The 2006 reference provided in the fourth staff draft to an outdated DWR report on nutrient issues is not adequate for providing the reader with current information on Delta nutrient water quality issues that need to be addressed. Of particular concern is the impact of nutrients on drinking water quality and the potential for controlling nutrients and their impacts. The fourth staff draft Chapter 6 continues to provide recommendations to the CVRWQCB on when it should develop nutrient criteria. We discussed the unreliability of recommendations pertaining to nutrients in our comments on the third staff draft.”

In the fourth, and now the fifth, draft of Chapter 6, the draft Delta Plan still fails to mention or provide reference to the work of Dr. van Nieuwenhuysen on the potential role of phosphorus in impacting phytoplankton populations in the Delta and the failure to mention the CWEMF Delta nutrient workshop represents a fundamental flaw in how the DSC staff have reviewed and incorporated information provided by DSC draft plan reviewers in revisions of the Plan.?

The bottom line is that there was considerable information provided in the Workshop presentations by experts on Delta nutrient water quality issues (available on the CWEMF website) that has not been properly incorporated into the Plan or discussions of the issues before the DSC. Furthermore, the unreliability of the Glibert, et al. N/P ratio approach for assessing the impacts of nutrients on Delta fish populations has been addressed by internationally recognized experts on the Delta ecosystem, including in the following paper (a preprint copy of which is attached):

James E. Cloern, Alan D. Jassby, Jacob Carstensen, William A. Bennett, Wim Kimmerer, Ralph Mac Nally, David H. Schoellhamer, Monika Winder, “Perils of correlating CUSUM-transformed variables to infer ecological relationships (Breton et al. 2006, Glibert 2010),” in press.

As discussed in my comments on the third staff draft of the Plan, Cloern, an international recognized expert on Delta ecosystem issues, also reported on this issue at a National Academy of Science (NAS)–National Research Council (NRC) meeting, “Sustainable Water and Environmental Management in the California Bay-Delta,” held on July 13-15, 2010 in Sacramento, CA. At that meeting Cloern explicitly stated that Glibert’s approach for evaluating the impact of N/P ratios on Delta fish is not technically valid.

The disregard of technical information and comments provided in this process, and the narrow focus on technically invalid approaches are of great concern if the goal of this process is to provide the DSC with reliable and complete technical information concerning the impacts of nutrients on Delta water quality. If there are questions of comments on these comments please contact me.

Fred