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Please note that the area code for telephone and fax has been changed to 530.

December 26, 1997

William Jennings
 DeltaKeeper
 3536 Rainier Avenue
 Stockton, CA 95204

Dear Bill:

Following up on our discussions at the CALFED Water Quality Parameter Assessment Team meeting, held in early December, I wish to suggest that the DeltaKeeper start to record the extent of water quality use impairment that occurs in the Delta due to excessive growth of aquatic plants. The use impairments of concern are boating, water skiing, fishing, swimming and other contact recreation, such as wading. Basically, it appears that people do not understand that the Delta has serious aquatic plant growth problems that limit the use of the waters in various areas for recreational purposes.

In 1989, when I moved back to California, I had the opportunity to personally observe the Delta's eutrophication-related water quality. At that time I was working with the Delta Wetlands Water Supply Project examining the potential impact of storing Delta waters on Delta islands. I became involved because water utilities were concerned that such storage could lead to deteriorated water quality when discharged back to the Delta channels at the end of the storage period. This caused me to examine the excessive fertility issues of the Delta. My examination was based on having worked on these kinds of problems over the previous 30 years at a variety of locations in the US and in many other countries, including Canada, Norway, France, Germany, Italy, Israel, Jordan, Tunisia, India, Japan, USSR, Argentina, Dominican Republic, the 22 OECD member countries, etc. For a period of four years in the late 1970s to early 1980s, I chaired the American Waterworks Association Quality Control and Reservoirs Committee. Under my leadership this committee specifically examined the impact of a lake or reservoir's watershed on a water supply's eutrophication-related water quality. I had the US EPA contract to develop the synthesis report for the US part of the OECD eutrophication studies. These studies represent a \$50 million, five-year effort, conducted by 22 countries located in Western Europe, North American, Japan and Australia. The OECD studies focused on the impact of nutrients on excessive fertilization of water bodies, which impairs the use of the water for domestic water supply and/or recreational activities. My wife, Dr. Anne Jones, and I have published extensively on our work on excessive fertility problems. A list of our major publications on this topic is available from our web site (<http://members.aol.com/gfredlee/gfl.htm>).

I am not sure that I have brought to your attention my work on Delta water quality eutrophication issues that was published a number of years ago. Enclosed is a copy of these papers. They were prepared in connection with a University of California Water Resources Center conference devoted to Delta water quality issues, where the organizers of the conference asked me to develop a review of the excessive fertility issues in the Delta. There is no question that excessive nutrients introduced into the Delta seriously impairs the aesthetic water quality from municipal water supplies using Delta waters as a raw water source. There is also significant excessive growth of algae and downstate reservoirs, as well as the Santa Clara water supply reservoir.

I have been somewhat surprised that no one until the Parameter Assessment Team meeting, held on December 3, 1997, has discussed the excessive fertility problems of the Delta as they impact domestic water supply, water quality and the use of the Delta for recreational purposes. Both of these are highly significant water quality problems in the Delta and the use of Delta waters. It appears that there is a relatively poor understanding of these issues among the technical community concerned with water quality of the Delta.

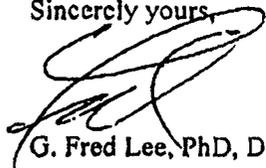
I suggest that the DeltaKeeper develop a channel map of the Delta that could be used by DeltaKeeper staff to indicate areas of the Delta where excessive aquatic plant growth is occurring that interferes with recreational or other uses of Delta waters. It is my suggestion that beginning in April or May and monthly thereafter, a survey of the various Delta channels where recreational activities occur be conducted by DeltaKeeper staff. At the end of the intensive summer recreational season, an overall report should be developed that discusses the areas where impairment of use is occurring due to excessive aquatic plant growth.

The survey information should include a discussion of the kind of impairment and the type of plants responsible, i.e. water hyacinths, attached algae, excessive emergent aquatic plant growth, planktonic algal scums, etc. The areal extent in each region of excessive algal/aquatic plant growth should be designated on the channel maps. While this type of information is anecdotal, a record of it will ultimately develop a sufficient database that can be used to show that excessive nutrient inputs to the Delta are, in fact, impairing the beneficial uses of the Delta Waters within the Delta. If there is interest, I would be happy to meet with the DeltaKeeper staff and possibly even go on parts of one or more of the mapping cruises to help define an overall, semi-quantitative approach for expressing excessive aquatic plant growth.

Another parameter that you would want to measure during the cruises is Secchi depth. It is a measure of water clarity. Water clarity in the Delta is a function of both color, inorganic turbidity brought in from erosion or stirring of the bottom muds, and planktonic algal growth. The public perceives a decreased water clarity, i.e. Secchi depth, as a use impairment. If you also measured color, you could then sort out the color due to humics (true color) and "apparent color" due to planktonic algae and suspended materials, plus humics. Also, Secchi depth is a parameter that relates to algal growth. The greater the Secchi depth, the more profuse the attached and planktonic algal growth.

If you or other members of the DeltaKeeper staff have questions or comments on these suggestions, please contact me.

Sincerely yours,



G. Fred Lee, PhD, DEE

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