

Comments on Water Quality Impacts of Suction Dredge Mining

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The following comments are made in response to the CA State Water Resources Control Board's (SWRCB) request for comments on the water quality impacts of suction dredge mining. They are based on our extensive research and regulatory background devoted to the investigation and management of water quality impacts of dredging of US waterway channels, as well as on Lee's involvement in evaluating the water quality impacts of mercury in sediments. A summary of this experience is appended to these comments.

G. F. Lee attended the June 12, 2007 SWRCB workshop on suction dredge mining. He found that those who spoke in support of continued suction dredge mining for gold did not make reliable representations of the potential water quality impacts of this activity. There is need for the SWRCB to develop a definitive, technically valid discussion of these issues. If there is interest, we could work with the SWRCB staff in developing such a discussion.

Overall Assessment

Suction dredge mining of gold in Sierra Nevada mountain streams and rivers is adverse to various aspects of water quality in those waterbodies and downstream. It also has the potential to further aggravate the problem of excessive mercury bioaccumulation in aquatic life and wildlife. Key aspects of these issues are discussed below.

Altered Habitat. Typically suction dredge mining increases the suspended solids/turbidity in the stream, and can thus be expected to cause violations of CVRWQCB (Central Valley Regional Water Quality Control Board) turbidity objectives. The increased turbidity can be adverse to aquatic life habitat in the water column and in the stream bed. Harvey and Lisle (1998) reviewed some of the potential impacts of suction dredge mining, focusing on aquatic habitat impacts on fisheries. Their review discussed many of the issues of concern, and concluded,

“Suction dredging and associated activities have various effects on stream ecosystems, and most are not well understood.”

There are several other potential water quality impacts that they did not discuss. For example, members of the American River Watershed Group have observed beds of attached algae downstream of suction dredge mining locations. Such beds will significantly alter the stream bed aquatic habitat. Apparently suction dredge mining has mobilized sediment-associated nutrients, resulting in the development of these beds of attached algae.

Mobilization of Mercury. One of the most important impacts of suction dredge mining is its potential to mobilize mercury in the stream sediments. This mobilization could lead to increased mercury conversion to methyl mercury and its bioaccumulation in edible fish and other aquatic life and present a threat to human health and wildlife. This issue has been reviewed in the Humphreys (2005) SWRCB staff report.

Several of those who spoke at the June 2007 SWRCB suction dredge mining workshop argued that suction dredge mining should be allowed since it recovers some of the mercury left in the riverbed sediments by former gold recovery activities. Humphreys (2005) addressed several aspects of this argument and discouraged this activity. There is need to evaluate whether such mining activities significantly increase the potential for increased methyl mercury formation over that which occurs naturally in the streams.

Those who advocate suction dredge mining for gold recovery assert that the potential impacts of this activity are similar to those that occur naturally. Not considered in that argument is the difference in the time of these events. Natural suspension of stream sediments and suction dredge mining typically occur at different times of the year and therefore will have different impacts on aquatic life and water quality.

Regulating Suction Dredge Mining. The magnitude of the impacts of suction dredge mining is site-specific and depends on a variety of factors including stream characteristics, and dredge characteristics and operation. If suction dredge mining is allowed, it should be regulated by permitting and required monitoring to help ensure that the potential adverse impacts are controlled to a sufficient degree to protect water quality and beneficial uses. The permitting of suction dredge mining should include a sufficient permit fee to cover the cost of adequate monitoring/management of the activities.

Experience of Commenters in Evaluating the Water Quality Impacts of Dredging and Dredged Sediment Management
Information on Drs. G. Fred Lee and Anne Jones-Lee's experience and expertise pertinent to providing technical assistance in evaluating the water quality impacts of suction dredge mining is provided on their website, www.gfredlee.com at <http://www.gfredlee.com/gflinfo.htm>.

Specific information on their work in the evaluation of the water quality impacts of dredging and dredged sediment management is at, <http://www.gfredlee.com/psedqual2.htm#dredge>.

That section of their website provides some of their papers and reports on these issues. Of particular relevance is their work in the 1970s and 1980s for the US Army Corps of Engineers Dredged Material Research Program (DMRP). That was a \$30-million, 5-year effort devoted to evaluating the water quality aspects of dredged sediment management associated with navigation dredging of US waterways. Dr. G. Fred Lee received over \$1 million in research support to evaluate, in the field and laboratory, water quality impacts of dredged sediment management, and to develop dredged sediment disposal criteria.

Those studies conducted by Dr. Lee and his graduate students became the basis for the current regulatory approach for evaluating the potential impacts of dredged sediment disposal in open water. In addition, Dr. Lee served as a member of the DMRP steering committee that reviewed all of the work done in the DMRP program.

Dr. Lee also has experience and expertise in evaluating the water quality impacts of mercury. Beginning in the late 1980s he served as a consultant to the American Dental Association to evaluate the fate and potential impacts of dental amalgam discharged to municipal sanitary sewer systems. He has been a member of the Delta Mercury Tributary Council since it was first organized. He is also presently serving as a member of the CALFED-supported \$ 2.5-million Fish Mercury Project that is being conducted to develop information for the regulation of mercury in Central Valley streams and the Delta. He is familiar with the current information being developed on the water quality impacts of mercury.

Potential Involvement in Evaluating the Water Quality Impacts of Suction Dredge Mining of Gold

Last spring Bill Templin, Watershed Coordinator of the American River Watershed Group, brought to Lee's attention the concerns of that group regarding potential water quality impacts of suction dredge mining of gold in the American River tributaries. Lee reviewed the literature on this topic and concluded that there is need for comprehensive studies to evaluate this situation. He indicated to Mr. Templin that with his extensive experience and expertise in investigating and developing regulatory approaches for controlling the significant water quality impacts potentially associated with dredging and dredged sediment disposal, he would be interested in developing and leading a research effort on this issue if there were support for such work. Subsequently Lee learned that there was interest in this issue by the SWRCB staff. If the SWRCB decides that there is need and funding to conduct studies to evaluate the water quality impacts of suction dredge mining in Sierra rivers, Lee and Jones-Lee could be of assistance in developing, coordinating, and reporting the results of site-specific studies geared toward developing permit conditions for suction dredge mining activities.

Drs. G. Fred Lee and Anne Jones-Lee are affiliated with the California State University, Fresno Water Institute. In 2002, , on behalf of the CVRWQCB and SWRCB, through the CSU Fresno, they completed four major reports on issues that need to be considered in developing pollution control programs for non-point-source pollutants in the Central Valley. Their reports on these issues are available on their website at, <http://www.gfredlee.com/pwwqual2.htm#eval>. Work on the potential impacts of suction dredge mining could potentially be conducted through CSU Fresno.

References

Harvey, B., and Lisle, T., "Effects of Suction Dredging on Streams: a Review and an Evaluation Strategy," *Fisheries* **23**(8):8-17 (1998).

Humphreys, R., "Mercury – Losses and Recovery during a Suction Dredge Test in the South Fork of the American River," Staff Report of the State Water Resources Control Board, Sacramento, CA, May (2005).