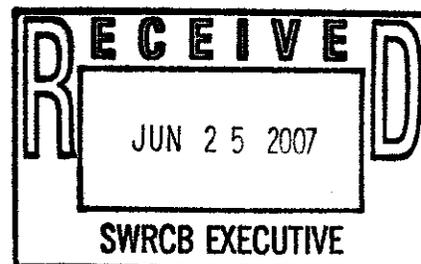




U.S. Geological Survey
California Water Science Center
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Placer Hall, CSUS
Sacramento, California 95819-6129
916-278-3134

6/12/07 Workshop
Suction Dredge
Deadline: 6/22/07 Noon



June 22, 2007

Ms. Song Her
Clerk to the Board, Executive Office
State Water Resources Control Board
P.O. Box 100,
Sacramento, CA 95812-0100

Subject: Comment Letter — Suction Dredge Mining

Dear Ms. Her,

Over the past several years, the U.S. Geological Survey has conducted several studies documenting mercury and methylmercury contamination of water, sediment, and biota in watersheds affected by historical gold and mercury mining in California. The attached lists of publications provide pertinent information from the USGS projects with which I have been personally associated as project chief or collaborating scientist.

Many of the watersheds described in the reports on the attached list have ongoing suction dredge mining activity. However, no USGS studies to date have been focused specifically on assessing the potential impacts of suction dredge mining on stream ecology, sediment transport, mercury transport, mercury methylation, or mercury bioaccumulation in California waterbodies.

As mentioned in the SWRCB staff report by R. Humphreys (May, 2005), "Mercury – Losses and Recovery during a Suction Dredge Test in the South Fork of the American River," dredging has the potential for "flouring" elemental mercury, that is, breaking up beads of liquid mercury into many tiny particles. This is an important phenomenon because the increase in surface area of the mercury is likely to result in more rapid oxidation (chemical conversion of elemental Hg(0) to oxidized Hg(II)) in the stream environment, enhanced by dissolved oxygen in the stream coming into contact with re-suspended particles that may include free liquid mercury, gold-mercury amalgam, and other forms of reduced mercury [Hg(0)]. This oxidation process is particularly important, as it is the Hg(II) form that is converted to the more toxic methylmercury (MeHg) form by sedimentary bacteria. Even without the effect of Hg oxidation, particle re-suspension and transport caused by suction dredge mining is likely to cause breaking up of Hg(0)- and Hg(II)-bearing particles, increasing their reactive surface area.

It has been demonstrated in recent studies by others including Bloom (2003) and Bloom et al. (2006) that oxidized forms of mercury [that is, forms composed of Hg(II)] are more susceptible to Hg-methylation by microbes (including sulfate-reducing and/or iron-reducing bacteria) than the unoxidized, elemental form [Hg(0)]. The fact that suction dredge mining takes place in areas of known contamination of elemental Hg(0), such as the Cosumnes, American, Bear, Yuba, and Feather rivers of the Sierra Nevada, and the Trinity River in the Trinity Mountains, raises the possibility that this dredging activity is contributing to making some of the Hg(0) and Hg(II) species more reactive, and raises the possibility that, ultimately, more of the mercury will convert to MeHg than if the dredging did not take place. However, the potential increase in the reactivity of mercury and its availability for methylation caused by suction dredge mining in mercury-contaminated areas remains a hypothesis that has yet to be tested by a rigorous scientific study.

The USGS (Marvin-DiPasquale et al., 2006) has developed an analytical method for measuring the concentration of "reactive Hg(II)" [or Hg(II)_R] in sediment or suspended sediment. The method consists of a 15-minute digestion using tin chloride (SnCl₂), a strong reducing agent. The measurement is designed to detect the fraction of Hg(II) that is most available for reaction with SnCl₂, a proxy measurement for the fraction that might be most accessible to microbes known to convert inorganic Hg(II) to the more toxic MeHg form.

Dr. Mark Marvin-DiPasquale (USGS, Menlo Park, CA) has recently completed some relevant experiments using sediments from Alviso Slough, an area that contains mercury-rich sediments derived from the New Almaden mining area in South San Francisco Bay. Based on my oral communication with Dr. Marvin-DiPasquale, I have learned that in these experiments, Bay sediments were stirred in closed flasks to simulate sediment scouring and re-suspension. One split sample had oxygen gas bubbled through to simulate an oxygenated water column; another split sample had nitrogen gas bubbled through to evaluate the effects of re-suspension without oxidation. Reactive Hg(II) was measured at several time points during the experiments (t=0, 1, 3, 5, and 7 days). The oxygenated samples showed an increase in Hg(II)_R concentration of approximately 50 times, compared to initial conditions, whereas the samples agitated with nitrogen gas had increases of about 5 times. This indicates that the processes of agitation and oxidation caused separate, but readily measurable increases in mercury reactivity, and potentially the availability of Hg(II) for MeHg production in physically perturbed environments.

USGS scientists are in the midst of discussions with AML Program staff from the Bureau of Land Management regarding a treatability study using suction dredge equipment as part of a CERCLA HazMat mercury removal project on the South Yuba River in the vicinity of the Humbug Creek confluence. This area receives drainage from the Malakoff Diggings State Park and is a known "hot spot" for elemental mercury. Treatability studies are designed to test the effectiveness of a technology and to determine its potential environmental effects. The goals of the BLM suction dredging treatability study would be to assess the effectiveness of suction dredging in removing mercury from the environment as well as to assess potential impacts of suction dredging with regard to discharging mercury to the aquatic environment.

It is anticipated that USGS participation in the BLM treatability study will consist of field and laboratory components. The field component will likely include sampling and analysis of mercury, reactive mercury, and/or methylmercury in water, sediment, and biota; the biota will likely consist of naturally occurring *Hydropsyche* (caddis fly), caged *Corbicula* (asian clam), and/or periphyton (epiphytic algae) on an artificial substrate. Experiments of mercury species transformations due to sediment perturbation similar to those described above for Alviso Slough would also be completed. The experiments may be supplemented by taking the run products from agitation with nitrogen and oxygen gas and mixing with "receiving" sediment from a downstream location in the South Yuba River or Englebright Lake to assess possible differences in rates of methylmercury formation that could be associated with the different treatments.

The USGS looks forward to the opportunity of working with SWRCB and RWQCB staff along with BLM AML Program staff in designing and implementing studies that will address some of the areas of scientific uncertainty with regard to potential impacts to water quality from suction dredge mining.

Sincerely,

(signed)

Charles N. Alpers
Research Chemist

cc: Debra Curry, Supervisory Hydrologist

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Attachments:

- 1) Mercury Contamination in California Watersheds Affected by Abandoned Mine Lands -- Publications by the U.S. Geological Survey
- 2) Reports for the Bear River Mercury Cycling Project
- 3) Summary of USGS publications and presentations for the Upper Yuba River Studies Program — updated April 9, 2007

Mercury Contamination in California Watersheds Affected by Abandoned Mine Lands

Publications by the U.S. Geological Survey

Outline:

A. Reports

1. General
2. Sierra Nevada*
3. Trinity Mountains
4. Cache Creek
5. Sacramento River

B. Abstracts

(all areas, grouped by year, alphabetically by author)

*(see separate lists for Upper Yuba River Studies Program and Bear River Mercury Cycling Project)

A. Reports

1. General

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- Curtis, J.A., Flint, L.E., Alpers, C.N., and Wright, S.A., 2006, Evaluating sediment sources, erosion, and transport processes in the upper Yuba River watershed, Joint 8th Federal Interagency Sedimentation and 3rd Hydrologic Modeling Conferences, June 2-6, Reno, NV. (talk presented by J. Curtis).
- Hothem, R.L., May, J.T., and Alpers, C.N., 2006, Biosentinels of mercury contamination in areas affected by abandoned gold and mercury mines: Why not the ubiquitous water strider? Mercury 2006 – 8th International Conference on Mercury as a Global Pollutant, August 6-11, 2006, Madison, WI. (poster presented by R. Hothem)
- May, J.T., Hothem, R.L., Brown, L.R., Moore, J.N., Gibson, J.K., Rytuba, J.R., and Alpers, C.N., 2006, Comparison of mercury bioaccumulation in adjacent watersheds influenced by historical mining in the Klamath-Trinity Mountains, California, Mercury 2006 – 8th International Conference on Mercury as a Global Pollutant, August 6-11, 2006, Madison, WI. (poster presented by J. May)
- Saiki, M.K., Alpers, C.N., and others, 2006, Mercury concentrations in two recreationally important fishes from a northern California reservoir, American Chemical Society, 232nd ACS National Meeting, September 10-14, 2006. San Francisco, CA. (talk presented by M. Saiki).

**USGS California Water Science Center
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Reports for the Bear River Mercury Cycling Project

1) Published reports:

- a. Kuwabara, J.S., Alpers, C.N., Marvin-DiPasquale, M., Topping, B.R., Carter, J.L., Stewart, A.R., Fend, S.V., Parchaso, F., Moon, G.E., and Krabbenhoft, D.P., 2003, Sediment-water interactions affecting dissolved-mercury distributions in Camp Far West Reservoir, California, U.S. Geological Survey Water-Resources Investigations Report 03-4140, 64 p. <http://water.usgs.gov/pubs/wri/wri034140/>
- b. Alpers, C.N., Hunerlach, M.P., May, J.T., and Hothem, R.L., 2005, Mercury contamination from historical gold mining in California, U.S. Geological Survey Fact Sheet 2005-3014, 6 p. <http://water.usgs.gov/pubs/fs/2005/3014/>

2) USGS-approved report, not yet published:

- a. Alpers, C.N., Stewart, A.R., Saiki, M.K., Marvin-DiPasquale, M.C., Topping, B.R., Rider, K.M., Gallanthine, S.K., Kester, C.A., Rye, R.O., Antweiler, R.C., and De Wild J.F., in press, Environmental factors affecting mercury in Camp Far West Reservoir, 2001–03. U.S. Geological Survey Scientific Investigations Report 2006-5008. (Status: USGS-approved. Publication on web expected in early 2007.)

3) Reports in preparation:

- a. Alpers, C.N., Saleh, D., and Meyer, R.W., in review, Mercury and methylmercury transport in a Sierra Nevada watershed contaminated by historical gold mining: the Bear River, California. Journal article (target journal: *Science of the Total Environment*). (Status: in USGS colleague review. Expecting USGS approval and submission to journal in late 2006 or early 2007.)
- b. Antweiler, R.C., Alpers, C.N., Peart, D.B., Plowman, T., Taylor, H.E., and De Wild, J.C., in preparation, Water quality data from the Bear River watershed, California. U.S. Geological Survey Data Series Report. (Status: USGS approval and publication during 2007.)
- c. Alpers, C.N., Stewart, A.R., Saiki, M.K., Marvin-DiPasquale, M.C., and Kuwabara, J.S, in preparation, Seasonal variations in water quality affecting mercury transport, methylation, and bioaccumulation in a reservoir experiencing severe water-level fluctuations: Camp Far West Reservoir, California, 2001-03. Journal Article (target journal: *Canadian Journal of Fisheries and Aquatic Sciences*). (Status: Expect USGS approval and submission to journal during 2007.)
- d. Stewart, A.R., Alpers, C.N., Saiki, M.K., Marvin DiPasquale, M., Kuwabara, J.S., and Krabbenhoft, D.P. Mercury cycling in the planktonic food web of a Sierra Nevada reservoir, California, U.S.A. Journal article (target journal: *Canadian Journal of Fisheries and Aquatic Sciences*). (Status: Expect submission for USGS colleague review during 2007.)

- e. Saiki, M.K., Stewart, A.R., and Alpers, C.N. Mercury concentrations in selected fish and fish-forage organisms in Camp Far West Reservoir, California, U.S.A. Journal article (target journal: *Canadian Journal of Fisheries and Aquatic Sciences*. (Status: Expect USGS approval and submission to journal during 2007.)
- f. Marvin-DiPasquale, M., Agee, J.L., Kieu, L.N., Stewart, A.R., Kuwabara, J.S., Krabbenhoft, D.P., and Alpers, C.N., Mercury Cycling in Sediments and Water of Camp Far West Reservoir, Bear River, California. Journal article (target journal: *Canadian Journal of Fisheries and Aquatic Sciences*. (Status: Expect USGS approval and submission to journal during 2007.)
- g. Alpers, C.N., Stewart, A.R., Marvin-DiPasquale, M., Kuwabara, J.S., Saiki, M.K., Hothem, R.L., and May, J.T., Mercury Methylation and Bioaccumulation in a Sierra Nevada Watershed Affected by Historical Gold Mining: the Bear River Watershed, California. U.S. Geological Survey Fact Sheet. (Status: Draft version by June 2007, publication by late 2007).

4) Completed Abstracts:

- a. Alpers, C.N., Stewart, A.R., Marvin-DiPasquale, M., Kuwabara, J.S., and Saiki, M.K., 2006, Seasonality of methylmercury production and bioaccumulation in a reservoir with severe water-level fluctuations: Camp Far West Reservoir, California, Mercury 2006 – 8th International Conference on Mercury as a Global Pollutant, August 6-11, 2006, Madison, WI.

Summary of USGS publications and presentations for the Upper Yuba River Studies Program — updated April 9, 2007

- A. Sediment Studies — Reports
- B. Water Quality — Reports
- C. General Reports
- D. Sediment Studies — Presentations and Abstracts
- E. Water Quality — Presentations and Abstracts

(Underlined sequence number (e.g. “S1”) indicates that electronic copy is included on CD.)

A. Sediment Studies — Reports

- S1. Childs, J.R., Snyder, N.P., Hampton, M.A., 2003, Bathymetric and geophysical surveys of Englebright Lake, Yuba-Nevada Counties, California, U.S. Geological Survey Open-File Report 03-383, 20 p. <http://geopubs.wr.usgs.gov/open-file/of03-383/>
- S2. Snyder, N.P., and Hampton, M.A., 2003, Preliminary cross section of Englebright Lake sediments, U.S. Geological Survey Open-File Report 03-397, 1 plate. <http://geopubs.wr.usgs.gov/open-file/of03-397/>
- S3. Snyder, N.P., Alpers, C.N., Flint, L.E., Curtis, J.A., Hampton, M.A., Haskell, B.J., and Nielson, D.L., 2004a, Report on the May-June 2002 Englebright Lake deep coring campaign: U.S. Geological Survey Open-File Report 2004-1061, 32 p. plus 10 plates. <http://pubs.usgs.gov/of/2004/1061/>
- S4. Snyder, N.P., Allen, J.R., Dare, C., Hampton, M.A., Schneider, G., Wooley, R.J., Alpers, C.N., and Marvin-DiPasquale, M.C., 2004b, Sediment grain-size and loss-on-ignition analyses from 2002 Englebright Lake coring and sampling campaigns: U.S. Geological Survey Open-File Report 2004-1080, 46 p. <http://pubs.usgs.gov/of/2004/1080/>
- S5. Snyder, N.P., Rubin, D.M., Alpers, C.N., Childs, J.R., Curtis, J.A., Flint, L.E., and Wright, S.A., 2004c, Estimating rates and properties of sediment accumulation behind a dam: Englebright Lake, Yuba River, northern California, Water Resources Research, v. 40, W11301, doi:10.1029/2004WR003279 http://www2.bc.edu/~snyderno/snyder_etal_2004.pdf
- S6. Curtis, J.A., Flint, L.E., Alpers, C.N., and Yarnell, S., 2005, Conceptual model of sediment processes in the upper Yuba River watershed, Sierra Nevada, CA: Geomorphology, v. 68, p. 149-166. doi:10.1016/j.geomorph.2004.11.019
- S7. Curtis, J.A., Flint, L.E., Alpers, C.N., Wright, S.A., and Snyder N.P., 2006, Sediment transport in the Upper Yuba River Watershed, California, 2001–03, U.S. Geological Survey Scientific Investigations Report 2005-5246, 74 p. <http://pubs.usgs.gov/sir/2005/5246/>

- S8. Snyder, N.P., Wright, S.A., Alpers, C.N., Flint, L.E., Holmes, C.W., and Rubin, D.M., 2006, Reconstructing depositional processes and history from reservoir stratigraphy: Englebright Lake, Yuba River, northern California, Journal of Geophysical Research, v. 111, F04003, doi:10.1029/2005JF000451.
<http://www.agu.org/journals/jf/jf0604/2005JF000451/>
http://www2.bc.edu/~snyderno/snyder_etal_2006.pdf
- S9. Childs, J.R., and Stevenson, A.J., 2006, Swath bathymetric survey of Englebright Lake, Yuba-Nevada Counties, California: U.S. Geological Survey Open-File Report 2006-1346, 11 p. <http://pubs.usgs.gov/of/2006/1346/>
- S10. Flint, L.E., Guay, J.R., Curtis, J.A., and Flint A.L., in prep., A distributed-parameter watershed and sediment transport model of the upper Yuba River watershed in the northern Sierra Nevada, journal article for Water Resources Research (Status: in prep, USGS approval and submission to journal expected during 2007).
- S11. Rockwell, G.L, Smithson, J.R., Friebel, M.F., and Webster, M.D., 2002, Water Resources Data, California, Water Year 2001, Volume 4. Northern Central Valley Basins and the Great Basin from Honey Lake Basin to Oregon State Line: U.S. Geological Survey Water-Data Report CA-01-4, 458 p. <http://water.usgs.gov/pubs/wdr/WDR-CA-01-4/>
- S12. Smithson, J.R., Friebel, M.F., Webster, M.D., and Rockwell, G.L., 2003, Water Resources Data, California, Water Year 2002, Volume 4, Northern Central Valley Basins and the Great Basin from Honey Lake Basin to Oregon State Line: U.S. Geological Survey, Water-Data Report CA-02-4, 470 p. <http://water.usgs.gov/pubs/wdr/WDR-CA-02-4/>
- S13. Friebel, M.F., Webster, M.D., Rockwell, G.L, and Smithson, J.R., 2004, Water Resources Data, California, Water Year 2003, Volume 4. Northern Central Valley Basins and the Great Basin from Honey Lake Basin to Oregon State Line: U.S. Geological Survey Water-Data Report CA-03-4, 520 p. <http://pubs.water.usgs.gov/wdr-ca-03-4/>
- S14. Webster, M.D., Rockwell, G.L., Friebel, M.F., and Brockner, S.J., 2005, Water Resources Data, California, Water Year 2004, Volume 4. Northern Central Valley Basins and the Great Basin from Honey Lake Basin to Oregon State Line, U.S. Geological Survey Water-Data Report CA-04-4, 455 p. <http://pubs.usgs.gov/wdr/2004/wdr-ca-04-4/>

B. Water Quality — Reports

- W1. Alpers, C.N., Hunerlach, M.P., Marvin-DiPasquale, M.C., Antweiler, R.C., Lasorsa, B.K., De Wild, J.F., and Snyder, N.P., 2006, Geochemical Data for Mercury, Methylmercury, and Other Constituents in Sediments from Englebright Lake, California, 2002: U.S. Geological Survey Data Series 151, 95 p. (ONLINE ONLY)
<http://pubs.water.usgs.gov/ds151/>

- W2. Alpers, C.N., Antweiler, R.A., Snyder, N.P., Curtis, J.A., and Hunerlach, M.P., in preparation, Mercury transport and deposition in a watershed affected by historical gold mining: the upper Yuba River, California. Journal article for Water Resources Research. (Status: Submitted for USGS colleague review in May 2006. USGS approval and submission to journal expected during 2007.)
- W3. Antweiler, R.C., Alpers, C.N., and others, in preparation, Geochemical data for water samples from the Yuba River Watershed, California, 2001-04. U.S. Geological Survey Data Series Report. (Status: In preparation. USGS approval and publication expected during 2007.)
- W4. Slotton, D.G., Ayers, S.M., and Alpers, C.N., in preparation, Mercury concentrations in fishes and zooplankton from Englebright Lake, Yuba River Watershed, California, 2002. U.S. Geological Survey Data Series Report. (Status: Draft report in review by co-authors. USGS approval and publication expected during 2007.)
- W5. Slotton, D.G., Ayers, S.M., Alpers, C.N., and Goldman, C.R., in preparation, Bioaccumulation legacy of Gold Rush mercury in watersheds of the Sierra Nevada of California, journal article to be submitted to one of the following journals: Canadian Journal of Fisheries and Aquatic Sciences, Science of the Total Environment, or Environmental Research (Status: Analyses complete, data compiled, report in preparation; USGS approval and submission to journal expected during 2007).

C. General Reports

- G1. Alpers, C.N., Hunerlach, M.P., May, J.T., and Hothem, R.L., 2005, Mercury contamination from historical gold mining in California, U.S. Geological Survey Fact Sheet 2005-3014, 6 p. <http://water.usgs.gov/pubs/fs/2005/3014/>

D. Sediment Studies — Presentations and Abstracts

- SA1. Snyder, N.P., Rubin, D.M., Alpers, C.N., Flint, L.E., Curtis, J.A., Childs, J.R., and Haskell, B.J., 2002, A record of rapid fluvial sedimentation in the Sierra Nevada hydraulic-mining region: Preliminary results from the 2002 Englebright Lake coring project. Geological Society of America, Abstracts with Programs, Paper 78-2. (talk)
http://gsa.confex.com/gsa/2002AM/finalprogram/abstract_42930.htm
- SA2. Curtis, J.A., Flint, L.E., and Yarnell, S., 2003, Conceptual model of sediment processes in the upper Yuba River watershed, Sierra Nevada, CA. CALFED Science Conference 2003, Sacramento, Calif., January 14-16, 2003. (poster)
- SA3. Flint, L.E., Curtis, J.A., Wilkins, B.C., Yarnell, S.M., and Larsen, E.W., 2003, Watershed characterization for sediment transport studies in the Upper Yuba River watershed, CALFED Science Conference 2003, Sacramento, Calif., January 14-16, 2003. (talk)

- SA4. Snyder, N.P., Rubin, D.M., Alpers, C.N., Flint, L.E., Curtis, J.A., Childs, J.R., and Haskell, B.J., 2003, A record of rapid fluvial sedimentation in the Sierra Nevada hydraulic-mining region: Preliminary results from the 2002 Englebright Lake coring project. CALFED Science Conference 2003, Sacramento, Calif. (talk)
- SA5. Flint, L.E., Curtis, J.A., and Flint, A.L., 2003, Development of a hillslope erosion potential index for sediment transport in the Yuba River basin, Annual Meeting Expanded Abstracts, Geological Society of America, Seattle, Wash., November 2-5, 2003. (talk) http://gsa.confex.com/gsa/2003AM/finalprogram/abstract_67330.htm
- SA6. Snyder, N.P., Childs, J.R., Hampton, M.A., Rubin, D.M., Alpers, C.N., Flint, L.E., Curtis, J.A., Wright, S.A., and Topping, D.J., 2003, The history and future of sediment deposition behind Englebright Dam, Yuba River, northern California, Annual Meeting Expanded Abstracts, Geological Society of America, Seattle, Wash., November 2-5, 2003. (talk) http://gsa.confex.com/gsa/2003AM/finalprogram/abstract_60291.htm
- SA7. Curtis, J.A., Flint, L.E., and Alpers, C.N., 2004, Sediment transport in the upper Yuba River watershed, 2001–03. Third Biennial CALFED Bay-Delta Program Science Conference Abstracts, October 4-6, 2004, Sacramento, Calif., p. 48. (talk)
- SA8. Flint, L.A., Guay, J.R., Flint, A.L., Curtis, J.A., and Alpers, C.N., 2004, Spatially distributed model of flow and sediment transport in the upper Yuba River watershed. Third Biennial CALFED Bay-Delta Program Science Conference Abstracts, October 4-6, 2004, Sacramento, Calif., p. 78. (talk)
- SA9. Snyder, N.P., Alpers, C.N., Childs, J.R., Curtis, J.A., Flint, L.E., Holmes, C.W., Rubin, D.M., and Wright, S.A., 2004, Rates and history of sediment accumulation behind Englebright Dam. Third Biennial CALFED Bay-Delta Program Science Conference Abstracts, October 4-6, 2004, Sacramento, Calif., p. 202. (talk)
- SA10. Snyder, N.P., Alpers, C.N., Childs, J.R., Curtis, J.A., Flint, L.E., Holmes, C.W., Rubin, D.M., and Wright, S.A., 2004, Reconstructing watershed history from reservoir stratigraphy: Englebright Lake, Yuba River, northern California. EOS, Transactions American Geophysical Union, v. 85, no. 47, Fall Meeting Supplement (invited talk).
- SA11. Flint, L.E., Guay, J.R., Flint, A.L., Curtis, J.A., and C.N. Alpers, 2005, Influence of climate on flow and sediment transport in the upper Yuba River basin, American River Science Conference, Sacramento, Calif., April 21-22, 2005. (talk)
- SA12. Curtis, J.A., Flint, L.E., Alpers, C.N., and Wright, S.A., 2006, Evaluating sediment processes, and transport processes in the Upper Yuba River Watershed, California, Joint Federal Interagency Conference (8th Federal Interagency Sedimentation Conference & 3rd Federal Interagency Hydrologic Modeling Conference), Reno, Nev., April 2-6, 2006. (talk)
- SA13. Flint, L.E., Guay, J.R., Flint, A.L., and Curtis, J.A., 2006, Effects of climate on flow and sediment transport in the Upper Yuba River Basin, northern Sierra Nevada. Joint Federal Interagency Conference (8th Federal Interagency Sedimentation Conference & 3rd Federal Interagency Hydrologic Modeling Conference), Reno, Nev., April 2-6, 2006. (talk)

- SA14. Flint, A.L., and Flint, L.E., 2006, Development of upper boundary conditions for a watershed model in the Upper Yuba River Basin, Northern Sierra Nevada. Joint Federal Interagency Conference (8th Federal Interagency Sedimentation Conference & 3rd Federal Interagency Hydrologic Modeling Conference), Reno, Nev., April 2-6, 2006. (talk)
- SA15. Wright, S.A., and Snyder, N.P., 2006, Reconstructing reservoir stratigraphy from hydrologic history and simple transport calculations: Englebright Lake, Yuba River, northern California, Joint Federal Interagency Conference (8th Federal Interagency Sedimentation Conference & 3rd Federal Interagency Hydrologic Modeling Conference), Reno, Nev., April 2-6, 2006. (talk)
- SA16. Snyder, N.P., 2006, Exploiting anthropogenic “natural” experiments to measure river erosion rates and processes, Annual Meeting Expanded Abstracts, Geological Society of America, Seattle, Wash., October 22-25, 2006. (talk)
http://gsa.confex.com/gsa/2006AM/finalprogram/abstract_112896.htm

E. Water Quality — Presentations and Abstracts

- WA1. Alpers, C.N., Hunerlach, M.P., Taylor, H.E., Marvin-DiPasquale, M.P., Kuwabara, J.S., and Krabbenhoft, D.P., 2003, Preliminary results of mercury and methylmercury transport studies in the Bear River and Yuba River watersheds, 1999–2002. CALFED Science Conference 2003, Sacramento, Calif., January 14-16, 2003 (talk)
- WA2. Alpers, C.N., Hunerlach, M.P., Marvin-DiPasquale, M.C., May, J.T., Hothem, R.L., Saiki, M.K., Stewart, A.R., Kuwabara, J.S., Taylor, H.E., and Krabbenhoft, D.P., 2004, Mercury cycling and bioaccumulation in fish in northern Sierra Nevada watersheds contaminated by historical gold mining, American Fisheries Society California-Nevada and Humboldt Chapters Symposium and 38th Annual Meeting, Redding, Calif., April 22–24, 2004, Program, unnumbered pages. (invited talk)
- WA3. Alpers, C.N., Hunerlach, M.P., Marvin-DiPasquale, M., Snyder, N.P., and Krabbenhoft, D.P., 2004, Mercury and methylmercury in the upper Yuba River watershed: Fluvial transport and reservoir sedimentation. Third Biennial CALFED Bay-Delta Program Science Conference Abstracts, October 4-6, 2004, Sacramento, Calif., p. 4. (talk)
- WA4. Slotton, D.G., Ayers, S.M., Alpers, C.N., and Goldman, C.R., 2004, Bioaccumulation legacy of Gold Rush mercury in watersheds of the Sierra Nevada of California. Third Biennial CALFED Bay-Delta Program Science Conference Abstracts, October 4-6, 2004, Sacramento, Calif., p. 388. (poster)
- WA5. Alpers, C.N., Hunerlach, M.P., Marvin-DiPasquale, M., May, J.T., Hothem, R.L., Saiki, M.K., Stewart, A.R., Kuwabara, J.S., Taylor, H.E., and Krabbenhoft, D.P., 2005, Mercury contamination, methylation, and bioaccumulation associated with historical gold mining, Sierra Nevada, California Geological Association of Canada / Mineralogical Association of Canada (GAC/MAC), Halifax, Nova Scotia, Canada, May 2005. (invited talk; keynote address, presented by J .Rytuba)

WA6. Hunerlach, M.P., Alpers, C.N., and Marvin-DiPasquale, M., 2005, Mercury and methylmercury distribution in sediments affected by historical gold mining, Sierra Nevada, California, 15th Annual Goldschmidt Meeting (The Geochemical Society), Moscow, Idaho, May 20-25, 2005. (invited talk, not given because of travel problems) abstract published in Geochimica et Cosmochimica Acta, v. 69, No. 10, Supplement 1, p. A707.