

Stormwater Runoff Water Quality Newsletter
Devoted to Urban/Rural Stormwater Runoff
Water Quality Management Issues

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This issue of the Newsletter examines stormwater runoff from the UCD/DOE LEHR Superfund site as a source of mercury that accumulates to excessive levels in fish of Putah Creek. It also presents additional information regarding arsenic from former gold mines in the Sierra Nevada mountains as a cause of water quality impairment. In addition, stormwater-related information presented in a recent issue of the US EPA *Non Point Source News*, and information on non-point sources of pollutants and their control from other sources are summarized. Included is additional information on the Gulf of Mexico hypoxia. This Newsletter also provides information on USGS Studies on National Emerging Contaminants Data.

Putah Creek Mercury Water Quality Issues

Putah Creek originates in the California Coast Range Vaca Hills and flows to the east, past Davis, CA, and on to the Yolo Bypass which is a tributary of the Sacramento San Joaquin Delta. It serves as an important natural resource, and is used for sport fishing. The use of fish from the Creek downstream of the LEHR Superfund site as a food resource led to concern about their potential contamination by chemicals in stormwater runoff from the LEHR site. The finding of excessive levels of Hg in fish from that area led to Lee and Jones-Lee's more encompassing review of the pollution of Putah Creek by mercury including the contributions of Hg to the Creek from the abandoned mercury mine area at the headwaters of the Creek. Prior to the damming of Putah Creek in the late 1950s to form Lake Berryessa, the Creek waters routinely flooded over the creek banks during high-flow periods and deposited particulate mercury derived from the upstream abandoned mercury mines on the near-creek lands. While the dam now retains much of the particulate Hg contributed to the Creek from the abandoned mines, the contaminated bank soils continue to serve a source of mercury in stormwater runoff to the Creek.

On December 2, 2008 Drs. G. Fred Lee and Anne Jones-Lee presented a review of these issues to the Delta Mercury Tributaries Council in Davis, California. The PowerPoint slides for that presentation are available as

Lee, G. F., and Jones-Lee, A., "Runoff of Mercury from UCD/DOE LEHR Superfund Site –Putah Creek Mercury Issues" Presentation to the Delta Tributaries Mercury Council PowerPoint slides, December 2, (2008)
<http://www.gfredlee.com/SJR-Delta/PutahHgMinesli.pdf>

A summary of issues covered in the PowerPoint slides is available at,

Lee, G. F., and Jones-Lee, A., "Summary Putah Creek Mercury Water Quality Issues" Report of G. Fred Lee & Associates December 2, (2008).
<http://www.gfredlee.com/SJR-Delta/PutahHgMinesli.pdf>

The Lee and Jones-Lee review illustrated inconsistencies in regulating mercury contributions to surface water from runoff depending on source (e.g., stormwater runoff from a Superfund site, urban areas, and agricultural areas) and demonstrated problems in current regulatory programs in the Central Valley of California for adequately addressing serious water quality problems. Putah Creek is listed as a Clean Water Act Section 303(d) “impaired” waterbody due to excessive mercury in edible fish that threatens the health of those who eat some of the Putah Creek fish. This situation has resulted in the requirement that the University of California Davis/Department of Energy (UCD/DOE) LEHR Superfund site control mercury in stormwater runoff from the site so that the Hg concentration in the runoff does not exceed the water quality/CTR (California Toxics Rule) standard/objective of 50 ng/L. This requirement is in contrast to contributions of Hg from nearby areas. For example, while studies have shown that surface soils on UCD property near the LEHR site contains elevated mercury levels and that stormwater runoff from those areas contains Hg concentrations ten times the CTR criterion, UCD is not required to monitor stormwater runoff from those areas under its Phase II stormwater NPDES permit. In another case, some agricultural lands adjacent to Putah Creek use Creek water as a source of irrigation water; particulate mercury associated with those Creek waters is deposited on the agricultural lands during periods of high Putah Creek flow. However, the agricultural interests are not required to monitor for mercury in their tail-water discharges or stormwater runoff to the Creek or Yolo Bypass. These inconsistencies will need to be addressed in the TMDL that the Central Valley Regional Water Quality Control Board requires be developed by 2015.

The Lee and Jones-Lee Summary of the PowerPoint slides includes information on

- Current mercury levels in Putah Creek fish
- OEHHA consumption guidance for Putah Creek fish
- Historical and present sources of mercury that is bioaccumulating to excessive concentrations in edible fish in Putah Creek
- Changes in the potential for abandoned mercury mines upstream of Lake Berryessa to pollute Putah Creek, Yolo Bypass, and nearby lands with mercury
- Current concentrations of mercury in soil near Putah Creek
- Information on the UCD/DOE LEHR Superfund site characteristics including mercury concentrations in stormwater runoff from the site
- Current and potential future regulation of discharges of mercury from urban and agricultural lands
- References to sources of additional information on these issues
- Recent photographs of Putah Creek during low-flow and high-flow conditions

Additional information on Lee and Jones-Lee’s work on water quality issues of mercury, and other topics is available on their website at www.gfredlee.com in the Surface Water Quality section, and on the DSCSOC website at <http://www.gfredlee.com/DSCSOC/DSCSOC.htm> in the LEHR documents section.

Background Information on the Lava Cap Superfund Site

Associated with a presentation by Dr. Carrie Monohan of Sierra Fund at the Delta Mercury Tributaries Council meeting on December 2, 2008 questions were raised about pollution of the environment by gold mines in the Sierra Nevada mountains. One of the issues of concern was the potential for arsenic in tailings from abandoned mines to cause water pollution. The following information is offered toward addressing those issues.

For three years in the early 2000s, Dr. G. Fred Lee served as the US EPA-supported Technical Assistance Grant (TAG) technical advisor to the public on the Lava Cap Mine Superfund site near Nevada City, CA. That site, a former gold mine in the Sierra Nevada mountains, has been a depository for large amounts of arsenic-contaminated tailings that are a threat to nearby water supplies and contribute to contamination of area soils. Reports on those investigations are available at <http://www.gfredlee.com/phazchem2.htm#lava>. A summary of the public health issues associated with arsenic at that site is available as

Lee, G. F. and Jones-Lee, A., "Occurrence of Public Health and Environmental Hazards and Potential Remediation of Arsenic-Containing Soils, Sediments, Surface Water and Groundwater at the Lava Cap Mine NPL Superfund Site in Nevada County, California," In: Chappell, et al., Editors, Arsenic Exposure and Health Effects V, Elsevier B.V., Amsterdam, The Netherlands, pp. 79-91 (2003).

http://www.gfredlee.com/HazChemSites/arsenic_07-2002.pdf.

Further information on this situation is available from gfredlee@aol.com.

US EPA "U.S. EPA Workshop on Managing Arsenic Risks to the Environment: Characterization of Waste, Chemistry, and Treatment and Disposal - Proceedings and Summary Report," National Risk Management Research Laboratory Office of Research and Development U.S. Environmental Protection Agency EPA/625/R-03/010 October 2003 Denver, Colorado, May 1–3, (2001) <http://www.epa.gov/nrmrl/pubs/625r03010/625r03010.pdf>

EPA's Nonpoint Source News-Notes, Issue #85 (November 2008)

Issue no. 85 is now online at www.epa.gov/newsnotes. The cover page includes hyperlinks to each section, article, and announcement listed below.

****Notes on the National Scene ****

- (1) NEMO Nation Grows: Network Helps Link Land Use and Water Quality
- (2) Natural Resource Agencies Turn to the Web to Share Messages
- (3) Revised Gulf Hypoxia Plan Emphasizes Adaptive Management Approach

**** Notes from the States, Tribes, and Localities**

- (4) Uncovering a Creek in Indiana
- (5) North Carolina Mud Meter Informs Local Citizens

****Agricultural Notes**

- (6) BMP CHALLENGE Program Expands
- (7) Rolling Machines Can Reduce Agricultural Nonpoint Source Pollution

**** Reviews and Announcements****

**** Recent and Relevant Periodical Articles**

**** Web Sites Worth a Bookmark**

**** Calendar ****

Following are paraphrase and excerpts from selected topics covered in Issue no. 85. (For the full text of articles, see www.epa.gov/newsnotes.)

(3) Revised Gulf Hypoxia Plan Emphasizes Adaptive Management Approach

More than 30 years after the passage of the Clean Water Act, a large area of low-oxygen or hypoxic water absent of most marine life, continues to form in the Gulf of Mexico off the coasts

of Louisiana and Texas during the summer. Coordinated efforts to address the hypoxia problem have been going strong for a decade, thanks to the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force (Task Force) and its partners throughout the Mississippi/Atchafalaya River Basin. The Task Force recently released its 2008 Action Plan—which outlines an updated national strategy to reduce the size of the hypoxic zone.

Additional information on the current plan for controlling the nutrient discharges to the Mississippi River and its tributaries is available in a October 7, 2008 webcast available as <http://www.epa.gov/owow/watershed/wacademy/webcasts/archives.html#20081007>. Also, past issues of this “**Stormwater Runoff Water Quality Newsletter**” (Vol.9 no.1/2, Vol.9 no.10, Vol.10 no.1) provide more information on the Gulf of Mexico hypoxia. Those Newsletters are available at <http://www.gfredlee.com/newsindex.htm>.

The National Research Council has released a report entitled, “**Nutrient Control Actions for Improving Water Quality in the Mississippi River Basin and Northern Gulf of Mexico**”

“For more than two decades, a large area of oxygen-depleted water -- often referred to as a "dead zone" - has appeared each year in the Gulf of Mexico. The dead zone is the result of algal growth fueled by excess nutrients, especially nitrogen and phosphorus, which flow into the Gulf from the Mississippi and Atchafalaya rivers from various sources -- including agriculture, municipal water treatment works, industries, and urban runoff. At the request of the U.S. Environmental Protection Agency (EPA), the National Research Council convened a committee to examine this problem and help EPA better meet nutrient and sediment reduction objectives. The committee's report identifies means for allocating reductions of nutrient discharges into streams and lakes. It also recommends that EPA and the U.S. Department of Agriculture jointly establish a Mississippi River Basin Nutrient Control Implementation Initiative, and a Mississippi River Basin Water Quality Center, to learn more about the effectiveness of various efforts to improve water quality.”

This report can be reviewed online at, http://www.nap.edu/catalog.php?record_id=12544

(6) BMP CHALLENGE Program Expands

“What if I lose money?” This is a common concern voiced by corn farmers when they are asked to implement new best management practices. Thanks to a project called the BMP CHALLENGE, many of these farmers no longer have to worry—they can use a side-by side approach in their own fields to test how crop yields are affected when they apply new BMPs compared to their usual farming methods. The BMP CHALLENGE provides a net income guarantee which acts as an economic safety net, removing the risk of economic loss as the farmer experiments and becomes familiar with the BMP...

(7) Rolling Machines Can Reduce Agricultural Nonpoint Source Pollution

Farmers could soon be on a roll when it comes to preparing their fields for planting. That’s thanks to rolling machines—developed by U.S. Department of Agriculture’s Agricultural Research Service (ARS) scientists in Auburn, Alabama—that can quickly flatten mature, high-biomass cover crops such as rye. The ARS research shows that the new machines save money, reduce soil erosion and runoff, help control weeds, conserve water in the soil, and decrease—or eliminate—the need for herbicides...

(8) Balancing Tires and the Environment

Tire companies, big box stores and the government are putting the brakes on the use of lead wheel weights. Through EPA's National Lead-Free Wheel Weight Initiative, partners have agreed to phase in the use of lead-free alternative wheel weights and reduce the amount of lead released into the environment by 2011...

(10) Climate Change Strategy Will Help Manage Water Resources

Preparing for the potential effects of climate change, EPA released a new strategy focusing on 40 specific actions for the national water program to take to respond to climate change. EPA's "National Water Program Strategy: Response to Climate Change" describes steps for managers to adapt their clean water, drinking water and ocean protection programs....

(11) Compliance Monitoring Strategy Released

EPA's Office of Enforcement and Compliance Assurance has issued its "Clean Water Act National Pollutant Discharge Elimination System Compliance Monitoring Strategy for the Core Program and Wet Weather Sources." This new strategy, which takes effect in 2009, outlines inspection and compliance goals for the entire National Pollutant Discharge Elimination System program...

(12) Document Explores Economic Measures of Soil Conservation Benefits

The U.S. Department of Agriculture's Economic Research Service released a report describing data and methodologies used to apply monetary values to changes in soil erosion. The document—"Economic Measures of Soil Conservation Benefits: Regional Values for Policy Assessment"—clearly describes values and methodology so that analysts can apply the data to specific soil conservation projects....

(17) National List of Beaches Available

EPA recently posted the 2008 National List of Beaches, which provides a picture of the extent of beach monitoring in U.S. coastal and Great Lake waters....

(19) New Stormwater Management Tools Released

The Center for Watershed Protection (CWP) recently released "Managing Stormwater in Your Community: A Guide for Building an Effective Post-Construction Program," a resource that provides practical tips and features a series of tools that can be downloaded and modified by local programs to help implement stormwater management programs. CWP also developed three other new documents, including "Municipal Pollution Prevention/Good Housekeeping Practices (Manual 9)," "Monitoring to Demonstrate Environmental Results: Guidance to Develop Local Stormwater Monitoring Studies Using Six Example Study Designs" and "Deriving Reliable Pollutant Removal Rates for Municipal Street Sweeping and Storm Drain Cleanout Programs in the Chesapeake Bay Basin."...

(20) Rain Garden Design Templates

Available The Low Impact Development Center offers a series of rain garden, or bioretention, design templates that can be used by landscape architects, landscape contractors and garden clubs across the nation...

(21) Resource Highlights National Environmental Trends

EPA recently released the “2008 Report on the Environment: Highlights of National Trends,” which summarizes highlights of the more comprehensive EPA’s “2008 Report on the Environment,” which was released in May....

(22) TMDL Document Highlights Mercury from Air Deposition:

EPA recently released a document called “TMDLs Where Mercury Loadings are Predominantly from Air Deposition” to help states, EPA regional staff and other stakeholders identify approaches to develop mercury total maximum daily loads....

(24) Watershed Webcast Resources Grow

EPA’s Watershed Academy periodically offers free Webcast seminars. Streaming audio versions of archived seminars are available for viewing at www.epa.gov/watershedwebcasts. Recent Webcasts addressed topics such as wetlands and climate change, measuring watershed program effectiveness, addressing gulf hypoxia, among others...

(30) Surface Water Flow Measurements for Water Quality Monitoring Projects

(see Nonpoint Source News for information on this issue

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** WEB SITES WORTH A BOOKMARK
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(31) Climate Ready Estuaries (www.epa.gov/cre)

(32) Long Island Sound Riparian Toolbox (www.hydroqual.com/projects/riparian)

(33) National Environmental Services Center (www.nesc.wvu.edu)

(34) Volunteers and Invasive Plants—Learning and Lending a Hand
(www.fws.gov/invasives/volunteersTrainingModule)

(35) Water Quality Information Center (www.nal.usda.gov/wqic)

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** CALENDAR (Upcoming Events) **
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An online calendar is accessible at www.epa.gov/owow/info/NewsNotes/calendar.htm.

Nonpoint Source News-Notes is available in either electronic form (www.epa.gov/newsnotes) or paper copy. To receive notification when a new issue is posted on the Web, join the NPS News-Notes notification electronic mailing list. Send an e-mail message to lyris@lists.epa.gov. Include the following message in the subject line or the body of the message: “subscribe news-notes [your name]”

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Nonpoint Source (NPS) – Encyclopedia

The California State Water Resources Control Board has announced an update of the Nonpoint Source (NPS) – Encyclopedia. According to that announcement,

“The NPS Encyclopedia is a free on-line reference guide designed to facilitate a basic understanding of nonpoint source (NPS) pollution control and to provide quick access to essential information from a variety of sources by providing direct hyperlinks to resources available on the World Wide Web (www.).” Additional information on this resource is available at http://www.waterboards.ca.gov/water_issues/programs/nps/encyclopedia.shtml

USGS Studies Offer National Emerging Contaminants Data

(Adopted from CASQA Water Quality NEWSFLASH)

RESTON, VA - The US Geological Survey (USGS) has published online data from two of its national-scale reconnaissance studies on the environmental occurrence of organic wastewater contaminants, such as pharmaceuticals, personal care products and other emerging contaminants, in groundwater and untreated sources of drinking water in the United States. According to the USGS, water samples were collected from a network of 47 groundwater sites across 18 states in 2000 for the groundwater study. The sample wells, which typically were not used for drinking water, were analyzed for 65 chemicals. The most frequently detected chemicals include N,N-diethyltoluamide (insect repellent), bisphenol A (BPA, a plastic- and epoxy-manufacturing ingredient), tri(2-chloroethyl) phosphate (fire retardant), sulfamethoxazole (veterinary and human antibiotic), and 4-octylphenol monoethoxylate (detergent metabolite). The concentrations of chemicals detected were low, the USGS said. In the 2001 source water study, a network of 25 groundwater and 49 surface water sources of public drinking water supply in 25 states and Puerto Rico were sampled and analyzed for 124 emerging contaminants. This study looked at water sources for populations ranging from one family to more than 8 million people, according to the USGS. All samples in the source water study were collected at surface-water intakes or wellheads prior to water treatment. At least one emerging contaminant - including some naturally occurring compounds such as plant and animal steroids - was detected in about 96 percent of the samples, the USGS reported. The most frequently detected chemicals in surface water were cotinine (nicotine metabolite) and 1,7-dimethylxanthine (caffeine metabolite); and in groundwater were carbamazepine (pharmaceutical), BPA, 1,7-dimethylxanthine and the fire retardant tri(2-chloroethyl) phosphate.

According to the USGS, the two reconnaissance studies are considered the first to collect baseline information on the environmental occurrence of pharmaceuticals, personal care products, detergents, flame retardants, naturally occurring sterols and other organic contaminants in US groundwater and untreated sources of drinking water. Although the Associated Press (AP) released in March its investigative report on pharmaceuticals in drinking water sources, the USGS' Michael J. Focazio told WaterTech Online(tm) on October 28 that the USGS data was not yet available to the public when the AP report was released. "They were aware of our pending study results and they were also informed that it would be published soon. Unfortunately, they put together a story without our data and therefore missed an important opportunity," he said, noting that the USGS projects require rigorous quality assurance/ quality control (QA/QC).

According to Focazio, who was the lead researcher on the sources of drinking water study and paper, the USGS emerging contaminant project is ongoing, and has many facets and studies associated with it. However, this is the first time data from the sources of drinking water study have been released. Focazio also helped coordinate the USGS Toxic Substances Hydrology

Program under which the emerging contaminant project is supported. "The contaminants we detected represent a wide range of medicines, personal care products, and other compounds excreted or disposed of by typical homeowners in our daily lives," said Focazio. Although not part of the study, some of these compounds are likely found in food and food ingredients, such as preservatives and chemicals used in food packaging as well as feed additives and medicines given to livestock. "These results highlight the fact that products used and choices made by homeowners and consumers living in our watersheds are impacting the quality of our own drinking water," said Focazio.

Although there is an increasing number of stewardship programs designed to handle disposal of unused pharmaceuticals, the programs do not address the "potentially larger source of pharmaceuticals to the environment caused by excretion from our bodies and into our wastewaters," added Focazio, who noted the connections between consumers and drinking water quality.

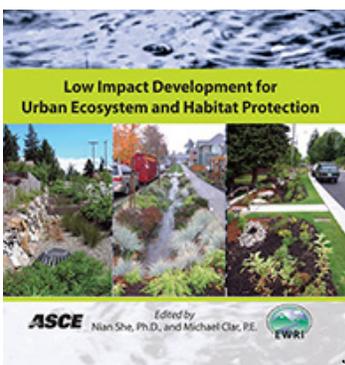
According to the USGS Web site, data from these surveys will help scientists, regulators, water-resource managers and health professionals to determine if the concentrations and mixtures of chemicals measured in the sampled waters pose a threat to human or environmental health, and will help with the development of mitigating strategies where needed. These studies follow a previous baseline survey of US streams for emerging contaminants.

A summary of these studies is available at <http://www.wwn-online.com/articles/69069/> and http://toxics.usgs.gov/highlights/gswsw_ec.html.

Past issues of this **Stormwater Runoff Water Quality Newsletter** (Vol.7 no.3, Vol.8 no.5, Vol.9 no.3, Vol.10 no.7, and Vol.11 no.7/8) provide additional information on unrecognized pollutants.

Publication of Interest on Low Impact Development:

The American Society of Civil Engineers (ASCE) has published the Proceedings of the 2008 International Low Impact Development (LID) Conference, focusing attention on Low Impact Development for Urban Ecosystem and Habitat Protection.



“The 2008 International Low Impact Development (LID) Conference expanded ongoing regional and national dialogue to a global scale. The proceedings report on new and continuing research, developments, and community adoption of LID throughout the United States and other parts of the world. These papers address a very broad range of topics that are relevant to sustainable approach to stormwater management using the Low impact Development technology. Topics include: LID and sustainability; codes, regulations, constraints, guidelines; recent monitoring/performance findings; computational methods; advances in LID BMP design methods - lessons learned; site design considerations; LID incentives for new development; watershed retrofit with LID; education, training outreach; and long-term performance, maintenance.”

Published by American Society of Civil Engineers. 2009, ASCE, CD-ROM, ISBN 978-0-7844-1009-7, Stock #41009, List \$90, ASCE Member \$67.50 Ordering information is available at <http://www.asce.org/bookstore/book.cfm?book=9103>