USGS Activities Related to Environmental Health Science

- Emerging Avian Influenza Viruses Highlight the Importance of Wild Bird Surveillance
- USGS Response to Hurricane Sandy
- New Hampshire Groundwater Used for Drinking Water Contains Arsenic: What’s the Risk?
- Coal-Tar-Based Pavement Sealers Are Associated With Increased Cancer Risk
- Natural Attenuation Accelerating Pump-and-Treat Cleanup of TCE in Fractured Rock
- Groundwater Restoration Slowed by Organic Materials on Sediments
- USGS Links Lead Poisoning From Artisanal Gold Mining in Nigeria to Bioavailable Mineral
- Assessing Acid Mine Drainage Mitigation Strategies
- Aquatic Organisms Absorb Metals From Ingested Mineral Particles
- Potential Migration of Radionuclides from Active Uranium Mill
- Improving Uranium Cleanup Methods
- Soil in Ukraine Contaminated with Mercury and Arsenic

What’s In This Issue

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(More information and contacts for each article can be found on the online version – http://health.usgs.gov/geohealth/v10_n01.html)

Upcoming Meetings

New Publications

USGS scientist takes a blood sample from a blue-winged teal (Anas discors) on the Anahuac National Wildlife Refuge in Texas as part of a study on migratory birds and the pathogens they may carry between continents. The USGS is conducting studies to determine the types of pathogens potentially being introduced by migratory birds into North America from Asia, South America, and Europe. Photo credit: U.S. Fish and Wildlife Service.

Recent studies by USGS scientists are helping provide some understanding of the movement and genetic mixing of avian influenza (AI) viruses in birds in Asia and North America. The studies listed here conclude that AI viruses from Asia likely change their genetic makeup either as they move in their avian hosts from Asia to North America.
Antibodies to Avian Influenza Viruses among Wild Waterfowl in Alaska — Scientists from the USGS and the U.S. Fish and Wildlife Service showed that 60 percent of the 4,485 wild waterfowl from 11 species they studied over 14 years in Alaska had antibodies from infection with an AI virus. Once infected, a bird usually sheds AI virus for only a few days, making it difficult to isolate the virus. However antibodies developed in response to viral infection can be found in the blood from months to years after infection providing a history of exposure. Not all waterfowl species are equally susceptible to AI viruses so species with high levels of AI virus antibodies and those with high AI viral infection rates are likely species to target for LPAIV and HPAIV surveillance programs.

This study was funded by the USGS Wildlife: Terrestrial and Endangered Resources Program, the U.S. Fish and Wildlife Service, and the National Institutes of Health.

Annual Patterns of Movement Influence Exposure of Wild Birds to Influenza Viruses — USGS scientists reported 47 to 96 percent of geese in late summer on the Yukon-Kuskokwim Delta of western Alaska had detectable antibodies to AI viruses, indicating previous infection with the virus. Over 95 percent of emperor geese (Chen canagica) sampled had detectable AI virus antibodies, compared to 40 to 60 percent in other species of geese in the study. Emperor geese spend winters in the Aleutian Islands of Alaska, moving to western Alaska for breeding and Russia for molting in late summer. Why emperor geese exhibit higher exposure to AI viruses is unknown. However, the restricted distribution of emperor geese when compared to other species in the Bering Sea region may contribute to their higher exposure to AI.

This study was funded by the USGS Wildlife: Terrestrial and Endangered Resources Program, the U.S. Fish and Wildlife Service, and the National Institutes of Health.

Transmission of Avian Influenza Viruses Among Alaskan Dabbling Ducks — Scientists from the USGS and the Institute of Arctic Biology at the University of Alaska Fairbanks used the genetics of LPAIV in dabbling ducks to examine how frequently genetically similar AI viruses are found across different timeframes and geographical distances in Alaska. Many AI virus genes can be identified as either Asian or North American because of their unique characteristics. The results suggest that highly similar AI viruses are more often found in birds that are in the same place at the same time; within days of each other and across short geographic distances (kilometers). Highly similar AI viruses were less frequently observed across larger distances (hundreds of kilometers) and longer time periods (years).

These results provide an initial perspective into how frequently avian influenza viruses change over time and space and support the observation that no completely Eurasian viruses have ever been detected in Alaska. Such information is useful in forecasting the movement of avian influenza viruses from Asia and other continents into North America.

This study was funded by the USGS Wildlife: Terrestrial and Endangered Resources Program and the U.S. Fish and Wildlife Service.

Avian Influenza Viruses Differ among Migrating and Resident Mallards (Anas platyrhynchos) in Northern California Wetlands — Mallards contribute differently to avian influenza virus gene pools depending on their migration strategy according to USGS scientists and their collaborators from Massachusetts Institute of Technology, University of California, Davis, Environment Canada, and University of Minnesota. Looking at stable isotopes in the flight feathers of wintering populations of mallards in northern California wetlands, scientists identified those birds that had migrated and those that hadn’t (residents). They then looked closely at the AI viruses isolated from these two groups. Migrants introduced viruses with genes from northern breeding grounds (Alaska and the northwest Pacific rim) into the wintering population, facilitating gene flow of viruses at continental scales. However, circulation of imported viruses in the wintering population of mallards appeared to be limited. Mallards that stayed in the wetlands year-round facilitated persistent circulation of a limited number of AI virus subtypes. Characterizing the more genetically stable AI viruses in the resident mallards and the contribution of novel viruses from afar, offers scientists an AI model of “virus exchange in temperate regions driven by the convergence of wild populations with separate geographic origins and exposure histories.”

This study was funded by the USGS Wildlife: Terrestrial and Endangered Resources Program, the National Institutes of Health’s National Institute of Allergy and Infectious Diseases (NIAID), and the U.S. Fish and Wildlife Service.
USGS Response to Hurricane Sandy

In late October 2012, Hurricane Sandy came ashore during a spring high tide on the New Jersey coastline, delivering hurricane-force winds, storm tides exceeding 19 feet, driving rain, and plummeting temperatures. Hurricane Sandy resulted in 72 direct fatalities in the mid-Atlantic and northeastern United States, and widespread and substantial physical, environmental, ecological, social, and economic impacts estimated at near $50 billion. Before the landfall of Hurricane Sandy, the USGS provided forecasts of potential coastal change; collected oblique aerial photography of pre-storm coastal morphology; deployed storm-surge sensors, rapid-deployment streamgages, wave sensors, and barometric pressure sensors; conducted Light Detection and Ranging (LIDAR) aerial topographic surveys of coastal areas; and issued a landslide alert for landslide prone areas. During the storm, Tidal Telemetry Networks provided real-time water-level information along the coast. Long-term network and rapid-deployment real-time streamgages and water-quality monitors reported on river levels and changes in water quality. Immediately after the storm, the USGS serviced real-time instrumentation, retrieved data from over 140 storm-surge sensors, and collected other essential environmental data, including more than 830 high-water marks mapping the extent and elevation of the storm surge. Post-storm lidar surveys documented storm impacts to coastal barriers, informing response and recovery and providing a new baseline to assess vulnerability of the reconfigured coast. The USGS Hazard Data Distribution System served storm-related information from many agencies on the Internet on a daily basis.

Immediately following Hurricane Sandy, the USGS developed a science plan to coordinate continuing USGS activities with other agencies and to guide continued data collection and analysis to ensure support for recovery and restoration efforts. The plan is titled “Meeting the Science Needs of the Nation in the Wake of Hurricane Sandy—A U.S. Geological Survey Science Plan for Support of Restoration and Recovery”. Data, information, and tools produced by implementing this plan will: (1) further characterize impacts and changes, (2) guide mitigation and restoration of impacted communities and ecosystems, (3) inform a redevelopment strategy aimed at developing resilient coastal communities and ecosystems, (4) improve preparedness and responsiveness to the next hurricane or similar coastal disaster, and (5) enable improved hazard assessment, response, and recovery for future storms along the hurricane prone shoreline of the United States.

The activities outlined in this plan are organized in five themes.

1. Coastal topography and bathymetry.
2. Impacts to coastal beaches and barriers.
3. Impacts of storm surge and estuarine and bay hydrology.
4. Impacts on environmental quality and persisting contaminant exposures.
5. Impacts to coastal ecosystems, habitats, and fish and wildlife.

A major emphasis for implementation of the plan is interacting with stakeholders to better understand their specific data and information needs; this understanding will help define the best way to make information available and also support the application of USGS science and expertise to decisionmaking.

New Hampshire Groundwater Used for Drinking Water Contains Arsenic: What’s the Risk?

USGS scientists have developed a new approach for helping people understand the risk of exposure to arsenic, a common drinking-water contaminant in New Hampshire. The approach consists of a set of models that predict the probability of arsenic occurring in the groundwater within bedrock aquifers at concentrations of 1, 5, and 10 micrograms per liter (µg/L). The U.S Environmental Protection Agency has set the standard for arsenic in public drinking water to 10 µg/L—known as the Maximum Contaminant Level (MCL)—to protect people served by public-water systems from the effects of long-term exposure to arsenic. The new models were developed for the New Hampshire Environmental Public Health Tracking Program, a Centers for Disease Control and Prevention (CDC) funded program designed to help connect the dots between environmental hazards and health outcomes. The models are available to the public, public health scientists, and others. The models can help identify parts of the State at risk for high levels of arsenic in drinking water, and support
Coal-Tar-Based Pavement Sealers Are Associated With Increased Cancer Risk

Coal-tar-based sealcoat—a product marketed to protect and beautify asphalt pavement—is a potent source of polycyclic aromatic hydrocarbons (PAHs) to air, soils, streams and lakes, and homes. PAHs are a group of hundreds of organic chemicals, many of which are probable carcinogens. A new study by Baylor University and USGS scientists indicates that living adjacent to coal-tar-sealed pavement is associated with an increase in estimated excess lifetime cancer risk, much of which occurs during early childhood.

Coal-tar-based sealant is the black liquid sprayed or painted on many parking lots, driveways, and playgrounds, and is used primarily in the central, southern, and eastern United States. Coal-tar sealcoat typically is 20 to 35 percent coal-tar pitch, a known human carcinogen that contains about 200 different PAHs. Friction from vehicle tires grinds pavement sealcoat into small particles, which are transported by wind, rain, and snowplows to nearby soil, and some are tracked into homes where they become part of household dust.

Incidental ingestion of soil and house dust is an exposure pathway to many chemicals, especially for children. Using data collected by USGS scientists a Baylor University scientist estimated that the lifetime dose of carcinogetic PAHs for someone living adjacent to coal-tar-sealcoated pavement was 38 times greater than for someone living adjacent to unsealed asphalt pavement, and half of that dose...
occurs during childhood (0 to 6 years of age). For the average person who lives adjacent to coal-tar-sealed pavement for a lifetime, the excess cancer risk is estimated to be greater than 1 in 10,000, a level which the U.S. Environmental Protection Agency considers to be a risk factor sufficiently large that remediation is desirable.

This project was funded by the University of Baylor and the USGS National Water-Quality Assessment Program.

**Natural Attenuation Accelerating Pump-and-Treat Cleanup of TCE in Fractured Rock**

USGS scientists find that the natural attenuation of trichloroethylene (TCE) in a contaminated fractured rock aquifer in New Jersey significantly adds to the effectiveness of site cleanup operations. An active pump-and-treat cleanup system is presently removing about 630 kilograms of TCE per year (kg/yr) at the site. Naturally occurring biodegradation processes remove an additional 500 kg/yr. Natural TCE biodegradation is a welcome addition to overall cleanup operations at this site because it does not incur the economic costs of a pump-and-treat system, and will accelerate cleanup.

A team of USGS scientists working at the Naval Air Warfare Center (NAWC) Research Site in West Trenton, New Jersey, estimated TCE biodegradation rates by combining 20-years worth of data on the concentrations of two degradation products of TCE and chloride from observation wells with estimates of rock porosities and groundwater residence times. The methodology that the scientists used to estimate the natural attenuation of TCE in fractured rock is now available to be applied at other fractured bedrock sites. Fractured bedrock is widely regarded by environmental professionals as being particularly difficult to clean up because residual pure TCE can be distributed in fractures and TCE diffuses from the fractures into the surrounding rock. Once the TCE is in the surrounding rock it only diffuses back out very slowly. Therefore, this new methodology has the potential to help assess the role of natural attenuation at fractured bedrock contamination sites.

The USGS Toxic Substances Hydrology Program and the U.S. Navy provided funding for this study.

**Groundwater Restoration Slowed by Organic Materials on Sediments**

The amount of organic material stored on an aquifer’s sediments can slow down natural processes that are often relied on to restore groundwater quality in a wastewater-contaminated aquifer. A team of USGS scientists found that analysis of sediment cores is an important part of developing reliable predictions for how long groundwater restoration will take. This observation resulted from a long-term study of a wastewater plume on Cape Cod, Massachusetts that is taking much longer to return to cleaner conditions than the scientists initially predicted. The ability to predict how long restoration will take is often the basis for decisions about whether or not to rely on monitored natural attenuation to remediate contaminated sites.

The scientists conducted long-term detailed sampling of groundwater and sediment from the wastewater plume. In the 15 years since wastewater disposal was stopped, the dissolved oxygen concentration has not returned to pristine levels near the disposal site, even though conservative chemicals in the wastewater such as chloride and boron have been flushed from the area. The scientists estimate that the return of dissolved oxygen to the aquifer, even near the disposal site, could take decades depending on the amount of biodegradable organic compounds that remain stored on the sediments from past disposal.

The USGS Toxic Substances Hydrology and Hydrologic Research and Development Programs funded this study.

**USGS Links Lead Poisoning From Artisanal Gold Mining in Nigeria to Bioavailable Mineral**

USGS scientists are helping the Centers for Disease Control and Prevention (CDC), Agency for Toxic Substances and Disease Registry (ATSDR), and TerraGraphics Environmental Engineering, Inc. understand sources and exposure pathways for an unusual outbreak of childhood lead poisoning linked to artisanal gold mining in northern Nigeria. By the summer 2010 the outbreak had killed hundreds of young children and affected thousands more. At the request of the CDC, the USGS analyzed samples of raw and processed ore, contaminated soils, dust and loose soils from eating areas in family compounds, and grain foodstuffs from local markets.
Assessing Acid Mine Drainage Mitigation Strategies

Field-based approaches developed by a team of USGS scientists have been used to evaluate strategies for the mitigation of acid mine drainage. The approaches were used to estimate post-cleanup water quality in two streams impacted by abandoned mines in Colorado and to identify the major sources of contamination in another Colorado stream. The approaches include prescribed field studies that are analyzed and interpreted using computer simulation models.

- In Mineral Creek, USGS scientists used a computer model to accurately predict water quality in the stream after cleanup. A comparison of model predictions and water-quality data before and after cleanup showed that the model accurately predicted attainment (or non-attainment) of water-quality standards in most of the scenarios tested.

- In Cement Creek, best management practices were evaluated for their ability to meet regulatory standards known as Total Maximum Daily Loads (TMDLs). The contributions to stream-water quality from groundwater sources and the effects of chemical transformations within the stream were found to decrease the effectiveness of the planned best management practices.

- In Peru Creek, the scientists applied a new approach for identifying the major sources of contamination to a mining-impacted stream. The approach includes determining the uncertainty in estimated contaminant loads associated with (1) natural variation in concentration of contaminants caused by daily cycles, (2) variability in laboratory analyses of constituent and tracer concentrations, and (3) variations introduced by field sampling. The measure of uncertainty is made possible by collecting replicate water-quality samples at key points along the stream. Consideration of uncertainty allowed cleanup managers to evaluate contaminant sources in light of potential errors, thereby lessening the potential for the misidentification of sources.

The USGS results indicate that other areas occur globally where artisanal mining of specific ore deposit types could enhance the potential for similar lead poisoning. Funding for the USGS component of the study was provided by the USGS Mineral Resources Program.

USGS analyses showed that:

- Lead was abundant in all samples in a form that is highly soluble in stomach acids.
- Soil and sweep samples had lead concentrations up to 18,500 parts per million (ppm) and plant foodstuff samples had up to 145 ppm lead.
- The same suite of lead minerals was found in all sample types.

These findings helped CDC determine that incidental ingestion of soils via hand-mouth transmission and inhalation of dusts are the dominant exposure pathways by which children develop acute lead poisoning. Consumption of contaminated water and foodstuffs are lesser but significant exposure pathways. Older children, pregnant women, and adult workers are also at substantial risk for lead poisoning.

In several villages of Zamfara State, Nigeria, gold ores are first crushed by hand, and then pulverized in grain grinders such as this one. Small-scale (artisanal) gold-ore processing activities are a potential and suspected source of lead poisoning among children in northern Nigeria. Photo credit: Carrie Dooyema (CDC) and Casey Bartrem (TerraGraphics).

Aquatic organisms, such as insect larva and snails, living on the bottom of streams can directly absorb copper in mineral particles that are in the food they eat. Scientists have known that some organisms absorb metals from their food. Now it seems that the mineral particles in stream water and sediment are a potentially important source of metals to sediment dwellers and the food web.

USGS scientists developed methods to investigate how the chemical properties of mineral particles consumed by aquatic organisms affect the absorption of metals. The new methods use isotopically enriched metals as tracers to measure metal absorption.

Aquatic Organisms Absorb Metals From Ingested Mineral Particles

At the confluence of Cement Creek (left) and the Animas River (right) in Colorado, aluminum and iron oxide particles are formed when the acid mine drainage from Cement Creek mixes with the near neutral water from the Animas River. Photo credit: Dan Cain, USGS

The influx of metal-rich groundwater from natural springs (foreground) to Cement Creek, Colorado (background) can complicate the selection of best management practices. Photo credit: Briant Kimball, USGS.

Funding for these studies was provided by the USGS Toxic Substances Hydrology Program, the Colorado Department of Public Health and Environment, and the U.S. Environmental Protection Agency. Cooperation with the Animas River Stakeholders Group, San Juan County, Colorado, and the San Juan Resource Conservation and Development Program helped make the studies possible.
during feeding experiments with freshwater organisms, such as the larva of mayflies (Serratella tibialis). The scientists developed a novel reverse labeling technique, which involves artificially enriching the test organisms with a rare isotope of the metal under study rather than adding the tracer to the natural mineral particles to be tested. Subsequent exposure to the element from the natural source particles shifts the isotopic ratio of the element in the test organism from the rare isotope to the natural isotope as the natural isotope is absorbed. The scientists can then measure the absorption of the metals from natural particles by measuring how much of the natural isotope replaces the rare isotope in the organism. This eliminates the need to alter the natural particles for the test.

This new technique will provide important information for regulators, resource managers, and scientists addressing contamination with metals in streams affected by acid mine drainage.

This study was funded by the USGS Toxic Substances Hydrology Program and Hydrologic Research and Development Program.

**Potential Migration of Radionuclides from Active Uranium Mill**

USGS scientists assessed the potential for offsite migration of radionuclides from an active uranium mill site near White Mesa, Utah. The mill site is currently the only conventional uranium mill operating in the United States. The scientists sampled groundwater, stream sediments, and plants to determine what the implications might be for offsite migration of contaminants from the mill site.

Uranium concentrations in sediment from three intermittent (ephemeral) streams east of the mill boundary exceeded natural background levels. Wind-blown dusts are a potential source of uranium contamination in two springs. Elevated concentrations of uranium and vanadium in sagebrush samples collected north-northeast, east, and south of the mill site also were suspected to be the result of wind-blown dust deposited on the plants and/or from dust transported to soil near the plants where it’s taken up by the plants.

Measuring uranium concentrations in various environmental media provided added insights into uranium sources and exposure pathways. Based on the results of their study, the scientists proposed potential monitoring strategies to stakeholders.

The USGS conducted the study at the request of the Ute Mountain Ute Tribe. Funding for the study was provided by the U.S. Environmental Protection Agency, Ute Mountain Ute Tribe, and USGS Cooperative Water Program.

**Improving Uranium Cleanup Methods**

Scientists studying the transformation of uranium in subsurface sediments at a site with uranium contamination have discovered multiple pathways for the chemical reactions that transform hexavalent uranium [U(VI)], which is soluble and mobile in groundwater, to more insoluble forms of tetravalent uranium [U(IV)]. The multiple reaction pathways can take place concurrently. Unfortunately, some forms of U(IV) are not as insoluble as others, and it is important for cleanup professionals to know which forms are present at contamination sites. This information could lead to improved cleanup methods that involve the transformation of soluble U(VI) to insoluble forms of U(IV), such as the mineral uraninite (UO2). The objective of such remediation is to stabilize uranium plumes or to immobilize uranium in place.

A team of scientists from the SLAC National Accelerator Laboratory; Lawrence Berkeley National Laboratory; U.S. Geological Survey (USGS); Ecole Polytechnique Fédérale de Lausanne, Switzerland; and Washington University in St. Louis, Missouri, showed that transformations of U(VI) to U(IV) in subsurface sediments can result in the formation of more than one form of U(IV)—at the same time and in the same location. The most desired from of U(IV) is the mineral uraninite, because it is insoluble and is less likely to move in groundwater, which makes it the preferred end point for groundwater cleanup. Other forms of U(IV) the scientists studied are more soluble than uraninite, and could conceivably be re-dissolved if the chemistry of the groundwater changes in the future, which could undo cleanup actions. The study findings also have direct implications not only for our understanding of uranium cleanup approaches (such as bioremediation systems) but for our understanding of the geology of uranium ore formation and our understanding of global geochemical processes.

This study was funded by the U.S. Department of Energy, USGS National Research Council Postdoctoral Fellowship Program, Swiss National Science Foundation, Marie Curie Grant Program, and National Institutes of Health.

**Soil in Ukraine Contaminated with Mercury and Arsenic**

USGS scientists, collaborating with U.S. and Ukrainian scientists, found high concentrations of mercury and arsenic in soils from the Donets Basin, a metal-rich coal-mining region in eastern Ukraine. Soils near mines and mining areas can become contaminated, and humans can be exposed to contaminants in a number of ways. For example, leaching of contaminants into groundwater used for drinking water, uptake contaminants by crop plants, and unintentional ingestion of contaminated soils. The scientists collected soils from industrial areas as well as playgrounds and public spaces. Analysis confirmed that more than 90 percent of the soils collected from Ukrainian residential areas exceeded the U.S. Environmental Protection Agency soil screening level for arsenic. Leaching studies predicted that the arsenic in the soil had potentially more potential to be absorbed or ingested by humans than mercury.
Mercury Levels in Tree Swallows and Loons Controlled by Lake pH

Tree swallows accumulate higher concentrations of mercury in their blood when they live on lakes with low pH than on lakes with more neutral-pH water. A team of USGS, Wisconsin Department of Natural Resources, and U.S. Environmental Protection Agency scientists came to this conclusion after studying tree swallows (Tachycineta bicolor) on eleven northern Wisconsin lakes with differing pH levels. The study was designed to assess the effects of lake pH on the accumulation of mercury and other trace elements in tree swallows and common loons (Gavia immer). Predictions of mercury exposure to wildlife based on water-quality and other nonbiological data are difficult because of complicated chemical and biological processes affecting how mercury is absorbed and processed by wildlife.

The scientists also gathered data on mercury exposure in loons and used the data to determine whether mercury exposure in swallows could be used to predict loon mercury exposure. Predictions, rather than direct sampling of loons, may be desirable because loons may not nest on all lakes where data are needed or they may be difficult to sample.

Although mercury exposure was approximately 15 times higher in loon eggs than in swallow eggs, there was a reasonably good association between the two species. Sampling the blood of tree swallows in addition to loons may enhance the assessment of the relative risk of mercury exposure to common loons, allowing wildlife scientists to cover a greater area with less cost. Mercury continues to be a contaminant of concern because source control remains difficult.

The USGS Contaminant Biology Program, Wisconsin Department of Natural Resources, and the U.S. Environmental Protection Agency provided funding for this study.

Is it Safe to Swim Today? New Models for Small Lakes Help Provide Answers

For more than a decade, predictive models have been used by public-health agencies for water-quality assessments of coastal recreational waters (such as swimming beaches on Lake Erie), but the effectiveness of the models has not been studied in inland waters. These new models address small inland lakes for the first time.

USGS scientists have developed predictive models that provide daily estimates of recreational water quality for swimming beaches on small lakes in Ohio. Traditionally, swim advisories or closings are issued by beach managers based on counts of indicator bacteria in water samples. This method takes at least 18 to 24 hours to complete and recreational water-quality may change during this time, leading to errors in assessments of public-health risk. The new predictive models use easily measured environmental and water-quality variables to estimate bacterial-indicator concentrations or the probability of exceeding target concentrations.

To develop the models, USGS scientists collected data from eight lakes during the recreational seasons of 2010 and 2011. They then constructed computer models for 13 swimming beaches. Some of the variables included in models at inland lake beach sites were rainfall, wind direction and speed, turbidity (a measure of the clarity of the water), and water temperature.

Predictive models at lakes with high swimmer densities provided better estimates of public health risk than the bacterial count methods currently used. Model results were not effective at some beaches because different climatic conditions occurred during the model development (very moist and moderate drought). Additional years of data collection during seasons with a variety of weather conditions may remedy this. These models will be a valuable resource for beach managers and the public.

The Ohio Water Development Authority, USGS Cooperative Water Program, and the U.S. Environmental Protection Agency through its Office of Research and Development provided support for this study.
The Muskingum Watershed Conservancy District, Clark County Combined Health District, Ohio Department of Natural Resources, and City of Celina Water Plant provided services that helped advance the study.

**Restoring Historic Wetlands May Take Years**

Despite being restored for over 5 years, the chemistry and biology of a historic wetland between the Upper Klamath and Agency Lakes in Oregon is still in transition. Scientists from the USGS and U.S. Bureau of Reclamation say the study area has not yet returned to the more natural state of a nearby wetland refuge.

The wetland had been drained and was used for agricultural production for seven decades. Explosive charges were used to remove large sections of multiple levees, which reconnected the former wetlands to the lakes and allowed water to flow into the wetlands again. One of the goals for the reconnection was to create additional habitat for wildlife, including two endangered fish species. Wildlife and water-resource managers were concerned about how long the recovery of the historic wetland would take.

Scientists monitored the water quality of the new wetland and also tracked the amount of nutrients (nitrate, ammonia, phosphorus) and metals (iron, manganese) moving in and out of the wetland sediments. They also monitored colonizing organisms, such as worms, leeches, and insect larvae that live on the bottom of the wetland. After 3 years, they found some things, such as dissolved organic matter and the community of organisms living on the bottom, had returned to levels and populations seen in much of Upper Klamath Lake. However, other essential elements, such as phosphorus, nitrogen, iron, and manganese, will take more time, perhaps even decades to return to a natural state.

The information provided by the scientists on the timescales and the interdependent processes involved in the restoration of the wetland will help resource managers develop appropriate management plans, as well as set appropriate expectations for the chemical, physical, and biological transitions associated with wetland restoration.

This study is being followed by an extended 5-year study of the entire Upper Klamath Lake to continue to look at how conditions on the bottom of the lake affect overall lake water quality. The USGS Toxic Substances Hydrology and Hydrologic Research and Development Programs and the U.S. Bureau of Reclamation funded this study.

**Complex Mixture of Contaminants in Streams Found Miles from the Source**

Natural processes such as dilution, chemical transformations, and microbial degradation are known to reduce concentrations of some contaminants from streams to below levels that can cause harm to aquatic organisms. USGS scientists, however, have shown that some chemicals discharged from municipal wastewater treatment facilities persist for miles downstream at levels known, or suspected, to cause adverse health effects in aquatic organisms—including endocrine disruption in fish. The scientists also found that these persistent chemicals occur in complex mixtures. The effect of these complex mixtures on the health of aquatic animals is unknown.

The scientists tracked water on two streams (Boulder Creek, Colorado, and Fourmile Creek, Iowa) as it flowed downstream from the point of wastewater discharge. The scientists then collected water samples from the same water as it moved downstream for analysis of a wide range of organic chemicals common in wastewater. Many of the chemicals showed little decrease in concentration downstream, other than that caused by dilution, as they flowed down the 6- to 8-mile segments of the two streams studied. Significantly, some of these contaminants persisted at concentrations that are known, or suspected, to cause sublethal health effects in exposed organisms.

Chemicals, such as steroidal hormones that mimic estrogen and could have additive effects were found in the chemical mixtures. The estrogen mimics and other chemicals could have multiple health effects that are additive.

The USGS Toxic Substances Hydrology and Hydrologic Research and Development Programs funded this study. Additional support was received by the U.S. Environmental Protection Agency.

**Contaminants Impact Wildlife and Fish in the Chesapeake Bay**

Legacy contaminants (chemicals no longer approved for use) and contaminants of emerging concern that persist in the environment are affecting the health of wildlife and fish in the Chesapeake Bay and its watershed. Many State agencies in the Chesapeake Bay watershed continue to report impaired water resources due to the persistence and toxicity of some previously banned pollutants. In addition, other contaminants of emerging concern are released to the environment at levels known, or suspected, to harm the health of fish and wildlife. These findings are documented in a recent report on toxic contaminants in the Chesapeake Bay and its watershed.
Evidence of Little-Studied Class of Steroid Hormones in U.S. Streams

The National Cancer Institute (NCI), Laboratory of Receptor Biology and Gene Expression in collaboration with the USGS, looked for evidence of glucocorticoid and androgenic activity in streams. Glucocorticoids and androgens are both potential endocrine disruptors. Scientists tested water samples using a new cell-based bioassay that identified molecular responses triggered by the presence of glucocorticoids and androgens in natural stream water. They found glucocorticoid and androgen activity in 27 and 35 percent of the water samples, respectively, potentially indicating the widespread occurrence of these hormones in U.S. streams.

Glucocorticoids are steroid hormones commonly referred to as “stress hormones,” are known for their potential to decrease immune responses. Glucocorticoid-based pharmaceuticals (prednisone and hydrocortisone, for example) are widely prescribed to relieve inflammation. Androgens are anabolic steroids that affect the development and maintenance of male characteristics as well as other physiological functions. Depending on the timing of exposure, these glucocorticoids and androgens can have significant endocrine-disrupting effects, but unlike estrogenic chemicals, not much is known about their occurrence in the environment.

USGS scientists provided extracts for testing from more than 100 water samples from streams and rivers located in 14 States. The testing method the NCI researchers developed allowed them to detect the activation of cell receptors or genes that respond specifically to glucocorticoids or androgens. Activation of the fluorescently tagged cell receptors led visual evidence of the presence of glucocorticoids or androgens in the samples of stream water. Other molecular methods were used to confirm that specific genes were turned on.

Considering that both glucocorticoids and androgens influence body development and metabolism, and have the potential to influence normal reproductive, endocrine, and immune system function, their presence in the environment has potential implications for wildlife and human health.

Intersex Fish and Contaminant Mixtures Found at Smallmouth Bass Nests

Contaminants including hormones, pesticides, and pharmaceuticals have been detected at fish nesting sites in the Potomac River watershed where smallmouth bass (Micropterus dolomieu) were found with evidence of endocrine disruption, such as intersex (having both female and male characteristics). Although these contaminants
Fungicides Found in Streams and Groundwater in High-Use Agricultural Settings

USGS scientists have documented the occurrence of several previously unreported fungicides in water and sediment in streams located near farm fields. Fungicides are used to control the outbreak of persistent plant diseases, which are a concern across the Nation because they can significantly reduce crop yields. Although more than 3,600 pesticide products containing fungicides are currently registered with the U.S. Environmental Protection Agency, few studies have investigated the occurrence or potential effects of fungicides in the environment.

A recent USGS study has shown that many fungicides are transported from areas of intense use to nearby streams and groundwater. In many cases the fungicides are found at concentrations that may be a concern for environmental health. Currently, limited toxicological information is available on the effects of fungicides on beneficial fungi, which are important to stream ecosystems. USGS scientists tested water and sediment from three geographic areas (Presque Isle, Maine; Parma, Idaho; and Hancock, Wisconsin) where fungicides are used intensively. They found at least one fungicide in 75 percent of the surface waters sampled and in 58 percent of the groundwater wells sampled. They also found at least two fungicides in 55 percent of the bed sediment samples and in 83 percent of the suspended sediment samples that were collected.

The results of this study indicate the importance of including fungicides in pesticide-monitoring programs, particularly in areas where crops are grown that require frequent treatments to prevent fungal diseases. This study will provide additional information to regulators and water-resource managers about the occurrence of fungicides in the environment across the Nation.

The USGS Toxic Substances Hydrology Program provided the funding for this study.

EPA Award for Tracking Contaminant Exposure and Effects in Food Webs

USGS scientist David Walters and his U.S. Environmental Protection Agency (EPA) collaborators won a Level 1 Scientific and Technological Achievement Award (STAA)—the highest research award given out by EPA. Criteria for these annual awards include scientific or technological research of exceptionally high quality, of national significance, of high impact on a broad area of science/technology, and recognizable as a major scientific/technological achievement within its field of study.

Results of the study “Identifying Mechanisms of Contaminant Bioaccumulation and Developing Indicators of Ecosystem Recovery” were published in Environmental Science and Technology and in Ecological Applications. The scientists identified mechanisms of contaminant exposure in aquatic organisms and then explored how this exposure propagates into food webs via the emergence of adult insects from contaminated aquatic ecosystems. Insects emerging from aquatic habitats affect the distribution, abundance, production, and diversity of predators. Contaminants, aquatic insects, and their predators interact in two important ways:
Upcoming Meetings


MEDGEO 2013 is sponsored by the International Medical Geology Association (IMGA), Geology and Health Division of the Geological Society of America (GSA), American Geosciences Institute, and the USGS. The conference will feature a wide variety of topics related to the intersection of human health and the natural environment. Technical sessions at the conference include:

- **Keynote Session**
  - USGS Presentation
  - Arsenic and Other Toxic Oxyanions in the Environment
  - Biogeochemical Biomarkers of Human Health
  - Children’s Health and the Environment
  - Climate Change and Human Health

- **USGS Presentations**
  - The Influence of Climate Related Factors on Emerging and Reemerging Zoonotic and Vector-Borne Disease, by Morman, S.A. (USGS)
  - Environmental Exposure to Asbestos and Other Natural Fibers

- **USGS Presentations**
  - Energy Related Health Issues

- **USGS Presentations**
  - Surface Coal Mining in Southern Shaanxi Province, China: Mineralogy of Environmentally Hazardous Elements, by Belkin, H.E. (USGS), and Luo, K. (Chinese Academy of Sciences)
  - Characterization and Health Impact of Natural and Anthropogenic Dust

- **USGS Presentations**

- **ISPRS: Earth Observing Data and Tools for Health Studies**
  - Landsat—Monitoring Our Earth’s Condition for Over 40 Years, by Cecere, T. (USGS)
  - Legacy of Natural Disasters
  - Medical Geography
  - Mercury and Environmental Health: Paleo-historical, Legacy and Contemporary Effects and Challenges
  - Military Applications of Medical Geology
  - Occupational Health Issues
  - Radioactivity, Geology and Human Health

- **USGS Presentations**
  - Invited—Geochemistry as a Critical Factor in Defining Radionuclide Occurrence in Water from Principal Drinking-Water Aquifers of the United States, by Szabo, Z. (USGS)
  - Soils in Medical Geology
  - Therapeutic Uses of Minerals
  - Urban Medical Geology: Integrating Geologic and Anthropogenic Processes

- **USGS Presentations**
  - Environmental and Medical Geochemistry in Disaster Scenarios, by Plumlee, G.S. (USGS)
  - Veterinary Geology
  - Water and Human Health


143rd Annual Meeting of the American Fisheries Society, Little Rock, Arkansas, September 8-12, 2013

143rd Annual Meeting of the American Fisheries Society will feature information on the managing and understanding of fisheries of all
kinds. The meeting’s theme is “Preparing for the Challenges Ahead.” Scientists from the USGS will present information on aquatic organisms and aquatic habitats that can help natural resource managers and decision makers do their job. USGS environmental health science will also be featured at the meeting. The following are selected sessions where presentations on USGS environmental health science will be given.

- Session: Watersheds, Land Use, and Fish Habitat
  - Presentation: Effects of Land Use and Associated Factors on Biological Communities of Small Streams in the Illinois River Basin of Arkansas, by James Petersen (USGS), Billy Justus (USGS), Bradley Meredith (USGS)
- Session: Fish Health
  - Presentation: Biological Effects of Environmental Contaminants on Gene Expression Endpoints in Fishes of the Great Lakes, by Cassidy Hahn (West Virginia University), Luke R. Iwanowicz (USGS), Vicki Blazer (USGS), Patricia M. Mazik (USGS)
- Session: Nutrients, Aquatic Food Webs, and Fisheries Management - Part 1
  - Presentation: Potential Nutrient Subsidy Synergies Between Agriculture and Stocked Trout in New York Streams, by Alexander Alexiades (Cornell University), William L. Fisher (USGS)
- Session: Current Research on the Impacts of Unconventional Oil and Gas Extraction on Freshwaters
  - Presentation: Current and Needed Research on the Impacts of Unconventional Oil and Gas Extraction on Freshwater Ecosystems, by Sally Entrekin (University of Central Arkansas), Kelly Maloney (USGS)
  - Presentation: Assessing Shallow Groundwater Quality and Geochemistry in the Fayetteville Shale Gas Production Area, North-Central Arkansas, by Timothy Kresse (USGS), Phil Hays (USGS), Jayson Funkhouser (USGS)
  - Presentation: Understanding the Relationships Between Hydraulic Fracturing and Brook Trout Habitat in the Marcellus Shale Region, by Maya Weltman-Fahs (Cornell University), Jason Taylor (Cornell University), William L. Fisher (USGS)
  - Presentation: Energy Development, Habitat Quality, and Native Fish Communities in Southwestern Wyoming, by Annika Walters (USGS), Carlin Girard (University of Wyoming)

http://afs2013.com/

20th Annual Conference of The Wildlife Society, Milwaukee, Wisconsin, October 5-10, 2013

The Wildlife Society will be holding its annual conference in Milwaukee, Wisconsin, on October 5-10, 2013. The conference will feature information on wildlife conservation challenges. The following environmental health related symposia and workshops are part of the conference.

Symposia

- Impacts of Renewable Energy Development on Wildlife: Potential Impacts and Future Opportunities
- Effects of Wildland Fire and Fire Management on Amphibians and Reptiles
- Current Science of Chronic Wasting Disease: What Have We Learned in the Last 5 Years?
- Wildlife Disease Ecology and Management
- Impacts of Lead Ammunition and Fishing Tackle: Current Issues in the Midwest
- Application of Molecular and Genetic Techniques to Wildlife Epidemiology
- Effects of Wildland Fire and Fire Management on Herptiles

Workshops

- Bat White-Nose Syndrome: Pathology, Epidemiology, Diagnostics, and Management
- Pollutants and Wildlife Management: Ecotoxicology for Biologists and Land Managers
- Monitoring Wildlife Populations: New Slants on Use of Existing Technology (Basic Biology Using Modern Technology)

http://wildlifesociety.org/

8th Biennial State of Lake Michigan and 13th Annual Great Lakes Beach Association Conference, Sheboygan, Wisconsin, October 15-17, 2013

Resource managers, scientists, coastal planners, local officials, and interest groups will attend this joint conference to present research and to work together to improve and protect Great Lakes beaches and Lake Michigan. The conference will feature several sessions on environmental health science topics.

- Session 1 — Developing, implementing, and communicating the use of predictive and rapid tools at beaches
  This session will present information on rapid methods for estimating beach water quality and reporting it to the public. This session has a USGS co-convenor.
- Session 2 — Beach remediation and monitoring success stories
- Session 5 — Identifying sources and managing fecal contamination
- Session 7 — Contaminant trends and health advice in Lake Michigan fish
- Session 8 — Lake Michigan monitoring and coastal assessment programs
  Coordinating monitoring and assessment programs is integral to understanding the coastal/nearshore interface. This session will feature presentations that describe how monitoring and coastal assessment programs are being used to better understand coastal/nearshore processes. USGS scientists are convening this session.
- Session 13 — Nuisance algae and nutrient dynamics in the nearshore zone
- Session 14 — Green Bay hypoxia
- Session 15 — Lake Michigan basin TMDLs and phosphorus management

http://www.aqua.wisc.edu/solm/Home.aspx


The Geological Society of America (GSA) annual meeting features a broad array of special technical sessions, field trips, short courses, and special lectures. USGS scientists are presenting a wide variety of information on USGS science, including environmental health science. The meeting will feature several sessions on environmental health science topics. Selected examples follow:

- T34 — Advances in Unsaturated Zone Geophysics
  This session will focus on geophysical methods for quantitative estimation and imaging of unsaturated-zone hydrologic properties and processes. A USGS scientist is one of the session’s USGS co-conveners.
- T35 — Bottoms Up! Shallow Water Table Influences on Vadose Zone Biogeochemistry and Ecohydrology
  This session will present information on the influence of shallow water table conditions on hydrologic and biologic processes that control the unsaturated zone’s biogeochemistry, contaminant fate and transport, and ecological community

More information on USGS's booth (number 837) in the Colorado Convention Center's exhibit hall. Information will be available on USGS science activities.

During the GSA Annual Meeting please feel free to stop by the USGS’s booth (number 837) in the Colorado Convention Center's exhibit hall. Information will be available on USGS science activities.
structure and composition. The USGS Unsaturated Zone Interest Group (UZIG) is one of the session’s sponsors.

• T36 — Impacts of Land-Use Change and Disturbances on Unsaturated-Zone Ecohydrology
  Land-use change profoundly impacts unsaturated-zone biotic and hydrologic processes, such as subsurface moisture dynamics, infiltration and runoff, sedimentary erosion and deposition, biodiversity, and ecological function. This session will explore recent work in assessing these process changes and related effects. The USGS Unsaturated Zone Interest Group (UZIG) is one of the session’s sponsors.

• T37 — Recent Advances in the Theory, Characterization, and Modeling of Unsaturated Zone Processes
  This session focuses on advances in understanding unsaturated zone processes that control gas and water transport using field and laboratory measurements and theoretical and numerical models. The USGS Unsaturated Zone Interest Group (UZIG) is one of the sponsors of this session.

• T38 — Vadose Zone Flow and Transport in Natural or Engineered Systems Under Extreme Conditions
  This session presents information on theoretical or experimental studies, measurement techniques, simulations, and technologies involving flow and solute transport at low water content, in very coarse materials, low-permeability media, fractured systems, soil-gravel mixtures, and across the soil texture interfaces. The USGS Unsaturated Zone Interest Group (UZIG) is one of the sponsors of this session.

• T41 — Contaminant Migration through the Groundwater—Surface-Water Interface: Processes, Impacts, and Implications for Remediation

• T44 — Environmental Arsenic: The Nexus of Natural Occurrences and Human Health

• T55 — Secondary Water Quality Effects of Natural and Enhanced Attenuation of Contaminants
  Anaerobic conditions in contaminant plumes can create secondary plumes containing elements not present in the contaminant source. This session will present information on the hydrologic and biogeochemical processes that control development and persistence of such secondary plumes. This session has USGS co-conveners.

• T46 — Experimental Study and Numerical Simulation of Reactive Chemical Transport in Complex Subsurface Media

• T63 — Transport and Transformation of Non-Solute Materials in Karst Aquifers

• T77 — Environmental and Social Implications of Hydraulic-Fracturing–Driven Oil and Gas Development: Toward a More Holistic Assessment
  This session consists of presentations on the environmental and socioeconomic effects of hydraulic-fracturing–driven oil and gas development. This session has a USGS co-convenor.

• T78 — Environmental Impacts of Coal Utilization
  This session explores the environmental impacts associated with coal utilization. Relevant topics include fate of coal combustion byproducts, emissions from coal-fired power plants, and environmental and health impacts of coal mining. This session has a USGS co-convenor.

• T83 — Impact of Winter De-Icing Chemicals on Water Quality and the Environment

• T88 — Pyrogenic Black Carbon, or Biochar, in Soils and Sediments, Its Characterization and Fate, Its Effects on the Carbon Cycle and Carbon Sequestration, and Its Effects on Soil Properties
  This session addresses pyrogenic carbon in soils and sediments. The presence of this material can have profound effects on the nature of soil and an increasing role to play in carbon sequestration. This session is convened by USGS scientists.

• T95 — Recent Advances in Medical Geology

• T152 — Celebrating the Scientific Contributions of Kirk Nordstrom—Part 1: Acid to Neutral Mine Drainage, Geochemistry of Iron and Sulfur, Sulfate Minerals, Natural Background, and Geochemical Modeling
  This session honors the career achievements of Kirk Nordstrom, USGS hydrogeochemist, by exploring research on mine drainage and related studies including iron and sulfur geochemistry, sulfate minerals, natural background in mining environments, and geochemical modeling. USGS scientists are convening this session.

  This session honors the career achievements of Kirk Nordstrom, USGS hydrogeochemist, by exploring research on arsenic/antimony speciation and redox transformations, microbial biogeochemistry, geothermal systems, water-rock interactions, radioactive waste disposal, and geochemical modeling. USGS scientists are convening this session.

• T154 — Coupling Colloid-Water Interfacial Geochemical Processes with Contaminant Transport: Micro Vehicles for Big Problems

• T158 — Geochemistry of Flowback and Produced Waters from Hydraulically Fractured Black Shale

• T166 — Sources, Transport, Fate, and Toxicology of Trace Elements and Organics in the Environment

• T171 — Disposal of Radioactive Waste: Promise, Progress, Pitfalls, and Path Forward

http://community.geosociety.org/2013AnnualMeeting/Home

2013 APHA Annual Meeting and Exposition, Boston, Massachusetts, November 2-6, 2013

The American Public Health Association (APHA) annual meeting addresses current and emerging health science, policy, and practice issues with the goal to prevent disease and promote health. The theme of the meeting is Think Global Act Local—Best Practices Around the World.

http://www.apha.org/meetings/AnnualMeeting/

SETAC North America 34th Annual Meeting, Nashville, Tennessee, November 17-21, 2013

The Society of Environmental Toxicology and Chemistry (SETAC) Annual Meeting’s theme is Harmonizing Science Across Disciplines. The meeting covers environmental health related topics such as aquatic toxicology and ecology, ecological risk assessment, environmental or analytical chemistry, and terrestrial or wildlife toxicology and ecology. USGS scientists present their environmental health research at many of the meeting’s sessions. The following are some selected examples of sessions related to environmental health:

• Better Benthic Biomonitoring for Risk Assessments, Criteria Development, and Causal Analyses

• Contaminants of Emerging Concern for Fish: Assessing Exposure and Effects Across Biological Scales

• Ecological Consequences of Exposure to Pharmaceuticals: From the Laboratory to the Field

• Ecotoxicology of Fungicides

• Harmful Algal Bloom Toxins in Inland Waters: Environmental Contaminants of Emerging Concern

• Pyrethroid Pesticides in Aquatic Environments: Exposure, Effects, and Mitigations

• Wastewater Effluents: Chemical and Ecotoxicological Characterization

• What Do We Know About the Ecological Risk of Personal Care Product Ingredients?

• Occurrence, Fate, Transport, and Risks of Veterinary Pharmaceuticals in the Terrestrial Environment

• Contaminant Accumulation in Plants: Mechanisms, Models, and Potential Risk

• Endocrine Disrupting Chemicals and Pharmaceuticals in the Environment

• Mercury Characterization and Contaminated Site Remediation: Methods, Challenges, and Lessons Learned

http://nashville.setac.org/
AGU 46th Annual Fall Meeting, San Francisco, California, December 9-13, 2013

The American Geophysical Union’s (AGU) annual fall meeting will cover a wide range of environmental health science topics. The meeting will also feature several themed sessions, called SWIRLS, to promote interdisciplinary collaboration. This meeting’s SWIRLS are (1) Characterizing Uncertainty, (2) Dust and Aerosols, (3) Computational Methods across Scales: from Personal to High Performance Platforms, (4) Global Soils, and (5) Urban Systems. The following are a few of the many sessions that are related to environmental health—many of which are going to be convened by USGS scientists.

- A034 — From Air Pollution to Climate Changes in Asia
- A047 — Multi-sensor and Model Aerosol Data Synergy for Climate and Air Quality Applications
- A064 — The Nexus of Geophysical Processes and Exposure Science
- B033 — Land Use and Climate Change Impacts on Water-Related Ecosystem Services
- B042 — Mercury Pollution and Global Environmental Change
  The goal of this session is to highlight recent scientific advances in mercury cycling in relation to environmental change. The session will present information on a variety of topics including: mercury speciation, biogeochemistry, and bioaccumulation in terrestrial, freshwater, and marine ecosystems. This session has a USGS co-convenor.
- B043 — Microbial Adaptation and Gene Transfer in the Environment
- B054 — Phenology as Both Forcing and Response: Integrating Measurements and Models Across Terrestrial and Aquatic Ecosystems
- B057 — Quantifying Uncertainty in Biogeochemical Studies
  This session will present information on comparisons of different approaches to uncertainty analysis, and on the use on uncertainty analysis in interpreting results, detecting trends, or designing field studies. This session has a USGS co-convenor.
- B068 — The Bio-atmospheric N cycle: N Emissions, Transformations, Deposition, and Terrestrial and Aquatic Ecosystem Impacts
- GC018 — Glacier Change: Implications for Hydrology, Biogeochemistry, Ecology and Oceanography
- H015 — Chemical, Isotopic, and Chronologic Tracers to Understand the Fate and Transport of Nutrients in Watersheds
- H016 — Colloids, Engineered Nanoparticles, and Emerging Contaminants in the Environment
- H026 — From Catchment Hydrological Structure to Catchment Biogeochemical Response
- H035 — Hydro-Epidemiology: Understanding Connections Between Hydrology and Human Health
- H061 — Nonpoint Source Fluxes in the Vadose Zone and Groundwater
  The goal of this session is to improve the understanding of biogeochemical and anthropogenic factors affecting diffuse mass fluxes of nutrients, pesticides, emerging contaminants, trace elements, greenhouse gases, and other chemicals. The session will feature information on assessing governing processes and mass fluxes using field, laboratory, and modeling approaches; and on the linkages between chemical, biological, hydrological, and/or social factors that affect fluxes in the vadose zone. The session has USGS co-conveners.
- H082 — Taking the Riverine Pulse: Monitoring and Research Through the Lens of Continuous Water Quality Data
  This session will highlight studies that collect large continuous water-quality data sets. The goal of the session is to present new ways of interpreting these large data sets to reveal the dynamic nature of terrestrial and aquatic ecosystems. The session has USGS co-conveners.
- H095 — Water Contamination and Environmental Ecosystem in Rivers
- H096 — Water Resources and Water Quality under Changing Climate and Land Use
- NH010 — Hazardous Submarine Groundwater Discharge
- PA007 — Hydraulic Fracturing: Knowns, Unknowns, and Communication to the Public

https://fallmeeting.agu.org/2013/


The National Council for Science and the Environment (NCSE) will host the 14th annual National Conference on Science, Policy, and the Environment. The theme of the conference is “Building Climate Solutions.” The conference will be attended by professionals from the fields of natural and social sciences, humanities and engineering, government and policy, business and civil society. A plenary session will be held on Agriculture and Natural Resources: Food Security, Ecological Integrity, and Ecosystem Services on Land and in the Ocean. USGS environmental health science has been presented at past conferences.

http://www.buildingclimatesolutions.org/

EmCon 2014—4th International Conference on Occurrence, Fate, Effects, and Analysis of Emerging Contaminants in the Environment, Iowa City, Iowa, August 19-22, 2014

USGS scientists are helping organize the EmCon 2014 conference, which is planned to feature research on emerging contaminants such as pharmaceuticals, antibiotics, hormones, personal care products, nanoparticles, and their many degradation products in the environment. USGS scientists have presented information on environmental health science and emerging contaminants at past conferences.

Topical themes for the conference will include:

- Sources and Exposure Pathways
- Treatment Processes and Technologies
- Waste, Wastewater Recycling and Reuse
- Sampling, Analytical and Characterization Methods
- Fate and Transport in Aquatic and Terrestrial Ecosystems
- Aquatic and Terrestrial Effects
- Risk Assessment, Risk Management, Regulations and Policy Frameworks

http://www.emcon2014.com/

New Publications

Coming Soon!

  http://dx.doi.org/10.1016/j.marpolbul.2013.04.022


  http://dx.doi.org/10.1016/j.marpolbul.2013.04.023

  http://dx.doi.org/10.1016/j.aeolia.2012.12.001

http://health.usgs.gov/geohealth/v10_n01.html

August 23, 2013


U.S. Geological Survey

http://dx.doi.org/10.1128/aem.02995-12

http://dx.doi.org/10.1080/15593390.2011.556984

http://dx.doi.org/10.1111/j.1365-294X.2012.05735.x


http://dx.doi.org/10.1016/j.coal.2009.06.003

http://dx.doi.org/10.1016/j.scitotenv.2012.09.063


http://dx.doi.org/10.1002/etc.1914


http://dx.doi.org/10.1289/ehp.1206051


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Each article in the on-line version of the newsletter has links to additional information.

The GeoHealth Newsletter provides information on new USGS environmental health science activities related to safeguarding the health of the environment, fish and wildlife, domesticated animals, and people. The newsletter is issued twice a year.

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