SOCIETY OF
ENVIRONMENTAL TOXICOLOGY AND CHEMISTRY
HUDSON-DELAWARE CHAPTER

24th ANNUAL MEETING

at

South Orange, New Jersey

Meeting Themes

Emerging Contaminants

Assessment of Risks in Small Tidal and Non-Tidal Watersheds

May 8-9, 2008

Thursday May 8, 2008	
Time	**Presentations/Activities**
8:00-8:30 a.m.	*Registration /Breakfast/Poster Set-up*
	Assessment of Risks in Small Tidal and Non-Tidal Watersheds - Session I
8:30-9:00 a.m.	Assessing Contemporary Sediment Supplies from Headwater Basin Areas Sean Smith - Geologist Maryland Department of Natural Resources
9:00-9:30 a.m.	The Distribution, Residence Time, and Fate of Hg and Sediment in Fine-Grained Channel Margin (FGCM) Deposits Within a Steep, Gravel-Bed River Katie Skalak - PhD candidate University of Delaware
9:30-10:00 a.m.	Sediments in the Estuarine Environment: Uncertainty in Sources, Measurement, and Fate Jeff Halka - Acting Director Maryland Geological Survey
10:00-10:30 a.m.	*Break*
	Emerging Contaminants – Session II
10:30-11:00 a.m.	Emerging Contaminants: Identification, Concern and Action Roland Hemmett, Science Advisor, EPA-R2
11:00-11:30 a.m.	Reconnaissance Sampling for Emerging Contaminants in Pennsylvania Andrew Reif, Water-Quality Biologist USGS PA Water Science Center
11:30-12:00 noon	Fate and Effects of Endocrine Disrupting Agents in NY/NJ Harbor Estuary Anne McElroy, Associate Professor School of Marine and Atmospheric Sciences Stony Brook University
12:00-1:00 p.m.	*Lunch*
1:00-1:20 p.m.	Ecological Land Reuse at Contaminated Sites—Planning at the Landscape Scale Damian V. Preziosi, John Sullivan and Deborah Rudnick Integral Consulting Inc.
1:20 -1:40 p.m.	Evaluations of Biomagnification in Small Tidal Estuaries Judi L. Durda, Damian V. Preziosi, and Peter Jensen, Integral Consulting Inc.
1:40-2:10 p.m.	*Break*
2:10-2:30 p.m.	Restoration in the Hackensack Meadowlands and its Potential Effect on Aquatic Biota, Celine Santiago Bass, Great Eastern Ecology, Inc.
2:30-2:50 p.m.	Risk-Based Remedy Selection Considerations for a Non-Tidal Watershed Steve Finn, Golder Associates, Inc.
2:50-3:10 p.m.	Emerging Contaminants in the Tidal Delaware River: A Pilot Monitoring Survey, Ron MacGillivray, DRBC
3:10-3:30 p.m.	Defining the Biologically Active Zone in Sediments: A Review of Approaches and Current Data Timothy Iannuzzi, ARCADIS
4:00-6:00 p.m.	*Poster Social*
5:00-6:00 p.m.	*Volleyball Classic*
6:00-8:00 p.m. 8:00 p.m.	*Social and Dinner* Speaker: Paul Reale Presenting "An Inconvenient Truth"

RETURN OF THE VOLLEYBALL CLASSIC

Once you have absorbed all that you can, unwind at the end of the day on Thursday with friends and colleagues in a game of volleyball. The HDC Board of Directors have never been beaten in a game of volleyball, so if you want to organize a team to oppose us, the HDC Board will take on all comers.

Thursday Evening Dinner Speaker

Paul Reale presenting "An Inconvenient Truth"

Friday May 9, 2007	
Time	**Presentations/Short Course/Activities**
8:00-8:30 a.m.	*Registration/Breakfast/Poster Set-up*
	Short Courses
8:30-11:30 a.m.	Nanomaterials: Use, Risk, and Regulation John Schupner and Laurie Gneiding, AMEC
8:30-11:30 a.m.	A Fugacity-Based Model for the Fate and Transport of Emerging Contaminants Dr. Darrel Lauren, Environ Corp.
8:30-11:30 a.m.	Dammed Estuaries: Implications for Flow, Sediment Transport, and Risk Analysis Dr. Peter Brussock, ELM, Inc
8:30-11:30 a.m.	Environmental Ethics Dr. Judith Stark, Seton Hall University
11:30-12:30 p.m.	***Poster Session***
12:30-1:30 p.m.	*Lunch/Business Meeting/Student Awards*
	Short Courses/Field Trip
1:30– 4:30 p.m.	Field Study on Urban Streams (field course) Dr. Carolyn Bentivegna, Seton Hall University
1:30– 4:30 p.m.	Detection of Pharmaceuticals in Water (laboratory course) Dr. Nicholas Snow, Seton Hall University
4:30 p.m.	*Meeting Adjourn*

ASSESSING CONTEMPORARY SEDIMENT SUPPLIES FROM HEADWATER BASIN AREAS. **Sean M.C. Smith**, Maryland Department of Natural Resources, 580 Taylor Ave (E2), Annapolis, MD 21401, ssmith@dnr.state.md.us,www.dnr.state.md.us/streams/geomorphic.html.

Sediment budgeting strategies that have been long standing pursuits of the geomorphology community can directly and indirectly provide support to evaluations of pollutant loadings to large rivers, lakes, and estuaries. A level of detail suitable to support decisions for the prioritization of stream restoration investments in either headwater or lower alluvial valley reaches can be attained using a suite of data derived from small pond and reservoir sedimentation assessments, short-term storm runoff sampling, rainfall-runoff modeling, and drainage network measurements. Analyses of hydrograph sediment concentration trends, watershed flow patterns, and channel adjustment mechanics that provide the details necessary for the quantification of sediment supply and delivery can also guide the selection of strategies to alter them. Examples will be presented from a recent investigation of first-order watershed sediment flux in the Piedmont region of Maryland (USA) to illustrate approaches that can used to quantify the sediment flux in headwater basins and relate them to the sediment yields that are characteristic of larger watersheds draining into the Chesapeake Bay.

THE DISTRIBUTION, RESIDENCE TIME, AND FATE OF HG AND SEDIMENT IN FINE-GRAINED CHANNEL MARGIN (FGCM) DEPOSITS WITHIN A STEEP, GRAVEL-BED RIVER. Katherine Skalak, Ph.D. Candidate and James Pizzuto, Associate Professor, Geology Department, College of Marine and Earth Studies, University of Delaware , Newark, DE 19716

We have determined the quantity and dynamics of fine sand, silt, and clay stored within the channel of a steep, gravel-bed river with a historic mercury contamination. Mercury (Hg) was released directly into South River, VA as part of an industrial process from 1929 to 1950 and Hg concentrations in the system are still elevated. Hg adsorbs to fine sediment so understanding the dynamics and transport of fine sediment are important in determining dynamics of Hg. To determine sources and sinks of fine sediment, we constructed a sediment budget on annual timescales for a 17-km section of the study area. Initial work suggests that the significant sediment-related processes in the study area are suspended sediment transport, bank erosion, levee deposition, and storage of fine-grained sediment trapped by large woody debris (LWD) in the channel margins (FGCM deposits). Efforts to assess floodplain contributions to the sediment and Hg budget are ongoing. Suspended sediment fluxes for the study reach were determined using a dimensionless regional sediment-rating curve. The estimates from the rating curve are comparable to the results obtained from 3 years of suspended sediment monitoring for ongoing TMDL studies and thus validates these estimates. Bank erosion rates were measured using aerial photographs in a GIS environment from 1937 and 2005. Natural levee deposition rates were estimated using dendrochronology and the distribution of sediment deposits over basal roots of trees. The extent of floodplain deposition since 1929 is currently being assessed through an extensive effort to map and core the floodplain. We will use the present distribution of Hg to define the extent of post 1929 floodplain accumulation. FGCM deposits have not been

extensively described before. These deposits were mapped, cored, and dated using bomb radiocarbon, Pb^{210}, and Cs^{137} and characterized with respect to grain size, organic composition, and Hg concentration. By volume the deposits store for about 25% of the annual load. The volume of sediment reworked through erosion and deposition every year is equivalent to approximately 5% of the annual load. By assuming steady state conditions (erosion and deposition are equal), we can use the radiocarbon dates to represent the age distribution for the entire population of FGCM deposits and therefore determine the average residence time and transit time of sediment in these features. The distribution of ages and Hg concentrations suggest that approximately 10% of the sediment in the deposits is from the release period, which accounts for approximately 75% of the Hg by mass in the system. Assuming the sediment transported in the deposits represents that from the water column, we can reconstruct the loading history of Hg from the plant and predict that it will require centuries to remove this material. Our empirical analysis utilized a unique and robust modeling approach that has never been applied in this context and traditional methods likely would not yield such a comprehensive understanding of the fate and transport of Hg in this system. These features are generally overlooked in most sediment budgets and have important implications for fine sediment and Hg dynamics in the system. They are in constant contact with the water column and are locations of potential mercury methylation and bioaccumulation.

SEDIMENTS IN THE ESTUARINE ENVIRONMENT: UNCERTAINTY IN SOURCES, MEASUREMENT AND FATE. Jeffrey Halka, Maryland Geological Survey, 2300 Saint Paul Street, Baltimore, MD, jhalka@dnr.state.md.us.

Sediments in the estuarine environment have multiple sources and travel multiple pathways to sites of deposition. Major sources include the watershed, shore erosion, oceanic input, and internal primary production and the introduced sediments have the potential for repeated cycles of resuspension and deposition. As a consequence source loadings vary spatially across the spectrum of estuarine environments, and exhibit high temporal variability. Recent efforts in the Chesapeake Bay, a microtidal system with strong gravitational circulation patterns, have included categorizing the major sediment source loadings and transport pathways in the entire system, understanding the mechanisms driving the estuarine turbidity maxima, and quantifying shore erosion sediment loadings. These efforts are focused on improving an understanding of sediment delivery to shallow water environments where improvements in water clarity are a major effort of the Chesapeake Bay Program. Sources of suspended sediments in shallow waters of the Choptank River sub-estuary will be examined from the perspective of local verses regional sediment supply and concentrations of suspended materials evaluated in response to local forcing mechanisms.

EMERGING CONTAMINANTS: IDENTIFICATION, CONCERN AND ACTION. **Roland Hemmett**, EPA-R2.

Emerging Chemicals are an increasing issue for both environmental organizations and the public at large. Numerous federal, state, tribal and local agencies are trying to get a better understanding of this issue and what the risks are to both human health and ecosystems. This presentation will discuss the basics of the issue and approaches that EPA is taking to better understand and address the issue.

Dr. Hemmett is the science advisor for EPA's Region 2. He presently serves as the Chairman of the Region 2 Regional Science Council, the EPA Chair of the National EPA Tribal Science Council and is a member of the EPA's Science Policy Council Steering Committee. Dr Hemmett is the past chair of the DRBC Toxic Advisory Committee and EPA's National Regional Science Council. Dr Hemmett has been involved with water quality issues for his entire 36 year career at EPA.

RECONNAISSANCE SAMPLING FOR EMERGING CONTAMINANTS IN PENNSYLVANIA . Andrew Reif, USGS PA Water Science Center

Recent research has documented that many chemical constituents that were not historically considered contaminants are present in the environment. These "emerging contaminates" include compounds such as pharmaceuticals, antibiotics, hormones, detergent metabolites, flame retardants, and personal care products. Many of these compounds are not currently regulated by drinking-water standards or human or aquatic-life health criteria. The United States Geological Survey (USGS) has begun research on analytical methods and reconnaissance data collection to help determine the distribution and concentration of these "emerging contaminate" compounds in various aquatic ecosystems. A national reconnaissance in 1999-2000 found that 82 of the 95 organic wastewater compounds (OWCs) analyzed were detected in 80% of the 139 streams sampled. In the 139 samples the median number of OWCs detected was 7 with a maximum of 38. The most commonly detected compounds were steroids, antibiotics, non-prescription drugs, caffeine, and insect repellents. The USGS and the Pennsylvania Department of Environmental Protection have begun a reconnaissance data collection program to document the occurrence and concentration of OWCs. Sampling locations in the Delaware River Basin include the Delaware River at Trenton, Schuylkill River at Philadelphia, Broadhead Creek near Stroudsburg, and Jordan Creek at Allentown.

Andrew Reif has a BA in Biology from West Chester University and has worked as a water-quality biologist for the United States Geological Survey since 1990. His major area of work has been in macroinvertebrate water-quality studies. He is currently project manager for the Stream Conditions of Chester County Biological Monitoring Program and the USGS portion of the PaDEP's Water Quality Network.

FATE AND EFFECTS OF ENDOCRINE DISRUPTING AGENTS IN NY/NJ HARBOR ESTUARY. Anne McElroy, School of Marine and Atmospheric Sciences, Stony Brook University

The NY/NJ Harbor Estuary is located within one of the most densely populated regions of the country. Work in our laboratory and that of Bruce Brownawell's at Stony Brook have been investigating the sources fates and effects of estrogenic chemicals in this system. We have measured levels of estrogens and nonylphenol ethoxylates (NPEOs) in effluent from several sewage treatment plants (STPs), levels of nonylphenol ethoxylates in surficial sediments from around the Harbor Estuary, and feminization in two species of resident fish, the winter flounder, *Pseudopleuronectes americanus*, and the Atlantic Silversides, *Menidia menidia*. Effluent from STPs is estrogenic, particularly to young fish with effluent from the plant with the highest levels of NPEOs being most potent. Sediment concentrations of NPEOs are elevated in many areas of the Harbor Estuary, including portions of Jamaica Bay, a highly sewage impacted estuary. Young-of-the-year winter flounder collected from Jamaica Bay are feminized, showing elevated levels of vitellogenin and female biased sex ratios as compared to reference fish from eastern Long Island. Atlantic Silversides collected from the more urbanized, western, embayments around Long Island also show female biased sex ratios compared to fish collected from water adjacent to eastern Long Island. Laboratory experiments exposing flounder to sediments from Jamaica Bay, or reference sediments dosed with nonylphenol can reproduce effects seen in fish collected from Jamaica Bay, implicating sediment-sorbed contaminants in general, and nonylphenol in particular in the feminization observed.

Dr. Anne McElroy is currently the Graduate Programs Director and an associate professor in the School of Marine and Atmospheric Sciences (SoMAS) at the Stony Brook University where she teaches undergraduate and graduate courses on global environmental problems and solutions, and environmental toxicology and public health. Her research focuses on how aquatic organisms interact with toxic chemicals in their environment. Current projects are examining reproductive effects of sewage-derived contaminants on fish, the etiology of environmental shell disease in lobsters, relationships between bioaccumulation and toxicity in marine organisms, and the condition of coastal National Parks Service properties on Long Island. Dr. McElroy received a Science Bachelors in Aquatic Biology from Brown University, her Ph.D. in Oceanography from the Massachusetts Institute of Technology-Woods Hole Oceanographic Institution Joint Program, and completed a postdoc at the Environmental Protection Agency's research laboratory in Narragansett RI. Before joining the faculty full time at Stony Brook, Dr. McElroy served as Director of the New York State Sea Grant College Program and was a faculty member in the Environmental Sciences Program at the University of Massachusetts at Boston. She has served on numerous environmental advisory committees and review boards and was a co-recipient, with Bruce Brownawell, of the 2003 Long Island Environmental Leadership Award in Research sponsored by Southampton College and New York Newsday.

ECOLOGICAL LAND REUSE AT CONTAMINATED SITES—PLANNING AT THE LANDSCAPE SCALE. Damian V. Preziosi, John Sullivan, Integral Consulting Inc., 4D Bay Street, Berlin, MD 21811 and Deborah Rudnick, Integral Consulting Inc., 7900 SE 28th Street, Suite 410, Mercer Island, WA 98040, dpreziosi@integral-corp.com.

Stakeholders are increasingly recognizing the value of incorporating ecological enhancements as a component of remediating and restoring contaminated sites. Ecological enhancements can include the use of cost-effective natural or green remediation technologies (e.g., phytoremediation, enhanced bioremediation) in place or alongside of traditional technologies. They can also involve the creation or restoration of ecological habitat. Habitat creation or restoration can be an effective means of meeting regulatory objectives under Superfund, the National Contingency Plan, and the Oil Pollution Act to protect human health and the environment or to manage environmental liabilities under a Natural Resource Damage Assessment. Even when a habitat project meets established site-specific ecological, economic, regulatory, or aesthetic goals, it is important for the ecological value of a project to be considered in the context of the larger landscape. By planning habitat projects in view of the broader landscape, ecological value can be enhanced by ensuring the project site's connectivity with other neighboring habitat areas. Using frameworks from the fields of conservation biology and metapopulation theory, we show how landscape connectivity models can be used to guide the planning of habitat projects at contaminated sites. Use of such approaches early in the planning process can ensure that habitat projects simultaneously meet stakeholder needs while maximizing ecological value at the landscape scale.

EVALUATIONS OF BIOMAGNIFICATION IN SMALL TIDAL ESTUARIES. Judi L. Durda, Damian V. Preziosi, and Peter Jensen, Integral Consulting Inc.**,** Annapolis, MD.

Biomagnification is the process whereby chemical concentrations increase with increasing trophic level within a food web. In aquatic systems, the conventional assumption is that biomagnifying chemicals will be highest in predatory species located at the top of the food web, and lowest in herbivorous or detritivorous species located near the bottom. This relationship may hold in situations where biomagnifying compounds are widely distributed in the environment and organisms have been continuously exposed to the chemicals over long periods of time, often throughout their entire life. In situations where contamination is more localized and exposures are not continuous, such as can exist in small tidal estuaries, conventional assumptions regarding biomagnifications at increasing trophic levels may not hold.

We recently examined biomagnification in a small tidal estuarine creek where historical releases of DDT resulted in localized contamination of aquatic sediments. DDT is an organochlorine compound known to biomagnify in aquatic food webs. We evaluated DDT accumulation in juvenile striped mullet (primarily a bottom-feeding detritivore), blue catfish (a bottom feeding invertivore/piscivore), and yellow bass and largemouth bass (pelagic piscivores), occupying trophic levels II, III, and IV, respectively in our tidal creek system. Total whole-body residues of DDT and its metabolites DDE and DDD (collectively DDT*r*) were consistently highest in the mullet, with mean concentrations ten or more times greater than those measured in bass or catfish. We explain this accumulation pattern by considering mullet home range, feeding strategy, physiology and metabolism compared to higher trophic level fish, in addition to DDT*r*

distribution and temporal changes in estuarine habitat conditions. We suggest that these factors are more important than trophic position alone in determining bioaccumulation associated with spatially explicit contamination. This paper presents the support for our hypothesis and also discusses implications of our findings for monitoring program design and risk assessment.

RESTORATION IN THE HACKENSACK MEADOWLANDS AND ITS POTENTIAL AFFECT ON AQUATIC BIOTA. Celine Santiago Bass, Great Eastern Ecology, Inc., 2231 Broadway, Suite 4, New York, New York 10024, csbass@geeinc.net.

The Hackensack Meadowlands District (District) stretches between Bergen and Hudson Counties in northeastern New Jersey and covers approximately 83 km^2 (7,885 ha). Although it includes a heavily degraded brackish marsh system, due to its size, it is considered a significant natural component of the Hudson Raritan Estuary in this highly urbanized area. Contamination issues were so pervasive and regarded as so severe that by the 1960s, the mummichog (*Fundulus heteroclitus*) was thought to be the sole fish species remaining in the Hackensack River due to its hardiness. Following a series of events including the reduction of sewage plant discharges, the closing of garbage dumps, and a number of restoration projects, approximately 3,399 ha of the District now consists of open space, waterways and wetlands, and is host to more than 265 different species of birds (both resident and migratory). Shellfish and finfish have also returned.

The majority of the wetlands located within the Hackensack Meadowlands are dense monocultures of the invasive wetland species common reed (*Phragmites australis*). As such, opportunities for restoration abound. Typical restoration activities include the removal of invasives (i.e., *Phragmites*), to replace them with more desirable native species such as smooth cord grass (*Spartina alterniflora*). By enhancing the existing habitat, the restoration process increases potential habitat for fish, birds and other wildlife – including parasites. Typically, a high abundance of parasite species indicates a healthy environment as it will likely have all of the parasite's required life cycle components. However, little research has been done to examine relationships of parasites to restored tidal marshes. The wetland restoration process, however beneficial in the long run, is still an act of disturbance and may not be beneficial to all species. If it is beneficial to parasites, it may not be beneficial to other wildlife, including their hosts. A more focused experimental effort examining the mummichog (*F. heteroclitus*) from restored and unrestored sites within the Hackensack Meadowlands was undertaken. Three restored (Mill Creek, Skeetkill Creek, Vince Lombardi), and three unrestored sites (Richard W. DeKorte Park, Cedar Creek, and Kingsland Creek) located throughout the District were examined. The study investigated whether the process of restoration was influencing either parasite or host abundance, or triggered changes to host physiology and/or behavior. The dynamics of the restoration process and subsequent parasite – host relationships will be discussed in the context of this study.

RISK-BASED REMEDY SELECTION CONSIDERATIONS FOR A NON-TIDAL WATERSHED. P. Stephen Finn and Andrew P. Joslyn, Golder Associates, Inc.

A feasibility study has been completed for a 40-mile creek and associated floodplain in eastern Ohio contaminated with the pesticide mirex, which emanated from a former manufacturing facility adjacent to the headwaters. Mirex has been detected in fish tissue and historically in beef and milk fat; engineering controls preventing access to contaminated areas have been effective in mitigating beef and milk pathways, and a portion of the creek has a fishing advisory in place that limits consumption of common carp due to the presence of mirex. There are also advisories in place that limit consumption of fish from the stream based on PCB and mercury contamination, which are not related to the former manufacturing facility.

The feasibility study followed USEPA's 2005 sediment guidance. The source of mirex to the creek has been previously eliminated by interim measures, and the sediments are generally stable with little evidence of significant downstream movement of contaminated material. Conceptually, sediment remediation in the form of targeted dredging to meet a surface weighted average risk-based preliminary remediation goal (PRG) is expected to reduce ecological and human health risks from consumption of fish tissue to acceptable levels, and, similarly, targeted removal of floodplain soil will address potential future risk from consumption of beef and milk. PRGs have been expressed as ranges to reflect uncertainties in exposure variables, food chain models, and acceptable risk ranges.

Final remedy selection and design must consider the net environmental benefit associated with the detailed remedial work scope. Key considerations include:

· In most of the contaminated areas there is a healthy, wooded riparian zone that offers valuable habitat and buffers the creek from non-point sources of pollution not related to the former manufacturing facility. Floodplain soil removal will damage this riparian habitat and reduce the protection it provides;

· Biocriteria studies show healthy fish and macroinvertebrate communities in the most contaminated reach of the stream, and improving conditions over time. Dredging will destroy the existing habitat and cause a decline in the aquatic health of the stream;

· Removal of mirex contamination is not expected to have an effect on mercury or PCB contamination in fish. Mercury contamination of fish is a state-wide issue, arising from atmospheric sources that will continue into the foreseeable future. Therefore, even after dredging the fishing advisories will remain.

This case history highlights the importance of concepts such as net environmental benefit, anthropogenic background conditions, and exposure uncertainty in making appropriate risk management decisions in remedy selection and design.

EMERGING CONTAMINANTS IN THE TIDAL DELAWARE RIVER: A PILOT MONITORING SURVEY. A. Ronald MacGillivray, Delaware River Basin Commission, 25 State Police Drive, West Trenton, New Jersey 08628, Ronald.MacGillivray@drbc.state.nj.us.

There are more than 85,000 chemicals commercially available in the United States with new chemicals and technologies introduced each year. The number of substances released to the environment, improved detection methods and a growing body of information on adverse effects has increased interest by scientists, the public and regulators in substances that are not routinely monitored. These emerging contaminants are substances that have been detected in humans or other living organisms, are toxic in some way to humans, aquatic life or wildlife, or are persistent in the environment. Therefore, these substances may have the potential to cause adverse effects on human health or the environment. This presentation summarizes a pilot monitoring survey of ambient water conducted by the Delaware River Basin Commission in the tidal Delaware River of emerging contaminants including brominated flame retardants, carbamate pesticides, nonyl phenols, perfluorinated compounds, pharmaceuticals and personal care products. This survey was initiated to better understand and assess these contaminants in order to set achievable environmental management and policy goals.

DEFINING THE BIOLOGICALLY ACTIVE ZONE IN SEDIMENTS: A REVIEW OF APPROACHES AND CURRENT DATA. Timothy Iannuzzi, ARCADIS, Robert Diaz, Robert Diaz & Daughters, Robert Romagnoli, ARCADIS, Paul Bluestein, Tierra Solutions, Inc. and David Ludwig, ARCADIS, tim.iannuzzi@arcadis-us.com.

Most ecological risk assessments for contaminated sediments focus on a surface layer of sediment where bioturbation and mixing occur, and the exposure potential is highest for invertebrates and fish. This layer is often referred to as the biologically active zone or BAZ. Despite the fact that defining the BAZ is a critical path in the risk-based sampling process, there have been very few studies published to date, and no national regulatory guidance, that have focused on developing a common process for its characterization and quantification. In this presentation we summarize the results of a recent study focused on estimating the BAZ for Newark Bay, a sub-area of the NY/NJ Harbor Estuary. A combination of sediment profile imaging and benthic invertebrate sampling were used to characterize and quantify the BAZ in intertidal and subtidal areas of the Bay. In addition, we have reviewed a number of case studies from the literature and regulatory reports, and synthesized data and information regarding the strategic approaches and sampling methods that have been applied to defining the BAZ. These findings will be summarized and placed into context relative to our Newark Bay investigation.

Nanomaterials: Use, Risk and Regulation
John K. Schupner and Laurie R. Gneiding, AMEC Earth & Environmental Somerset, NJ

In early 2007 the United Nations reported that nanotechnology would grow to account for 14% of the worldwide market by the year 2014, or $2.6 trillion in U.S. dollars. Nano-sized chemicals have changes in basic material properties due to the dominance of quantum effects at the nanometer size. They can have increased physical strength and chemical reactivity due to increased relative surface area per unit mass. The novel properties of nanomaterials offer revolutionary means to optimize a variety of products, including electronics, textiles, paintings and coatings, pharmaceuticals, and personal care products. In the environmental realm, nanomaterials are being applied to improve energy efficiency, reduce and treat waste, and to clean-up previously contaminated environmental media. Nanomaterials include a wide diversity of material types and variations within types. There are many uncertainties regarding the potential risks associated with nanoparticles. The models and paradigms typically used to predict environmental behavior and effects of conventional chemicals are not entirely adequate. The development and use of the technology has progressed rapidly, but environmental regulations have been slow to adapt. This course introduces the properties and uses of nanomaterials, reviews the potential human health and ecological risks, and presents an overview of current stewardship and regulatory initiatives.

Dammed Estuaries: Implications for Flow, Sediment Transport and Risk Analysis
Peter Brussock, Ph.D., Environmental Liability Management, Inc.

The Dammed Estuaries short course will review the fundamentals of the physical, chemical and biological characteristics of large river estuaries in the mid-Atlantic region. Changes in the basic patterns of conditions will then be evaluated in relation to urbanization with particular consideration of the impacts of the placement of dams at or near the head of tide. The role of regional planning decisions, such as dam building and management practices, on landscapes and ecosystem mosaics will be discussed. Implications for environmental site characterizations of estuaries and risk analysis will also be considered and discussed with the participants.

FUGAWEB: A Probabilistic Fate and Effects Model for Emerging Contaminants
J. Lyndall[1], M. Bock[2], T. Barber[1], and D. Lauren[3]
ENVIRON International, 1) Burton, OH; 2) Portland, ME; and 3) Philadelphia, PA.

Many emerging contaminants such as pharmaceuticals and personal care products (PPCPs) are introduced into the environment by disposal down household drains to be conveyed to wastewater treatment plants (WWTPs). Effluents from WWTPs can introduce any residual contaminants into the aquatic system. Sludge from WWTPs can be processed into biosolids to be applied to terrestrial systems. Watershed-wide risk assessments can be conducted using fugacity modeling to evaluate the potential exposure of emerging contaminants in WWTP effluent and biosolids and facilitate aquatic and terrestrial risk assessment.

A fugacity and bioaccumulation model, FUGAWEB, was developed to predict deterministic and probabilistic exposures under various environmental conditions. FUGAWEB is based on multiple models currently available as free ware. These are the Sewage Treatment Plant model (STP; Clark et al. 1995), the EQC model (Mackay et al. 1996), the AQUAWEB bioaccumulation and foodweb model (Arnot and Gobas 2004), and the Biosolids-Amended Soil Level 4 model

(BASL4; Hughes et al. 2005). The FUGAWEB model consists of six major compartments: (1) discharge of chemical into system; (2) removal during wastewater treatment; (3) loading to system via effluent or land-applied biosolids; (4) fugacity modeling of transport and fate; (5) bioaccumulation modeling, and (6) wildlife intake modeling. The compartments are linked sequentially and together describe the movement of a chemical of interest into the aquatic and terrestrial systems.

Using this model, direct and indirect exposures (e.g., foodweb) can be estimated using basic physico-chemical parameters, particular characteristics of the WWTP, and characteristics of the ecological system and receptors. Data are fit to particular distributions using Crystal Ball©. FUGAWEB is then run as a Monte Carlo simulation with 10,000 or more iterations. The resultant predicted concentrations are more robust than conventional point estimate analyses because the probabilistic approach accounts for variability and uncertainty in each of the input parameters.

The predicted exposure concentrations of the chemical of interest, can be compared to measured (e.g., toxicity studies) or estimated (e.g., QSAR) effects concentrations for ecological receptors (e.g., fish, earthworms) to estimate potential risk from direct exposure to water or soil. Additionally, the estimated dietary doses to wildlife and avian receptors can be compared to toxicity reference values (TRVs) derived from the primary or proprietary literature to determine risk from bioaccumulation.

This workshop will discuss: (1) a conceptual site model for PPCP introduction to the environment, (2) fugacity modeling using FUGAWEB, (3) the bases for the input parameters and distributions, and (4) an example with a generic chemical of interest.

Environmental Ethics
Judith Stark Ph.D., Seton Hall University

How can ethical principles and frameworks be used to address environmental issues today? In this presentation Dr. Judith Stark will discuss some of the ethical theories that are being used to address current challenges and problems in environmental studies. One central distinction pertinent to the discussion is that between the theories that place human beings at the center of ethical considerations (anthropocentric theories) and those that argue for the inherent value of nature. How we think about these and other relevant distinctions affects the ways we develop policies and attempt to resolve specific environmental problems.

Trace Analysis of Drugs from Aqueous Samples Using GC/MS
Nicholas Snow, Ph.D., Department of Chemistry and Biochemistry, Seton Hall University

Trace analysis of drugs from aqueous samples such as water supplies is receiving increasing interest from environmental scientists. For small drugs including many common over the counter, prescription and illegal compounds, gas chromatography/mass spectrometry (GC/MS) is the analytical technique of choice. In this short course, the basic principles of drug analysis from water-based samples using GC/MS will be discussed and demonstrated in the laboratory. Analytical work flow and instrumentation capabilities and limitations will be discussed. Common and novel extraction techniques, including headspace, liquid-liquid, solid phase and solid phase micro-extraction will be demonstrated.

Field trip: Water Quality Monitoring of Small, Urban Streams
Carolyn Bentivegna Ph.D., Seton Hall University

Faculty and students at Seton Hall have been developing a water quality and benthic macroinvertebrate monitoring program in local streams. The long term goal is to establish a volunteer program with the Village of South Orange, NJ. This course will begin by presenting data collected so far on two distinct streams: one that flows through the center of the Village, which is designed to collect stormwater, and one that flows through South Mountain Reservation, which is less modified and intended to be esthetically pleasing. Seasonal and rainstorm data show typical effects of urbanization on surface water including nutrient spikes and changes in hardness. After the introduction to the two rivers, a tour will be given, and participants will have the opportunity to run some chemical analyses streamside.

.

POSTER ABSTRACTS

To allow viewing by participants throughout the meeting, it is recommended that all posters should be setup as early on Thursday as possible. Student posters enrolled in the Student Poster Competition must be placed on display by 8:00 am on Friday morning at the latest for discussion with selected judges and must be displayed during the poster viewing session time for at least one day during the meeting. Student aurthors must be present to answer questions and non-student authors should be present during as much of the poster viewing sessions as possible.

*Denotes student is enrolled in the poster competition.

STUDENT POSTER ABSTRACTS

***NOVEL METHODS TO ACCURATELY DETERMINE ENVIRONMENTAL FATE AND EXPOSURE OF THE COMMON PLASTICIZERS PHTHALATE ESTERS IN URBANIZED MARINE SETTINGS.** Anne C. Ellefson & Bruce J. Brownawell, School of Marine and Atmospheric Sciences, Stony Brook University, Stony Brook, New York, 11794.

Phthalate esters are common plasticizers used in a wide variety of plastics and personal care products. They are suspected to have carcinogenic and endocrine disrupting properties, especially during early development of humans and other organisms. Phthalates are ubiquitous in air and water as they can diffuse out of materials they are used to make. Past studies attempting to quantify phthalates in humans and the environment may have been flawed due to the high risk of contamination during the analytical process. New methods developed at the Center for Disease Control have successfully used persistent metabolites of phthalate esters as new tools to monitor exposure in humans and other mammals. We have begun to apply these analytical approaches to understand the occurrence and sources of phthalate plasticizers in the Lower Hudson River and New York Harbor. Preliminary results indicate readily detectable levels of phthalate esters and their metabolites in lower New York Harbor and Jamaica Bay. Sewage treatment plants and combined sewage outflows appear to be an important source of phthalates to the environment and can affect the form in which phthalates are distributed into the environment. We will show recent method development for phthalate di-esters and mono-esters, challenges faced, and environmental measurements to date.

EFFECT OF SEDIMENT CAPPING ON BENTHIC MACROINVERTEBRATES IN THE NEW JERSEY MEADOWLANDS. Anthony W Gerardi & Carolyn S. Bentivegna, Department of Biological Sciences, Seton Hall University, 400 South Orange Ave, South Orange, New Jersey, 07079.

In Kearny Marsh, there is a great deal of sediment contamination that is having an effect on the organisms living there. The contamination comes from urban pollution in the surrounding area. In order to reduce the bioavailability of pollutants in the sediment, AquaBlok (AB), a capping substrate, was placed over the sediment in July 2005. AB has been known to absorb the pollutants and block their release into overlaying water. The ability of AB to improve environmental health was evaluated using biodiversity (Shannon-Weiner Index) and abundance of the benthic macroinvertebrates (BMI). The main focus of this project was on data collected on August 10, 2006 and July 31, 2007: this was when summer conditions created the most stress on organisms and therefore, the effects of AB should have been most apparent. The placement of AB generated 10 sites: 4 without AB, the controls, and 6 with it, the treatment. Hester-Dendys were placed in triplicate in each plot, and BMI were allowed to colonize them for one month. After collection BMI were sorted, counted (abundance) and identified to the Family level. Water quality parameters were measured at the time of collection: including pH, temperature, dissolved oxygen, redox-potential (eH), salinity and conductivity. Results found low diversity overall and no change in biodiversity between 2006 and 2007. Abundance did improve at AB sites in 2007. Of all the water quality parameters, redox potential was observed to have the most positive influence on abundance. Overall, sediment capping with AB showed some marginal improvement in marsh health in one year.

USING PASSERINE NESTLINGS AS BIOINDICATORS OF HEAVY METAL ACCUMULATION AT A FORMER BROWNFIELD SITE. Charles Hofer & Claus Holzapfel**,** Department of Environmental & Natural Resource Sciences, Rutgers University, 14 College Farm Road, New Brunswick, New Jersey, 08901.

Soils of former brownfield sites are notoriously laden with heavy metal pollutants that may have adverse effects on resident wildlife. Previous studies at our study site – Liberty State Park in Jersey City, NJ – have shown high levels of lead (Pb) and zinc (Zn) translocating from soil to plant tissue where they become available to the greater food web. We tested breast feathers of nestling house wrens (Troglodytes aedon) for heavy metal accumulation using high resolution inductively coupled plasma mass spectrometry (ICP-MS). Our results indicate that concentrations of Pb, iron (Fe), chromium (Cr), copper (Cu), and arsenic (As) at the study site were significantly higher than those found at our control site. While these levels were high at the study site, they were still below clinical levels known to have adverse physiological or neurological effects on birds, suggesting the site is in fact providing viable habitat for breeding avifauna. Nest success and growth data collected from both sites showed no significant differences, suggesting that elevated metals concentrations in nestlings has no effects on growth during the nestling stage. Our results also suggest that there was no temporal change in metal concentrations comparing nestlings from first clutches to those of second clutches, indicating that metal concentrations remain relatively constant during the course of the breeding season. Overall, our study indicates that nestling passerines could effectively be used as bioindicators of heavy metal accumulation to help evaluate the future viability of brownfield habitat.

***CATIONIC SURFACTANTS: EMERGING CONTAMINANTS OF CONCERN AND NEW TRACERS FOR CONTAMINANT SOURCE APPORTIONMENT, SEDIMENT TRANSPORT AND *IN-SITU* TRANSFORMATION OF ENDOCRINE DISRUPTING COMPOUNDS.** Xiaolin Li[1], Bruce J. Brownawell[1], Lucille A. Benedict[2] & Richard F. Bopp[2]
[1]Marine Sciences Research Center, Stony Brook University, Stony Brook, New York, 11794, [2]Department of Earth and Environmental Sciences, Rensselaer Polytechnic Institute, Troy, New York, 12180.

The characterization of sources and fate of sediment contaminants is important to assessments and management of contaminated sites. A novel and sensitive method for analysis of cationic surfactants in sediments has been developed, the most abundant of which is the fabric softeners ditallowdimethylammonium chlorides (DTDMAC). DTMAC is persistent and very strongly bound to sediments. Concentrations greater than 100 – 300 μg/g (at least a million times above detection limits) have been measured in sewage affected urban harbor sediments, including sites within and proximate to three Superfund sites in the Hudson Basin. We are exploring many applications of DTDMAC and other cationic surfactants as tracers of sources and transport of contaminants and endocrine disrupting activity of sediments, and as tools to understand differential transport or transformations of contaminants of concern. We have now tested hypotheses related to separating two apparent sources of PBDEs in the Hudson Basin, and the sources and post-depositional transformations of NPEO metabolites in sediments. Three classes of quaternary amine disinfectants (QAD) are also easily measured in sediments with this method, and each class has dramatically different histories of use. The earliest generation of QADs are the well known benzalkoniums, which are still extensively used as sanitizers, personal care products, and in the food/beverage industry. All three classes of QADs are readily detected in urban estuarine sediments, reaching levels near 20 μg/g). Thus, interest in cationic surfactants, as "new" emerging contaminants, will likely increase in the future.

***UNDERSTANDING THE EFFECTS OF CHRONIC POLLUTION ON GENETIC DIVERSITY USING A NOVEL MICROSATELLITE GENE.** Innocent Njoku, Jr. & Carolyn S. Bentivegna. Department of Biological Sciences, Seton Hall University, 400 South Orange Ave, South Orange, New Jersey, 07079

Measures of genetic diversity are good indicators of chronic pollution. They act as sub-lethal indicators of environmental health by representing changes at the population instead of the individual level. This study was carried out at a location known to contain heavy metal contamination: the Kearny Marsh of the New Jersey Meadowlands. Our research evaluated the ability of a novel microsatellite-containing gene to detect genetic diversity. Microsatellites are repeated nucleotide sequences. Due to their high mutation rate, the number of repeated units is known to vary among individuals. The test organism was the chironimid, the aquatic larvae of midge flies. Chironomids were collected from three sites (two capped with AquaBlok [AB] and one uncapped [control]) in May, August and November. AB is a clay-based substance that is placed over sediment to separate aquatic organisms from contaminants in sediment. It was hypothesized that AB would improve environmental health and contribute to higher levels of genetic diversity. DNA was isolated and the microsatellite region was amplified by PCR. Genetic diversity was evaluated by comparing bands on agarose gels. Results showed that microsatellites could differentiate between seasons with August having the lowest diversity overall. Capping alone did not account for differences in genetic diversity. Sequencing results showed similarities between the lab population of *Chironimus riparius* and the field population

of *Chironimus riparius* collected in the marsh. Both populations contained the microsatellite sequence but had different numbers of repeats, reinforcing the notion that microsatellites are highly variant sequences. Overall, data indicated that microsatellite sequences can be used to evaluate genetic diversity and changing environmental conditions.

CHIRONOMID HEMOGLOBIN PROTEIN AS A MOLECULAR BIOMARKER FOR SPECIES IDENTIFICATION AND GENETIC DIVERSITY USING HEMOGLOBIN PROTEIN IN WILD CHIRONOMIDS FROM A CONTAMINATED WETLAND. Jun-Taek Oh, Viren Jadeja, Innocent Njoku & Caryolyn Bentivegna. Department of Biological Sciences, Seton Hall University, 400 South Orange Ave, South Orange, New Jersey, 07079..

Chironomids, aquatic larvae of the midge fly (Diperta: Chironomidae), are abundant, widely distributed, sediment-dwelling organisms that should be used more often for field studies. One major challenge is distinguishing between species based on morphological characteristics such as head capsules. In this study, hemoglobin protein detected by SDS-PAGE gel was evaluated for its ability to discriminate between species collected at Kearny Marsh, an urbanized wetland that is part of the New Jersey Meadowlands. Hemoglobin protein is highly polymorphic in chironomids. It is important for their ability to survive in organic, subtoxic wetland sediments. Hemoglobin proteins were also evaluated as biomarkers of population diversity by comparing chironomids collected from sediments that were uncapped or capped with AquaBlok. Capping the sites altered the environmental conditions in an otherwise geologically similar environment. Chironomids were collected from Hester-Dendys placed for one month. Collection dates were in May and August of 2006 and 2007 and November, 2006. Hemoglobin profiles from individual larvae were distinguished by the presence or absence of bands as well as band intensities. Band profiles were compared to larval head capsules, which are commonly used to identify species. Results showed unique hemoglobin profiles that corresponded with four different Genera. One species appeared to be a hybrid of two others. Diversity of genera increased over time with *Chironomus* dominating at uncapped sites and *Glyptotendipes* dominating at capped sites. Hierarchical clustal analyses found that hemoglobin diversity was highest at uncapped sites in summer and was lowest in fall overall. Dissolved oxygen increased with capping but did not correlate with hemoglobin diversity. Heavy metal burden in chironomids also did not correlate with diversity. Species competition seemed to confound the affects of AB at the two capped sites. However, hemoglobin protein diversity did detected the changing ecological conditions over time and seasonally.

PROFESSIONAL POSTER ABSTRACTS

A NEW WEIGHT-OF-EVIDENCE FRAMEWORK FOR REACHING SCIENTIFIC CONSENSUS. Judi L. Durda[1], Ann E. Bradley[1], & Louis P. Brzuzy[2] ,[1]Integral Consulting, Annapolis, Maryland, [2]Shell Chemical LP, Houston, Texas

Risk assessment and risk management in complex systems is most robust if multiple lines of evidence are incorporated into the overall decision-making process. Existing weight-of-evidence (WOE) frameworks, however, are too narrow in focus to incorporate the full range and complexity of information that often is available to support the assessment, and most commonly rely on *post facto* decision making heavily rooted in professional judgment. These collective constraints of existing WOE approaches can sometimes lead to assessments and management decisions that are incorrect, ill conceived, or biased.

We were faced with the need to assess if contaminated groundwater that was discharging to a small tidal creek was the cause of observed sediment toxicity in the creek. The outcome of the assessment was being used to support management decisions regarding the amount of allowable groundwater discharge to the creek. Four independent lines of evidence that reflected relatively disparate data types and analyses were available to assess the potential groundwater contribution to sediment toxicity. We developed a WOE framework to incorporate the full suite of data to reach a consensus decision amongst all stakeholders regarding causality. Our WOE approach has advantages over the existing WOE approaches in that it can incorporate multiple types of data, as well as multiple analyses using those data types, into the assessment. Further, it factors data quality, relevance, and certainty into the decision making process, and avoids bias by requiring *a priori* ranking of data and lines of evidence with respect to these factors. As a result, it minimizes bias and gives more weight to analyses that are tied most closely, and with the most certainty, to the assessment question. We present the results of our specific application of this WOE approach and discuss how it can be applied to similar cases to synthesize, reconcile, and integrate multifaceted data to understand causality and inform management decisions.

IDENTIFYING THE SOURCE OF EXCESS FINE-GRAINED SEDIMENTS IN NEW JERSEY RIVERS USING RADIONUCLIDES. Joshua C. Galster[1], Huan Feng[1] & Kirk Barrett[2]**.** [1]Department of Earth and Environmental Studies and Passaic River Institute, Montclair State University, Montclair, New Jersey, 07043**,** [2]Passaic River Institute, Montclair State University, Montclair, New Jersey, 07043

Fine-grained sediment is a major pollutant in streams and lakes, affecting feeding and reproduction of aquatic animals, aesthetics, recreation and water supply. One barrier to controlling sediment load is that it is often difficult to determine whether the source of sediment is widespread but shallow surficial erosion from overland flow throughout the watershed or from the lateral erosion of vertical channel bank material. However, these two sources of sediment are identifiable by their different radionuclide signatures, including 7Be, 210Pb, and 137Cs. We propose to sample channel bank material, watershed soils, and in-stream fine sediment and analyze them for radionuclide activity to identify the relative contributions of sediments from the watershed and channel banks in New Jersey. This knowledge will allow for improved stream and watershed management and the possible initiation of sediment-reduction programs.

ORGANIC GEOCHEMICAL INVESTIGATION OF A HIGHLY CONTAMINATED URBAN WATERWAY: THE GOWANUS CANAL, BROOKLYN, NEW YORK, USA. Michael A. Kruge[1, 2], Kevin Olsen[1, 2], Danlin Yu[1, 2], Eric A. Stern[3] & Kirk Barrett[2], [1]Dept. Of Earth & Environmental Studies and Passaic River Institute, Montclair State University, Montclair, Montclair, New Jersey, 07043, [2]Passaic River Institute, Montclair State University, Montclair, New Jersey, 07043, [3]2WRDA Sediment Decontamination Program, U.S. Environmental Protection Agency - Region 2, New York, New York

The Gowanus Canal is an industrial waterway constructed in the mid-19th century by widening and deepening a natural tidal channel. It is 3 km in length and empties into Gowanus Bay, an arm of New York Harbor. Its banks, reinforced by bulkheads and piers, became the site of intensive industrial activity, including oil refining, coal gasification, soap making and tanning. Its sediments remain highly enriched in organic and inorganic contaminants, with combined sewer outfalls continuing to transport pollutants into the canal. Ten grab samples were collected along the length of the canal. Standard environmental chemical analyses were performed (volatile and semi-volatile organics, PCBs, metals). Dried sediment samples were also analyzed by pyrolysis-gas chromatography/mass spectrometry (Py-GC/MS) and thermodesorption-gas chromatography/mass spectrometry (TD-GC/MS). The most highly enriched sample had PAHs up to several hundred mg/kg. The pyrolyzates contain phenols, pyrroles, indoles and guaiacols as both terrestrial and aquatic biomass signatures, but these are overshadowed by the 3 to 5 ring PAHs, parent and methylated.

The PAH distributions are characteristic of creosote, a coal-tar derivative and by-product of coal gasification. If these had been due to petroleum or petroleum product contamination, more abundant petroleum biomarker compounds would be expected. These were detected by TD-GC/MS using selected ion monitoring, but in trace quantities only. The sterenes and fatty acids likely derive from raw and/or partially treated sewage. In spite of the recent reopening of the flushing tunnel at the head of the canal after decades of disuse, it is evident that acute sediment pollution persists in the Gowanus sediments.

NANOTECHNOLOGY AND NANOTOXICOLOGY: CHALLENGES. Nai-chia Luke, Camp Dresser & McKee Inc., Edison, New Jersey.

Nanotechnology is becoming a growing presence in our daily life and a major player in our global economy. It is defined as “ability to measure, see, manipulate, and manufacture products usually between 1 and 100 nanometers”. The field of nanotechnology has great potential applications, in consumer products, health care, transportation, energy, and agriculture, for social, economic and environmental benefits. However, in addition to chemical properties, the physical properties of nanomaterials, such as particle size, solubility, surface area and characteristics, shape, state of dispersion and agglomeration, have contributed to adverse effects on human health and the environment. Furthermore, little is known of the long term toxicity effects to health and of the fate of nanomaterials in the environment. Thus, nanomaterials have been cited as a major concern to public and regulatory communities. Consequently, a new science of nanotoxicology has emerged with the need to study, investigate, evaluate, and determine whether and to what extent these materials may pose a threat to human health and the environment. Although nanotoxicology is still in its infancy, it has created an exciting field for toxicologists. The immediate challenges facing nanotoxicologists include: How to develop the scientific basis for evaluating and characterizing exposure, toxicity, and risks associated with

nanomaterials and how to establish toxicity guidelines. How to communicate public understanding of the benefits of nanotechnology and the risk assessment of nanomaterials, how to establish regulatory guidance and regulations to protect human health and the environment, and how to direct research and resources to investigate the impacts of nanomaterials and minimize the health and the environmental risks, while supporting sustainable development. Answering these questions constitute major challenges for global researchers and regulators in the field of nanotechnology.

THE DELAWARE ESTUARY DATABASE. Greg Murphy, Todd Morrison & Barry Baker**.**

URS Corporation, 335 Commerce Drive, Suite 300, Fort Washington, Pennsylvania, 19034
A searchable, georeferenced database of current environmental conditions was developed in support of a Relative Risk Model (RRM) for regional-scale ecological risk assessment in the Delaware Estuary. The RRM approach is an adaptation of the traditional ecological risk assessment paradigm that accounts for the interactions and impacts of multiple environmental stressors and their sources that occur in a given region. The database design consists of two linked systems, including a searchable Microsoft® Access database and ArcGIS® spatial database, and was developed following best practice database design with integrated use in mind. The extent of physical, chemical, and biological information incorporated into the database was made possible by cooperative participation among state and federal agencies, academic institutions, non-governmental organizations, and industry. The database provides the new and updated stressor and habitat information necessary to further advance the RRM for regional-scale ecological risk assessment in the Delaware Estuary. Incorporating the RRM into the current database platform will enable increased functionality for future applications and iterations. Although the intended purpose of the database was to support the RRM, it has an array of other potential applications for stakeholders involved in management decisions throughout the Delaware Estuary, such as natural resource management and restoration.

TACKLING EMERGING CONTAMINANTS AT PUBLICLY OWNED TREATMENT WORKS. Parikhit Sinha, Stephen Harper & Christopher Kriegner**.** O'Brien & Gere.

Due to demonstrations of their detrimental effects on wildlife, emerging contaminants (ECs) have received increased and recent attention. The new attention is well warranted; harmful effects of these compounds have been demonstrated in wildlife (and potentially humans) at levels as low as 0.01 percent of dosages previously deemed toxic. ECs are a group of previously ignored or unrealized compounds, often of pharmaceutical origin, that enter the environment via point and non-point source pollution. In the case of point source pollution, the mechanism of entry into the environment is primarily through wastewater discharge, where the treatment of affected water at Publicly Owned sewage Treatment Works (POTWs) was insufficient. Currently, effective wastewater treatment technology does not exist that sufficiently treats unmetabolized and biologically active multi-structure ECs that enter POTWs. This is true even though scientific studies and nearly promulgated regulations suggest that in order to protect wildlife, the concentrations of some ECs in effluent should not exceed part per trillion levels. Preliminary pilot scale tests of new technologies have had mixed results, likely due to the diversity of ECs and abundance of non-targeted organics in the wastewater mixture. Additional improvements to existing technologies are needed, to include in plant modifications that both pretreat and polish selected chemicals. Additional treatment steps may include membrane bioreactors, advanced oxidation, or carbon adsorption depending on the ECs present and should

be implemented while considering the potential for the formation of objectionable daughter products. The future of wastewater EC treatment needs to be developed now, in tandem with the lessons of scientific inquiry and impending regulatory requirements.

The Program Committee

Meeting Chairs	Peter Brussock and Ron MacGillivray
Short Courses	Bob Hoke and George Molnar
Poster Chairs and Awards	Ben LePage and Amanda Maxemchuk
Local Arrangements	Carolyn Bentivegna
Exhibitors	Steve Brown
Advertisement	Sean Bugel & Don Nazario
Registration	Chris Nally
Website	Sean Bugel

HDC-SETAC FALL WORKSHOPS

Plan to attend the HDC-SETAC Fall 2008 workshop. Last year's workshop on *Environmental Risk Assessment of Metals and Metalloids* at the Adventure Aquarium in Camden, NJ was well attended. If you have a topic in mind for a one day workshop, suggest it to a HDC-SETAC board member. Updates on the 2008 fall workshop will be available on our website at www.hdcsetac.org.

2008 STUDENT POSTER COMPETITION

The Hudson/Delaware Chapter (HDC) of the Society of Environmental Toxicology and Chemistry is pleased to once again sponsor student research awards. The purpose of these awards is to both recognize outstanding young scholars and to encourage active participation in SETAC and the HDC. Up to six cash prizes are offered:

1. Graduate 1st place: $500 (increased for 2008)
2. Graduate 2nd place: $250
3. Graduate 3rd place: $150

4. Undergraduate 1st place: $350 (increased for 2008)
5. Undergraduate 2nd place: $150
6. Undergraduate 3rd place: $75

Prizes will be awarded at the close of the meeting on Friday and will be based on three reviews performed by unbiased peers during the meeting. The HDC Board of Directors will also review all posters and reserves the right, based on scientific merit, to reject any and all materials submitted.

Eligibility:

- All students must be currently enrolled in an environmental toxicology or chemistry-related undergraduate or graduate program with the following exception: those within one year of graduation may also compete, if the work being evaluated was completed while a student.
- Students and/or their faculty advisors must be HDC members, or must apply for membership at the time of award application. The academic program must be located in the general HDC area (NY/NJ/PA/DE).
- To be considered for any award, a research poster relevant to environmental toxicology and chemistry must be presented at the annual HDC meeting. In advance (typical deadline May 2nd) a 250-word abstract must be submitted for inclusion in the poster program listing.
- Posters should be displayed throughout the 2-day meeting and remain on display through final judging early Friday afternoon. Recognizing that this may not be possible for one-day attendees, posters must be displayed (at a minimum) either all day Thursday or from 8:00 am through completion of judging on Friday.

To apply for the award, students must submit the following:

- A letter of application from the student if not accompanied by a faculty member including a statement from the major advisor identifying the research presented as predominantly that of the student.
- For all awards, a 250 word abstract.
- The student's campus and permanent address, phone number and email address.
- The major advisor's name, address, phone number, and email address.
- The student's current enrollment (institution, department degree program, and expected date of completion).

The HDC- SETAC Officers and Current Board of Directors

Position	Name	Affiliation
President	Steve Brown	Rohm & Haas Company
Vice President	Ron MacGillivray	Delaware River Basin Commission
Past President	Carolyn Bentivegna	Seton Hall University
Secretary	Amanda Maxemchuk	Battelle Memorial Institute
Treasurer	Christopher Nally	American Aquatic Testing
Communications	Richard Henry	U.S. Dept. of Interior, Fish and Wildlife Service
	Don Nazario	Aqua Survey, Inc.
Board Member	Gina Ferreira	US EPA Region 2
Board Member	Peter Brussock	Environmental Liability Management
Board Member	Bob Hoke	DuPont
Board Member	Ben LePage	PECO Energy Company
Board Member	George Molnar	Camp Dresser & McKee
Board Member	Brett Sovick	Lockheed Martin/REAC
Student Board Member & Webmaster	Sean Bugel	Rutgers University

HDC-SETAC is a professional society for environmental scientists, engineers and related disciplines concerned with environmental quality located in eastern Pennsylvania, New Jersey, Delaware, and southeaster New York. HDC-SETAC is a regional chapter of SETAC, a scientific non-profit organization of about 5000 members from 50 U.S. states, 13 Canadian provinces, and more than 70 countries worldwide. HDC-SETAC was founded in 1984, making it one of the first established regional chapters within SETAC in North America. HDC-SETAC is all about environmental scientists and students of our region. All meetings and workshops are designed to educate attendees about current issues and topics of the Hudson / Delaware region.

HDC-SETAC is managed by a 13 member Board of Directors which is elected by the voting membership-at-large each spring. Each board member serves a term of three years, and may serve more than one term. Board members must be members in good standing in both HDC-SETAC and SETAC, and must be committed to following the goals and By-laws of HDC-SETAC. Please consider participating as a board member or officer. ***Your contributions are necessary for our continued vitality. Current needs include a Chapter newsletter editor and an additional local liaison for the proposed 2009 annual meeting in New York state.***

The board of directors and our membership would like to thank the 2008 Corporate Sponsors for their generous support.

Sustaining Corporate Sponsors

Integral Consulting, Inc.

Rohm and Haas Company

Weston Solutions

Full Corporate Sponsors

AMEC Earth & Environmental, Inc.

American Aquatic Testing, Inc.

EcoAnalysts, Inc.

Environmental Liability Management, Inc.

Environmental Resources Management

Golder Associates

HDR, Inc.

Aqua Survey, Inc.

Environmental Standards, Inc.

Merck & Co., Inc.

Camp Dresser & McKee, Inc.

Environ Corporation

Entrix

Exponent

Test America, Inc.

Hydroqual, Inc.

Associate Corporate Sponsors

DuPont

Qualitative Environmental Analysis, LLC

Great Eastern Ecology

SGS Environmental