

US EPA ARCHIVE DOCUMENT

United States Environmental Protection Agency

- Office of Research and Development
- National Health and Environmental Effects Research Laboratory
- Mid-Continent Ecology Division, Duluth, Minnesota

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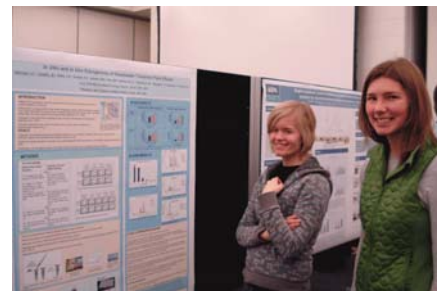
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Research Events

ANNUAL POSTER SOCIAL

The Mid-Continent Ecology Division and Twin Ports Freshwater Folk co-hosted the 4th Annual MED Poster Social on December 2. Over 20 posters were on display, highlighting the research presented by MED staff at scientific meetings throughout 2009. Presentations covered the wide range of work being conducted at MED, from research on nanoparticles to large scale ecosystems:



- Towards an ecosystem services research program for the Great Lakes Basin (ESRP-GLB): Understanding multiscale variation in ecosystem structure, function, and services in aquatic ecosystems subjected to multiple stressors. Angradi, T.A., D. Bolgrien, J. Hoffman, T. Hollenhorst, M. Moffett, J. Morrice, J. Scharold, M. Sierszen, D. Taylor, A. Trebitz, J. Thompson and P. Yurista.
- A classification scheme for assignment of chemical class and mode of action for organic and metal contaminants. Barron, M.G., D.N. Vivian, C.L. Russom, and S. Raimondo.
- Microwave digestion and furnace atomic absorption method for the quantification of nano-scale TiO₂ in aqueous samples. Brennan, A.A., J.D. Fernandez, and S.A. Diamond.
- Relative chemical binding affinities for trout and human estrogen receptor using different competitive binding assays. Denny, J.S., M.W. Hornung, M.A. Tapper, P.K. Schmieder, J. Pregonzer, J. McKim IV, and D. Blakeman.
- Measuring endocrine-active chemicals at ng/L concentrations in water. Durhan, E.J., E.A. Makynen, J.E. Cavallin, L.C. Wehmas, and G.T. Ankley
- Ecoenzymatic stoichiometry of microbial nutrient acquisition in aquatic sediments. Hill, B.H. and C.M. Elonen.
- The influence of test conditions on the performance of *Chironomus dilutus* and *Hyalella azteca* in sediment toxicity tests. Hockett, J.R., T.L. Highland, D.J. Hoff, C.T. Jenson, T.J. Norberg-King, and D.R. Mount.
- An evaluation of the venous equilibrium model for hepatic clearance using isolated perfused rainbow trout livers. Hoffman, A.D., T.L. ter Laak, P.N. Fitzsimmons, and J.W. Nichols.
- Effects of silver nanoparticles on Japanese medaka (*Oryzias latipes*) and *Daphnia magna*. Hoheisel, S., A.A. Brennan, S.A. Diamond, and D.R. Mount.
- Use of tandem in vitro and ex vivo assays to assess chemicals for thyroid hormone synthesis inhibition. Hornung, M.W. and E. Burgess.
- Evaluation of the antimicrobial triclocarban in a short-term reproduction assay with the fathead minnow (*Pimephales promelas*). Jensen, K.M., J.E. Cavallin, E.J. Durhan, M.D. Kahl, E.A. Makynen, D.L. Villeneuve, L.C. Wehmas, and G.T. Ankley.
- Dynamic nature of alterations in the endocrine system of fathead minnows exposed to the fungicide prochloraz. Kahl, M.D., J.E. Cavallin, K.M. Jensen, N.D. Mueller, D.L. Villeneuve, L.C. Wehmas, G.T. Ankley, and D. Martinovic.

Continued on next page...

POSTER SOCIAL – CONTINUED

- An international conference on the ecology of Lake Superior: Integrated approaches and challenges in the 21st century. J.R. Kelly and M. Munawar
- Resolving responses of coastal receiving systems to landscape stressors: A model approach in support of nutrient criteria development in large regional settings. J.A. Morrice, M.E. Sierszen, J.A. Thompson, A.S. Trebitz, and J.R. Kelly
- Metabolism of 7-ethoxycoumarin by isolated perfused rainbow trout livers. Nichols, J.W., G.J. Lien, A.D. Hoffman, and P.N. Fitzsimmons.
- Comparisons of sediment test volumes for freshwater solid phase sediment toxicity tests. Norberg-King, T.J., T.L. Highland, R.J. Hockett, and D.R. Mount.
- Using biological assemblages to assess the condition of the Great Rivers of the Central Basin, USA. Pearson, M.S., T.R. Angradi, S.L. Batterman, D.L. Taylor, T.M. Jicha, and D.W. Bolgrien.
- Use of microarray to analyze gene expression profiles of acute effects of prochloraz on fathead minnows (*Pimephales promelas*). Skolness, S.Y., K.M. Jensen, M.D. Kahl, D. Martinovic, D.L. Villeneuve, and G.T. Ankley.
- Defining Great Lakes shallow nearshore zones for the USEPA 2010 National Coastal Assessment. Starry, M.A., J.R. Kelly, P.M. Yurista, J.V. Scharold, and T. Olsen.
- Negative feedback control of pituitary thyroid-stimulating hormone synthesis and secretion by thyroid hormones during metamorphosis in *Xenopus laevis*. Sternberg, R.M., K.R. Thoenke, J.J. Korte, S.M. Moen, J.E. Tietge, and S.J. Degitz
- Multimetric habitat and hydrology indices for Mid-Continent (USA) Great Rivers. Taylor, D.L., B.H. Hill, M.S. Pearson, D.W. Bolgrien, and T.R. Angradi.
- In vitro and in vivo estrogenicity of wastewater treatment plant effluent. L. Wehmas, J. Cavallin, L. Blake, E. Durhan, K. Jensen, M. Kahl, D. Martinovic, D. Villeneuve, J. Mayasich, T. Tuominen, and G. Ankley.



Contact: Mike Hornung (218) 529-5236.

UNIVERSITY FOR SENIORS

In January, February, and March 2010, several Division scientists made presentations on a variety of research topics as part of a work study group associated with the University for Seniors program at the University of Minnesota Duluth. This program is sponsored by the Department of Continuing Education, which provides lifelong learning for individuals age 50 and older, and focuses on opportunities for intellectual and cultural development. The program is designed to function as an intellectual cooperative with its members acting as instructors, planners, and committee members. Over forty study groups are offered each term, and three eight-week terms are held each academic year.

Bob Spehar made a series of general presentations highlighting the Division's research, organism culture, and test system designs from the late 1960s, when the laboratory was built, to the present. Later presentations described the use of science in regulation (Teresa Norberg-King); and research involving asbestos (Phil Cook), amphibians (Joe Tietge), wildlife (Rick Bennett), and toxicokinetics (Mike Hornung). Each presentation discussed why the research was undertaken, what was done, and how it has evolved over time. An excellent exchange of questions and answers occurred after each presentation between the seniors and the Division's scientists. **Contact:** Bob Spehar (218) 529-5123.

ORD AND GLNPO SCIENTISTS MEET TO CHARACTERIZE POTENTIAL RISKS OF TOXIC SUBSTANCES IN GREAT LAKES

On January 20-21, scientists from across ORD held a meeting in Chicago with the USEPA Region 5 Great Lakes National Program Office (GLNPO), the toxic chemical component of the Great Lakes Restoration Initiative (GLRI). The purpose of the meeting was to create a strategy to establish a framework to be used by GLNPO to prioritize and organize toxics-related work that may be conducted by ORD, federal agencies, grantees, and other collaborators. The draft strategy will be reviewed and critiqued at a binational, interagency workshop to be held in May of 2010 in Toronto. The GLRI is a major, comprehensive effort to address priority issues in the Great Lakes, including the issue of toxic substances. Monitoring of toxic substances in the Great Lakes has been longstanding, but assessing the risks associated with the presence of legacy contaminants and contaminants of emerging concern has been hampered by the lack of effects data or predictions. Therefore, a major emphasis in the upcoming GLRI work will be on characterizing and predicting potential effects of chemicals relevant to the Great Lakes. **Contact:** Joe Tietge (218) 529-5176.



SYMPOSIUM ON INTEGRATED MODELING FOR LARGE AQUATIC ECOSYSTEMS

PUTTING THE BEST AVAILABLE SCIENCE AND INFORMATION TECHNOLOGY TO USE: INTEGRATED MODELING AND ANALYSIS TO SUPPORT THE MANAGEMENT AND RESTORATION OF LARGE AQUATIC ECOSYSTEMS

The visible signs of a major water-body under stress are profound. Harmful algal blooms, hypoxia, habitat loss, nuisance species invasions, declining fish and shellfish populations, waters unsafe for drinking or swimming...

Large aquatic ecosystems such as the Chesapeake Bay, Great Lakes, and Puget Sound are facing some of the Nation's most complex water resources and ecosystem management challenges. These systems are very complicated networks of correlated hydraulic, hydrological, ecological, geochemical, biological, and atmospheric components, supporting a variety of processes. In addition to housing an amazingly diverse array of plants and wildlife, these ecosystems support many important economic activities. The stress on these ecosystems from urban sprawl, air and water pollution, invasive species, and climate change has wide ranging impacts on the quality of life in their vicinity. Consequently, their restoration is increasingly viewed as a national priority. Developing strategies for the management and restoration of the large aquatic ecosystems relies on scientific analyses that tie the multiple pressures on these systems to multiple ecological responses of concern. Given the multi-scale and multi-media challenges associated with understanding and restoring these ecosystems, integrated modeling and analysis is an especially useful approach.

On January 21-22, the USEPA convened a symposium on the development and design for application of multi-media, multi-scale, and multi-disciplinary models to support the

protection and restoration of large aquatic ecosystems. The symposium sought to determine how science-based modeling systems can be used to inform management and the design of innovative policies, including those that combine traditional regulatory approaches with market-mechanisms. Over 150 participants attended from a wide range of sectors (federal, state and local government, NGOs, academia, private sector), including policy analysts, ecologists, environmental engineers, economists, IT specialists, and program managers. Plenary sessions and breakout workgroups were convened. Next steps are to develop a symposium report, a symposium white paper, and a journal publication on integrated modeling and analysis systems.

The organizing committee was composed of USEPA personnel from numerous Offices and Programs:

- Richard Allen, Office of Environmental Information
- Alan Dixon, Office of Pollution Prevention and Toxics
- Noha Gaber, Office of the Science Advisor
- Michael Hiscock, Office of the Science Advisor
- Russell Kreis, Office of Research and Development, NHEERL
- John Lehrter, Office of Research and Development, NHEERL
- Lewis Linker, Chesapeake Bay Program Office
- Mahri Monson, Pacific Islands Office
- Gabriel Olchin, Office of the Science Advisor
- John Powers, Office of Water
- Gary Shenk, Chesapeake Bay Program Office

The Symposium website can be found at:

<http://www.epa.gov/crem/2010-symposium.htm>.

Contact: Russ Kreis (734) 692-7615.



6TH US-JAPAN BILATERAL MEETING ON ENDOCRINE DISRUPTION TEST METHODS DEVELOPMENT

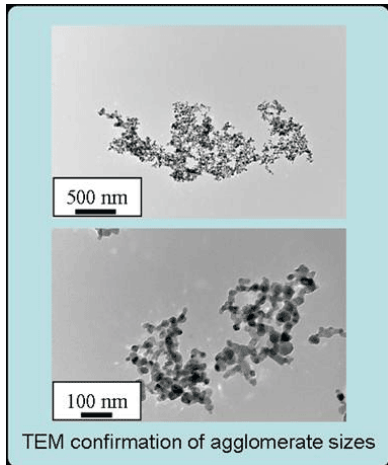
This meeting was held in Washington DC on January 27-28, to harmonize efforts by the USEPA and Japanese Ministry of the Environment to develop Tier 2 testing protocols for evaluating chemicals for endocrine disruption and reproductive toxicity in fish, amphibians, and invertebrates. Meeting participants included Japanese representatives from the Ministry of the Environment, the Chemicals Evaluation and Research Institute, and the National Institute of Environmental Studies; and USEPA representatives from the Office of Scientific Coordination and Policy and the ORD NHEERL Mid-Continent Ecology Division. The agenda included presentations of bilateral progress in test development, followed by the establishment of workgroups to discuss issues for each test protocol and to propose areas of collaboration between US and Japanese research groups, for possible integration into research plans for the following year. Also discussed was US-Japanese cooperation on harmonizing test protocols for Organization for Economic Cooperation and Development validation. The bilateral meeting provided opportunities for exchange of research results, opinions, and views on various issues related to endocrine disruption effects in aquatic animal species, including fish, amphibians, and invertebrates.

Contact: Rod Johnson (218) 529-5117 or Sig Degitz (218) 529-5168.

Featured Research

NANOMATERIALS ECOTOXICOLOGY RESEARCH

Nanomaterials continue to be developed, produced, and incorporated into consumer and commercial products at an ever-increasing pace. These materials, loosely defined as having at least one dimension between 1 and 100 nm, are characterized by having physical-chemical properties and behaviors not present in their bulk forms. These characteristics make nanomaterials extremely attractive as additives or primary constituents in consumer, commercial, and industrial products. They have the potential to

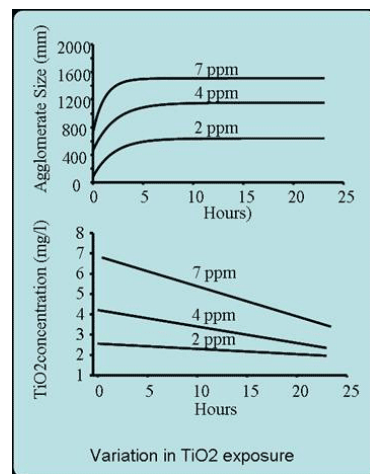


dramatically increase the efficiency of solar voltaic systems, rapidly degrade environmental contaminants, greatly advance targeted drug delivery, yield lighter and stronger materials, and impact almost every sector of human activity. All of these characteristics also contribute to concerns with the environmental risk posed by these materials. Adding to those concerns is the particulate or fibrous nature of nanomaterials. Ecotoxicity test protocols or guidelines focus exclusively on soluble chemicals and do not describe methods for creating exposure media or monitoring factors such as agglomerate size or settling rates. To address these issues, researchers at MED have, over the last two years, identified the inadequacies in test protocols and begun developing test approaches that address those inadequacies. Initial testing with nano-scale titanium dioxide (TiO₂) and silver (n-Ag) has demonstrated that, for many nanomaterials, test protocols will need to require additional characterization of particle suspension including agglomeration state (the extent to which individual particles clump together) and measurement of concentration. For example, the figures shown here illustrate the consistent change in these properties over a standard media renewal time of 24 hours. These properties are also strongly affected by water-quality factors including ionic strength and pH, and the presence of organisms (likely due to exudates in exposure media). MED researchers have also quantified the increase in

toxicity of TiO₂ in the presence of solar radiation (simulated; SSR). At very moderate levels of SSR (simulating a mostly-cloudy summer day in Duluth) the effect level (96-hour LC₅₀) has been estimated to be about 4.5 mg/l, whereas only partial effects are seen at 500 mg/l, representing a two order of magnitude increase in potency. There is also some suggestion that larger agglomerates are slightly more toxic than smaller agglomerates, although this effect has not been entirely confirmed.

MED researchers have also completed several assays with a variety of forms of n-Ag and Ag salts in an effort to differentiate between toxicity of particles and the ions that they may release to the exposure media. A key regulatory issue relative to n-Ag and n-Ag-containing products: it is currently unclear whether it is adequate to regulate n-Ag based solely on the ions that it may release, or if regulation should, in part, be based on the toxicity of particles, per se. Research at MED indicates that n-Ag is much less toxic, on a bulk concentration basis, but it remains unclear whether the toxicity observed is due to ions released from the particles (note that ionic silver is toxic to small fish and aquatic invertebrates at low part per billion levels). In the near future, MED researchers plan to incorporate proteomic approaches to address this question.

The nanomaterials toxicology research at MED is being conducted by a team comprised of Steve Diamond (lead PI), Dave Mount (co-PI), Sarah Hohiesel (UMD M.S. student being funded under the UM Coop), and Amanda Brennan (SSC), with assistance from Joe Fernandez and others. MED researchers have also collaborated with NHEERL, NRMRL/CINCI, and NERL researchers as well as US Army Corps scientists. The research directly addresses needs of OPPTS and partially fulfills a US commitment to participate in international research efforts being coordinated by the Organization for Economic and Cooperative Development. **Contact:** Steve Diamond at (218) 529-5229, or diamond.steve@epa.gov.



OUR NEW RESEARCH VESSEL!

The Research Vessel *R/V Lake Explorer II* was transferred to USEPA Duluth in August 2008 from NOAA/Norfolk, VA, where it was known as the *RUDE*. The vessel will be used at MED to complete a series of research surveys across the Great Lakes, which will develop and demonstrate a new generation of lakewide assessment designs. The Division's efforts to improve existing designs include nearshore ecosystems in lakewide assessment, and are designed to integrate with the work of bi-national monitoring partners.

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NEW RESEARCH VESSEL – CONTINUED



The vessel is moored at the Army Corps of Engineers vessel yard at 901 Minnesota Ave., the first one in line of the “research vessel row” along the south dock, in front of *R/V LL Smith* (University of Wisconsin-Superior), and the *R/V Blue Heron* (UMD Large Lakes Observatory). The *R/V Lake Explorer II* is a 90-foot vessel of 150 gross registered tons and has a draft of 7.5 feet (1.9 meters), shallow for a vessel of this size. There are eleven bunks (four double staterooms and one triple stateroom) aboard. The vessel accommodates four crew (boat captain, first mate, chief and first engineers) and up to seven scientists.

The vessel’s former mission with NOAA was to perform inshore hydrographic surveys along the east coast in support of NOAA’s nautical charting mission, specializing in the location and accurate positioning of submerged hazards to navigation. Aside from hydrographic surveying, *RUDE* was called upon to assist the US Coast Guard and Navy in search, rescue, and recovery operations. The *RUDE* located the TWA flight 800 wreckage of Moriches, NY in 1996 and located John F. Kennedy Jr.’s plane off Martha’s Vineyard.

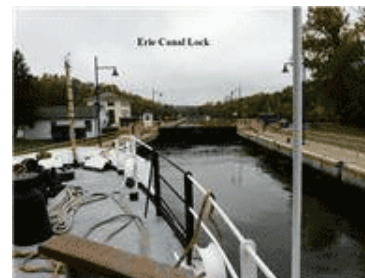
The *R/V Lake Explorer II* came well-equipped from the transfer. All the operational equipment to navigate the vessel was left aboard, but all the NOAA science mission equipment was removed. MED is currently fitting the vessel with the necessary equipment to conduct Great Lakes research.

Even though the vessel is equipped with an A-frame, MED seeks to add install another winch and frame for deploying our in situ sensor packages to make continuous synoptic maps of water and plankton properties on extensive research surveys more efficient.



The *R/V Lake Explorer II* went into a Portsmouth, VA shipyard in summer 2009 for extensive upgrades to structural components. The primary objective of the haul-out was to install a new tank to hold all sewage generated aboard the vessel to meet the Great Lakes requirement of zero discharge of sewage and grey water. During this period, the sewage tank was installed, shaft tubes were replaced, sea valves replaced or rebuilt, new anti-foul bottom paint applied, and routine out-water inspection of equipment and hull performed.

Once out of the shipyard, the *R/V Lake Explorer II* was sailed from Norfolk, VA to Duluth, MN. The vessel and crew departed from NOAA Marine Operations Base in Norfolk at 7:00 am Oct. 1. The transit included two days on the Atlantic Ocean to New York, NY harbor, then a break in New York before continuing up the Hudson River to enter the New York State Canal System, also known as the Erie Canal. It took four days to navigate the Canal System, which ends in Oswego, NY. The *R/V Lake Explorer II* cleared 30 locks to get from the Hudson River to Lake Ontario. The trip took 15 days from start to end: 1580 miles, one ocean, 7 rivers, 39 locks, and 4 Great Lakes. **Contact:** Captain Sam Miller (218) 529-5211.



RESERV RESEARCH PROGRAM

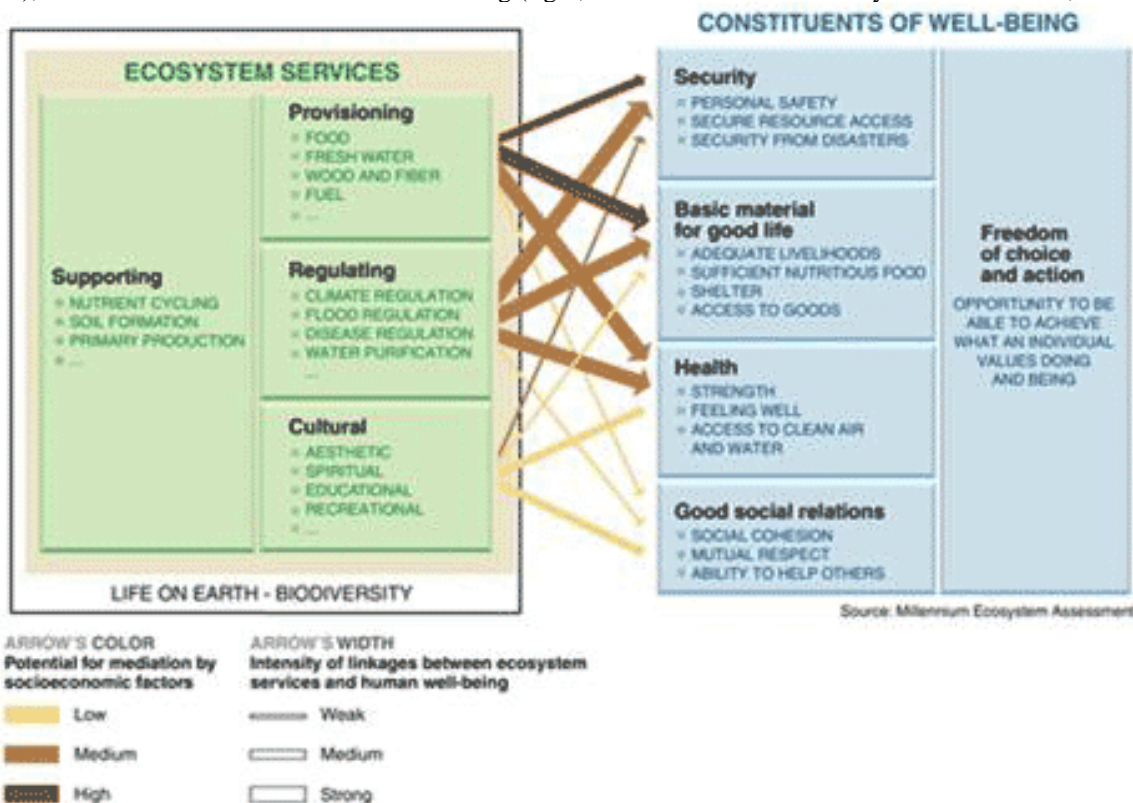
The Regional Ecosystem Services (REServ) research program is a new collaborative program between ORD and USEPA regions. The dual goals of REServ are:

- to characterize the type, quality, and magnitude of services we receive from ecosystems and to offer a scientific basis for transforming the way decision-makers view ecosystems;
- to demonstrate the value of ecosystems services for improving regional/state environmental management decisions.

Ecosystem services can be defined as **the products of ecological functions or processes that directly or indirectly contribute to human well-being, or have the potential to do so in the future.** This definition provides an interpretation of ecosystem services that may or may not be quantifiable. It is used to help us recognize the broad array of services we receive, whether or not amenable to economic valuation.

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The conceptual model below illustrates this framework showing the relationship between services (left), drivers mediating these services (arrows), and their contributions to human well-being (right; from the Millennium Ecosystem Assessment, 2005).



In general, ecosystem services are products like clean air and water, food, and fiber supplied by the natural world. The ecosystem processes and functions creating these services are the chemical, physical, and biological interactions among ecosystem components. In some circumstances, what may be a service in one case is a function or process in another, when the process is an intermediate input to the final service. For proper accounting, services are identified in relationship to particular goals, problems, regions, or decisions that are of concern.

Natural ecosystems and associated plants and animals provide humans with services that are difficult to replace. One of the greatest challenges in defining the **value** of ecosystem services is finding ways to identify, quantify, or consider them in ways applicable to commerce. The National Research Council (2004) defined the **ecological production function** as the *translation of ecosystem structure and function into goods and services produced from inputs of natural and human capital, labor, and other resources*. While much work remains to be done to effectively value ecosystem services, there are some methods available to characterize societal values. There are also decision support methods available that do not rely on monetization. Questions about REServ may be directed to Brian Hill (hill.brian@epa.gov, 218-529-5224).

Current Events

MED HOSTS LAKE SUPERIOR BINATIONAL FORUM



On January 29, the Binational Forum met at the Division. The Forum is a collaborative of federal, state, tribal, local, and industry partners focused on the entire ecosystem of Lake Superior--its air, land, water, and human and wildlife.

USEPA and the Forum co-sponsored this public event titled *Monitoring Climate Change: How Can We Tell It's Happening in the Lake Superior Basin and Can We Do Anything About It?* Speakers from the Division, National Resources Research Institute, UMD; and the MN Sea Grant discussed signs of changing climate, how climate changes affect port/harbor infrastructure and moose populations, and the Twin Ports Interfaith Climate Change Initiative.

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LAKE SUPERIOR BINATIONAL FORUM – CONTINUED

The Forum is the stakeholder group of the Lake Superior Binational Program. The Forum will develop and further the goals of the Binational Program to restore and protect the Lake Superior Basin; review projects, budgets, and activities undertaken by the governments that were signatory to the Binational Program, the Lake Superior Task Force, and Lake Superior Work Group; and identify obstacles and solutions to the achievement of goals of the Binational Program. The Forum may also serve as a source of information and stakeholder input to the communities of the Lake Superior Basin on environmental issues that impact the water quality of Lake Superior and the larger ecosystem made up by the Basin. The Forum recognizes individuals and organizations through the annual Lake Superior Environmental Stewardship Awards. For more information, see: <http://superiorforum.org/>.

Contact: Carl Richards (218) 529-5010.

USEPA REGION 5 MEETS WITH TRIBAL TECHNICAL STAFF AT THE DIVISION

The Division hosted a quarterly meeting of the Minnesota reservations technical staff on February 18-19. This meeting was coordinated by Ed Fairbanks, USEPA Region 5, Minnesota Tribal Liaison. Thirty invited technical staff attended, representing Native American tribal environmental programs from across Minnesota. During this meeting Allan Batterman, Outreach Coordinator at the Division, offered a tour of the MED research facility; and Dr. Carl Richards, MED Director, provided an overview of ORD research programs and discussed ways in which ORD can interact with tribal programs. Other agenda items for this meeting included: reports on National Tribal Air and Water Councils, Central Regional Air Planning Association/CenRAP, and Region 5 Air Monitoring Network Assessment; presentation and discussion on emergency notification; discussion on Minnesota Department of Transportation right-of-ways on tribal lands; National and Regional Tribal Operations Committees Reports; tribal/MPCA wild rice correspondence and the wild rice standard; tri-annual water quality standards; and regional haze state implementation plan/SIP.

Contact: Carl Richards (218)-529-5010.

UPCOMING: INTERNATIONAL CONFERENCE: ECOLOGY OF LAKE SUPERIOR: INTEGRATED – APPROACHES & CHALLENGES OF THE 21ST CENTURY, MAY 3-5

Co-hosted by MED and the Aquatic Ecosystem Health and Management Society (AEHMS), this conference will be held at the Division. The Lake Superior Binational Program, Great Lakes Regional Research Information Network is sponsoring the event, which is being organized by a committee from the US, Netherlands, and Canada.



Conference objectives include:

- Develop understanding of Lake Superior's ecology, including its internal limnological dynamics.
- Explore the lake's interactions with the basin, air shed, and regional climatology.
- Create a state-of-the-lake perspective from a variety of information.
- Overview recent study results that can provide insights enabling integration and synthesis at several levels, such as:
 - from water quality/biogeochemical cycles to effects on food webs and fisheries;
 - from basin/air shed trends to their influences on physical limnology and biology;
 - across spatial scales and habitats within the lake, such as linking coastal processes with offshore ecology or surface water dynamics with deep water ecology; and
 - across temporal scales from seasons to decades or longer.
- Consider current and future threats to the ecology of the lake, including climate change and exotic species.

Background questions:

- How well do we know the present status and ecological dynamics of Lake Superior?
- Can we integrate understanding of the lake and its interaction with the basin and atmosphere more comprehensively?
- What does our present knowledge portend for the lake's future into the 21st century?
- Can we identify important information gaps that could be filled by research and monitoring?
- What emerging tools and approaches will best facilitate an integrated, multi-disciplinary assessment in Lake Superior and function as an international model?
- Are there useful lessons and comparisons of Lake Superior with other great lakes of the world?

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The Publication and Production Committee of the AEHMS, chaired by Dr. M. Munawar, Chief Editor, will oversee the publication of selected manuscripts originating from the conference. The manuscripts will be considered for publication subject to peer review in the ISI rated journal: *Aquatic Ecosystem Health and Management* and/or in the *Ecovision World Monograph Series* depending on the quality and suitability of the manuscripts. For more information, see the AEHMS website: <http://www.aehms.org/>.

Contact: Jack Kelly (218) 529-5119.

New Publications since November 2009

- Angradi, T.R., M.S. Pearson, D.W. Bolgrien, T.M. Jicha, D.L. Taylor, and B.H. Hill. 2009. Multimetric macroinvertebrate indices for mid-continent US great rivers. *Journal of the North American Benthological Society* 28:785-804.
- Ankley, G.T., D. Bencic, J.E. Cavallin, K.M. Jensen, M.D. Kahl, E.A. Makynen, D. Martinovic, N. Mueller, L.C. Wehmas, and D.L. Villeneuve. 2009. Dynamic nature of alterations in the endocrine system of fathead minnows exposed to the fungicide prochloraz. *Toxicological Sciences* 112:344-353.
- Ankley, G.T., R.S. Bennett, R.J. Erickson, D.J. Hoff, M.W. Hornung, R.D. Johnson, D.R. Mount, J.W. Nichols, C.L. Russom, P.K. Schmieder, J.A. Serrano, J.E. Tiegte, and D.L. Villeneuve. 2010. Adverse outcome pathways: A conceptual framework to support ecotoxicology research and risk assessment. *Environmental Toxicology and Chemistry* 29:730-741.
- Blocksom, K., D.M. Walters, T.M. Jicha, J.M. Lazorchak, T.R. Angradi, and D.W. Bolgrien. 2010. Persistent organic pollutants in fish tissue in the mid-continental great rivers of the United States. *Science of the Total Environment* 408:1180-1189.
- Burkhard, L.P., P.M. Cook, and M.T. Lukasewycz. 2010. Direct application of biota-sediment accumulation factors. *Environmental Toxicology and Chemistry* 29:230-236.
- Greenberg, R., B.J. Olsen, and M.A. Etterson. 2010. Patterns of seasonal abundance and social segregation in inland and coastal plain swamp sparrows in a Delaware tidal marsh. *The Condor* 112:159-167.
- Etterson, M.A., G.J. Niemi, and N.P. Danz. 2009. Estimating the effects of detection heterogeneity and overdispersion on trends estimated from avian point counts. *Ecological Applications* 19:2049-2066.
- Martinovic, D., D.L. Villeneuve, M.D. Kahl, L.S. Blake, J. Brodin, and G.T. Ankley. 2009. Hypoxia alters gene expression in the gonads of zebrafish (*Danio rerio*). *Aquatic Toxicology* 95:258-272.
- Nichols, J.W., A.D. Hoffman, and P.N. Fitzsimmons. 2009. Optimization of an isolated perfused rainbow trout liver model: Clearance studies with 7-ethoxycoumarin. *Aquatic Toxicology* 95:182-194.
- Petkov, P.I., S. Temelkov, D.L. Villeneuve, G.T. Ankley, and O.G. Mekenyan. 2009. Mechanism-based categorization of aromatase inhibitors: A potential discovery and screening tool. *SAR and QSAR in Environmental Research* 20:657-678.
- Reavie, E.D., T.M. Jicha, T.R. Angradi, D.W. Bolgrien, and B.H. Hill. 2010. Algal assemblages for large river monitoring: comparison among biovolume, absolute and relative abundance metrics. *Ecological Indicators* 10:167-177.
- Sinsabaugh, R.L., B.H. Hill, and J.J. Follstad Shah. 2009. Ecoenzymatic stoichiometry of microbial organic nutrient acquisition in soil and sediment. *Nature* 462:795-798.
- Stroom, K.T., K.L. Schmude, J. Snitgen, S.J. Lozano, T.D. Corry, and J.V. Scharold. 2010. New records and range extensions for several Chironomid genera from Lake Superior. *Proceedings of the XV International Symposium on Chironomidae*, The Chironomidae Research Group, University of Minnesota, St. Paul, MN, pp. 184-195.
- Trebitz, A.S., J.R. Kelly, J.C. Hoffman, G.S. Peterson, and C.W. West. 2009. Exploiting habitat and gear patterns for efficient detection of rare and non-native benthos and fish in Great Lakes coastal ecosystems. *Aquatic Invasions* 4:651-667.
- Van Aggelen, G., G.T. Ankley, W. Baldwin, D. Bearden, W. Benson, J. Chipman, T. Collette, J. Craft, N. Denslow, M. Embry, F. Falciani, S. George, C. Helbing, P. Hoekstra, T. Iguchi, Y. Kagami, I. Katsiadaki, P. Kille, L. Lie, P. Lord, T. McIntyre, A. O'Neill, H. Osachoff, E. Perkins, E. Santos, R. Skirrow, J. Snape, C. Tyler, D. Versteeg, M. Viant, D. Volz, T. Williams, and L. Yu. 2010. Integrating omic technologies into aquatic ecological risk assessment and environmental monitoring: Hurdles, achievements and future outlook. *Environmental Health Perspectives* 118:1-5.

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PUBLICATIONS – CONTINUED

Villeneuve, D.L., N. Garcia-Reyero, D. Martinovic, N.D. Mueller, J.E. Cavallin, E.J. Durhan, E.A. Makynen, K.M. Jensen, M.D. Kahl, L.S. Blake, E.J. Perkins, and G.T. Ankley. I. Effects of a dopamine receptor antagonist on fathead minnow, *Pimephales promelas*, reproduction. *Ecotoxicology and Environmental Safety*. 73:472-477.

Villeneuve, D.L., N. Garcia-Reyero, D. Martinovic, N.D. Mueller, J.E. Cavallin, E.J. Durhan, E.A. Makynen, K.M. Jensen, M.D. Kahl, L.S. Blake, E.J. Perkins, and G.T. Ankley. II. Effects of a dopamine receptor antagonist on fathead minnow dominance behavior and ovarian gene expression in the fathead minnow and zebrafish. *Ecotoxicology and Environmental Safety*. 73:478-485.

MED Seminars

January 6

Ms. Jayna DeVore, University of Georgia, Athens, GA

- Indirect effects of plant invasion on American toads: Top-down and bottom-up influences

January 13

Dr. Rachel Morgan, US Army Corps of Engineers, ERDC-CERL, Champaign IL

- Cell and tissue-based biosensors: Exploiting biological processes for water toxicity testing

January 27

Drs. Mike Hornung & Dan Villeneuve, USEPA, MED

- Ecotoxicology for the 21st Century within the framework of adverse outcome pathways

February 3

Dr. Carlie LaLone, USEPA, MED

- Identification of key Echinacea constituents and their mechanism leading to the inhibition of prostaglandin E2 (research conducted at Iowa State University)

February 10

Dr. Ric Lopez & Ms. Annie Neale, USEPA, NERL, Las Vegas

- Mapping ecosystem services

February 24

Mr. Eric Mead & Mr. Rod Booth, USEPA, MED

- MED culture unit wastewater treatment system

March 31

Dr. Euan Reavie, UMD-NRRI

- Scientific aspects of the Great Ships Initiative



Awards

As part of its comprehensive Environmental Management System (EMS), the Division has developed a very successful solid waste diversion program. Staff has been recycling for over 20 years with great success; in FY08, we diverted 64% of our solid waste, and in FY09, 79%. (Diversion rate is the percent of solid waste diverted from the landfill by recycling, reusing, or donating waste items.) In addition to food waste composting, where we divert food scraps and biodegradable paper products from the waste stream, our "recycle, reduce, and reuse" practices include use of 100% recycled content paper, two-sided printing, energy and water conservation, and our sustainable "Northern meadow" landscape.

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AWARDS – CONTINUED

In 2009, MED-Duluth was crowned the heavyweight champion in the "Laboratory Conference" in the EPA-wide *Strive for 45* recycling competition. Our 79% rate translated to a diversion of 22.3 pounds of waste per person per week! The Grosse Ile facility had a diversion rate of 65%, an excellent rate for a multi-tenant facility. MED's EMS Team was acknowledged in 2009 with an award for achieving "full success" at meeting Agency EMS goals in FY08, and we expect a top rating for FY09 and into future years. **Contact:** Barb Sheedy (218) 529-5192.



People



Dr. Joel Hoffman has joined our Ecosystem Assessment Research Branch as a Research Biologist in Systems Ecology (fisheries). In 2006 Joel received his Ph.D. in Marine Science at The College of William and Mary, Virginia Institute of Marine Science (VIMS). Joel was an NSF fellow at VIMS and received a number of notable graduate student awards during that time. He earned dual undergraduate degrees in 1999 from the University of Michigan: B.S. with Honors (Resource Ecology and Management) and B.A. with Highest Distinction (Philosophy). His research interest is to understand the connections between human-caused changes to the environment, ecosystem processes, food web dynamics, habitat, and fish population success to develop a workable practice of sustainable ecosystem-based management. He has worked in a number of marine and freshwater environments, focusing often on coastal and estuarine fishes because of their economic and social importance and because their habitat is highly vulnerable to anthropogenic impacts. Joel has been a very active post-doctoral researcher at MED for the past three years, where he studied larval fish as potential indicators of terrestrial subsidies of organic matter and the role this linkage may play in structuring the production of coastal fisheries. He also contributed as co-PI to

invasive species and coastal wetland research, and to development of isotopic techniques to unravel Lake Superior and mid-Atlantic Ocean food webs.

We are pleased to welcome him to a career research scientist role at MED and know that he will continue to make strong contributions to ORD's Water Quality and Ecosystem Services Research Program. Joel is in room 204; phone (208) 529-5135.