

**B&ESD Newsletter**  
**June 2011**

**Pubs and Products**

Adams, S. M. and K. D. Ham. 2011. Application of biochemical and physiological indicators for assessing recovery of fish populations in a disturbed stream. *Environ. Manage.* 47: 1047-1063.

Andres, R. J., Gregg, J. S., Losey, L., Marland, G., and T. A. Boden. 2011. Monthly, global emissions of carbon dioxide from fossil fuel consumption. *Tellus B* 63: 309-327.

Bitra, V. S. P., Womac, A. R., Yang, Y. T., Miu, P. I., Igathinathane, C., Chevanan, N., and S. Sokhansanj. 2011. Characterization of wheat straw particle size distributions as affected by knife mill operating factors. *Biomass Bioenerg.* Available online. DOI:10.1016/j.biombioe.2011.05.026

Brown, S. D., Begemann, M. B., Mormile, M. R., Wall, J. D., Han, C. S., Goodwin, L. A., Pitluck, S., Land, M. L., Hauser, L. J., and D. A. Elias. 2011. Complete genome sequence of the haloalkaliphilic, hydrogen-producing bacterium *Halanaerobium hydrogeniformans*. *J. Bacteriol.* 193: 3682-3683.

Chauhan, A., Layton, A. C., Williams, D., Smartt, A. E., Ripp, S., Karpinets, T. V., Brown, S. D., and G. S. Sayler. 2011. Draft genome sequence of the polycyclic aromatic hydrocarbon-degrading, genetically engineered bioluminescent bioreporter *Pseudomonas fluorescens* HK44. *J. Bacteriol.* Available online. DOI:10.1128/JB.05530-11

Christensen, S. W., Brandt, C. C., and M. K. McCracken. 2011. Importance of data management in a long-term biological monitoring program. *Environ. Manage.* 47: 1112-1124.

Dale, V. H., Efrogmson, R. A., and K. A. Kline. 2011. The land use-climate change-energy nexus. *Landscape Ecol.* 26: 755-773.

Gihring, T. M., Green, S. J., and C. W. Schadt. 2011. Massively-parallel rRNA gene sequencing exacerbates the potential for biased community diversity comparisons due to variable library sizes. *Environ. Microbiol.* Available online. DOI:10.1111/j.1462-2920.2011.02550.x

Greeley, M. S., Kszos, L. A., Morris, G. W., Smith, J. G., and A. J. Stewart. 2011. Role of a comprehensive toxicity assessment and monitoring program in the management and ecological recovery of a wastewater receiving stream. *Environ. Manage.* 47: 1033-1046.

Hauser, L. J., Land, M. L., Brown, S. D., Larimer, F., Keller, K. L., Rapp-Giles, B. J., Price, M. N., Lin, M., Bruce, D. C., Detter, J. C., Tapia, R., Han, C. S., Goodwin, L. A., Cheng, J.-F., Pinluck, S., Copeland, A., Lucas, S., Nolan, M., Lapidus, A. L., Palumbo, A. V., and J. D. Wall. 2011. The Complete Genome Sequence and Updated Annotation of *Desulfovibrio alaskensis* G20. *J. Bacteriol.* Available online. DOI: 10.1128/JB.05400-11

Kalamorz, F., Keis, S., McMillan, D. G. G., Olsson, K., Stanton, J., Stockwell, P., Black, M. A., Klingeman, D. M., Land, M. L., Han, C. S., Martin, S. L., Becher, S. A., Peddie, C. J., Morgan, H. W., Matthies, D., Preiß, L., Meier, T., Brown, S. D., and G. M. Cook. 2011. Draft Genome Sequence of Thermoalkaliphilic *Caldalkalibacillus thermarum* strain TA2.A1. *J. Bacteriol.*

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Loar, J. M., Stewart, A. J., and J. G. Smith. 2011. Twenty-five years of ecological recovery of east fork poplar creek: review of environmental problems and remedial actions. *Environ. Manage.* 47: 1010-1020.

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Peterson, M. J. 2011. Introduction to the biological monitoring and abatement program. *Environ. Manage.* 47: 1005-1009.

Peterson, M. J., Efroymson, R. A., and S. M. Adams. 2011. Long-term biological monitoring of an impaired stream: synthesis and environmental management implications. *Environ. Manage.* 47: 1125-1140.

Petridis, L., Pingali, S. V., Urban, V., Heller, W., O'Neil, H., Foston, M., Ragauskas, A., and J. C. Smith. 2011. Self-similar multiscale structure of lignin revealed by neutron scattering and molecular dynamics simulation. *Phys. Rev. E.* 83: 061.

Ryon, M. G. 2011. Recovery of fish communities in a warm water stream following pollution abatement. *Environ. Manage.* 47: 1096-1111.

Smith, J. G., Brandt, C. C., and S. W. Christensen. 2011. Long-term benthic macroinvertebrate community monitoring to assess pollution abatement effectiveness. *Environ. Manage.* 47: 1077-1095.

Southworth, G. R., Peterson, M. J., Roy, W. K., and T. J. Mathews. 2011. Monitoring fish contaminant responses to abatement actions: factors that affect recovery. *Environ. Manage.* 47: 1064-1076.

Stewart, A. J., Smith, J. G., and J. M. Loar. 2011. Long-term water-quality changes in East Fork Poplar Creek, Tennessee: background, trends, and potential biological consequences. *Environ. Manage.* 47: 1021-1032.

Sukharnikov, L. O., Cantwell, B. J., Podar, M., and I. B. Zhulin. 2011. Cellulases: ambiguous nonhomologous enzymes in a genomic perspective. *Trends Biotechnol.* Available online. DOI:10.1016/j.tibtech.2011.04.008

### **Notable Achievements**

Steve Brown has been appointed to a Joint Faculty Assistant Professor position in the Biochemistry and Cellular and Molecular Biology (BCMB) Department at the University of Tennessee, Knoxville.

On June 1<sup>st</sup> Virginia Dale gave a presentation to 500 5<sup>th</sup>-8<sup>th</sup> grade students and teachers at Glenville State College in Glenville, WV, on behalf of The Jason Project. Read more at <http://www.jason.org/>.

Loren Hauser attended the 6<sup>th</sup> annual Sequencing, Finishing and Analysis in the Future meeting on June 1<sup>st</sup>-3<sup>rd</sup> in Santa Fe, NM, and presented a talk titled "Comparative Gene Expression of the Caldicellulosiruptor Genus using RNAseq."

On June 3<sup>rd</sup> the Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC) staff held a one-day, offsite retreat. The purpose of the retreat was to refresh all DAAC staff on DAAC activities, tools, history, mission, and objectives. The retreat featured a lunchtime discussion with long-time ORNL DAAC Manager, Larry Voorhees. DAAC staff closed the day with a brainstorming session where ideas were solicited for future enhancements for the various DAAC tools, services, data management efforts, and web interfaces. Future follow-up from the retreat will include review of the ideas put forth for possible inclusion in future work plans after appropriate review by the ORNL DAAC user working group (UWG).

ORNL submitted its 3<sup>rd</sup> quarter Budget (Joule) report to the Office of the Biomass Program (OBP) focused on evaluating the sensitivity of national average yield of feedstock production (corn stover) to tillage, price and conventional crop yield assumption in 2011. Yield was most sensitive to tillage assumptions.

On June 3<sup>rd</sup> ORNL submitted comments to the OBP on proposed metrics and program performance targets for sustainability. June 30<sup>th</sup> - ORNL participated in a conference call with OBP and the National Renewable Energy Laboratory (NREL) to refine the Platform Milestones for FY12 based on revised metrics and improved definitions.

Vincent Neary and Budi Gunawan visited St. Anthony Falls Laboratory (SAFL) in Minneapolis, MN, on June 5<sup>th</sup>-8<sup>th</sup> to discuss laboratory experiments to characterize inflow and wake flows around 1:10 scale Verdant Gen5 turbine.

The June issue of the journal *Environmental Management* is devoted to the results from ORNL's Biological Monitoring and Abatement Program (BMAP) and entitled "Long-Term Biological Monitoring of an Impaired Stream: Implications for Environmental Management." Read the articles online at <http://www.springerlink.com/content/0364-152x/47/6/>.

On June 6<sup>th</sup>-9<sup>th</sup> ORNL discussed draft abstracts submitted and topics proposed with OBP and other labs to coordinate contributions to the International Energy Agency (IEA) Task 38/40/43 joint workshop on quantifying and managing land-use effects of bioenergy.

Brennan Smith traveled to Boulder, CO, for business meetings on June 6<sup>th</sup>-9<sup>th</sup>.

Udaya Kalluri was invited to give a bioenergy talk entitled, “Genetic and Genomics Approaches to Overcoming Recalcitrance of Populus Feedstock for Biofuel Production,” at the In Vitro Biology Meeting held in Raleigh, NC, on June 7<sup>th</sup>.

Also on June 7<sup>th</sup> ORNL submitted comments on the Global Bioenergy Partnership (GBEP) Capacity Building to support an OBP proposal submitted to the State Department. The proposal recommends that GBEP facilitate training and scientific cooperation to build capacity around three areas of common interest – biomass resource assessments, feedstock logistics, and conversion technologies – in target regions including Central America, Asia and West Africa.

On June 7<sup>th</sup>-9<sup>th</sup> Bob Cook attended the FLUXNET and Remote Sensing Open Workshop in Berkley, CA. Read more about FLUXNET at <http://daac.ornl.gov/FLUXNET/fluxnet.shtml>.

ORNL (Tara Hall and Keith Kline) participated in a series of calls to organize the first International Organization for Standardization (ISO) PC248 (Sustainable Bioenergy Standard) webinar and meeting of Work Group 4 on Indirect Effects. Definitions and criteria drafted by ORNL were discussed in the call. Work Group 4 is led by a team from Argentina, Canada, and the U.S. (represented by ORNL). Keith prepared and submitted Update #4 outlining progress with the ISO Process Standard development, future plans and OBP contributions via Argonne National Laboratory (ANL) and ORNL.

The article “Hybrid opto-electric manipulation in microfluidics-opportunities and challenges,” by Alope Kumar and others and which is featured on the front cover of Issue 13 of *Lab on a Chip* magazine has been selected as “HOT Article” and has been made free to access. It has also been highlighted on the *Lab on a Chip* blog at <http://blogs.rsc.org/lc/2011/06/15/issue-13-now-online/>. Read the original article at <http://pubs.rsc.org/en/Content/ArticleLanding/2011/LC/c1lc20208a>.

On June 13<sup>th</sup> Shahab Sokhansanj participated in a workshop on ToSIA (Tool for Sustainability Impact Assessment). The tool is a dynamic sustainability impact assessment model that can be used to analyze environmental, economic, and social impacts of changes in forestry-wood production chains. The workshop was conducted by Tmimi Suominen of the European Forest Institute. ToSIA has been developed as a four-year project of EFORWOOD (<http://87.192.2.62/eforwood/default.aspx>) that is funded by the European Union’s Sixth Framework Program.

On June 14<sup>th</sup> Virginia Dale and Tanya Kuritz presented a talk titled “Environmental Effects of Large-Scale Algal Fuel Production” to the National Research Council Committee on Sustainable Development of Algal Biofuels.

Also on June 14<sup>th</sup> Keith Kline was invited by Victoria Junquera (Roundtable on Sustainable Biofuels [RSB] Manager for Science and Technology) to participate in the RSB Indirect Impacts Expert Group (IIEG). Read about the IIEG at <http://rsb.epfl.ch/lang/en/iieg>.

ORNL Distributed Active Archive Center (DAAC) Manager and Earth Science Information Partners (ESIP) Federation President, Chris Lenhardt, participated in the ESIP Federation Strategic Planning Retreat, June 14<sup>th</sup> – 16<sup>th</sup>, in Tucson, AZ.

On June 15<sup>th</sup> ORNL provided a press release, “ORNL neutrons, simulations reveal details of bioenergy barrier.” The press release highlights work done by the team led by Jeremy Smith and

described in their *Physical Review E* paper, Self-similar multiscale structure of lignin revealed by neutron scattering and molecular dynamics simulation (83: 061911). Read the press release at [http://www.ornl.gov/info/press\\_releases/get\\_press\\_release.cfm?ReleaseNumber=mr20110615-00](http://www.ornl.gov/info/press_releases/get_press_release.cfm?ReleaseNumber=mr20110615-00) and read their paper online at <http://pre.aps.org/abstract/PRE/v83/i6/e061911>.

On June 15<sup>th</sup>-16<sup>th</sup> Robin Graham attended the National Academies Soils Committee Meeting in Washington, D.C. Robin is a member of this standing committee that reviews and advises on soil science issues. Participation on the committee has been useful in raising the awareness and understanding on bioenergy sustainability issues.

On June 15<sup>th</sup> and 16<sup>th</sup> Mark Peterson participated in a Department of Energy (DOE) meeting in Washington, D.C., focused on developing a report and future workshop identifying Scientific Opportunities for Monitoring of Environmental Remediation Sites (SOMERS). Mark is leading a section on the Grand Challenges for Surface Water Monitoring, and presented his ideas and outline to the working group.

Maggie Stevens led outreach to Brazilian bioenergy researchers from the Brazilian Bioethanol Science and Technology Laboratory (CTBE), Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP), Universidade de São Paulo (USP) to develop technical collaborations on sustainability, land-use and soil carbon change.

During June 20<sup>th</sup> – 22<sup>nd</sup> Chris Lenhardt attended the National Oceanic and Atmospheric Administration (NOAA) Environmental Data Management Meeting in Silver Spring, MD.

On June 23<sup>rd</sup> Shahab Sokhansanj participated as an external reviewer of the M.Sc. research “A life cycle carbon balance for Bioenergy produced from forest residues” conducted and completed by Andrew Burke.

The Biological and Environmental Research Information System (BERIS) has won both chapter and international technical publication awards for two documents from the Society for Technical Communication’s (STC) 2010–2011 International Summit Awards Competition. The publications were prepared for DOE’s Biological and Environmental Research Program. To be eligible to enter the International Competition, the entry must first have been given either a Distinguished (the highest rating) or an Excellence (second highest rating) in a chapter or regional U.S. competition (chapter Merit awards, the third level, are not eligible for the international competition). After the 2011 STC Summit, where the winners are displayed, awardees receive evaluations from the judges who reviewed the entries at both levels. Members of the BERIS group, led by Betty Mansfield, received inscribed certificates in honor of their achievements: Jennifer Bownas, Holly Haun, Judy Wyrick, Shirley Andrews, Marissa Mills, Kris Christen, Sheryl Martin, Christopher Caldwell, and Betty Mansfield. Others receiving awards for the first document below are Arthur Katz (DOE), Mitchel Doktycz (ORNL), and H. Steven Wiley (Pacific Northwest National Laboratory).

From the STC International Competition, *New Frontiers in Characterizing Biological Systems; Report from the May 2009 Workshop* won an Award of Excellence. “An entry that wins an award of Excellence consistently meets high standards in all areas. The entry clearly demonstrates an exceptional understanding of technical communication principles.” The STC Washington, D.C., Chapter’s 2010–2011 Summit Competition had earlier awarded the document a *Distinguished* in the first round of the competition. “The competition judges were impressed with the high level of professional work in this area.”... “This document clearly uses the vocabulary and information

common to the target audience to define problems and solutions, and that is creative. But what is even more creative is the way the information is chunked, organized, and illustrated.”

From the STC International Competition, *U.S. Department of Energy's Bioenergy Research Centers: An Overview of the Science* has won an Award of Merit. “An entry that wins a Merit award consistently meets high standards in most areas and applies technical communication principles in a highly proficient manner.” The Washington, D.C., Chapter had earlier awarded the document an award of Excellence in the first round. “The competition judges were impressed with the high level of professional work in this area.” From one judge: “Well done! I learned something by reading the case studies and other sections as well. The presentation of technical material was in many ways masterful. The brochure is an excellent example of scientific writing used to promote the capabilities and importance of basic research and research critical to finding and developing new and sustainable energy sources.”

DOE Headquarters’ contacts Rajesh Dham, Patrick O’Connor and Michael Spray visited ORNL on June 22<sup>nd</sup> and 23<sup>rd</sup> to discuss the Hydropower Advancement Project (HAP) and Small Hydro with the Water Power Team.

On June 23<sup>rd</sup> – 24<sup>th</sup> Chris Lenhardt attended the NOAA Data Access and Archiving Working Group (DAARWG) Meeting.

On June 24<sup>th</sup> Virginia Dale gave a presentation titled “Pathways toward Sustainable Bioenergy” in the Howard Baker Center’s Energy and Environment speaker series.

The ORNL sustainability team met several times to develop an annotated outline for the development of a draft publication on “indicators to support socioeconomic sustainability of bioenergy systems.”

At the Environmental Sciences Division (ESD) Staff Meeting on June 24<sup>th</sup>, the Stanley I. Auerbach Award for Excellence in Environmental Science was awarded to Melanie Mayes for her research on coupled hydrological and geochemical mechanisms that govern the migration of radionuclides and toxic metals in the vadose zone and molecular-scale mechanisms of stabilization of organic matter on mineral surfaces in soil. The SIA Award serves to recognize sustained, high-quality, creative scientific contributions in support of basic research, technology development, or analysis as demonstrated by publication in refereed journals of high reputation or by significant impact through application of science in solution of complex environmental problems.

The Canadian Wood Fibre Centre (CWFC) has requested the assistance of Shahab Sokhansanj (research group at University of British Columbia) for the tracking of storage characteristics and moisture conditioning of juvenile hardwood woody biomass bales recovered from a natural regenerating trembling aspen stand in central Alberta. The objective of the storage and handling study is to track from harvest through final processing to the bale condition under a controlled exposed and covered outdoor environment. Tracking is to include: progressive mass, moisture content, emissions (energy unit losses through decomposition), continuous weather indices and external and internal temperature and humidity. A secondary objective is to create pellets from a small sample using both mechanical and steam explosion techniques and torrefication if possible, followed by analysis of the resulting pellets.

On June 27<sup>th</sup> Maggie Stevens gave a presentation to the Sunset Rotary club of Oak Ridge about Brazil, land-use change, and her thesis research with small-scale eucalyptus foresters. Read the

summary of Maggie's visit on the rotary website at [http://www.oakridgesunsetrotary.org/IMupload/newsletter/20110627\\_newsletter.pdf](http://www.oakridgesunsetrotary.org/IMupload/newsletter/20110627_newsletter.pdf).

ORNL contributed to further revisions and clarifications in the draft "Vision and Action Plan" document for the Global Sustainable Bioenergy (GSB) Project Stage 2, which was distributed on June 27<sup>th</sup> to potential external partners for further input.

On June 27<sup>th</sup>-28<sup>th</sup> Robin Graham attended the Program Peer Reviews in Washington, D.C. Every other year, the Office of Biomass Program seeks outside review. First individual projects within the program are reviewed (this took place in March and April and all ORNL research was reviewed) and then the overall Program is reviewed (this took place in June). The individual project scores will be made available on the web in the near future.

On June 27<sup>th</sup>-30<sup>th</sup> Giri Palanisamy, Ranjeet Devarakonda, and Biva Shrestha attended the National Biological Information Infrastructure (NBII) Species Occurrence Meeting in Reston, VA.

The *BMC Microbiology* article "Transcriptomic analysis of *Clostridium thermocellum* ATCC 27405 cellulose fermentation" has been designated as "Highly Accessed." The article was accessed 565 times in the 14 days after publication. Co-authored by Babu Raman, Catherine McKeown (both former BSD), Miguel Rodriguez Jr., Steve Brown, and Jonathan Mielenz, the article was published on June 14<sup>th</sup>. Read the article online at <http://www.biomedcentral.com/1471-2180/11/134>.

On June 28<sup>th</sup> Mark Peterson presented a status report on the East Tennessee Technology Park (ETTP) Ponds Project to the ETTP Core Team, consisting of staff from DOE, site contractors, the Environmental Protection Agency, and the Tennessee Department of Environment and Conservation. The presentation was well received and resulted in additional financial support for the ESD project team.

Bob Andres attended the 2011 International Union of Geodesy and Geophysics (IUGG) General Assembly held in Melbourne, Australia, from June 28<sup>th</sup> to July 7<sup>th</sup>. He made two presentations there entitled "An Implication for Assuming No Error in Anthropogenic Fossil-fuel Emissions" and "Partitioning of Measured Atmospheric Carbon Dioxide into Fossil Fuel, Oceanic, and Terrestrial Biosphere Components." While in Melbourne, he also visited the Commonwealth Scientific and Industrial Research Organisation (CSIRO) office in Aspendale where he gave a presentation entitled "CDIAC Fossil-Fuel-Derived Carbon Dioxide Emissions Time Series: Trends and Uncertainties in the Mass and Stable Carbon Isotopic Composition, An Informal Presentation" and discussed collaborations between CSIRO and the Carbon Dioxide Information Analysis Center (CDIAC).

On June 29<sup>th</sup> Robin Graham and Brian Davison met with Paul Grabowski and Leslie Pezzullo from the DOE Office of Biomass Program to discuss where the Program was going in the future in its biomass conversion research. Historically, most of the conversion research has been conducted by the National Renewable Energy Laboratory (NREL) (Biochem & Thermochem) and by Pacific Northwest National Laboratory (PNNL) (Thermochem). The DOE Office of Energy Efficiency and Renewable Energy (EERE) plans to gradually compete most of its conversion research in solicitations open to Labs, Universities, and Industry. This visit was to better understand the direction of OBP in the conversion area and to introduce them to our Laboratory Directed Research and Development (LDRD) efforts in this arena.

On June 29<sup>th</sup> and 30<sup>th</sup> Keith Kline and Virginia Dale participated in conference calls of the Council on Sustainable Biomass Production (CSBP) Producer Work Group and Field Testing Task Force.

On June 30<sup>th</sup> Shahab Sokhansanj represented and participated in the Stage Gate Review of Genera's "Development of Bulk-Format System to Harvest, Handle, Store, and Deliver High-Tonnage Low-Moisture Switchgrass Feedstock." OBP funds the three-year research, development and demonstration project. Genera is a partnership between the University of Tennessee and DuPont Danisco Cellulosic Ethanol LLC. The partnership operates the 250 thousand gallons of ethanol per year demonstration plant in Vonore, TN.

Esther Parish, Laurence Eaton and Mark Downing had a series of meetings with University of Tennessee Institute of Agriculture (UTIA) personnel Sam Jackson, Tim Rials and Mladen Grbovic during the months of May and June to discuss Center for BioEnergy Sustainability (CBES) collaboration with UTIA Southeastern Sun Grant Center staff in the collection, synthesis, and analysis of geographic information system (GIS) data from a variety of past, ongoing and planned bioenergy-related studies conducted throughout Tennessee and the Southeast Region, and at Vonore in particular. Joint collaboration will ultimately facilitate input of information into the Knowledge Discovery Framework (KDF, <https://bioenergykdf.net/>).

### **BESD New Arrivals**

Hengfu Yin arrived in June to work as a postdoctoral research associate with Gerald Tuskan. With international investigators Hengfu will develop new crops for biofuel production and focus on a deep understanding of molecular control of the Crassulacean Acid Metabolism pathway to inform genetic improvement of bioenergy crops for sustainable biofuels products.