

PATRICK CENTER FOR ENVIRONMENTAL RESEARCH

2008 ACTIVITY REPORT



THE
ACADEMY
OF NATURAL
SCIENCES

PATRICK CENTER STAFF (2008)

ADMINISTRATION

Dr. David J. Velinsky (PCER Director)
Kristen Kepics
Maria Eife
Daniel H. Snyder

ASIA CENTER

Dr. Clyde Goulden (Director)

ENVIRONMENTAL BIOGEOCHEMISTRY

Dr. David Velinsky (Section Leader)
Paul Kiry
Mike Schafer
Linda Zaoudeh
Paula Zelanko

CENTER FOR ENVIRONMENTAL POLICY

Roland Wall (Director)
Erin Johnson
Dr. Richardson Dilworth III (Visiting Scholar)

FISHERIES

Dr. Richard J. Horwitz (Section Leader)
David Keller
Shane Moser
Paul Overbeck

FRANCIS BOYER CHAIR

Dr. Ruth Patrick
Susan O'Connell

MACROINVERTEBRATES

Recruitment in 2009

PHYCOLOGY

Dr. Donald F. Charles (Section Leader)
Frank Acker
Dr. Mihaela Enache
Dr. Eduardo Morales
Sara Mays
Pat Palmer
Dr. Ling Ren
Judie Marie Roszek
Andrew Tuccillo

PROJECT SUPPORT

Roger L. Thomas (Section Leader)
Robin Davis
Camille Flinders
Joseph Hegarty
Sylvan Klein
Danielle Kreeger
Rosemary L. Malfi

QUANTITATIVE POPULATION BIOLOGY

Dr. James N. McNair

SUMMER RESEARCH INTERNS

Marcell Vasquez

RESEARCH EXPERIENCE FOR UNDERGRADUATES INTERNS (NSF PROGRAM)

Erin McKinley
Sean McGrath
Susan Tsang

RESEARCH ASSOCIATES

Dr. Jeffery Ashley, Philadelphia University
Dr. Jonathan Fingerhut, St. Josephs University
Dr. James Pizzuto, University of Delaware

VOLUNTEER

Bill Frezel

HIGHLIGHTS

DEPARTMENTAL HAPPENINGS

- **Rich Horwitz** (Fisheries), **Anthony Geneva** (LMSE), and REU student Ms. Susan Tsang worked on bridge shiner DNA (REU Presentation won best poster at National Sigma XI Meeting, Washington DC).
- **Rich Horwitz** (Fisheries) and **Jerry Mead** (Watershed and Systems Ecology) initiated ecological and restoration studies in August and September on a large ranch in Colorado (High Lonesome Ranch). They, along with **Jason Weintraub** (Entomology), conducted initial biotic surveys and collected stream data (geomorphology and temperature).
- The **Patrick Center** initiated a study in New York State. In collaboration with EPA, NY Dept. of Environmental Conservation, algae, macroinvertebrates and water from 100 sites were collected and analyzed as part of an effort to help environmental managers set scientifically-based limits on nutrients in waterways.
- **Patrick Center** staff served on numerous local, state, regional and national committees that address environmental regulations and protection.

ASIA CENTER

- **Clyde Goulden** and scientists at the University of Pennsylvania initiated an NSF study in Mongolia on climate change and impacts to local herders.
- **Clyde Goulden** (Asia Center), **David Velinsky** (Environmental Biogeochemistry) and others hosted the Nanjing University Workshop: During the first two weeks of August, 12 students from Nanjing University attended a course on Environmental Assessment taught by Academy Staff and members of the local environmental community. The workshop was conducted at St. Josephs University, with field excursions to the Academy and a local stream restoration project.
- **David Velinsky** (Environmental Biogeochemistry) along with **Ling Ren** (Phycology) and **Clyde Goulden** (Asia Center) traveled to China to meet with various University and Government scientists about potential new scientific collaborations. During the first part of the trip staff met with scientists from Nanjing University and China EPA at Tai Hu (Lake Tai) near the city of Wuxi to discuss water quality concerns for the lake. Clyde Goulden then traveled to Nanjing University and met with the Dean and Deputy Dean of the School of the Environment to discuss future workshops and a scientist exchange program. Ling Ren and David Velinsky traveled to Zhoushan Island for the 2008 Zhoushan National Symposium on Mariculture meeting and as part of an international delegation of the Academy for the 50th anniversary of Zhejiang Ocean University.

CENTER FOR ENVIRONMENTAL POLICY

- **Roland Wall** received a William Penn Foundation grant to establish the Center for Environmental Policy (CEP). The CEP currently has one part time staff member, **Erin Johnson**, and a Visiting Scholar, **Richardson Dilworth III**, of Drexel University.
- The **Environmental Associates/Center for Environmental Policy** sponsored 21 public events in 2008, with a total audience of 3,400 attendees. Featured speakers included Mayor Michael Nutter (3 appearances), genomics pioneer Dr. Craig Venter, polar explorer Lonnie Dupre, green jobs activists Van Jones (now on President Obama's staff), City Council members Blondell Reynolds Brown and Darrel Clark, and Director of the Mayor's Office of Sustainability, Dr. Mark Alan Hughes.

The topics of the programs included sustainability (especially in an urban setting), global warming, environmental awareness and public science. Two of the public programs (Global Warming in the Delaware Valley and Development of a Green Infrastructure) were preceded by day-long expert workshops. The results of the workshops were part of the information conveyed at the evening programs.

ENVIRONMENTAL BIOGEOCHEMISTRY

- **Paul Kiry, Paula Zelanko** and a summer intern completed water quality monitoring programs and studies in NY, NJ, and PA with NY DEC and DRBC.
- **David Velinsky** and **Patrick Center Staff** presented results of a small pond study to the staff and residences of Beaumont Retirement Facility in Bryn Mawr, PA.
- **David Velinsky** tutored a summer NSF REU intern, Ms. Erin McKinley, from Northland College (see presentations).
- **David Velinsky, Paul Kiry, Mike Schafer and Roger Thomas** completed field sampling trips to various tidal marsh systems in the Delaware estuary to collect sediment cores.
- **David Velinsky** presented two talks at Zhejiang Ocean University; one an overview of The Academy of Natural Sciences and the other a technical talk on historical changes in the Delaware.

FISHERIES

- **Rich Horwitz, Paul Overbeck, Shane Moser and David Keller** were highlighted on numerous local TV stations in a feature showing them collecting Snakehead fish in ponds in South Philadelphia's FDR Park.
- **Rich Horwitz**, along with **Anthony Geneva**, tutored summer NSF REU intern Ms. Susan Tang (see presentations).

PHYCOLOGY

- **Don Charles, Mihaela Enache, and Babs Rinkel** initiated projects to analyze samples and data for the U.S. EPA National Lake Assessment and the National River and Stream Assessment. These projects involve the study of 1000 sites each throughout the U.S. and will serve as the basis for a report to Congress on the ecological status of the nations surface waters.

WATERSHED AND SYSTEMS ECOLOGY

- **Jerry Mead** assumed the position of Assistant Scientist of Watershed and Systems Ecology. Dr. Mead is an expert on watershed and fisheries ecology, and uses mathematical modeling and Geographic Information Systems (GIS) to answer questions of interest posed by ecologists, environmental policy makers and environmental managers.

FIELD WORK

Fisheries – High Lonesome Ranch Stream Restoration (CO); Delaware River (NY, NJ, PA); Housatonic River (CONN); Tinicum Marsh (PA); SE PA Eel Studies (PA, DE); Black River (NY).

Environmental Biogeochemistry – Delaware Estuary Coring (NJ, PA, DE); Tinicum Marsh (PA); Lake Tai (China).

Watershed Ecology – High Lonesome Ranch Restoration (CO); Black River (NY).

Project Support – Oyster Population Health Assessment (TX); NY State Water Quality Studies (100 sites in NY State).

PROPOSALS & GRANTS (Submitted and Awarded; Not all proposals listed)

ASIA CENTER

- *Ecological and evolutionary effects of climate change in Mongolia*, University of Pennsylvania, under NSF PIRE.

CENTER FOR ENVIRONMENTAL POLICY

- *Center for Environmental Policy*, William Penn Foundation.

ENVIRONMENTAL BIOGEOCHEMISTRY

- *Chemical Pollution Histories in the Tidal Christiania River & Shellpot Creek*, Wilmington, Delaware Department of Natural Resources and Environmental Control.
- *Delaware Bay Oyster Monitoring Sample Analyses*, US Army Corps through Rutgers University.
- *Frankford Inlet*, Rohm and Haas Corporation (now Dow)
- *NPS Vital Signs Water Sample Analyses*, National Park Service, NER Acquisition Philadelphia Office.
- *Nutrient Bioassay*, Delaware River Basin Commission.
- *Nutrient and Ecological Histories in Barnegat Bay, New Jersey*, Environmental Protection Agency, Region II; Office of Research and Development.
- *Nutrient and Ecological Histories in the Murderkill River, Delaware*, Delaware Department of Natural Resources and Environmental Control.
- *Philadelphia Water Department Water and Periphyton Sample Analyses*, Philadelphia Water Department.
- *Trophodynamics of PBDEs and PCBs within the lower food web(s) of Tinicum Marsh*, PA, Pennsylvania Sea Grant (NOAA) join with Philadelphia University.

FISHERIES

- *Age determination of Hybognathus*, American Southwest Ichthyological Researchers, LLC.
- *American Eel Research*, The Debemac Foundation “of Drinker Biddle & Reath.”
- *Avatar Fish Scale Aging*, Avatar Environmental.
- *Black River Watershed Management Plan*, Bergman Associates, Inc.
- *Bridle Shiner study*, Pennsylvania Department of Conservation and Natural Resources, Wild Resource Conservation Program.
- *Bridle Shiner study*, National Park Service.
- *Housatonic River PCB Bioaccumulation Study*, General Electric.
- *Lockheed Scale Aging*, Lockheed Martin.
- *National Stream Survey Quality Assurance*, U.S. Environmental Protection Agency.

PHYCOLOGY

- *Periphyton Community Assessment of Nontidal Piedmont Streams of Delaware*, Delaware Department of Natural Resources and Environmental Control.
- *Brooktrout Lake NY Phytoplankton*, New York State Education Department.
- *Delaware River Mainstem Periphyton Sample Analysis*, DRBC.
- *EPA National River and Stream Assessment*, Environmental Protection Agency funds passed through GLEC.
- *Louisiana Periphyton Sample Analysis*, U. S. Geological Survey, Louisiana.
- *Maine DEP Periphyton Samples*, State of Maine, Department of Environmental Protection.
- *Maine USGS*, U. S. Geological Survey, Maine.
- *New England Lakes Survey*, New England Interstate Water Pollution Control Commission.

- *NYSDEC Rock Only Diatom Analyses*, New York State Department of Environmental Conservation through Oak Ridge National Laboratory.
- *Paleolimnological assessment of nutrient enrichment and hypolimnetic oxygen historical changes for criteria development in New Jersey and New York lakes*, Environmental Protection Agency through Oak Ridge National Laboratory.
- *Periphyton Analysis for North Carolina DWQ's Pilot Study*, North Carolina Department of Environment and Natural Resources.
- *Periphyton Community Assessment of Nontidal Piedmont Streams of Delaware, Yr 2*, Delaware Department of Natural Resources and Environmental Control.
- *Philadelphia Renewable Energy Project*, Philadelphia Renewable Energy, Inc.
- *Susquehanna River Institute Phychology Samples*, Susquehanna River Institute.
- *Upper Colorado River*, Eagle River Water & Sanitation District.
- *Virginia Department of Environmental Quality Periphyton Sample Analysis*, Virginia Department of Environmental Quality.
- *West Virginia Streams*, West Virginia Department of Environmental Protection.
- *Wyoming USGS*, U. S. Geological Survey, Cheyenne, WY.

PROJECT SUPPORT

- *Growing Greener: Freshwater Mussel Restoration*, Pennsylvania Department of Environmental Protection Growing Greener Program (Co-PI with Richard Horwitz, Fisheries).
- *New York State Department of Environmental Conservation Wadeable Streams*, UT Batelle, LLC, for Oak Ridge National Labs.
- *Restoration of Extripated Freshwater Mussels to the Brandywine River*, Partnership for the Delaware Estuary.
- *San Antonio Bay Oyster Population Health Assessment*, Dow/Union Carbide; Seadrift Coke.
- *Seston sample analyses for oyster model for Apalachicola Bay, Florida*, Rutgers University.

WATERSHED AND SYSTEMS ECOLOGY

- *Delaware Estuary Riparian Reforestation Modeling*, Delaware Estuary Watershed Grants Program.
- *Legacy sediments and the responses of channel morphology to riparian forests*, National Science Foundation.
- *Validate Invertebrate Energetics Model*, National Science Foundation.

PUBLICATIONS

Bushaw-Newton, K. L., D. A. Kreeger, S. Doaty, and D. J. Velinsky. 2008. Utilization of *Spartina*-and *Phragmites*-derived dissolved organic matter by bacteria and ribbed mussels (*Geukensia demissa*) from Delaware Bay salt marshes. *Estuaries and Coasts* 31: 694-703.

- Flinders, C. A., R. J. Horwitz,** and T. Belton. 2008. Relationship of fish and macroinvertebrate communities in the mid-Atlantic uplands: implications for integrated assessments. *Ecological Indicators* 8: 588-598
- Horwitz, R. J., C. H. Hession, T. Johnson, P. Overbeck** and B. Sweeney. 2008. Effects of riparian vegetation and watershed urbanization on fishes in streams of the mid-Atlantic Piedmont. *J. Amer. Water. Res. Assoc.* 44:721-741.
- Cooper, J. E., **J. V. Mead,** J. M Farrell, and R. E. Werner. 2008. Potential impacts of spawning habitat changes on the segregation of pike (*Esox lucius*) and muskellunge (*E. masquinongy*) in the Upper St. Lawrence River. *Hydrobiologia* 601(1): 41
- Newbold, J. D., S. Herbert, B. W. Sweeney, and **P. Kiry.** 2008. Water Quality Functions of a 15-year-Old Riparian Forest Buffer System. In "Riparian Ecosystems and Buffers: Working at the Water's Edge," *AWRA 2008 Summer Specialty Conference*, Virginia Beach, VA, June 30 - July 2, 2008.
- Ponader, K. C., D. F. Charles,** T. J. Belton, and **D. M. Winter.** 2008. Total phosphorus inference models and indices for coastal plain streams based on benthic diatom assemblages from artificial substrates. *Hydrobiologia* 610: 139-152.

PRESENTATIONS

- Charles, D. F.,** J. K. Crawford, S. E. Hamsher and J. T. Zalack. Diatom-based approaches to develop nutrient criteria for streams in the Mid-Atlantic region of the eastern USA. 20th International Diatom Symposium. Dubrovnik, Croatia.
- Charles, D. F., A. Tuccillo** and T. J. Belton. Tiered Aquatic Life Use (TALU) evaluation of New Jersey's Diatom Trophic Index (TDI). NJ DEP workshop on development of NJ TALU using diatoms. Trenton, NJ.
- Charles, D. F., F. A. Acker,** P. A. Bukaveckas, W. H. Shaw, C. W. Boylen and S. A. Nierzwicki-Bauer. Phytoplankton assemblage response to decreasing acidic deposition in Adirondack Mountain lakes. Northeast Natural History Conference X. Albany, NY.
- Enache, M. D., D. F. Charles,** T. J. Belton and C. W. Callinan. Diatom-based paleolimnological reconstruction of European settlement impact on lakes in New York and New Jersey, USA. 20th International Diatom Symposium. Dubrovnik, Croatia.
- Flinders, C.A., R. J. Horwitz, P. Overbeck, A. Fierro, D. Keller** and T. J. Belton. Reference conditions for mid-Atlantic headwater streams. American Fisheries Society Meeting. Ottawa, Canada.
- Horwitz, R. J., C. Flinders,** T. J. Belton, **P. Overbeck, S. Moser** and **D. Keller.** Factors determining presence or absence of fish in headwater streams. Annual Meeting American Fisheries Society. Ottawa, Canada.
- Horwitz, R. J., P. Overbeck, D. Keller** and **S. Moser.** Bridle shiner and other fishes of the Upper Delaware River drainage. Northeast Natural History Conference. Albany, NY.
- Horwitz, R. J., D. Velinsky** and **D. Charles.** The Manatawny Creek Dam Removal Study. Invited presentation at symposium on dam removal. State College, PA.
- Mays, S. J., D. F. Charles** and **P. Palmer.** The Academy of Natural Sciences on-line phycological resources. 47th Northeast Algal Symposium. Durham, NH.

- McKinley, E.** (NSF REU student), **P. Zelanko, J. Ashley** and **D. J. Velinsky**. Trophic Relationships within Tinicum Marsh, Philadelphia, PA: Insights from the Stable Isotopes of Carbon and Nitrogen. 2008 Sigma Xi Annual Meeting and Student Research Conference. Washington, DC.
- Mead, J. V.,** F. N. Scatena, **R. J. Horwitz,** Y. Pan and R. Birdsey. The production potential of stream fishes as affected by changes in water temperature driven by climate and land-use in the Delaware River basin. Headwater streams symposium: Annual meeting of the American Fisheries Society. Ottawa, Canada.
- Mead, J. V.** The greatest challenge for fish and wildlife conservation in the 21st century. Economic growth and its effects on wildlife conservation: A collaborative symposium among TWS working groups. Miami, FL.
- Moser, S., R. Horwitz, P. Overbeck** and **D. Keller**. Status of the bridge shiner, *Notropis bifrenatus*, in the Upper Delaware River. Northeast Fish and Game Conference.
- Ren, L.:** Nutrient Enrichment, Coastal Eutrophication and Aquaculture. 2008 Zhoushan National Symposium on Mariculture, Zhejiang Ocean University.
- Tsang, S.** (NSF REU student), **R. J. Horwitz** and **A. Geneva**. Population structure of the bridge shiner *Notropis bifrenatus*. Poster presentation at Sigma Xi student conference. Washington, D.C.
- Tucillo, A., R. Horwitz** and **D. F. Charles**. Application of a benthic macroinvertebrate nutrient biotic index (NBI) to New Jersey streams and a comparison to benthic diatom indices. North American Benthological Society 56th Annual Meeting. Salt Lake City, UT.
- Tuccillo, A., R. J. Horwitz, D. F. Charles** and T. J. Belton. Application of a benthic macroinvertebrate biotic index (NBI) to New Jersey streams and a comparison to benthic diatom indices. NABS annual meeting. Salt Lake City, UT.
- Velinsky, D. J.** Tidal Marshes in the Delaware Estuary: Historical Reconstruction of Chemical Loadings and Ecosystem Effects. Zhoushan National Symposium on Mariculture. Zhoushan, China.
- Velinsky, D. J.** Impact of Climate Change on the Water Quality and Biogeochemical Processes. Academy and Partnership for the Delaware Estuary; *Climate Change in the Delaware Estuary*. The Academy of Natural Sciences. Philadelphia, PA.