



December, 2010



## Annual Report



**Center for Earth and Environmental Science  
Indiana University – Purdue University Indianapolis**



2010 Annual Report

CEES Publication 2010

## **2010 Annual Report**

### **IUPUI Center for Earth and Environmental Science**

#### **Mission**

The CEES mission is to provide applied interdisciplinary environmental solutions to translate research into action while promoting environmental stewardship through education and public service programs. Applied research is important in bringing solutions to critical problems and gives CEES its uniqueness. CEES' vision is to grow into an international leader providing environmental solutions to both existing and emerging water resource issues.

#### **Unique and Distinctive Features**

CEES has built its program and reputation around excellence in water resources and ecosystem restoration research. Key to our success has been the development of a research network founded on strong corporate, governmental and community partnerships and collaborations. This framework is strengthened by the mutual benefit realized by all partners and helps to support IUPUI's core value of community engagement as an urban research university.

In order to maximize the efficient use of resources, CEES is pursuing four strategic objectives in a manner that will further the universities goals of pursuing excellence in 1) research, scholarship and creative activity, 2) teaching and learning, and 3) civic engagement while also enhancing the resource base of the university.

*High priority* - The Center places the highest priority on four strategic initiatives:

1. The Center will engage in cutting-edge research and training for mixed agricultural and urban watersheds
2. Evaluate and assess watershed Best Management Practices targeting atrazine, nutrients and emerging contaminants and pathogens
3. Establish a K-12 technology based science education program in water, air and energy
4. Work with state agencies to identify watershed issues associated with Major Moves and other economic development initiatives, the standards to be applied and training needs

*Medium priority* - The Center intends to make steady progress on the following four strategic initiatives:

1. Develop applied comparative research on sustainable integrated water resource management
2. Build partnerships with local and state government to support USEPA collaborative watershed models and other federal models
3. Facilitate a regional dialog to integrate stream and wetland mitigation efforts
4. Bridge a gap that exists between water resources and human health.

*Low priority* - The Center views two strategic initiatives as important and worthy of progressing, but at a slower pace than the high and medium priority issues:

1. Work with Indiana biofuels leaders to identify solutions to water resource issues
2. Become a source for longitudinal data on human health effects



*Foundational initiatives* - The Center has three foundational initiatives that are required to be resourced in order to maintain the ongoing credibility of the Center with influence leaders and academia:

1. Host research conferences on water resource management and human health issues
2. Maintenance of CEES' Regional Water Quality Monitoring Network and enhanced mapping and visualization tools
3. Facilitate regional watershed management in central Indiana

CEES must bring research focus and pursue projects in the following areas in order to move toward the vision:

- Water Resource Evaluation and Watershed Management
- Assessment of Environmental Constituents
- Stream and Wetland Assessment and Restoration
- Environmental Data Management and Visualization
- Science Education and Public Outreach

### **2010 Research Project Activities**

#### ***Publications***

Graves, D.M., Tedesco, L.P., and Jacinthe, P.A., Hydrochemistry of Central Indiana Fens, *Wetlands* (submitted).

Jacinthe, P.A., Filippelli, G.M., Tedesco, L.P., and Raftis, R., 2010. Carbon storage and greenhouse gases emission from a fluvial reservoir in an agricultural landscape. *Catena* (submitted).

Nguy-Robertson, A.L., Li, L., Tedesco, L.P., Wilson, J., & Soyeaux, E. (submitted). Comparison between empirical, semi-empirical, and curve fitting models in predicting cyanobacterial pigments, *International Journal of Remote Sensing*.

Babbar-Sebens, M., Barr, R.C., Tedesco, L.P., Multiobjective Optimization for Wetland Restoration Site Selection - Eagle Creek Watershed, Indiana, USA, *Proceedings of the American Society of Civil Engineers (ASCE) Environmental & Water Resources Institute 's (EWRI) 3rd Developing Nations Conference: India 2010 - An International Perspective on Current & Future State of Water Resources & the Environment*, Chennai, India, January 5-7, 2010.

Johnstone, J., Vidon, P., Tedesco, L.P., and Soyeux, E., Nitrogen, phosphorus and carbon dynamics in a third-order stream of the US Midwest, *Proceedings of the Indiana Academy of Science*: 119 (1), June 2010.

Li, L., Sengpiel, R., Pascual, D.L., Tedesco, L.P., Wilson, J.S., and Soyeux, E., Using hyperspectral remote sensing to estimate chlorophyll a and phycocyanin in a mesotrophic reservoir, *International Journal of Remote Sensing* (in press, 2010).

Bills, J.S., Jacinthe, P.A., Tedesco, L.P., 2010. Soil organic carbon pools and composition in a wetland complex invaded by reed canary grass, *Biology and Fertility of Soils* (in press, 2010).

Jacinthe, P.A., Filippelli, G.M., Tedesco, L.P., and Licht, K., Distribution of copper in sediments from fluvial reservoirs treated with cutrine, *Water, Air & Soil Pollution*, (DOI: 10.1007/s11270-009-0278-3) (in press, 2010).

Rogers, Y., Connelly, K., Hazelwood, W., and Tedesco, L.P., Enhancing Learning: A Study of How Mobile Devices Can Facilitate Sensemaking. *Personal and Ubiquitous Computing*, vol. 14 (2), p. 111-124. Springer-Verlag, (DOI: 10.1007/s00779-009-0250-7).

- Jacinthe, P.A., Bills, J.S., Tedesco, L.P., 2010. Size, Activity, and Catabolic Diversity in a Wetland Complex Invaded by Reed Canary Grass: *Plant and Soil*, 329: 227-238.
- Gidley, S., Tedesco, L.P., Wilson, J.E., and Johnson, D., Using High Resolution Satellite Imagery to Map Aquatic Macrophytes on Multiple Lakes in Northern Indiana: A Case Study to Test Applicability for Management. Indiana Department of Natural Resources, Lake and Reservoir Enhancement Program Final Report, 87 p.

## **Abstracts**

- Tedesco, L.P., Clercin, N., and Gray, M., in press. Climate Induced Changes in Taste and Odor Production and Transported Sources Impacting Indianapolis Drinking Water Supplies, World Water Congress, International Water Association Biennial Conference, Montreal, Canada, September, 2010.
- Tedesco, L.P., Barr, R.C., and Hall, B.E., The Coupled Effects of Climate Change and Modification of Indiana's Hydrologic Cycle to Water Resources and Flooding", 4<sup>th</sup> Annual HAZUS Conference, Federal Emergency Management Agency, Indianapolis, August, 2010.
- Tedesco, L.P., Clercin, N., and Gray, M., Microcystin Occurrence, Sources, and Transport in Indiana. 30<sup>th</sup> International Symposium, North American Lake Management Society, Oklahoma City, abstracts, p. 69.
- Tedesco, L.P., Clercin, N., Cowan, A., Stouder, M., and Gray, M., 2010. Microcystin and Taste and Odor Compound Occurrence, Fate and Transport in central Indiana Surface Waters. 7<sup>th</sup> National Water Monitoring Conference, Abstracts with Program, p. 150.
- Tedesco, L.P., Clercin, N., Cowan, A., and Gray, M., 2010. Cyanobacterial Occurrence and Toxicity in central Indiana Drinking Water Reservoirs with an Assessment of Statewide Occurrence. 7<sup>th</sup> National Water Monitoring Conference, Abstracts with Program, p. 151.
- Tedesco, L.P., Clercin, N., and Gray, M., 2010. Cyanobacterial Occurrence and Toxicity in Indiana Lakes and Reservoirs. 31<sup>st</sup> Annual Indiana Water Resources Symposium, West Lafayette, May, 2010.
- Li, L., Babbar-Sebens, M., Song, K., Tedesco, L., Bruder, S., Li, S., Xie, S., and Zhang, T., 2010. Remote Sensing of Global Warming-Affected Inland Water Quality, NASA Biodiversity and Ecological Forecasting Team Meeting, Washington, DC., May, 2010.
- Li, L., Linhai, L., Tedesco, L.P., and Hall, R.E., 2010. Variations in the Specific Absorption Coefficients for Chlorophyll and Phycocyanin of Central Indiana Drinking Water Reservoirs. Assoc. Am. Geographers Annual Meeting, Washington, April, 2010.  
([http://communicate.aag.org/eseries/aag\\_org/program/AbstractDetail.cfm?AbstractID=31529](http://communicate.aag.org/eseries/aag_org/program/AbstractDetail.cfm?AbstractID=31529)).
- Soyeux, E., Tedesco, L.P., Matzinger, A., and Pagotto, C., 2010. Near Natural Mitigation Zones for Agricultural Runoff Management to Protect Drinking Water Supplies: A French-German- US Research Collaboration. Developing Partnerships for Sustainable Water management and Agriculture in the Context of Climate and Global Change, French American Agriculture and Climate Change Symposium, West Lafayette, May, 2010, Program, p. 47.
- Tedesco, L.P., Clercin, N., Cowan, A., and Gray, M., 2010. Cyanobacterial Occurrence and Toxicity in Indiana. Indiana Lake Management Society, 22<sup>nd</sup> Annual Meeting, Abstracts with Program, p. 32.
- Tedesco, L.P., Clercin, N., Cowan, A., and Gray, M., 2010. Cyanobacterial Occurrence and Toxicity in Midwestern Drinking Water Reservoirs. Indiana Chapter American Water Works Association Annual Meeting, Indianapolis, February 2010.

Tedesco, L.P., Barr, R.C., and Hall, B.E., 2010. Indiana's Water Resources and Challenges for Sustainable Water Quality, Indiana Chapter American Water Works Association Annual Meeting, Indianapolis, February 2010.

Tedesco, L.P., Barr, R.C., Hall, B.E., Hoffmann, J., and Neilson, B., 2010. Bioretention Swales as Urban Stormwater Best Management Practices: Design and Effectiveness. 2010 Indiana Association of Soil and Water Conservation Districts Annual Meeting, Indianapolis, IN, January, 2010.

Babbar-Sebens, M., Barr, R.C., and Tedesco, L.P., 2010. Responding to Climate and Landuse Changes: Multiobjective Optimization for Wetland Restoration Site Selection - Eagle Creek Watershed, Indiana, USA. 2010 Indiana Association of Soil and Water Conservation Districts Annual Meeting, Indianapolis, IN, January, 2010.

Hoffmann, J., and Tedesco, L.P., Regional Watershed Planning Approach Leading New Public Education Strategy. 2010 Indiana Association of Soil and Water Conservation Districts Annual Meeting, Indianapolis, IN, January, 2010.

Babbar-Sebens, M., Barr, R.C., and Tedesco, L.P., 2010. Multiobjective Optimization for Wetland Restoration Site Selection - Eagle Creek Watershed, Indiana, USA. Environmental Water Resources Institute's 3rd International Perspective on Current and Future State of Water Resources and the Environment, American Society of Civil Engineers, Chennai, India, January 5-7, 2010.

### ***Hosted Conferences and Workshops***

Blue Green Algae Symposium, Indianapolis, June 2010  
 Central Indiana Water Resources Partnership Science Meeting, Indianapolis, May 2010

### ***Invited Talks, Tours, and Events***

"The Coupled Effects of Climate Change and Modification of Indiana's Hydrologic Cycle to Water Resources and Flooding", Indiana GIS Conference, Invited Keynote, Indianapolis, November 2010

"Water Quality Challenges", Indiana Land Use Consortium's Annual Communities at the Crossroads Conference, Indianapolis, October 2010

"Climate Induced Changes in Taste and Odor Production and Transported Sources Impacting Indianapolis Drinking Water Supplies", World Water Congress, Montreal, CA, September 2010

"Blue-green Algae: A Threat to Indiana's Lakes and Streams", USEPA Regional Source Water Managers Annual Meeting, Indianapolis, September 2010

"Pharmaceuticals in Indiana's Waters: An Overview", State of Indiana Legislature, Environmental Quality Service Council, Interim Study Committee, September 2010

"The Coupled Effects of Climate Change and Modification of Indiana's Hydrologic Cycle to Water Resources and Flooding", 4<sup>th</sup> Annual HAZUS Conference, Federal Emergency Management Agency, Invited Keynote, Indianapolis, August 2010

WFYI Drop by Drop: Protecting Indiana's Water Supply July 2010

Goose Pond Biodiversity Study, Linton, Indiana, July 2010

"Blue-green Algae: A Threat to Indiana's Lakes and Streams", Indiana Wildlife Federation Annual Meeting, Clifty Falls State Park, June 2010

“Microcystin and Taste and Odor Compound Occurrence, Fate and Transport in central Indiana Surface Waters.” 7<sup>th</sup> National Water Monitoring Conference, Denver, CO, April 2010

“Modification of Indiana’s Hydrologic Cycle”, Operation Stay Afloat 2010, Flood Preparedness and All Hazard Mitigation Conference, Keynote Address, Indiana Department of Natural Resources and Indiana Department of Homeland Security, March 2010

“Cyanobacterial Occurrence and Toxicity in Indiana”, Indiana Lake Management Society, Annual Meeting, Merrillville, IN, March 2010

“Cyanobacterial Occurrence and Toxicity in central Indiana Drinking Water Reservoirs with an Assessment of Statewide Occurrence”, Purdue University, Water Community Seminar, West Lafayette, IN, March 2010

“The Quest for Sustainable Water Resources and the Role of Stormwater”, Keep It Clean, Central Indiana Stormwater Workshop, Indianapolis, February 2010

### ***Research Grants***

Development of a Fluvial Erosion Hazard Mitigation Program for Indiana  
 Indiana Office of Community and Rural Affairs/FEMA  
 With USGS  
 10/10 – 5/13                      \$799,873

Algal Ecology and Cyanobacteria Toxicity of Three Eutrophic Drinking Water Supply and Recreational Use Reservoirs in Central Indiana  
 Veolia Water Indianapolis  
 1/10-12/10                      \$156,240

Remote Sensing of Global Warming Affected Inland Water Quality: Challenge, Opportunity and Solution  
 NASA  
 With L. Li and M. Babbar-Sebens  
 1/10 – 12/10                      \$72,525

Eagle Creek Watershed Implementation Project  
 EPA 319 Grant Program/ Indiana Department of Environmental Management  
 10/09 – 9/12                      \$655,375 (\$393,225 grant dollars)

Testing Bio-optical Algorithms for Remote Sensing of Inland Water Quality  
 With L. Li and J. Wilson  
 NASA  
 6/09-5/13                      \$569,820

Performance Analysis of Selected Mitigation Systems Used to Attenuate Diffuse Pollution Occurring during Baseflow and High Flow Events from Agricultural Fields (Aquisafe 2)  
 KompetenzZentrum Wasser Berlin  
 Co-PI with P.A Jacinthe and M. Babbar-Sebens  
 1/09-12/12                      €150,000 (~\$216,200)

A Model to Identify Constructed Wetland Sites to Maximize Nitrate Reduction and Flood Mitigation  
Indiana State Department of Agriculture  
Co-PI with M. Babbar-Sebens  
1/09-1/10 \$38,000

Sustaining Water Resources: Environmental Impacts of Chemical Loadings and Transport during Floods  
Indiana University - Bloomington – IUPUI Intercampus Collaboration in Environmental Research  
Co-PI with M. Babbar-Sebens and P.A. Jacinthe (IUPUI)  
K. Clay, S. Hall, H. Reynolds, and T. Royer (IUB)  
1/09 – 6/10 \$50,333

### ***Research Contracts***

Monitoring and Analysis of Blue-green Algae in Indiana Lakes and Reservoirs  
Indiana Department of Environmental Management  
7/10 – 6/12 \$29,060

Development of Restoration and Mitigation Plans for Streams and Wetlands on Indianapolis Park  
Properties  
City of Indianapolis Department of Public Works  
1/10 – 12/12 \$33,300

Development of Restoration and Mitigation Plans for Streams and Wetlands on Indianapolis Park  
Properties  
Indianapolis Parks Foundation, Inc.  
12/07-12/12 \$13,500 + work package amendments  
6/09-6/10 Amendment 1 - \$119,460

### **2010 Science Education and Public Outreach Activities**

#### ***Abstracts***

Furge, B.A., Tedesco, L.P., Salazar, K.A., Digital Water: Water Quality Monitoring for a Tech-savvy Generation, 39th Annual Meeting North American Association for Environmental Education, Buffalo-Niagara, New York, October 2010.

Hayes, M. and Salazar, K.A. Environmental Education in Indiana: Updates, Events, and Your Opinion on Indiana's Environmental Literacy Plan, Hoosier Association of Science Teachers, Indianapolis, IN, February 2010.

Salazar, K.A. and Furge, B.A., Discovering the Science of the Environment: Technology Applications for Environmental Education Instruction, Hoosier Association of Science Teachers, Indianapolis, IN, February 2010.

Cowan, A.M., Furge, B., Tedesco, L.P., and Maars, K., 2010. Teaching Middle-school Students about Algal Blooms: A program of Discovering the Science of the Environment through the NSF GK-12 Graduate Fellow Program. Am. Assoc. Advancement of Science, Annual Meeting, February, San Diego, 2010.

### ***Hosted Conferences and Workshops***

Discovering the Science of the Environment Teacher Professional Development Summer Institute, Indianapolis, June 2010

Discovering the Science of the Environment Teacher Professional Development Winter Workshop, Indianapolis, February 2010

### ***Invited Talks, Tours, and Events***

“Pharmaceuticals in the Environment”, IN Project WET, WILD and Hoosier Riverwatch Facilitators Meeting, Camp Camby, Indianapolis, December 2010

Imagine IN Summit Education Panel, Indianapolis Museum of Art, October 2010

National FFA Convention Career Success Tours, Indianapolis, October 2010

Conversations on Civic and Community Development - Service Learning Research Conference Roundtable, Indianapolis, October 2010

Green Generation Fair – IUPUI, September 2010

CICOA Safe at Home Event - Yard / Landscaping Volunteer Effort, August 2010

“IUPUI Campus Sustainability Initiative”, Xerox Company Luncheon, IUPUI, July 2010

“Towards Sustainable Water Resources for Indiana”, Project WET USA Annual Conference, Keynote Address, Indiana Department of Natural Resources, McCormicks Creek State Park, June, 2010

“Campus Sustainability Initiative”, Environmental Law Society - Environmental Symposium, IU School of Law, Indianapolis, April, 2010

Pike Community Schools Math and Science Night, March 2010

### ***Environmental Service Learning***

The CEES Environmental Service Learning program engages IUPUI undergraduate students, university-wide, in interdisciplinary environmental stewardship field days at local natural areas with community partners.

### **Spring and Fall 2010 Service Learning Tracking:**

- Projects - 16
- Students - 373
- Project Partners - 4
- Courses - 10
- Sections - 26
- Departments - 6
- Schools - 4



### ***Discovering the Science of the Environment Program***

The Discovering the Science of the Environment program is an experiential, inquiry-based, outdoor laboratory focused science education program for 4<sup>th</sup>-9<sup>th</sup> grade classes in central Indiana. Utilizing a mobile resource trailer equipped with interactive technology tools, web interface, and GIS mapping capabilities, the DSE program travels to area schools to provide free educational programming at school ground natural areas.

During the Spring and Fall 2010 field seasons, science and technology programs with the Discovering the Science of the Environment trailer engaged:

- **6 grade levels (Grades 4, 5, 6, 7, 8, High School Environmental Science)**
- **16 schools**
- **50 teachers**
- **120 classes**
- **3,018 students**

### ***Education and Teaching Grants***

Discovering the Science of the Environment

Co-Pi with L. Li

NASA

3/10-7/13

\$60,000

The GK-12 Urban Educators Program at IUPUI: Teaching and Learning Science through Research

Co-PI with K. Marrs, A. Gavrin, J. Watt, P. Crowell, S. Rhodes

National Science Foundation

2/08-2/12

\$2,993,160

### **Advisory Boards and Committees**

#### ***Professional***

State of Indiana, Natural Resource Conservation Service, State Technical Committee, 2009-present, Tedesco

State of Indiana, Department of Environmental Management, Nutrient Technical Advisory Group, 2009 – present, Tedesco

State of Indiana, Department of Agriculture, Technical Advisory Group, 2009 – present, Tedesco

Indiana State Water Monitoring Council Board of Directors, Founding Member, 2008 – present, Tedesco

City of Indianapolis Indy Greenprint Commission, Commissioner, Mayoral Appointee Bart Peterson, 2007 - present, Tedesco

City of Indianapolis, Clean Stream Team Advisory Board, 2007 – present, Tedesco

State of Indiana Solid Waste Management Board, Gubernatorial Appointee Joseph Kernan, 2003-present, Tedesco

Indiana Water Resource Research Center, Board of Directors, 2004 – present, Tedesco

Veolia Water Indianapolis Technical Advisory Board, 2003 – present, Tedesco

Upper White River Watershed Alliance, Board of Directors, 2004 – present, Tedesco  
National Science Foundation, Proposal Reviewer, 1995-present, Tedesco

### ***University***

Campus Sustainability Initiative Steering Committee, Chair, 2005 – present, Tedesco  
Campus Sustainability Initiative, 2005-Present, Salazar  
Greening IUPUI Grant Review Committee, 2009-Present, Salazar  
Permanent Reviewer, University Research and Sponsored Programs Grant Program, 2008 – present,  
Tedesco  
Staff Council, 2008-Present, Salazar

### ***School***

Bachelor's of Science in Environmental Science, Program Director, 2006- present, Tedesco  
School of Science Signature Center's Taskforce, 2010 – present, Tedesco  
Staff Council Executive Committee, 2008-Present, Salazar  
Technology Committee, 1993 – present, Tedesco

### ***Community***

Eagle Creek Watershed Alliance Education Committee, 2006 – Present, Salazar  
Environmental Education Association of Indiana Board of Directors, 2009-Present, Salazar  
Laura Hare Charitable Trust, Trustee, 2006 – present, Tedesco  
Town of Fishers, Department of Parks, Ritchey Woods Nature Preserve Advisory Council, 2007 – present,  
Tedesco

### **Student Activities**

#### ***Scholarship Awards***

Stacy Yager, Carl H. Johnson Achievement Scholarship

Mathew Beshears, Central Indiana Technical and Environmental Societies Scholarship

#### ***Affiliated Graduate Students***

Slawa Bruder  
Research Focus: Managing Eutrophication and Human Health Impacts in Central Indiana Reservoirs  
Advisor, Dr. Meghna Babbar-Sebens

Julie Crewe, *GK-12 Scholar*  
Research Focus: Spatial analysis of mercury deposition and anthropogenic sources in an urban area.  
Advisor, Dr. Gabriel Filippelli

Angie Cowan, *GK-12 Scholar*

Research Focus: Physicochemical and biological assessment of Eagle Creek, Geist and Morse Reservoirs, Indiana.

Advisor, Dr. Lenore Tedesco

Andrew Gamble

Research Focus: Use of multivariate techniques to analyze water quality or water flow in the White River Watershed, Indiana.

Advisor, Dr. Meghna Babbar-Sebens

Susan Gidley

Research Focus: Use of Quickbird Satellite Imagery to map aquatic vegetation in northern Indiana lakes.

Advisor, Dr. Jeffrey Wilson

Joseph Johnstone

Research Focus: Examining nutrient export patterns during storms in Eagle Creek Watershed, Indiana.

Advisor, Dr. Philippe Vidon

Deborah Morrison

Research Focus: Correlating high lead blood levels in children in an urban setting using geospatial analysis and geographically referenced health data.

Advisor, Dr. Gabriel Filippelli

Tony Robertson

Research Focus: Development of Bio-optical and Modified Gaussian Models for the prediction on cyanobacterial concentration.

Advisor, Dr. Lin Li

Allyson Smith, *GK-12 Scholar*

Research Focus: Investigating nutrient conversion from agricultural runoff using constructed wetlands.

Advisor, Dr. Pierre-Andre Jacinthe

Amy Smith, *GK-12 Scholar*

Research Focus: Nutrient and Atrazine Removal in a Constructed Wetland Bioswale Complex Capturing Agricultural Tile Runoff

Advisor, Dr. Lenore Tedesco

Mike Stouder

Research Focus: Investigation of nutrient export dynamics in a large scale watershed dominated by agriculture, Upper White River Watershed, Indiana.

Advisor, Dr. Lenore Tedesco

Shuangshuang Xie

Research Focus: Remote Sensing of Global Warming Affected Inland Water Quality

Advisor, Dr. Meghna Babbar-Sebens

***Student Interns and Employees***

Casey Baldwin, BS, Environmental Science - *Funding by Sam H. Jones Community Service Scholarship Program as Service Learning Assistant*

Daniel Bowman, BS, Psychology - *Funding by Sam H. Jones Community Service Scholarship Program as Service Learning Assistant*

Jennifer Cusick, BS, Mechanical Engineering - *Funding by Sam H. Jones Community Service Scholarship Program as Service Learning Assistant*

Sandra Haefner, BS, Environmental Science - *Funding by Sam H. Jones Community Service Scholarship Program as Service Learning Assistant*

Jacob Lemon, BS, Environmental Science

W. Ryan McAtee, B.G.S.

Samantha Simpson, BS, Environmental Science

Mark Sparks, BS, Geology

Ty Winslow, BS, Environmental Science

**Appendices**

CEES Community Advisory Board and Staff

CEES Researchers - Affiliated Faculty and Staff

Community Partners in Research and Education

CEES Financials Report



# CENTER FOR EARTH AND ENVIRONMENTAL SCIENCE

## Community Advisory Board and Staff

### Dr. Lenore P. Tedesco

Director, Center for Earth and Environmental Science / Professor, Department of Earth Sciences  
*Stream and Wetland Ecosystem Restoration, Water Resources, Environmental Education, Sedimentology,*  
*ltedesco@iupui.edu*

### Community Advisory Board

#### Robert Bowen

Chairman and Chief Executive Officer  
Bowen Engineering Corporation  
*bob@bowenengineering.com*

#### Susan Cornacchione

Vice President of Development  
CICOA Aging & In-Home Solutions  
*scornacchione@cicoa.org*

#### Vince Griffin

Director, Environmental & Energy Policy  
Indiana Chamber of Commerce  
*vgriffin@indianachamber.com*

#### Tim Hewitt

Corporate Industry Professional  
*thewitt718@aol.com*

#### Lori Kaplan

*LFKaplan@aol.com*

#### Neil B. Myers

Principal  
Williams Creek Consulting, Inc.  
*nmyers@williams creek.net*

#### Barbara Simpson

Executive Director, Indiana Wildlife Federation  
*barbsimp@comcast.net*

#### Ellen E. Tobias

Executive Director  
Elanco Manufacturing  
Eli Lilly and Company  
*tobiasee@lilly.com*

### Staff

#### Robert Barr

Research Scientist  
*Hydrology, Fluvial Geomorphology, Wetland Science*  
*rbarr@iupui.edu*

#### Nicolas Clercin

Research Scientist  
*Algal Ecology, Limnology*  
*nclercin@iupui.edu*

#### Brooke Furge

Education Specialist  
*Environmental and Outdoor Education*  
*bfurge@iupui.edu*

#### Bob E. Hall

Systems Engineer  
*Wetland Restoration, Water Quality Monitoring, GIS, Remote Sensing, Technology*  
*bhall@iupui.edu*

#### Kara Salazar

Education Outreach Coordinator  
*Environmental Service Learning, Environmental Science Education, Ecosystem Restoration*  
*salazark@iupui.edu*

#### Mike Stouder

Research Specialist  
*Fluvial Geomorphology, Water Quality Monitoring*  
*mstouder@iupui.edu*

#### Center for Earth and Environmental Science

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# IUPUI



# CENTER FOR EARTH AND ENVIRONMENTAL SCIENCE

## Research Expertise

### **Dr. Meghna Babbar-Sebens**

*Assistant Professor of Earth Sciences, IUPUI*  
Water Resources and Environmental Systems Analysis,  
Environmental Risk Assessment and Management, Contaminant Fate  
and Transport Modeling, Uncertainty Analysis, Surface and Groundwater  
Hydrology, Optimization, and Decision Support Systems

Ph.D., University of Illinois at Urbana-Champaign, 2006  
M.S., University of Illinois at Urbana-Champaign, 2002  
B.E., Indian Institute of Technology, Roorkee, India, 2000

Research is focused on the fate and transport modeling of water-borne contaminants, and assessment and management of associated ecological and human health risks. Dr. Babbar-Sebens research focuses on a) analysis of uncertainty when models are used to conduct spatially referenced systems-scale environmental assessments, b) incorporation of uncertainty analysis within decision support systems used for risk assessment and management, and c) optimization of planning and management strategies for emergency response and water-borne disease prevention.

### **Dr. M. Pauline Baker**

*Associate Professor, School of Informatics and Computer Science Department, IUPUI*  
*Director of the Visualization and Interactive Spaces Lab, IU*  
Information Technology, Computer Graphics, Visualization, Human-Computer Interaction

Ph.D., University of Illinois, 1990  
M.S., Syracuse University, 1977  
B.A., Cornell University, 1974

Research focus is on the use of advanced computer-graphics and user interaction methods for creating hardware and software environments for data exploration and for learning. Dr. Baker has particular interest in using ubiquitous computing technologies (sensors, mobile devices, etc.) to design learning environments suitable for informal education venues such as museums and discovery centers.

### **Robert Barr**

*Research Scientist*  
*Center for Earth and Environmental Science, IUPUI*  
Hydrology, Fluvial Geomorphology, Wetland Science, Ecosystem Naturalization

B.A., IUPUI, 2002  
B.A., IUPUI, 1991

Develop, implement, and coordinate hydrologic analysis of aquatic ecosystems, with particular emphasis on the physical hydrology of streams and wetlands and the systems analysis of watersheds. Outreach activities include conducting continuing education workshops for environmental science professionals and community members. Teach or coteach courses in stream and wetland ecosystems for graduate and undergraduate students. Primary research interests are stream and riparian corridor naturalization in the glaciated Midwestern United States and the hydrologic linkages between depressional wetlands and primary headwater streams.

### **Dr. William Blomquist**

*Professor, Dean of the IUPUI School of Liberal Arts*  
Water Resources, Watershed Management

Ph.D., Indiana University, 1987  
M.A., Ohio University, 1979  
B.S., Ohio University, 1978

Research focuses on water management institutions and policies. Dr. Blomquist has studied and written about groundwater management agencies in Southern California; state water laws and agencies in Arizona, California, and Colorado; watershed management agencies in the United States; and river basin management organizations in other countries. His newest project is an exploration of the legal and political barriers to the development of desalination facilities in coastal areas of the U.S.

# IUPUI

*Center for Earth and Environmental Science*  
**Dr. Lenore P. Tedesco, Director**

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# CENTER FOR EARTH AND ENVIRONMENTAL SCIENCE

## Research Expertise, Continued

### **Dr. Ross A. Brittain**

*Adjunct Faculty, IUPUI*

*Indiana Director of Bird Conservation, National Audubon Society*

*Applied Ecology, Wetland Ecology, Ornithology, Conservation Biology, Community Ecology*

Ph.D., Indiana University at Bloomington, 2009

M.P.A. & M.S.E.S, Indiana University at Bloomington, 2006

B.A., Indiana University at Bloomington, 1991

Design spatially-explicit and species-specific bird conservation plans for the State of Indiana as the Director of Bird Conservation for the National Audubon Society. Coordinate and conduct land stewardship activities and monitoring research of bird species of concern as part of ongoing adaptive management strategies in Important Bird Areas across Indiana. Coordinate research of Northern Saw-whet Owl (*Aegolius acadicus*) migrations patterns and demographics across Indiana. Use stable isotopes of C, N and D to assess avian food webs and habitat relationships.

### **Dr. Timothy S. Brothers**

*Associate Professor of Geography, IUPUI*

*Physical Geography, Biogeography*

Ph.D., University of California, LA, 1985

M.A., University of California, LA, 1981

B.A., University of California, Davis, 1978

Research focuses on human alteration of natural vegetation, and the geography of the Caribbean. He has studied causes and consequences of deforestation in the Dominican Republic and comparative vegetation change in Haiti and the Dominican Republic.

### **Nicolas Clercin**

*Research Scientist, Phytoplankton Ecology*

*Center for Earth and Environmental Science, IUPUI*

*Limnology, Phytoplankton ecology, Cyanobacteria, Toxicology, Nutrients Cycling, Algae Taxonomy*

M.S., University of Rennes, France, 2005

B.S., University of Rennes, France, 2002

Research interests focus on the ecology of freshwater phytoplankton with emphasis on understanding the environmental factors triggering the growth of the microalgae. Algae blooms in freshwater are predominantly cyanobacteria (blue-green algae), some of which produce potent cyanotoxins and pose a potential risk to human health through exposure from recreational use, drinking water, fish consumption, and other vectors.

### **Dr. Kay Connelly**

*Assistant Professor of Computer Science, Indiana University*

*Lead, Security for Ubiquitous Resources Group (SURG), IU*

*Associate Director, Center for Applied Cybersecurity Research, IU*

PhD, University of Illinois at Urbana-Champaign, 2003

MS, University of Illinois, 1999

B.S. and B.A., Indiana University, 1995

Research includes user acceptance of ubiquitous and mobile computing technologies where there is a delicate balance between such factors as convenience, control and privacy. She is currently investigating the following application domains: Convenience applications such as automatically configuring a cell phone's notification mechanism depending on the physical and social context of the cell phone owner; Health care applications to empower both the ill and the healthy to manage and improve their own health; Work and learning applications such as a tool to assist students in gathering environmental data while simultaneously supporting data analysis in the field.

# IUPUI

*Center for Earth and Environmental Science*

**Dr. Lenore P. Tedesco, Director**

Indiana University-Purdue University Indianapolis

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# CENTER FOR EARTH AND ENVIRONMENTAL SCIENCE

## Research Expertise, Continued

### **Dr. Gabriel Filippelli**

*Professor of Earth Sciences, IUPUI*  
*Director, Center for Urban Health*  
*Environmental Chemistry, Paleoceanography, Paleoclimatology*

Ph.D., University of California, Santa Cruz, 1994  
B.S., University of California, Davis, 1986

Research includes biogeochemical cycling in the environment and the connections between geochemistry and the geologic record of global climate change. Current research involves determining the effects of climate on weathering and terrestrial nutrient cycling; examining carbon and nutrient cycles on glacial/interglacial time scales; assessing industrial heavy metal inputs to near-urban wetlands; and examining the connection between soil lead, climate, and children's health.

### **Brooke Furge**

*Education Specialist*  
*Center for Earth and Environmental Science, IUPUI*  
*Environmental Education*

B.A., Oberlin College, 2004

Efforts include designing, developing and implementing environmental science education outreach programs to Central Indiana schools and teachers through the Center for Earth and Environmental Science's *Discovering the Science of the Environment* program. Programs focus on local, technology-infused field science research experiences utilizing a mobile technology trailer, digital handheld data input devices, on-site student data upload, and comprehensive data sharing via the web.

### **Dr. Dominique M. Galli**

*Associate Professor in Department of Oral Biology,*  
*Indiana University School of Dentistry*  
*Faculty Fellow, Office of the Executive Vice Chancellor and Dean of Faculties*  
*Periodontal Pathogens*

PhD. in Microbiology, Ludwig Maximilians- Universität  
M.S. in Biology, Ludwig Maximilians-Universität

Research is focused on the use of plasmids and other mobile genetic elements to develop molecular biological and genetic tools that will allow for an investigation of the functionality and regulation of putative *Aa* virulence traits. The use of these genetic tools has been crucial in the initiation of the following three projects: *Aa*-neutrophil interaction, Characterization of biofilms formed by *Aa*, Conjugative transfer in mixed biofilms.

### **Bob E. Hall**

*Research Scientist, Systems Engineer, Technologist*  
*Center for Earth and Environmental Science, IUPUI*  
*Environmental Remote Sensing, Ecosystem Monitoring,*  
*Environmental Restoration, Data and Systems Administration, and Design*

M.S., IUPUI, 2000  
B.S., Ball State University, 1994

Efforts revolve around facilitating faculty research with hydrologic monitoring of wetland, riparian, and lake ecosystems. Research includes: evaluating restoration strategies and efforts; environmental mapping, modeling, and visualization; data and environmental sensor network design, administration, and maintenance; and graphic, publication, and website design.

### **F. Vincent Hernly**

*Research Scientist, Laboratory Coordinator, Department of Earth Sciences, IUPUI*  
*Glacial Stratigraphy, Soils, Geomorphology*

M.S., IUPUI, 1997  
B.S., IUPUI, 1992

Research is on Quaternary stratigraphy of the Midwest, with special emphasis on the use of paleosols as a stratigraphic tool and environmental indicator. Current interests are in the use of soils as wetland indicators, and in questions related to the development and persistence of hydric soils associated with both wetland restoration and wetland drainage.

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# CENTER FOR EARTH AND ENVIRONMENTAL SCIENCE

## Research Expertise, Continued

### **Dr. Pierre-André Jacinthe**

*Assistant Professor of Earth Sciences, IUPUI*

Environmental Soil Science, Soil Biochemistry, Soil Geomorphology

Ph.D., Ohio State University, 1995

M.S., Ball State University, 1991

B.S., State University of Haiti, 1985

Research interests include nitrate transformations in wetlands, carbon sequestration in natural and managed ecosystems, nutrient cycling and soil-atmosphere exchange of trace gases (carbon dioxide, methane and nitrous oxide) as related to land-use and management practices. His research has also focused on fates of eroded carbon (mineralization, entrapment in terrestrial deposits), and linkages between water, erosion and the global carbon cycle. A recently funded project involves application of selective oxidation procedures, stable carbon isotope and radiocarbon techniques to partition carbon pools in reclaimed mine soils into fossil and recently deposited carbon fractions.

### **Dr. Lin Li**

*Assistant Professor of Earth Sciences, IUPUI*

Planetary Earth Sciences

Environmental Remote Sensing

Ph.D., Brown University, 2002

M.E., Brown University, 2001

M. S., Institute of Remote Sensing Application, Academy Sinica, 1989

B.S., Jilin, University, China, 1986

Research involves lunar and planetary Earth Sciences, environmental remote sensing and global climate change. Recent research focuses on wetland vegetation classification and invasive plant mapping with hyper-spectral remote sensing data, lunar soil mapping and impact mixing with multi-spectral imagery, and using radiative transfer models to derive the biochemical and biophysical parameters of vegetation and soils from hyperspectral remote sensing and MODIS data. Additional research interests involve the development/improvement of digital image processing algorithms for material classification and discrimination, and of radiative transfer modeling for the retrieval of material properties.

### **Dr. Kathy Licht**

*Assistant Professor of Earth Sciences, IUPUI*

Quaternary Earth Sciences, Glacial Earth Sciences, Geomorphology

Ph.D., University of Colorado, 1999

M.S., University of Colorado, 1995

B.S., St. Norbert College, 1992

Research focus is on reconstructing the history of the Antarctic and Laurentide Ice Sheets over the past 30,000 years. Previous work has utilized sedimentology and stratigraphy to reconstruct ice extent, as well as  $^{14}\text{C}$  dating to constrain the timing of ice advance and retreat. A recently funded Antarctic project linked the mineralogical, geochemical, and isotopic characteristics of the sediments from Ross seafloor sites that were once covered by glacial ice to sediments collected from the source areas of ice in East and West Antarctica to determine past ice flow paths. This type of study contributes to the understanding of changes in ice sheet dynamics through time. Current projects also include studies of lake sediments in northern Indiana and southern Michigan to determine how regional climate has changed since the end of the last ice age.

### **Dr. Gary D. Rosenberg**

*Associate Professor of Earth Sciences, IUPUI*

Biomineralization, Evolution, Historical Earth Sciences,

History of Geologic Thought

Ph.D., University of California, Los Angeles, 1972

B.S., University of Wisconsin, 1966

Research uses digital electron microscopy to produce high magnification images of the minerals and matrices that organisms deposit in shells, teeth, and bone as well as to draw maps of the distribution of elements within those materials. He is interested in determining how the external environment and the internal physiology of the organism have influenced the shape, structure, and composition of skeletons throughout the course of evolution, how various human afflictions alter skeletal development, and how pollution influences growth.

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# CENTER FOR EARTH AND ENVIRONMENTAL SCIENCE

## Research Expertise, Continued

### **Kara Salazar**

*Education Outreach Coordinator*

*Center for Earth and Environmental Science, IUPUI*

*Environmental Service Learning, Environmental Education, Ecosystem Restoration*

M.S.Ed., IUPUI, 2007  
M.P.A., Indiana University, 2002  
B.S., Indiana University, 1999

Efforts include developing, implementing, and evaluating environmental science curriculum, outreach programs, and institutes for K-12 students and teachers, university students, community members, and environmental professionals with emphasis placed on urban and multicultural education. Outreach programs include environmental service learning coordinated in conjunction with community partners and the Discovering the Science of the Environment program. Environmental science research interests include wetland, riparian, and prairie restoration projects, wetland delineation, vegetation monitoring, and environmental sustainability efforts.

### **Dr. Joshua Smith**

*Assistant Professor of Educational Psychology, IUPUI*

*Director, Center for Urban and Multicultural Education*

*Educational Transition, Research Design, Evaluation, Urban Education, Case Method Pedagogy*

Ph.D., University at Albany, 2002  
M.S., University at Albany, 1997  
B.A., University at Albany, 1994

Courses offered include Educational Psychology in the Teacher Education Program and graduate courses in qualitative and quantitative research methods. Research interests include student transition from middle school to high school, and the transition from high school to college. He currently coordinates six program evaluations in the Indianapolis region.

### **Dr. Lenore Tedesco**

*Associate Professor of Earth Sciences, IUPUI*

*Director, Center for Earth and Environmental Science*

*Water Resources, Wetland Ecosystem Restoration, Environmental Education, Sedimentology*

Ph.D., University of Miami, 1991  
B.A., Boston University, 1984

Research focuses on regional watershed and water quality issues with a focus on surface water and drinking water resources. Current research efforts are evaluating the distribution of emerging contaminants and cyanobacteria toxins in central Indiana surface waters. Wetlands and wetland restoration including evaluation of restoration strategies and wetland function are important research interests. This includes studies of urban riparian reforestation, fen wetland restoration, and on the distribution of anthropogenic pollutants. Dr. Tedesco is working with the Pervasive Technology Labs and CEES staff to develop an autonomous environmental monitoring network measuring water quality throughout central Indiana. Environmental education based on restoration research and environmental monitoring is an important part of her research interests.

### **Dr. Xianzhong Wang**

*Assistant Professor of Biology, IUPUI*

*Plant Physiological Ecology, Soil and Environmental Sciences*

Ph.D., The Ohio State University, 1999  
M.S., Institute of Soil Science, Academia Sinica, 1989  
B.A., Zhejiang University, China, 1986

Research focuses on the effects of global environmental changes, including rising CO<sub>2</sub> concentration in the atmosphere, on plant physiology and growth at different organizational levels. Research is interdisciplinary in nature and aims at understanding the responses of plants to environmental disturbances caused by human activities.

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# CENTER FOR EARTH AND ENVIRONMENTAL SCIENCE

## Research Expertise, Continued

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**Dr. Gwen M. White**

*Adjunct Faculty, IUPUI*

Water Resources, Communication & Public Relations

Ph.D., University of Minnesota, 1996

M.S., University of Maryland, 1988

B.A., Goshen College (Indiana), 1984

Research focuses on water resource management, land use impacts, conservation biology, invasive species, and marine ecology. Outreach activities include development and implementation of communication plans, public relations campaigns, strategic planning, public participation, collaborative consensus-building, environmental education, and policy analysis for natural resource agencies and organizations.

**Dr. Jeffrey S. Wilson**

*Associate Professor of Geography, IUPUI*

*Chair, Department of Geography*

Geographic Information Systems, Environmental Remote Sensing

Ph.D., Indiana State University, 1998

M.A., California University of Pennsylvania, 1994

B.S., California University of Pennsylvania, 1991

Research interests are in environmental remote sensing, geographic information systems, and human/environment interactions. Current research involves remote sensing of cities; 3D modeling of urban environments; land cover dynamics and urban sprawl; and relationships between the physical environment and human health.

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# CEES Partners in Research, Education, and Philanthropy

## Research Partnerships

- Purdue University
- Indiana Water Resources Research Center
- United States Geological Survey – Indiana Water Science Center
- Indiana Department of Environmental Management
- Indiana Department of Natural Resources
- Indiana State Department of Agriculture
- Indiana University School of Medicine – Center for Environmental Health
- NASA
- Veolia Environment Research Centers – Paris, Adelaide, and Berlin

## Not-for Profits

- Central Indiana Land Trust Incorporated (CILT)
- Sycamore Land Trust
- Science Education Foundation of Indiana
- Indiana State Fair
- Keep Indianapolis Beautiful (KIB)
- WFYI Public Television
- Life Science Education Center at Marian College (LSEC)
- Indiana Audubon Society
- Indiana Wildlife Federation
- Friends of White River (FOWR)
- Rotary Club of Indianapolis

## Foundations

- Dr. Laura Hare Charitable Trust\*
- Nina Mason Pulliam Charitable Trust\*
- Eli Lilly and Company Foundation\*
- Duke Energy Foundation\*
- Hoover Family Foundation\*
- Nicholas H. Noyes, Jr., Memorial Foundation\*
- Efroymsen Fund of the Central Indiana Community Foundation\*
- UPS Foundation\*

*\*Denotes Major Donor*

## State and Local Government

- IDNR – Natural Resources Education Center
- Indiana State Department of Health
- Natural Resources Conservation Service
- Indiana State Museum
- City of Indianapolis - Department of Public Works – Office of Environmental Services
- City of Indianapolis, Office of Sustainability
- Indy Parks and Greenways
  - Environmental Education Outreach Program
  - Office of Land Stewardship
  - Division of Resource Development - Park Planning and Design
  - Earth Discovery Center of Eagle Creek Park
- Hamilton County Parks
- Noblesville Parks Department
- Zionsville Parks Department
- Marion, Hamilton, Boone, Hendricks County SWCD
- Marion and Boone County Health Departments

## Corporations

- Eli Lilly and Company\*
- Veolia Water Indianapolis\*
- Veolia Water North America
- Dow AgroSciences\*
- IPL\*

## Universities

- Butler University
- Marian College - EcoLab
- University of Wisconsin – Madison Arboretum
- Purdue University
- Indiana University
- University of Indianapolis – Center for Excellence in Leadership and Learning

## Schools

- Numerous IPS and Township Schools
- Indiana Charter Schools
- Indiana School for the Blind



# Center for Earth & Environmental Science

## REVENUE & EXPENSE REPORT - FISCAL YEAR 2005-2011

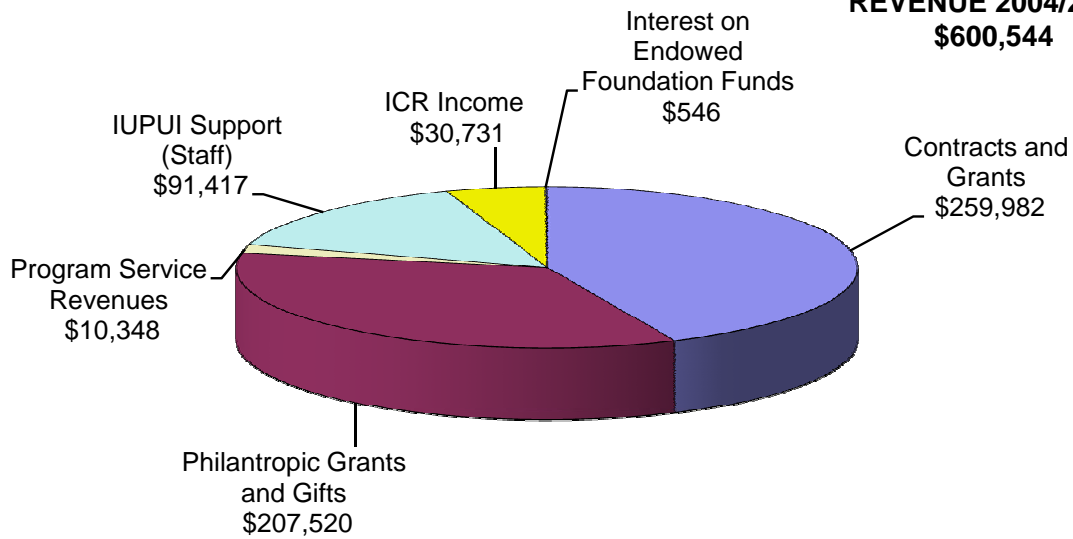
	FISCAL YEAR 2004/2005	FISCAL YEAR 2005/2006	FISCAL YEAR 2006/2007	FISCAL YEAR 2007/2008	FISCAL YEAR 2008/2009	FISCAL YEAR 2009/2010	Est FISCAL YEAR 2010/2011
<b>REVENUE</b>							
<b>SOURCE</b>							
Government Grants and Contracts	\$ 9,982	\$ 64,128	\$ 158,916	\$ 218,286	\$ 126,336	\$ 140,375	\$ 395,182
Non-government Grants and Contracts	\$ 250,000	\$ 366,622	\$ 336,683	\$ 590,333	\$ 497,597	\$ 443,531	\$ 312,706
Foundation Gifts	\$ 189,850	\$ 35,000	\$ 200,350	\$ 118,000	\$ 101,050	\$ 141,000	\$ 160,000
Corporate Gifts	\$ 3,670	\$ 2,725	\$ 104,000	\$ 121,000	\$ 15,579	\$ 1,050	\$ 7,500
Individual Gifts	\$ 14,000	\$ 27,008	\$ 6,490	\$ 8,898	\$ 4,490	\$ 4,390	\$ 3,325
Program Service Revenues	\$ 10,348	\$ 22,080	\$ 30,602	\$ 44,291	\$ 69,812	\$ 5,100	\$ 23,237
IUPUI Support (Staff)	\$ 91,417	\$ 102,799	\$ 69,218	\$ 72,746	\$ 73,361	\$ 73,361	\$ 57,899
ICR Income	\$ 30,731	\$ 61,462	\$ 61,462	\$ 30,731	\$ -	\$ 3,390	\$ 4,102
Interest on Endowed Foundation Funds	\$ 546	\$ 659	\$ 764	\$ 822	\$ 813	\$ 739	\$ 672
<b>TOTAL</b>	<b>\$ 600,544</b>	<b>\$ 682,483</b>	<b>\$ 968,485</b>	<b>\$ 1,205,107</b>	<b>\$ 889,038</b>	<b>\$ 812,936</b>	<b>\$ 964,623</b>
<b>EXPENSES</b>							
<b>ITEM</b>							
Faculty Salaries	\$ 54,081	\$ 78,082	\$ 103,813	\$ 154,674	\$ 145,550	\$ 117,160	\$ 92,298
Student Academic Salaries	\$ 24,700	\$ 66,500	\$ 52,234	\$ 50,967	\$ 37,714	\$ 16,250	\$ 24,750
Professional Salaries	\$ 105,808	\$ 125,523	\$ 138,285	\$ 149,902	\$ 109,623	\$ 132,346	\$ 157,350
Biweekly, and Hourly Wages	\$ 41,671	\$ 101,719	\$ 125,178	\$ 92,494	\$ 41,431	\$ 64,559	\$ 53,349
Benefits & Payroll Taxes	\$ 59,879	\$ 74,321	\$ 71,438	\$ 100,986	\$ 102,059	\$ 78,904	\$ 85,106
Student Fee Remission	\$ 5,693	\$ 13,893	\$ 31,184	\$ 13,149	\$ 11,848	\$ 14,565	\$ 9,000
Consultants\Professional Fees\Subcontracts	\$ -	\$ 2,500	\$ 52,100	\$ 33,033	\$ 75,857	\$ 48,063	\$ 58,114
Office Supplies and Expenses	\$ 11,770	\$ 19,766	\$ 16,107	\$ 26,910	\$ 13,231	\$ 10,460	\$ 16,000
Printing, Copying	\$ 595	\$ 6,123	\$ 7,094	\$ 11,134	\$ 7,209	\$ 2,813	\$ 5,000
Research, Lab and Field Supplies	\$ 55,850	\$ 112,460	\$ 44,156	\$ 76,628	\$ 91,884	\$ 220,534	\$ 50,139
Equipment <\$5,000 & Maintenance	\$ 63,281	\$ 73,172	\$ 64,042	\$ 100,336	\$ 21,350	\$ 14,108	\$ 18,325
Capital Equipment	\$ 23,558	\$ 52,721	\$ 17,110	\$ 72,814	\$ 7,621	\$ -	\$ -
Travel & Training	\$ 22,569	\$ 29,219	\$ 29,071	\$ 41,889	\$ 38,167	\$ 23,361	\$ 38,180
Project Development	\$ 4,003	\$ 10,634	\$ 5,684	\$ 14,083	\$ 8,850	\$ 6,203	\$ 11,066
ICR Expenses	\$ 88,893	\$ 99,602	\$ 90,652	\$ 148,022	\$ 58,745	\$ 49,127	\$ 59,463
<b>TOTAL</b>	<b>\$ 562,351</b>	<b>\$ 866,235</b>	<b>\$ 848,148</b>	<b>\$ 1,087,021</b>	<b>\$ 771,141</b>	<b>\$ 798,453</b>	<b>\$ 678,140</b>
<b>NON-REVENUE GENERATING FUNDS</b>							
Endowed Foundation Funds	\$ 14,320	\$ 16,103	\$ 19,407	\$ 21,056	\$ 13,485	\$ 15,558	\$ 16,222
Account Reserves (Unspent Funds)	\$ 297,216	\$ 150,945	\$ 337,219	\$ 214,891	\$ 140,008	\$ 220,176	\$ 286,483
In-Kind Support	\$ 127,617	\$ 198,026	\$ 181,073	\$ 331,488	\$ 247,141	\$ 264,957	\$ 242,002
<b>TOTAL</b>	<b>\$ 439,153</b>	<b>\$ 365,074</b>	<b>\$ 537,699</b>	<b>\$ 567,435</b>	<b>\$ 400,633</b>	<b>\$ 500,691</b>	<b>\$ 544,707</b>

^ Income actual based on existing grants/gifts

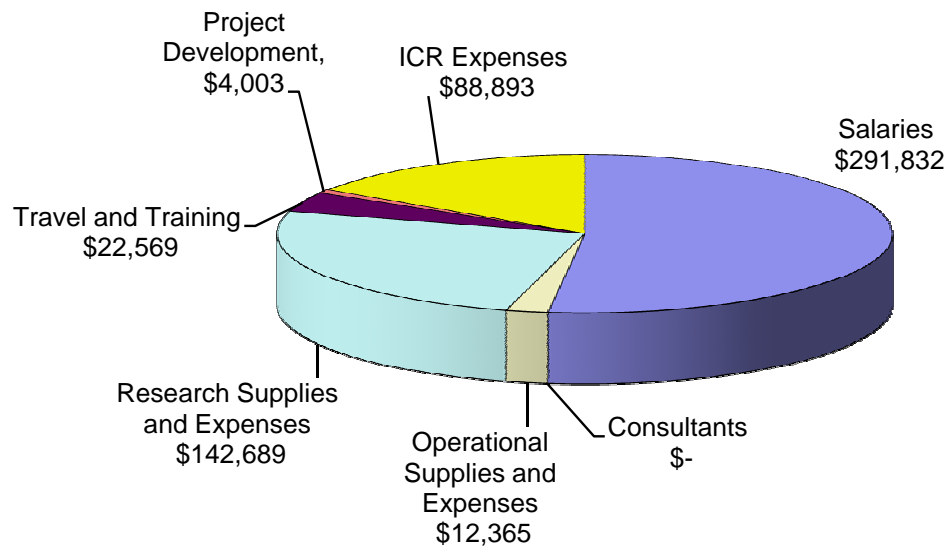
Revenue from contracts and grants is based on award amount evenly divided among fiscal years of award. This does not match expenses.

Note - no Internal Grant Funds Shown

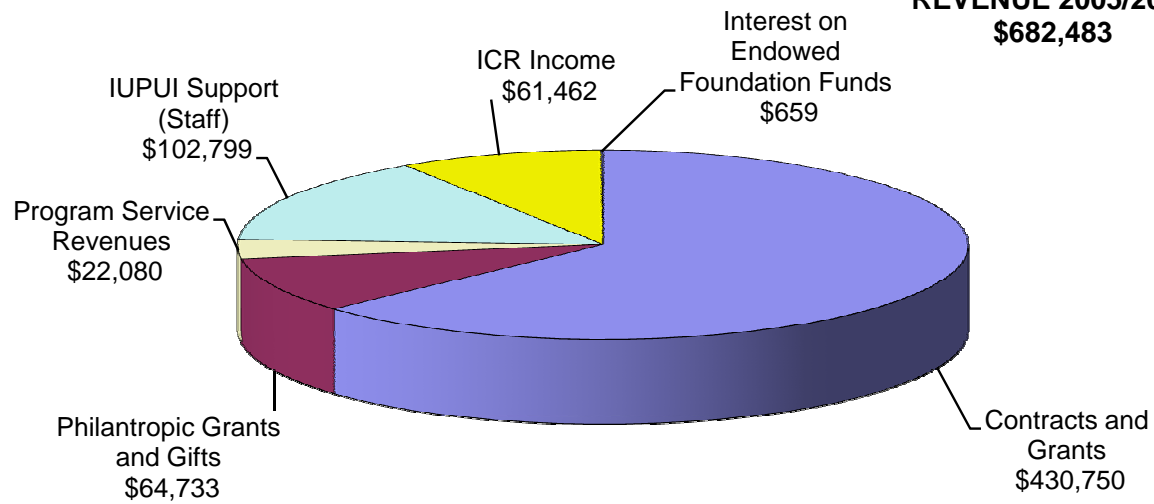
**REVENUE 2004/2005**  
**\$600,544**



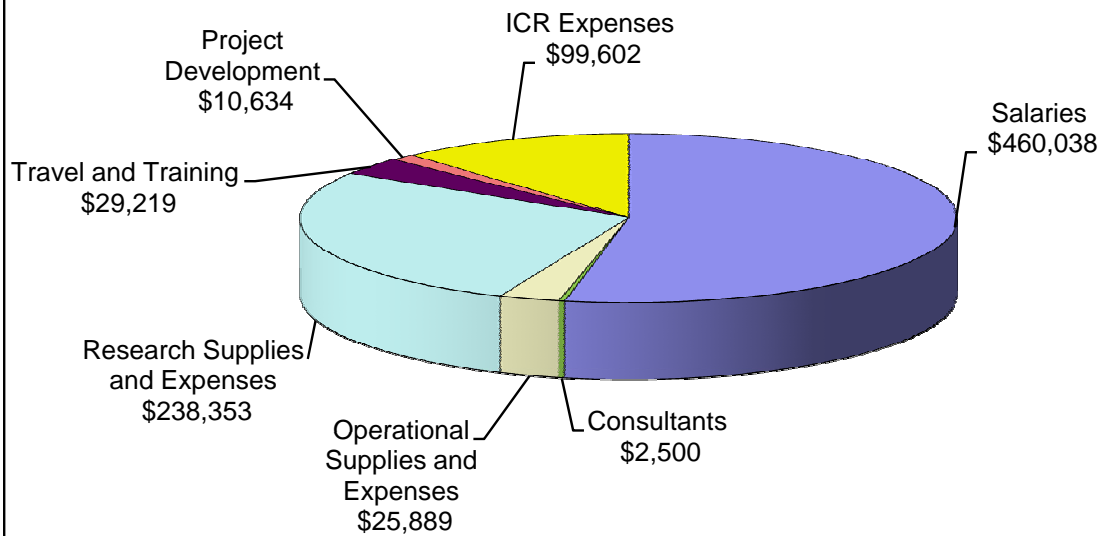
**EXPENSES 2004/2005**  
**\$562,351**



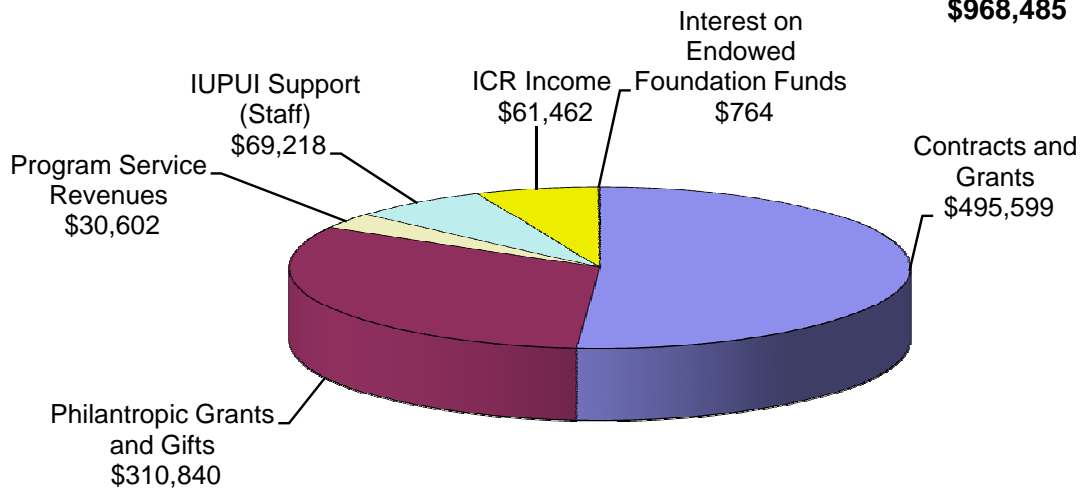
**REVENUE 2005/2006**  
**\$682,483**



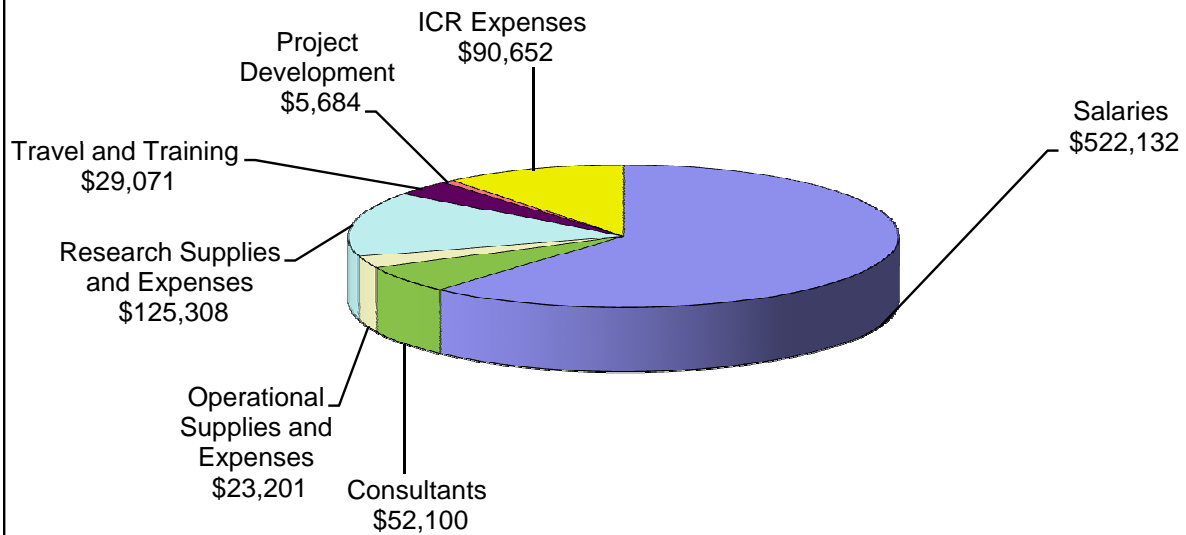
**EXPENSES 2005/2006**  
**\$866,235**



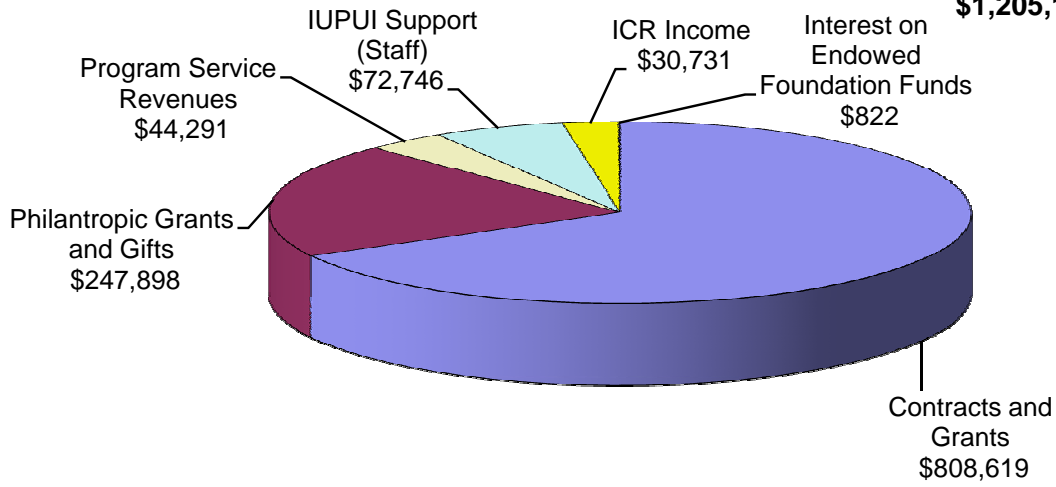
**REVENUE 2006-2007**  
**\$968,485**



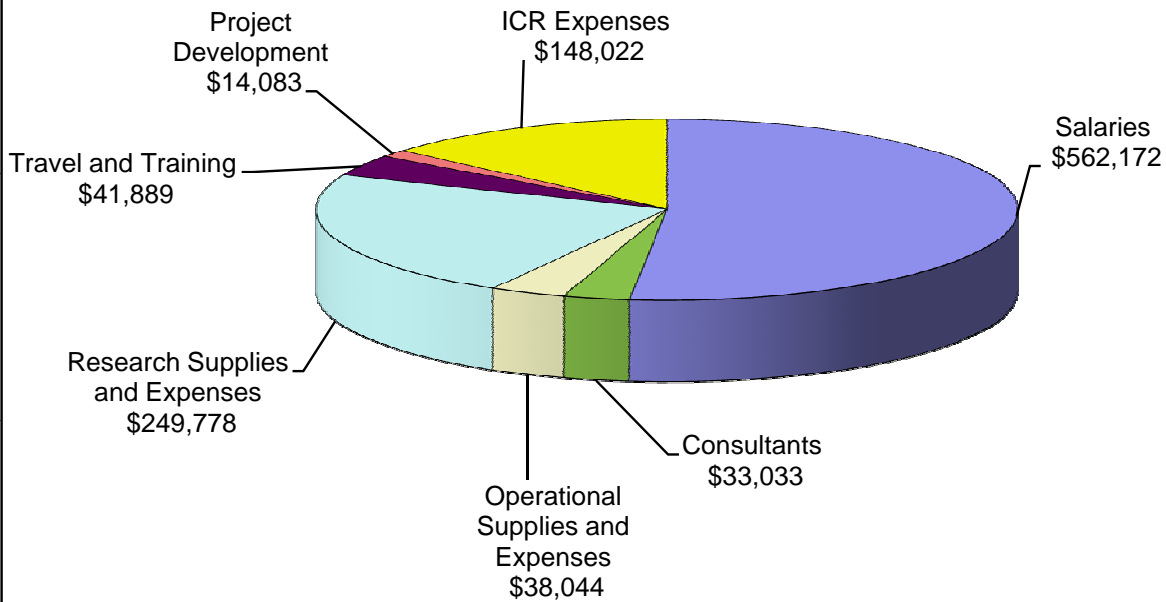
**EXPENSES 2006-2007**  
**\$848,148**



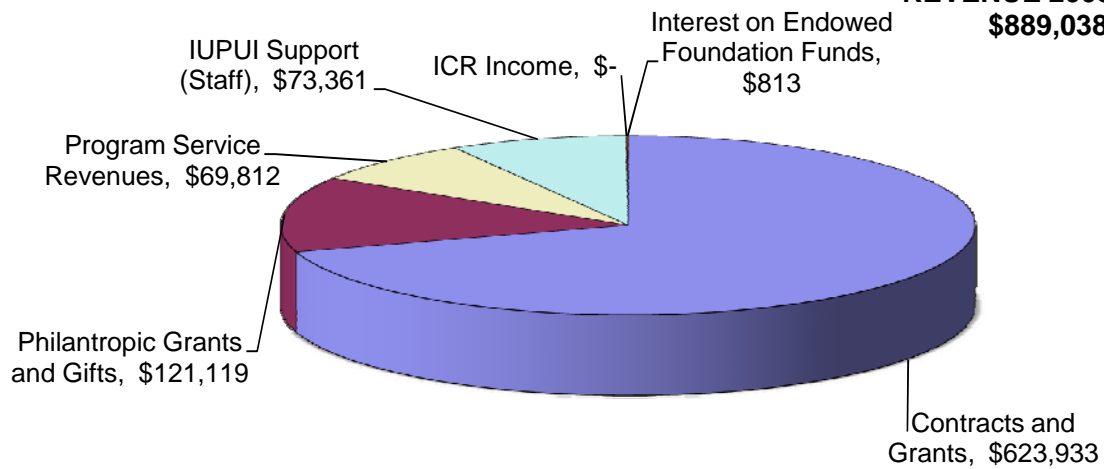
**REVENUE 2007-2008**  
**\$1,205,107**



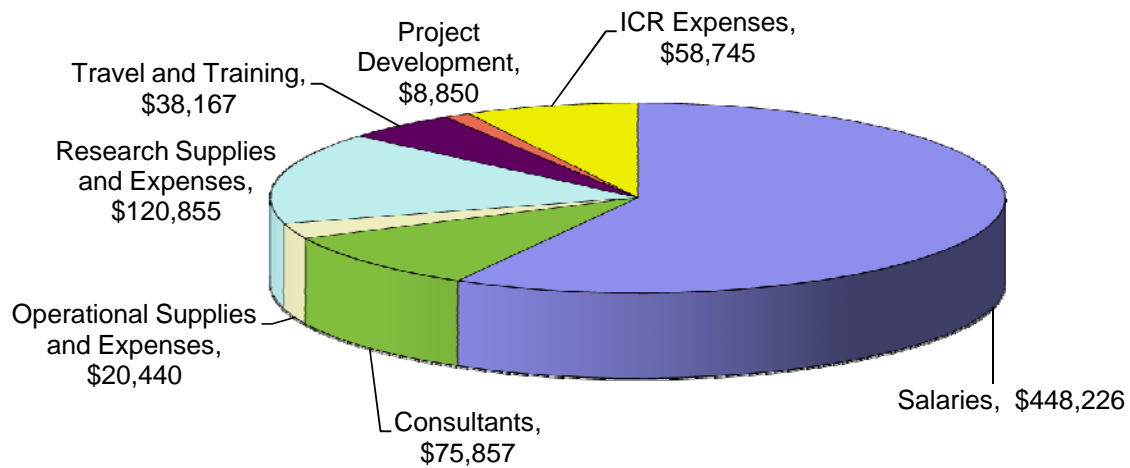
**Expenses 2007-2008**  
**\$1,087,021**



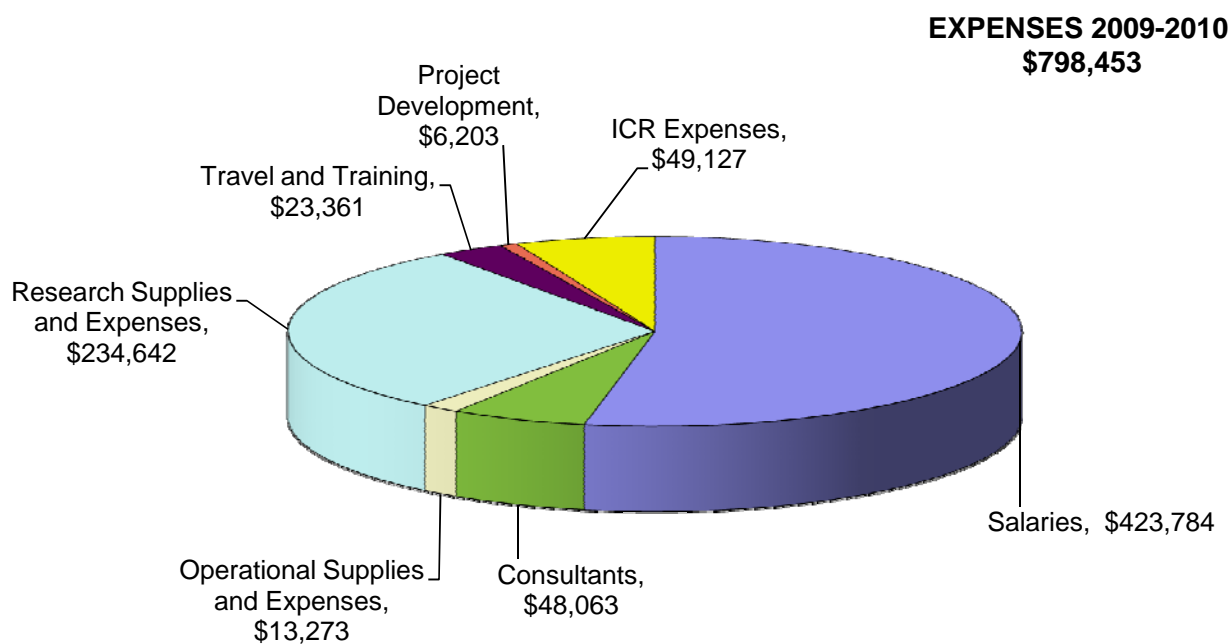
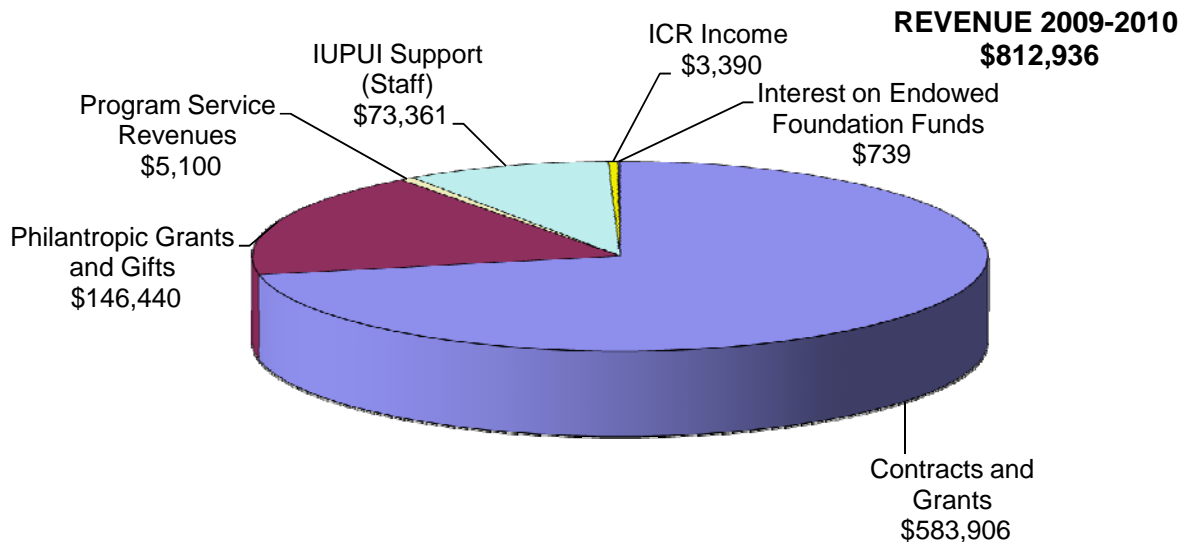
**REVENUE 2008-2009**  
**\$889,038**

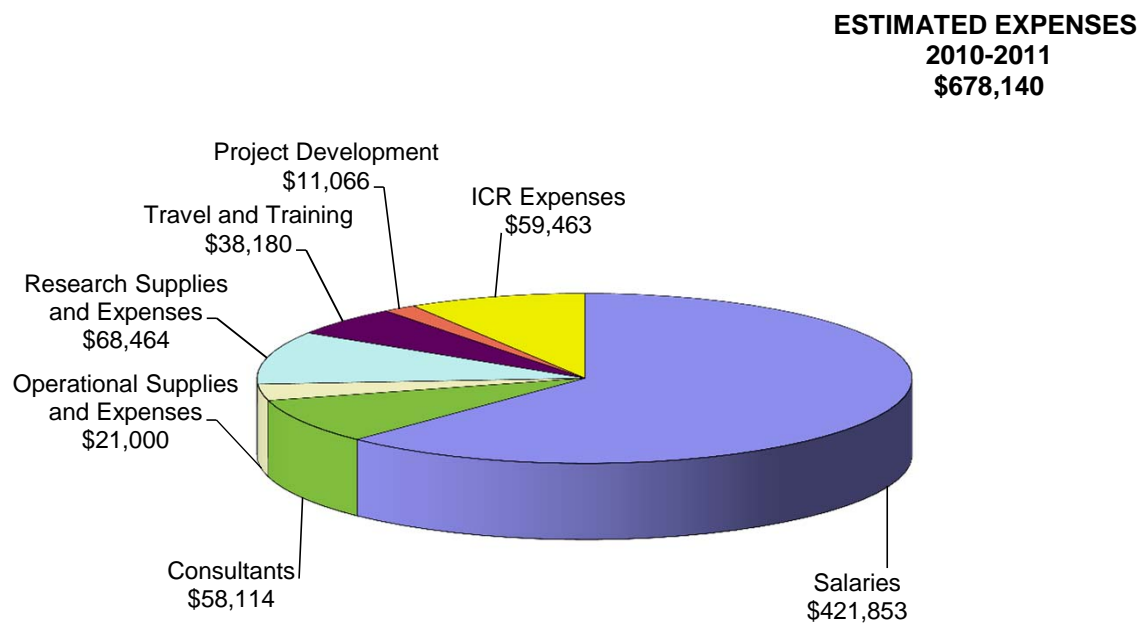
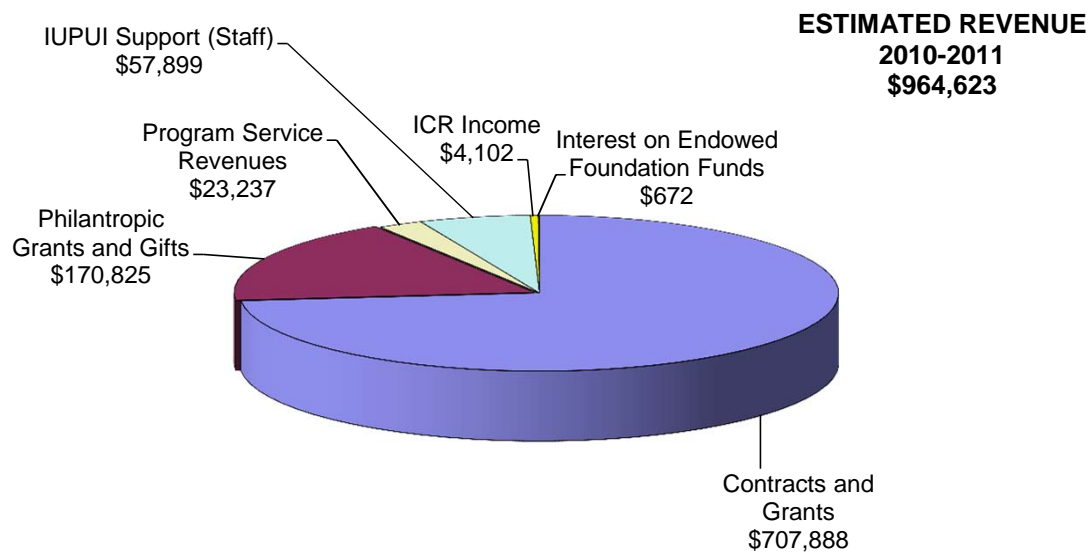


**EXPENSES 2008-2009**  
**\$771,141**













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2010