

Illinois Natural  
History Survey

**ANNUAL  
REPORT**

**FY2007**



Illinois Natural History Survey (INHS) scientists study the plants and animals of Illinois and how they interact among the variety of ecosystems throughout the state. Through its research and other activities, the Survey fosters intelligent and responsible management of the biological resources of Illinois and public appreciation of the state's natural heritage. INHS is recognized as among the premier state natural history surveys. Founded in 1858, the Survey, now a division of the Illinois Department of Natural Resources, is headquartered on the campus of the University of Illinois at Urbana-Champaign. Its collections of plant and animal specimens are among the oldest in North America.

**Photos:**

All nature photographs throughout the report are by Michael Jeffords, INHS.

Photograph of INHS Chief David Thomas is courtesy of Illinois Department of Natural Resources

I-Building photos are by Charlie Warwick, INHS.

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Fiscal Year 2007 (July 2006—June 2007) was a time of transition for the Illinois Natural History Survey (INHS) as we implemented our reorganization. The major change was a move from four scientific centers to two divisions: Biodiversity and Ecological Entomology (DBEE) and Ecology and Conservation Sciences (DECS). Each Division has three sections headed by a Research Leader (see organizational chart on page 16). DBEE (Dr. Geoff Levin, Division Director) has the sections of Ecological Entomology, Biodiversity, and Biotic Surveys; DECS (Dr. John Epifanio, Interim Director) has the sections of Wildlife and Plant Ecology, Aquatic Ecology, and Field Stations and Ecosystem Science. Another significant change was the formation of an Information Services Unit that is coordinating our various information technology and resources programs, plus helping to market the Survey to outside groups. A major goal of the reorganization was reducing administrative overhead, which we achieved by centralizing some activities such as human resources. As a result we were able to reduce the number of administrative positions and so far have reallocated funds to support two scientist positions. This reduction in administrative staff has resulted in some reductions in support for our scientists, and this is an issue that is being evaluated.

Restrictions by the state on filling vacancies were eased this year, and we had a number of searches that occurred during the winter and spring of 2007. We were pleased that Dr. Michael Douglas of Colorado State University accepted the position of Director of the Division of Ecology and Conservation Sciences. Dr. Douglas started on August 1, 2007. Other professional scientist track hires included Marlis Douglas, Ichthyologist, who will start January 1, 2008; Yong Cao, Stream Ecologist (August 16, 2007); and Felipe Soto-Adames, Insect Systematist (Sept. 4, 2007). Our search for a Wildlife Ecologist was suspended and was resumed in fall 2007. Searches for an Urban Insect Ecologist and a Medical Entomologist are underway. We welcome the new staff and look forward to the expertise that they will bring the Survey and the state.

After a long lull in the planning for our new botany building, the University of Illinois renegotiated a contract with Cannon Design, Inc. near the end of the fiscal year. Design is beginning for a building to be located east of our Natural Resources Studies Annex that will house our plant and fungus collections and those of the UIUC, our staff that work with these collections, and our Orthoptera Program.



David L. Thomas, Chief

The present schedule calls for construction to start in September 2008.

We continue to see progress on the National Great Rivers Research and Education Center (NGRREC) field station. Design for this facility is nearing

completion. The governor in early November 2006 announced that the state would put over \$6 million of capital funds into the project.

We still await the passing of the national Water Resources Development Act (WRDA) that should provide additional funds for capital development as well as operational funding for the center. When completed this field station will house our staff at our Great Rivers Field Station, who are working on the Long-Term Resource Monitoring Program for the U.S. Geological Survey. The building stresses sustainable design and is slated to be LEED gold certified.

Our outside grant and contract activities have remained quite good. In FY06 the UI listed our total sponsored expenditures at \$11,320,147, with \$3,805,884 from the federal government, \$7,008,869 from the state, and \$505,394 from private sources. In FY07 we estimate total expenditures at \$11,269,907 (excluding our F&A expenditures), with \$3,272,432 from the federal government, \$6,993,455 from the state, and \$349,665 from private sources.

## MESSAGE FROM THE CHIEF

At present, some 452 research projects are being undertaken by Survey staff. These break down as follows: science in support of Ecosystem Management and Conservation (125 projects), Species-level Biodiversity and Systematics (83), Invasive Species (57), Organismal Ecology and Life Histories (of organisms not associated with other research programs) (56), Public and Environmental Health (39), Threatened and Endangered Species (37), State Fish, Wildlife and Outdoor Recreation Programs (33), Agriculture (14), and Environmental Regulation (8). This diverse research program covers a large range of natural resource issues in the state and beyond. It includes many student research projects that will lead to Master's and doctoral degrees. Highlights of a few of our research areas are included elsewhere in this report.

On a personal note, I announced at the May Board meeting my intention of retiring early in 2008. I have now selected the date to be February 29, 2008, some 10 years and three months after I started as Chief. Considering that my first job as a biologist was working as a wildlife technician for the Survey during the summer of 1964, I will have started and ended my career at this fine institution. My intention is to continue to find ways of supporting the activities of the Survey and to continue my lifelong endeavor of working to protect and enhance the environment in which we all live and on which we so much depend. I can truly say that it has been a pleasure and an honor to work for the Illinois Natural History Survey. It is a collection of hard-working, dedicated people who believe strongly in the work they are doing and in the importance of their findings to our future. As our environmental problems have increased in scope and complexity, it becomes even more important that scientists at places like the Survey bring their diverse expertise to bear on some of our most pressing social, environmental, and natural resources problems. It is also equally important that basic and long-term research be conducted that can provide information that will be needed to meet future crises, not yet documented or anticipated, and to better understand the natural world around us. The research and work of Illinois Natural History Survey scientists address all of these issues and more.

I might also add that it has also been a pleasure for me to work with the other scientific surveys,



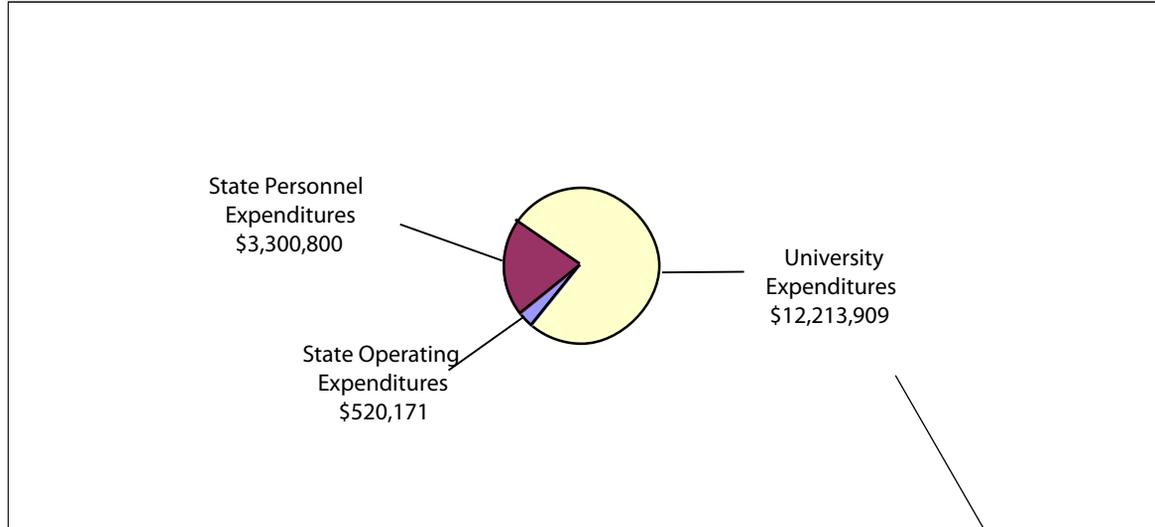
The I-Building, headquarters for the INHS in Champaign, with its new American bison statue to welcome citizens.

particularly the Chiefs and Director of those organizations, with members of the Board of Natural Resources and Conservation, and with many dedicated staff within the Illinois Department of Natural Resources. It is the strength of all the surveys working together, under the Board, which makes it possible for Illinois to provide the sound scientific underpinnings for massive projects like the Super Collider/Super Conductor or the present FutureGen project. Illinois has been fortunate to have these strong scientific organizations, although their neglect and inadequate support in recent years has made it more difficult for them to respond in a timely fashion. Hopefully the value of these organizations will once again be fully appreciated, and the state will realize that a healthy economy and environment is dependent on the work of these organizations.



A gigantic metal praying mantis now adorns the east side of the I-Building.

## FINANCIAL STATEMENT



University Total	\$12,213,909
Service & Activity Accounts	\$225,806
Facilities & Administration	\$944,002
Federal Accounts	\$3,272,432
State of Illinois Accounts	\$6,993,455
Private Accounts	\$349,665
Other	\$428,549

## INHS Activities Totals for FY2007

### Outreach/Presentations

Schools, K-12: 81  
 Colleges: 138  
 Conferences and Symposia: 226  
 Clubs and Private Organizations: 145  
 State and Federal Agencies: 100  
 Other: 20

**Boards and Committees Served: 150**

### Outside Publications Produced

Peer-reviewed Scientific: 169  
 Technical Reports: 225  
 Miscellaneous : 90  
 (news articles, book chapters, Web pages, book reviews, posters, etc.)

### Research Projects: 452

To view an on-line list of this year's INHS Research Projects and Publications, please access:

<http://www.inhs.uiuc.edu/annualreports/annualreports.html>

# INHS

## EXTERNAL SERVICES

### INHS Information Services Unit

Marsha Carter-Hatchel, Head

In 2003, an external review team identified a need for a greater advocacy effort to market and promote the products and services of the Survey to various constituents. Our re-organization resulted in the integration of many technical and support services at INHS into a newly developed Information Services Unit (ISU).

The groups that comprise the ISU are:

- Marketing and Informational Outreach
- Library Services
- Computer Services
- Web and Data Services
- Publication Sales
- Mailing Services
- Constituency Development

The primary mission of the ISU is to provide access and information about the natural resources of Illinois to the citizenry of the state, scientists, academicians, policy and decision makers, and other constituencies. The mission is enhanced by the goals of the ISU to further develop and strengthen information and data structures for the scientific and technical staff of the INHS.

Since the inception of the ISU, many projects have been launched or identified. Some of these include:

- Provided a marketing/informational display at numerous scientific conferences, symposiums, or events.
- Set up publication sales booths at various conferences or events.
- Produced informational materials on the programs and services of the Survey for dissemination to various customers of the Survey.
- Created a constituents database and began tracking the many populations that interact with the Survey. Current entries exceed 3,000 constituents or partners. Targeting these constituencies enables administrators and scientists to further develop critical partnerships.
- Designed a content-managed and driven Web site for the Survey's research and subject matter topics. Set to launch in October 2007.
- Launched an E-commerce publication site to offer a more efficient way to purchase the wealth of publications produced and offered by the Survey.
- Developed and strengthened relationships with media outlets locally, nationally, and internationally. These relationships assure that our scientific contributions are communicated to our many critical populations.
- Archiving and digitization of the historical data and publications of the Survey as well as consolidation of the publications inventory from multiple storage facilities into a temperature-controlled environment.
- Development of supportive resources and infrastructure for the Survey, e.g., databases, electronic forms, etc. This aspect affords scientific staff the appropriate technical and operational tools to conduct their vital research.
- Further development of library exchange partners (+500 other libraries worldwide).
- Development of a new technical report repository for scientific reports and the digitization effort toward capturing historical technical reports. Thousands of nonproprietary reports are now widely accessible to all via the Web and are being archived as part of the University of Illinois' IDEALS project.
- Continued participation with the State of Illinois Library's "Electronic Documents Initiative" digitization effort.

## INHS Biological Collections

C.H. Dietrich, Head

The Illinois Natural History Survey (INHS) biological collections, assembled by Survey scientists and others over the past 150 years and in many cases worldwide in scope, are a unique and invaluable resource. Specimens in the collections often represent the only direct evidence that a species occurred in a particular place at a particular time. Thus, the collections represent an important source of data not only for taxonomic and phylogenetic studies, but also for tracking changes in the distributions of species over time.

INHS curators and collection managers continue to make innovative use of these collections in their own research, but are also working to improve access to specimens and data by the scientific community and general public. For example, as part of the National Science Foundation-funded effort to database the Survey's hymenopteran insects (300,000+ specimens of bees, wasps, and ants), the insect collection has implemented an Internet protocol that automates the sharing of specimen data (e.g., species name, collection locality, date of collection, etc.) with the Global Biodiversity Information Facility (GBIF), a centralized on-line data clearinghouse that enables users to search simultaneously more than 1,400 databases at more than 200 institutions around the world for information on a particular species. The INHS Collections Committee is currently working on ways to extend such efforts to other INHS collections.

Besides the Hymenoptera database project, six other externally funded projects are contributing directly to collection development and databasing efforts. A State Wildlife Grant from the Illinois Department of Natural Resources (IDNR) and the U.S. Fish and Wildlife Service supports the databasing and georeferencing of all specimens of "species in greatest need of conservation," identified by the Illinois Wildlife Action Plan, present in the INHS insect collection. Three NSF REVSYS (Revisionary Syntheses in Systematics) grants are not only facilitating the databasing of erythroneurine and empoasine leafhoppers and unionid mollusks (freshwater

mussels), but also supporting the development of illustrated on-line tools for identification of species in these diverse groups of organisms. An NSF BS&I (Biodiversity Surveys and Inventory) grant is also allowing numerous fungi, many of which will contain a genetic "barcode," to be added to the Survey collection, and an identification guide for these poorly known organisms is being developed. An NSF Research Experiences for Undergraduates award is supporting new surveys of Illinois bumblebees and will result in significant numbers of new specimens being added to the insect collection and its database.

Because ongoing research at INHS results in large numbers of specimens being added to the collections annually (see table below), planning for growth of the collections has long been a critical issue. Currently several collections have outgrown their original spaces in the Natural Resources Building (NRB) with specimen cabinets placed in hallways, stairwells, and other unsuitable locations that make pest management and control of access difficult. The recent move of many INHS staff not directly associated with the collections, as well as the INHS library, from the Natural Resources Building to the newly renovated I-Building in the University of Illinois Research Park has temporarily freed up some space for housing portions of the collections. A longer-term solution will require construction of new collection facilities specially designed to facilitate preservation of the specimens. Funds originally promised by the University of Illinois to move all the INHS staff and collections remaining in NRB to a new collections research facility to be built in the Research Park unfortunately did not materialize, but planning for a smaller facility to house the combined INHS/University of Illinois Herbarium is proceeding and construction is scheduled to begin next year. A second phase of construction, which would house the remaining collections, is also being planned, but we have not yet secured funding for this project.

Collections-based research remains a core area of research at INHS and the Survey's world-renowned collections both reflect and support the active roles that INHS scientists continue to play in efforts to improve knowledge of the earth's biological diversity.

Collection	Size	Specimens Accessioned	Loans: Number	Specimens	Queries	Visitors
Amphibians/Reptiles*	119,000	610	11	138	11	7
Annelids	330,000	150	2	130	11	2
Birds	1,873	0	2	10	2	0
Crustaceans	82,988	924	0	0	6	3
Fish	845,561	4,270	25	1640	367	12
Fungi	58,443	256	0	0	0	2
Insects	7,000,000	10,868	34	15,026	32	6
Mammals	1,093	0	0	0	3	0
Mollusks	117,327	1,073	4	23	22	12
Plants	238,931	4,086	7	550	11	10
Total	8,795,216	22,237	83	17,507	460	54

\*This includes the University of Illinois Collection, for which INHS has now assumed ownership and curatorial responsibility.

## INHS Office of Education and Outreach

Michael Jeffords, Head

The education/outreach effort at the Illinois Natural History Survey (INHS) has had a very good year with varied programming for a wide audience. The effort has been statewide, and through a couple of special projects we're also reaching a regional and national audience. INHS has two mobile science centers, one stationed at Illinois Department of Natural Resources (IDNR) Region 2 Headquarters in Bartlett and staffed by Jen Mui and Heather Grotefend. It is named the "Traveling Science Center" and it serves the northern quarter of Illinois. It's 40-foot trailer has an exhibit on Biodiversity in Northern Illinois and has visited upwards of 40 sites and serviced over 25,000 children and adults during the last year. The Traveling Science Center visits schools, special events, and day camps during the year and is on-site from four to six days/week. The Mobile Science Center (the second INHS traveling center) is stationed in Champaign and operated by Charles Helm and a variety of staff (Anne Bartlett, Jonathon Solversen, Tina Thomas, and Patty Dickerson). The exhibit here, Arthropods Across Illinois, serves the remainder of Illinois and targets small city and rural school districts and special events. Since its inception in 2003, this unit has serviced over 80,000 children and adults across Illinois.

The Illinois Wilds Institute for Nature (IWIN) had four courses during the period—Amphibians and Reptiles of Illinois, Dragonflies of Illinois, The Natural History of Northwestern Illinois, and Sun, Sand, and Skippers. Over 120 adults took the four

Heather Grotefend (left) and Jen Mui prepare to "take the show on the road" in the INHS Traveling Science Center, one of two mobile classrooms created and operated by the Survey.



courses, collectively, and enjoyed learning about the habitat and organismic diversity of Illinois. Survey scientists served as instructors for the IWIN courses.

The Corps of Discovery program, operating from Emiquon Preserve and the Cache River Natural Area, added a third group, the Lost Mound Corps of Discovery in northwestern Illinois. The program trains interested, dedicated citizens in the skills of nature photography, descriptive writing, and sketch journaling that allow them to then adopt a site and aesthetically document the landscape as it changes before them. Various projects undertaken by corps members include annual exhibits at their sites showcasing their work, the creation of interpretive trails, and the production of note cards for sale to help fund wetland restoration.

A new project was undertaken that addressed a nation-wide need for an education product. INHS now offers the Hellbender Education Kit for sale to groups that are working on this endangered salamander in the U.S. The kit contains a life-size, authentically detailed hellbender model with an appropriate base and a descriptive booklet. The model was created by Carie Nixon at INHS from an original museum specimen. The kits have been very popular and we have sold over 20 of them across the eastern and midwestern U.S.

While this brief overview does not touch all the projects INHS undertakes, it certainly gives a flavor for the diversity of our programs and the wide range of audiences we seek to address. As we approach the 150<sup>th</sup> Anniversary of INHS, we view our role as becoming increasingly important in this ever-changing world.

# Division of Ecology & Conservation Sciences



The Division of Ecology and Conservation Sciences was established on October, 2007 by merging the former Center of Aquatic Ecology and Conservation and the Center for Wildlife and Plant Ecology. This new unit chose the name to reflect two major themes in our scientific work: ecological function and processes, as well as conservation-based approaches, including partnerships with governmental and nongovernmental management authorities. These themes have proven important over the years and largely cut across the broad diversity of aquatic and terrestrial ecosystems in Illinois and beyond.

As part of our new organization we are proud to welcome several new professional scientists and program leaders to our group. Dr. Greg Sass is a fish and aquatic ecologist who specializes in large river ecosystems. He takes over as Director of the Illinois River Biological Station in Havana, Illinois. Dr. Sergiusz Czesny is a physiological ecologist who specializes in the effects of fatty acid and energetics in fishes. He takes over as Director of the Lake Michigan Biological Station in Zion, Illinois. Dr. Yong Cao is an aquatic ecologist who specializes in community and diversity metrics in stream ecosystems. He will be based in our Champaign offices and will ultimately lead an already productive effort to characterize and understand Illinois' stream ecosystems. Dr. Mike Ward is an avian ecologist focusing on the conservation and ecology of a host of bird species and ecosystems. He is based out of our Champaign offices and will serve as Director of the Critical Trends and Analysis Program (CTAP). Finally, Dr. Michael Douglas joins us as Director for the Division. He is a molecular ecologist focusing on a variety of terrestrial and aquatic species, especially herpeto-fauna.

While the arrival of such new talent generates considerable excitement and portends incredible opportunity, I wish to highlight the accomplishments, recognition, and national service of several

of our staff and students—the list is lengthy and I offer these few examples rather than an exhaustive record.

- Dr. Steven Havera, Director Emeritus of the Forbes Biological Station, was recognized by the Wildlife Society with its prestigious Award of Merit for his life-long commitment and achievement in wildlife ecology.
- Dr. David Philipp, Principal Scientist, was recognized by the North Central Division of the American Fisheries Society for excellence in fisheries science. Dr. Philipp is also a Board Member of the Fisheries Conservation Foundation.
- Dr. Ed Heske, Professional Scientist, was named Editor for the Journal of Mammalogy.
- Kristin TePas and Pat Charlebois received a second place Best Web-Based Outreach Effort for their work on “Nab the Aquatic Invader: Be a Sea Grant Super Sleuth” by the National Sea Grant at Sea Grant Office.
- John K. Tucker received the Best Paper Award from the Illinois Chapter /American Fisheries Society. John also had an incredible year, submitting for publication more than 20 technical papers.
- Our students have received awards from the Champaign-Urbana Bass Club, Central Illinois Musky Alliance, Illinois Audubon Society, and the Sea Grant Knauss Policy Fellowship.

We continue to applaud excellence at every level of achievement and rank of staff. It has been a privilege serving the staff of the Division of Ecology and Conservation Sciences (and Center for Aquatic Ecology and Conservation) as director. As new challenges and opportunities emerge, the division is well positioned to assist and serve the resources and citizens of the State of Illinois.

John Epifanio, Interim Director

## Section for Wildlife and Plant Ecology

Ed Heske, Section Research Leader

The Section for Wildlife and Plant Ecology (WPE) includes four teams supported by grants and contracts, and seven additional Professional and Research Scientists based in Champaign. The Wetlands Team, led by Dr. Allen Plocher, surveys soils and plants and develops assessments of Illinois wetlands in association with Illinois Department of Transportation (IDOT) projects. The Biotic Surveys Team, led by Dr. Joyce Hofmann, also works on IDOT projects, conducting surveys for threatened and endangered birds and mammals. The Critical Trends Assessment Program (CTAP) Team, led by Dr. Mike Ward, inventories and monitors plants, birds, and insects in selected habitats statewide and assesses patterns and trends in distribution and abundance. The Geographic Information Systems (GIS) Team, led by Diane Szafoni and Tari Tweddale, provides expertise in mapping and spatial analyses. Many members of these teams also conduct independent research, often related to their contract work, and are highly active in community and statewide outreach and conservation organizations.

The Professional and Research Scientists in WPE maintain high-caliber research programs. Wildlife epidemiology has become a thriving program in WPE under the direction of Dr. Nohra Mateus-Pinilla. Dr. Mateus-Pinilla's current projects include several studies related to Chronic Wasting Disease (CWD) in white-tailed deer, surveys for Lyme Disease, and a study of feral cats as dispersers of *Toxoplasma gondii* in natural areas. Dr. Mateus-Pinilla also was an invited speaker at a national conference on Biodetection Technologies. Dr. Jeff Hoover continued his long-term studies of migratory songbirds and bottomland forest restoration in the Cache River area of southern Illinois and authored a highly publicized paper on "Cowbird Mafias" in the *Proceedings of the National Academy of Science*. Dr. Dave Enstrom and Dr. Mike Ward are using radio telemetry and AM radio recorders/transmitters to study seasonal development of song and the ecology of Northern Cardinals. Their research is breaking new ground in the use of telemetry and audio recording in studies of avian ecology, and involves collaboration with the National Center for Supercomputing Applications at UIUC, as well as collaborators at Princeton University and the Max Plank Institute in Germany. Dr. Ward, Dr. Jeff Walk (now with The Nature Conservancy), Steve Bailey, Dr. Jay Diffendorfer,

and WPE-affiliate Dr. Jeff Brawn are continuing a statewide bird survey that repeats surveys done 50 and 100 years ago, and that is revealing interesting changes in bird communities in Illinois over time.

Dr. Ron Larkin was an invited speaker on the impacts of wind turbines on bats and birds at several national and international venues, and co-authored a review article on the impacts of wind power in *Frontiers in Ecology and the Environment*. He also is using radar technology to evaluate avian flight paths during migration. Stacy Lischka has been leading our Human Dimensions Program, which provides IDNR with Illinois hunter and trapper survey data needed for informed management. Stacy also conducted an analysis of differences in hunting activities between resident and nonresident deer hunters in Illinois, and their management implications. Dr. Jeff Levengood investigated the effects of environmental contaminants on wildlife, including a pilot study of isoflavones, estrogenic compounds produced by soy and many other legumes, in aquatic environments in central Illinois, and surveyed for mercury exposure in small fish in Illinois streams. He co-authored a chapter in a new textbook on veterinary toxicology. On the subject of textbooks, Dr. Joe Merritt co-authored a new edition of the leading textbook in mammalogy.

Our GIS Team, led by Diane Szafoni and Tari Tweddale, is a participant in a large contract to update the Illinois Natural Areas Inventory (INAI). The INAI is a statewide database of natural communities of biological significance in Illinois. The GIS team will design, implement, and maintain a large spatial data storage system for the final INAI database. Dr. Jay Diffendorfer is developing new indices for measuring biological integrity, developing monitoring programs for endangered species in southern California, and is involved with several collaborative projects in Illinois including landscape influences on CWD and new analyses of the CTAP data. He co-authored a paper on worldwide declines in amphibians that appeared in the prestigious journal *Science*. Dr. Ed Heske and his students continue to study the ecology of mammals and birds in Illinois. Projects include analyses of landscape effects on the distribution of mammalian predators in southern Illinois, surveys of waterbirds using Conservation Reserve Enhancement Program wetlands, effects of exotic, invasive shrubs on nest success of songbirds, and surveys for the state-threatened Franklin's ground squirrel. Additional studies by WPE scientists can be found at <http://www.inhs.uiuc.edu/annualreports/annualreports.html>

## Section for Field Station and Ecosystem Science

John Chick, Section Research Leader

Scientists within the Field Station and Ecosystem Science Section conduct ecological research and monitoring on some of the largest and most important ecosystems within the state of Illinois, including Lake Michigan, the Mississippi and Illinois rivers, Lake Shelbyville, the Midewin National Tallgrass Prairie, and the Lost Mound Unit of the Upper Mississippi River National Wildlife and Fish Refuge. This research and monitoring would not be possible without the nine INHS field stations that comprise this section: the Lake Michigan Biological Station (LMBS), Forbes Biological Field Station (FBFS), Great Rivers Field Station (GRFS), Illinois River Biological Station (IRBS), Midewin Field Station (MFS), Lost Mound Field Station (LMFS), Kaskaskia Biological Station (KBS), Sam Parr Biological Station (SPBS), and Ridge Lake Biological Station (RLBS). We hired new directors for two of our field stations during the past year. Dr. Greg Sass is the new director of the IRBS and Dr. Sergiusz Czesny is the new director of the LMBS. Greg joins us from the University of Wisconsin where he received his Ph.D. and served as a post-doctoral research assistant. Sergiusz has worked for the Survey for several years, as both a post-doctoral research assistant and the associate director of the LMBS. Both Greg and Sergiusz have hit the ground running and are doing great things with their field stations.

The main activities at the IRBS revolve around data collection and analysis for the Long Term Resource Monitoring Program (LTRMP) on the Mississippi and Illinois rivers, which is a partnership of four federal and five state natural resources agencies. Additionally, this field station has conducted the Long Term Illinois River Electrofishing Survey for over 50 years. Over the past year, staff at the IRBS initiated important research projects on invasive Asian carp and provided interviews and field trips for several international news agencies doing stories on Asian Carp, including CBC Canada, Russian State TV, French TV, and Tokyo News. Along with the IRBS, Josh Stafford and his staff at the FBFS are a major Survey presence on the Illinois River. The FBFS is a nationally recognized waterfowl research institution. In addition to their annual migratory waterfowl inventories and research projects, the FBFS also held a workshop on moist soil management for resources managers in the Illinois Department of Natural Resources at the Dickson Mound Museum. Director Josh Stafford presented

an invited presentation on the life of Frank C. Bellrose at the 4<sup>th</sup> North American Duck Symposium in Bismarck, North Dakota, as well as a keynote address at the dedication of the Frank C. Bellrose Waterfowl Production Area in Bismarck.

Staff at the GRFS also collect and analyze data for the LTRMP. The GRFS has conducted data collection and analysis for the U.S. EPA's Great Rivers Environmental Monitoring and Assessment Program, including a major project on developing planktonic indicators of great river health for this program. John Tucker continued to head an important herpetology research program, publishing several manuscripts in peer-reviewed scientific journals, and giving several presentations at scientific meetings. Eric Gittinger made arrangements for interviews and field trips for CNN, which broadcast several stories on Asian carp. Sergiusz Czesny and staff at the LMBS continued their important research on Lake Michigan. This field station conducts critical monitoring and assessment of yellow perch populations, and has important projects dealing with several invasive species that threaten Lake Michigan, including Asian carp, zebra mussels, and the round goby. Over the past year, Sergiusz has overseen an important project yielding new insights into the role of fatty acids on the reproductive success and early life history traits of top predators in Lake Michigan.

Dr. Chris Whelan at the MFS and Dr. Dan Wenny at the LMFS conduct the majority of terrestrial ecology projects for the Field Station and Ecosystem Science Section. Dan Wenny kept up his important research on seed dispersal, prairie ecology, and avian ecology, and worked hard over the last year to further the visibility and capability of the Lost Mound Field Station by developing an important research initiative with the Illinois Department of Natural Resources. Over the past year, Chris Whelan's research and monitoring focused on woody encroachment, avian communities, and foraging ecology of several grassland birds. Chris worked to further develop the Grand Restoration Experiment at the MFS. This project is a partnership among the USFWS, INHS, and the University of Illinois-Chicago. In June, Chris traveled to the Lajuma Research Center, South Africa, to participate in research on grassland, woodland birds, primates, and ungulates.

## Section for Aquatic Ecology and Conservation

Dr. David H. Wahl, Section Research Leader

The Section for Aquatic Ecology and Conservation (SAEC) conducts research, assessments, and monitoring on the aquatic resources of Illinois and the organisms that inhabit them. To assure the optimum and sustained use of our aquatic resources for educational, aesthetic, recreational, and economic benefit to the citizens of the state, we produce scientific and technical information that can be used in the development of a wide array of management plans as well as the dissemination of the resulting information to scientists, state and local government agencies, sportsmen, and other users.

Implied in this mission statement is the concept that much of our research will focus on the functional interrelationship of living organisms with their physical, chemical, and biological environment across multiple scales (from genes to populations to communities to whole ecosystems). Moreover, this focus will address process-level questions (e.g., why systems or communities function the way they do) along with compositional-level questions (e.g., what do aquatic communities look like and how are they distributed within and among the region's watersheds). This focus occurs across broad taxonomic boundaries from algae and microinvertebrates (such as microcrustacea, and insects) to larger macro-in-

vertebrates and vertebrates (such as fishes, amphibians, and even birds). For example, Dr. Walter Hill studies primary producers and consumers and is currently investigating the relationship between nutrients and algal growth with the goal of developing protective nutrient criteria for streams. He is also developing energy and nutrient budgets for invasive, filter-feeding Asian carp in order to predict their potential for colonizing the Great Lakes, and is carrying out field experiments to assess the potential impact of these carp on plankton communities. Drs. Wahl, Philipp, and Epifanio are addressing a number of questions related to sportfish management using food web approaches, including recruitment mechanisms in largemouth bass and causes of stunting in bluegill populations.

Much of the success of the section relies on active dissemination of interpreted information and outreach to the resource managers within our parent agency (Illinois Department of Natural Resources), our professional peers, and the public. Finally, our scientific research activities target a variety of systems that include Lake Michigan; the Illinois, Mississippi, and Kaskaskia rivers; numerous impoundments; small ponds; and wadable streams. In addition to researchers based in facilities at the University of Illinois and in Springfield, we also operate nine field stations located throughout Illinois and near every major aquatic habitat and aquatic ecosystem type found in the state (see additional description in the Section for Field Stations and Ecosystem Science).



## Division of **Biodiversity & Ecological Entomology**



The Division of Biodiversity and Ecological Entomology was formed during the Survey's reorganization by the merger of the Centers for Biodiversity and Ecological Entomology. The Center for Biodiversity was split into two sections, Biodiversity and Biotic Surveys and Monitoring, and the former Center for Ecological Entomology retains its composition as the division's third section.

Dr. Geoffrey Levin heads the division, with Drs. Chris Dietrich (Biodiversity), Chris Phillips (Biotic Surveys and Monitoring), and Lee Solter (Ecological Entomology) serving as Research Leaders for the sections, and Jen Schuster serving as Business Manager.

A major goal of the reorganization was to increase administrative efficiency, and a significant focus of the division this year was developing a new business structure and the processes necessary to meet the needs of the scientific staff. A measure of our success is that we have been able to reduce our administrative head count and thereby increase our scientific staff, completing a search to fill the long-vacant ichthyology position. The division also saw several retirements, with Drs. Eli Levine, Robert Novak, and Don Webb completing many years of service to the Survey. Searches to fill these positions and the Insect Collection Manager position vacated this year are either underway or complete; more information on these can be found in the section narratives.

The division is committed to continuing the centers' legacies of outstanding research and outreach in systematics and ecology relevant to conserving and managing natural and human-dominated ecosystems. Highlights of research during the year can be found in the section narratives. In addition, the division manages the Survey's biological collections, in addition to the zoological collections maintained by the University of Illinois at Urbana-Champaign. More information on the collections, which are not only the most significant record of the Illinois' natural heritage but of national and international importance, can be found elsewhere in this report.

Geoffrey A. Levin, Director



## Section for Biodiversity

C.H. Dietrich, Section Research Leader

The newly reorganized Section for Biodiversity (SBD) comprises scientists previously belonging to the Center for Biodiversity (CBD), but without the IDOT Further Studies Group (now Section for Biotic Surveys and Monitoring [SBSM]), which comprised more than half of the former center's scientific staff. The primary focus of SBD remains largely the same as that of CBD, i.e., collection-based research on systematics and evolution. Conservation biology also remains a significant component of our work. Our work not only helps elucidate the natural processes that have yielded the extraordinary diversity of life on earth but also provides the taxonomic classifications and species identification tools upon which most other biological research depends. SBD retains responsibility for the Survey's insect, plant, fungi, and bird collections, and shares responsibility for the fish collection with SBSM (see INHS Biological Collections, page 6).

SBD is currently the smallest INHS section in number of professional and research scientists, but three successful searches conducted during FY07 will substantially enhance our ability to serve constituents and conduct cutting-edge research.

When our previous insect collection manager, Dr. Colin Favret, moved to Washington last year, we redefined the position to increase the research component to 50%. This enabled us to attract a large pool of highly qualified applicants to fill this vacancy. Our new insect collection manager, Dr. Paul Tinerella, previously a postdoctoral fellow at Michigan State University, began work in June 2007. Paul is an expert on aquatic true bugs and beetles and brings with him an already active research program on the systematics of Corixoidea (water boatmen).

A new curator of insects, Dr. Felipe Soto-Adames, currently at the University of Vermont, assumed his new position at the Survey in September, 2007. Felipe is one of only a handful of experts on springtails (Collembola) worldwide and will revive the long dormant research program on this diverse group of primitively wingless insects at the Survey. Collembola comprise a substantial component of the soil biota and play vital roles in nutrient cycling. The INHS has the world's largest collection of North American Collembola, including many important type specimens. Felipe replaces Dr. Don Webb, who retired in June 2007 but remains an active emeritus member of our staff.

Our new curator of fishes, Dr. Marlis Douglas, currently at Colorado State University, is not scheduled to begin work until January, 2008, but her arrival is eagerly anticipated, in part because the Survey has been without a curator of fishes since Dr. Larry Page retired in 2001. Dr. Douglas'

research focuses on molecular phylogenetics and conservation genetics of North American freshwater fishes. She will enhance the Survey's ability to address research issues related to the conservation of native nongame fish species.

Another noteworthy personnel change was Dr. Brenda Molano-Flores' resignation as coordinator of the Critical Trends Assessment Program (CTAP) to return to her original position of plant restoration ecologist. This will enable Brenda to devote much more time to her research on restoration of native plant communities, focusing particularly on Midewin National Tallgrass Prairie and Lost Mound National Wildlife Refuge.

SBD scientists are conducting a diverse array of research projects. Many of these focus on improving our knowledge of, and tracking changes in, the biota of Illinois and the upper Midwest through field surveys and studies of biological collections. Examples of these are Rick Phillippe's surveys of the vascular plants of several Illinois nature preserves, Ed DeWalt's sampling of aquatic insects in high-quality reference streams for comparison with Critical Trends Assessment Project (CTAP) sites, and Chris Dietrich's efforts to database specimens and survey historical localities for insect species listed as "in greatest need of conservation" by IDNR's Wildlife Action Plan.

Other projects focus more broadly to provide the global context needed to fully understand the biodiversity of our state, region, and continent. Many of the latter projects are funded by the National Science Foundation (NSF). These include a revisionary synthesis of the leafhopper tribe Erythroniini, which includes more than 1,500 species worldwide and at least 400 in Illinois; a phylogenetic analysis and study of egg-laying behavior in sharpshooters, one of the most important groups of leafhopper pests of agriculture; an inventory of pyrenomycete fungi of the Smoky Mountains; and studies of the co-evolution of lice and their vertebrate hosts. SBD scientists are also principal investigators on two NSF PEET (Partnerships for Enhancing Expertise in Taxonomy) grants, which provide research experience for University of Illinois students and facilitate training of new experts on diverse but understudied groups of organisms. Although the geographic scope of each of the latter projects extends well beyond the borders of Illinois, such broader perspectives are becoming increasingly important as economic globalization and climatic change bring more exotic species to our own backyards. Ongoing and rapid human alteration of the global environment requires that organizations like ours redouble our efforts to provide the sound science needed to inform policymakers in their efforts to preserve the earth's biological resources for future generations. Because of our unique taxonomic expertise and collection resources, SBD scientists continue to play crucial roles in providing such information both within Illinois and beyond.

## Section for Biotic Surveys and Monitoring

C.A. Phillips, Section Research Leader

The newly formed Section for Biotic Surveys and Monitoring (SBSM) includes scientists supported on the Statewide Biological Survey and Assessment Program (SBSAP) who were most recently in the INHS Center for Biodiversity (CBD), with the addition of the plant ecologists in the program who were most recently in the Center for Wildlife Ecology (CWE). The Statewide Biological Survey and Assessment Program is funded through the Illinois Department of Transportation (IDOT) as an annually renewed contract. Most scientists in the program conduct biological surveys and environmental assessments, especially for threatened and endangered species and high-quality natural communities within IDOT project areas. Others provide biological collections (see below) and database support for these activities. Also included in the SBSM are scientists supported on a contract with the Illinois Toll Highway Authority, providing similar services as those provided under the SBSAP.

Scientists in the section also conduct externally funded research in ecology, evolution, conservation biology, and systematics. Major research programs in the Section include statewide inventories of native and introduced organisms, long-term monitoring of plant and animal communities, studies on exotic species, intensive surveys for threatened and

endangered species and high-quality remnant natural communities, restoration of disturbed or fire-dependent communities, life history and demography of threatened and endangered species, and systematic studies of organisms within our taxonomic expertise.

The SBSM includes the curators and collections managers for the Survey's mollusk, annelid, crustacean, and amphibian and reptile collections as well as the manager of the Survey's fish collection. The Section currently includes 16 full-time staff, including one Professional Scientist, six Research Scientists, and nine Technical Scientists. Many scientists in the section have appointments as faculty at the University of Illinois and advise graduate students and offer research opportunities to undergraduates. The section also maintains a strong outreach program, with scientists presenting general information and research results to K–12 classes, adult groups, nature centers, outdoor camps, and the Survey's popular Illinois Wilds Institute for Nature (IWIN) classes. SBSM staff regularly consult with resource managers, regulatory personnel, and policy makers from such agencies and organizations as The Nature Conservancy, the U.S. Fish and Wildlife Service, the Forest Service, and the National Park Service. Several of our scientists also serve as members of or consultants to the Illinois Endangered Species Protection Board, the Illinois Nature Preserves Commission, U.S. Forest Service advisory panels, and state and federal endangered species recovery teams.



## Section for Ecological Entomology

Lee Solter, Section Research Leader

The Section of Ecological Entomology serves the people of Illinois, policy makers, and the scientific and educational communities by investigating entomological problems and issues in four critical areas: agriculture, medicine, natural environments, and urban landscapes. The section provides scientifically based information leading to an understanding and appreciation of our natural heritage and the wise preservation, management, and utilization of Illinois' natural resources.

Entomologists in the Section of Ecological Entomology address a broad range of disciplines that relate to insects and other arthropods including toxicology, behavior, ecology, taxonomy, pathology, agriculture, plant-insect interactions, and transmission of vertebrate diseases. Staff members also participate in educational events for producers, policy makers, and the public; train undergraduate and graduate students; and provide scientific data that benefit the public and the greater scientific community.

### Entomology Research Highlights from 2006

- The mechanism by which sodium sulfate, a coal mining contaminant, reduces metabolic rates and, therefore, reduces biomass production in filter-feeding freshwater invertebrates was determined. (D. Soucek)
- Insectivorous birds nesting in the Calumet region of Chicago were shown to be accumulating polybrominated diphenyl ethers (organic flame retardants) in their tissues. (S. Gallo, D. Soucek)
- The potential interface between the emerging bioeconomy and the challenge of invasive species was highlighted in an article in *Science* (September 2006). Agencies involved in the policy arena are developing policies to prevent use of potentially invasive species as bioenergy crops. (S. Raghu)
- Delayed mating among potentially *Bt*-resistant female corn rootworms from transgenic cornfields gives potentially resistant males more opportunities to mate and sire *Bt*-resistant offspring. (J. Spencer)
- The pattern of human West Nile Virus cases in Illinois in 2005 and 2006 correlated to the pattern of density of infected mosquitoes (abundance times infection rate), offset by two to four weeks, which

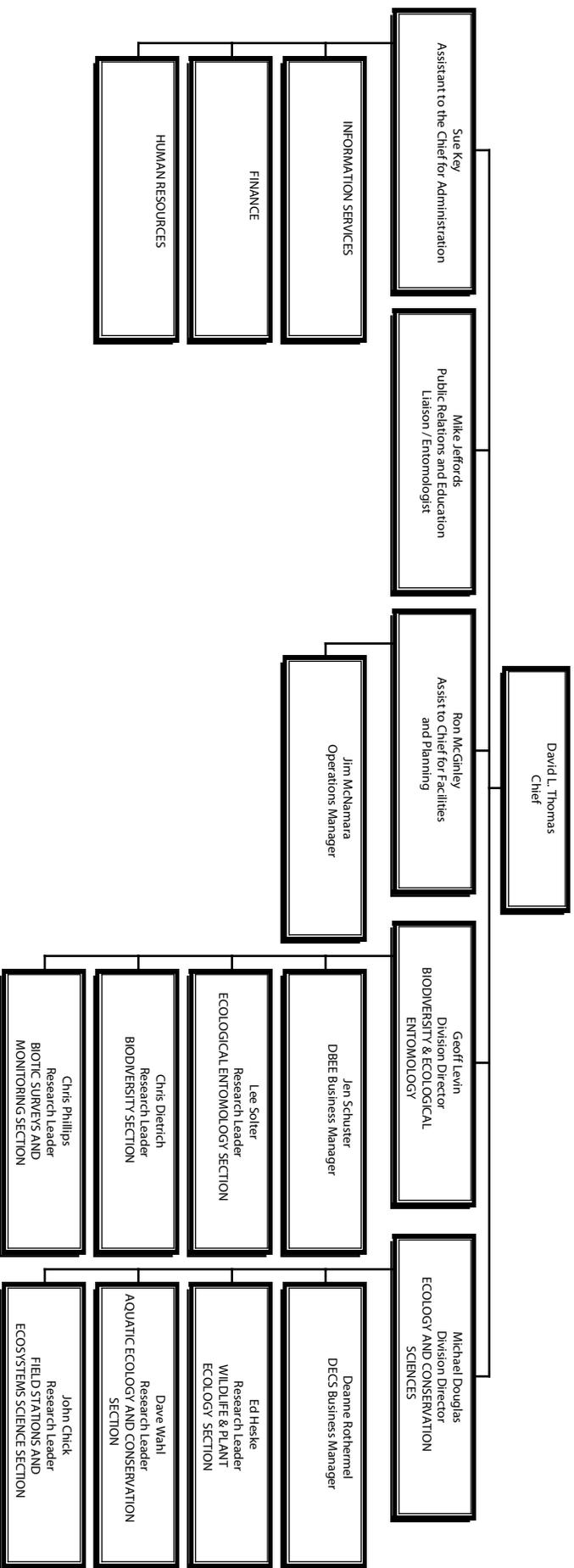
provides a means of estimating risk in areas where sentinel birds have been decimated. (R. Lampman)

- The systematics and biodiversity database system, Mandala, used to track specimens, taxa, and literature, is searchable on the Web at <http://www.inhs.uiuc.edu/research/mandala/> (G. Kampmeier)
- Two aphid species, newly invasive in Illinois on elm and hackberry trees, were discovered in suction traps. (D. Voegtlin)
- The Organic Transitions Research Program completed its fourth field season and is preparing documentation to seek certification as an organic research site, one of only a handful of such sites nationwide (C. Eastman, E. Zaborski, M. Wander, J. Masiunas, D. Eastburn, D. Cavanaugh-Grant, D. Anderson, L. Cooperband, J. Lundgren)
- Bumble bees in the U.S. are infected with a microsporidian pathogen that is genetically identical to the disease organism in European bumble bee species. (L. Solter, S. Cameron, C. North)

With the retirement of Dr. Eli Levine and the continuation of corn rootworm studies by J. Spencer, the section scientists recommended that additional emphasis be placed on urban/ suburban entomology and ecology. This recommendation was approved and a search to fill a position in urban landscape ecology is underway. In addition, Dr. Robert Novak, head of the Survey's Medical Entomology Program, retired late in the fiscal year. Dr. Richard Lampman has been appointed interim head of the program while we undertake a search to fill the position.



# Illinois Natural History Survey



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