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Illinois
Natural History Survey

Development and Expansion of the Natural Resource Data and Information Systems in Support of the Illinois Comprehensive Wildlife Conservation Plan

Annual Segment Report 2004

Chris Phillips, Kevin Cummings, Liane Cordle, Walter Hill, Ann Holtrop, Pat Brown, and John Epifanio

Submitted to

Illinois Department of Natural Resources
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Illinois Natural History Survey
Center for Aquatic Ecology
607 East Peabody Drive
Champaign, Illinois 61820

March 2004

Cross Center

Illinois Natural History Survey

Center for Aquatic Ecology and Conservation, Center for Biodiversity, Center for Wildlife and Plant Ecology

(February 1, 2003 - January 31, 2004)

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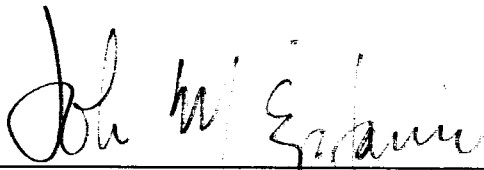
Project: T-03-P-001

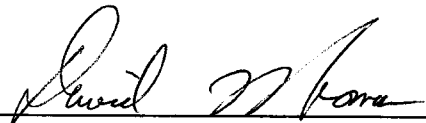Annual Report, Segment 1
1 February 2003 to 31 January 2004

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FFY'02 WILDLIFE GRANT PROGRAM

State of Illinois

Annual Performance Report
(February 1, 2003 - January 31, 2004)

PROJECT NUMBER: T-03-P-001

PROJECT TITLE: State Wildlife Conservation Plan/Strategy Data System

JOB 1. **Conservation Mapping in Support of the Comprehensive Wildlife Conservation Plan and Wildlife Conservation Strategies.**

Task 1.1 *Expand the Illinois Conservation Practices Tracking System (ICPTS) to selected southern Illinois counties. This will include assessment of current mapping, initiating mapping in selected counties and working with selected counties to implement standard mapping protocols as defined in ICPTS.*

The initial work completed under this task has focused primarily on planning and coordination with IDNR's partner agencies in the further development of the Illinois Conservation Practices Tracking System. These include the USDA-Farm Service Agency (FSA), the University of Illinois Extension, the Association of Illinois Soil and Water Conservation Districts, and the IDNR-Conservation 2000 Ecosystem Partnerships Program. Agreements have been reached with the Illinois State office of FSA to allow IDNR and its' contractees access to producer files for the purpose of gathering spatial and attribute information pertaining to enrollments in the Illinois Conservation Reserve Enhancement Program (CREP), the Conservation Reserve Program (CRP), the Environmental Quality Incentives Program (EQIP), and, where feasible, contracts in the Wetland Reserve Program (WRP) and Wildlife Habitat Incentives Program (WHIP) managed by NRCS.

Two regions in central/southern Illinois will be the focus for new conservation mapping work under this project in 2004: the Upper Little Wabash River basin (including portions of Coles, Cumberland, Shelby, Effingham, Fayette, Marion, Clay, and Jasper counties), the Middle Illinois River basin (Logan, Mason, Peoria, and Tazewell counties). Contracts for both of these projects

areas are anticipated to be finalized on or before April 2004 and work will commence as soon as these are finalized. This project will also coordinate with the Southwestern Illinois RC&D to gather data in the Lower Kaskaskia River watershed, including all active conservation easements in Bond, Madison, Monroe, Randolp, St. Clair, and Washington counties. These areas have been chosen as priorities for mapping due to interagency concerns and significant local enrollment in conservation programs: Illinois CREP and Illinois Rivers 2020 priorities in the case of the Middle Illinois River basin counties and IDNR C2000 Ecosystem Partnership watershed planning in the Upper Little Wabash and Lower Kaskaskia watersheds. The 2004 work will also include a review of the USDA-FSA's Common Land Unit statewide GIS initiative, where all producer farm, tract, and field boundaries and CRP enrollments are being digitized on a county by county basis into an ArcView GIS shapefile. While the software platform used by USDA is compatible with that of ICPTS, a review of mapping methodology and attribute information gathered will be done in an attempt to ensure maximum compatibility between the work of FSA and that of this project. Upon completion of this task, it is anticipated that 36 of Illinois' 102 counties will be at least partially represented in the Illinois Conservation Practice Tracking system. The information stored within the system should also grow significantly beyond the 8,200 contracts (approximately 135,000 acres) already digitized in ICPTS. Work will also continue to collaborate with similar conservation mapping efforts being conducted by the IDNR Conservation 2000 Ecosystem Partnership program to track their habitat restoration projects and the Illinois Environmental Agency's effort to track all of their active Clean Water - Section 319 restoration projects. Both of these use modified ICPTS database schema to store their project and the combination of these three data sets should provide wildlife planners with a potentially powerful data set for targeting future conservation efforts and analyzing the efficacy of these programs in providing additional and suitable wildlife habitat.

Tasks 1.2 & 1.3

Task 1.2.   *Map all IDNR sites purchased with federal and special funds including the habitat, Pheasant, Migratory Waterfowl Stamp, and Furbearer funds.*

Task 1.3.   *Develop initial phase of a complete accurate, and fully metadata attributed GIS dataset of IDNR owned and leased properties.*

These tasks focused on the mapping of IDNR owned, managed, and leased properties (OMLP). Task 1 includes digital mapping of all IDNR sites purchased with federal and special funds (e.g. Habitat, Pheasant, Migratory Waterfowl Stamp, and Furbearer funds). A geodatabase has been created in the form of a parcel-based mapping system. Facilities for mapping outer extent property boundaries as well as corner monument markers, interior parcel lines, right-of-way and easement extents, and historical boundary change information have been built into the OMLP GIS data management system. A large portion of the mapping project involves thorough research of existing paper and database records for relevant and critical historical information for each property. Personnel have familiarized themselves with the organization and format of the property documents and research has been completed for seven (7) properties in preparation for digitization. A procedure for accurately and consistently digitizing all aspects of each property has been developed and is being implemented. Metadata is being created for the GIS data layers using Federal Geographic Data Committee compliance standards as a guide. A quality assurance, quality control methodology has been put into place to insure the data created meets the accuracy standards defined in the OMLP project data input methodology. Once the properties purchased with federal and dedicated funds are completed, mapping work will continue on the larger and key Agency properties (Task 2) using the protocol developed as part of Task 1.

Estimated expenses for Job 1 through January 31, 2004.

Job 1	Allocation	Expenses	Balance
Personnel (Wages & Benefits)	$153,495	$37,368.00	$116,127
Travel	$7,500	$224	$7,276
Commodities	$10,000	$6,371.00	$3,629
Equipment	$10,635	$10,635.00	$0
Contractual	$33,388	$8,643.00	$24,745
Direct Costs (includes Personnel, Travel, etc.)	$215,018	$63,241	$151,777
Indirect Costs	$31,699	$7,614.00	$24,085
			$0
TOTAL (Direct + Indirect)	$246,717	$70,855	$175,862

JOB 2: **Ecological Classification of Rivers for Environmental Assessment and Management.**

Task 2.1 *To delineate and validate ecologically delineated valley segments for all river systems in Illinois.*

The 1:100,000-scale, flow validated, National Hydrography Dataset (NHD) was used as the base linework for this project. For future processing to occur correctly, the NHD linework was modified. Data clean up included reconnecting or deleting disconnected stream reaches and removing loops (i.e., polygons). Following clean up, data sets needed to attribute streams and their catchments were identified and gathered, or created. Currently all stream reaches are attributed with Strahler stream order, downstream order, Shreve link, and downstream link. Also, catchments have been generated for all stream reaches in one-third of the state. Gathered datasets and additional programs will be used to delineate remaining catchments and riparian buffers for all stream reaches as well as to attribute stream channels and catchments. After all attributes are compiled, multivariate statistics will be used to investigate the ecological relevance of physically-derived attributes. Key attributes will be used to combine adjacent segments into valley segments. Those attributes not used in valley-segment delineation will be used to further describe each valley segment.

Task 2.2. *To build statistical models for predicting riverine site habitats and biota from mapped landscape and local variables.*

The initial focus of this objective is to develop a model that will predict fish communities from landscape and local variables. Records of fish community samples collected in wadeable Illinois streams (i.e., from 1990-2000) via the electric seine, have been extracted from IDNR's fisheries database (i.e., FAS). Current efforts are focused on insuring that the fish data, which corresponds to each sample record, have been entered into FAS. If data were missing, then the appropriate field personnel were contacted to gather such data for immediate entry. Future work will focus on verifying that fish community data have been entered correctly into FAS as well as on removal of rare species from the data set. If duplicate samples exist for a site, then only the sample collected under conditions that promoted the greatest sampling efficiency will be retained. Once the structure of the data set is finalized, exploratory analyses will be conducted to identify methods appropriate for identifying fish community-land use relationships.

EXPECTED RESULTS AND BENEFITS

This project is the first step in the development of an ecological stream classification for Illinois. This resulting classification system will allow resource mangers to model a suite of habitat and biological traits at specific, often unsampled, river locations across the state over time. Thus, resource managers will have a tool to help them identify the distribution of key aquatic species and their habitats, and to help them stratify monitoring efforts to ensure that stations selected address the variability of aquatic-community types in the basin.

Estimated expenses for Job 2 through January 31, 2004.

Job 2	Allocation	Expenses	Balances
Personnel (Wages & Benefits)	$92,671.00	$66,018	$26,653
Travel	$5,000.00	$3,020	$1,980
Commodities	$7,000.00	$15	$6,985
Equipment	$0.00	$0	$0
Contractual	$900	$305	$595
Direct Costs (includes Personnel, Travel, etc.)	$105,571.00	$69,358	$36,213
Indirect Costs	$21,114.00	$0	$21,114
			$0
TOTAL (Direct + Indirect)	$126,685.00	$69,358	$57,327

JOB 3: **Enhance and Integration of Resource Information Systems to Support Wildlife Planning**

Task 3.1 *Illinois will update Biotics 4 (formerly known as BCD/MANAGE) software into the Illinois Conservation Management System and begin tracking site management information.*

The DOS-based Biological Conservation Database (BCD) was upgraded by the Illinois Natural Heritage Database Program into the Oracle-based Biotics 4 database (formerly called Heritage Data Management System). Biotics 4 combines geographic information systems (GIS) and powerful relational database technologies to organize, map, and analyze data about T&E species and other significant natural resources. Initial efforts to integrate data from the new Biotics 4 system with data to be gathered in the revised Manage system, under the umbrella of the proposed Illinois Conservation Management System (ICMS) will be planned as part of the system design and initial coding of ICMS to be completed in the later part of 2004 under Task 3.4.

Task 3.2 *Software and hardware upgrades will be completed for handling the new data systems*

An Oracle data server and software was purchased for use by the Biotics 4 database. Additional hardware and software, including 20 computer workstations and 28 ArcView GIS software licenses, were purchased for field staff who will be the primary users of Biotics 4. Twenty-eight (28) Global Positioning System (GPS) receivers were obtained to aid in the collection of precise T&E species location data. In an effort to train staff in the use of these new technologies, staff of the Heritage Database program arranged for regional GPS training workshops in September 2003 and custom ArcView training has been scheduled for February/March 2004.

Task 3.3 *Develop the mussel database as part of the Fisheries Analysis System (FAS) and link to existing INHS museum collections.*

The Principal Investigator (Kevin Cummings), Dave Day, Steve Sobaski, and other IDNR staff have met twice to discuss the status and needs for the development of the Statewide Mussel Database. The first meeting was held on 08/22/03 the second on 01/30/04. Progress on the project since August included additional work, primarily on some outputs to the statewide web-based component. We have developed a workable web-based system for querying and viewing mussel data and distributional maps. Additional work will now shift to modifying that system to make it more user-friendly. We reviewed the focus of this database, processing of data, and how it will be eventually served over a secure web-based site. We will develop a database structure for use in the field or office, and the data will then be transferred to INHS for proofing and incorporation into the main database.

An Access-based interface and database is expected for entering, storing and analyzing data collected by each biologist. This will allow the biologists to work with their data on their own machines (e.g. develop tables, graphs etc.). When new data have been entered and verified, a routine would be invoked that will transfer the data to the INHS where it would be reviewed and uploaded into the statewide database.

The importance of the Statewide database will be for analyzing data from larger drainage basins, regions or statewide, and thus the significance of the web-based component. For a statewide

perspective, some analyses include: species distributions, community analyses, sampling sites, etc.

Task 3.4   *Develop appropriate web interfaces for access and reporting from the Illinois Conservation Management System.*

The Illinois Department of Natural Resources maintains a vast collection of natural resource data, however these data sets reside in paper format or disparate databases, in various software platforms, formats, and degrees of completeness and compatibility within the agency's state headquarters, and regional and district offices statewide. There is a great need for these scattered data sources to be developed into an integrated and updated, readily-accessible, enterprise-level database system, such that management decisions in the field can be based upon the most current and accurate data possible. This vital information consists of boundary and tabular data on state-owned and managed habitat areas as well as management units and habitat project areas on private lands. The need to capture information on the nature and extent of these sites and the history of management activities being conducted on those sites into an enterprise database system is elemental to the developing and implementing a comprehensive wildlife habitat conservation plan for Illinois.

As the first step in developing the Illinois Conservation management System, Environmental Systems Research Incorporated (ESRI) was contracted by IDNR in December 2003 to conduct an information needs assessment and system design and feasibility study for the agency in order to identify the state of data and information technology assets and needs across a wide variety of natural resource disciplines within IDNR. Specifically, the ESRI contract is designed to provide: (a) a complete assessment of business needs by IDNR's natural resource professionals, (b) a conceptual design for database development and integration for agency divisions whose mission impacts the wildlife planning process, (c) a feasibility study for the database integration project, and lastly (d) a logical design for the database integration project, if the feasibility study warrants continued work at that point.

ESRI consultants conducted a series of business need meetings with representative groups of professional managers, administrators, and data managers from wildlife, forestry, natural heritage, nature preserve, ecosystem management, water resources, land management, Federal Aid, and informational technology in January 2004. The outcomes from these meetings and additional research conducted by ESRI will be summarized and serve as the basis of a series of system recommendations by ESRI to be completed and presented to IDNR in Spring 2004. Concurrently, a bi-directional dialogue has been initiated between ESRI and IDNR staff to construct and refine a conceptual design for database integration, including all aspects of data storage, data input, and data access by staff involved with wildlife planning and conservation easement management projects. Work is currently underway, as ESRI and IDNR staff work through this dialectic process, to create the conceptual database design for the Illinois Conservation Management System (ICMS). Once this conceptual design is developed and approved by IDNR project and administrative staff, one or more components of this conceptual design will serve as the focus for initiating the actual design and development of ICMS. The ICMS will be developed in a modular fashion, with the logic design, coding, and implementation of the target system components to be completed and tested as a pilot project during the second half of 2004.

EXPECTED RESULTS AND BENEFITS

The appropriate data management tools must be in place to efficiently process data, prioritize data collection, and guide conservation efforts. Upgrading the Biotics 4 (formerly known as BCD/MANAGE) software and the integration and development of related resource information systems will allow for improved tracking of species and habitat information and management activities on a local, regional, and statewide basis. These upgrades will enable the Department to use quality information for the development of wildlife conservation plans and will assist in tracking progress and monitoring effects of conservation activities.

Estimated expenses for Job3 through January 31, 2004.

Job 3	Allocation	Expenses	Balance
Personnel (Wages & Benefits)	$32,178	$9,854	$22,324
Travel	$4,500	$4,362	$138
Commodities	$55,323	$34,580	$20,743
Equipment	$0	$0	$0
Contractual	$125,712	$0	$125,712
Direct Costs (includes Personnel, Travel, etc.)	$217,713	$48,796	$168,917
Indirect Costs	$9,000	$5,836	$3,164
TOTAL (Direct + Indirect)	$226,713	$54,632	$172,081

JOB 4: Re-evaluation Of Historical Illinois Threatened and Endangered Species Occurrences and Illinois Natural Areas Inventory Habitat Sites

Specific Actions and Deliverables:

Task 4.1 *Update and Locate New Threatened and Endangered Species Records*

Two hourly workers were hired as field technicians on contract via the Illinois Natural History Survey in an attempt to relocate historic endangered and threatened animal species occurrences. Maps and data from the Illinois Natural Heritage Database were provided to the field technicians for use in planning their surveys. The field technicians conducted surveys for timber rattlesnakes, dusky salamanders, Kirtland's water snakes, and other historic, state-listed amphibian and reptile occurrences in southern Illinois. Consultants were identified for the remaining species groups and a meeting was held to explain the data reporting system and the desired procedure for the field surveys. Map packets were assembled in preparation for them to begin relocation of historic occurrences starting in the spring of 2004 once the necessary permits are obtained.

Task 4.2 *Survey and Update Rare Communities and Habitats of the INAI*

IDNR heritage biologists were contacted to identify priority sites for surveillance. The cost of aerial flights is being determined in order to conduct aerial surveillance on priority INAI sites and other INAI sites within yet-to-be-determined flight routes. Aerial surveillance will allow heritage biologists to determine if an INAI site has been destroyed and to witness the overall condition of the site and its communities. This method of surveillance has several advantages in that it allows a large number of sites to be visited in a short period of time, it is the only way to survey sites for which the landowner will not grant access, and it is a means to examine large sites in their entirety.

Task 4.3 *Data entry and Product Development*

Two Data Entry Technicians were hired to log, enter, and map T&E species data. The technicians have been entering a backlog of T&E species data that existed within the Illinois Natural Heritage Database Program. To date, over 800 records have been entered on both new T&E populations and updates to existing T&E populations. The technicians will enter T&E data collected under this job once it is processed and submitted to the Heritage Database program.

Task 4.4 *Developing Negative Data Database*

A negative occurrence database has been developed by the Illinois Natural Heritage Database Program (INHDP). Records of recent site surveys without element occurrences (i.e., lacking evidence of threatened or endangered species or natural areas) are now maintained in a spatial database, using the ArcView GIS shapefile format, within the Biotics 4 database used by the INHDP. The negative occurrence database will serve IDNR as a valuable complement to the element occurrence information currently provided by Biotics 4. While Biotics 4 is designed to track information statewide on where threatened and endangered species or resources of concerns (e.g., natural areas or unique habitats) have been surveyed and found to occur, it fails to provide any information on the remaining areas of the state without element occurrence records. The negative occurrence database helps fills this void in information by confirming sites without threatened or endangered species or habitat in need or protection.

EXPECTED RESULTS AND BENEFITS

The systematic survey of historic T&E occurrences and INAI communities statewide and the creation of a negative occurrence database will provide the means to update a significant portion of the Illinois Natural Heritage Database Program's Biotics 4 database, which in turn will assist in providing a clear picture of the status of wildlife and wildlife habitat resources in the state. Biotics 4 is expected to play an integral role in the planning and monitoring of management strategies under Illinois' comprehensive state wildlife conservation plan.

Estimated expenses for Job 4 through January 31, 2004.

Job 4	Allocation	Expenses	Balance
Personnel (Wages & Benefits)	$88,281	$30,671	$57,610
Travel	$57,446	$2,000	$55,446
Commodities	$9,000	$5,794	$3,206
Equipment	$0	$0	$0
Contractual	$74,747	$179	$74,568
Direct Costs (includes Personnel, Travel, etc.)	$229,474	$38,643	$190,831
Indirect Costs	$44,475	$7,719	$36,756
TOTAL (Direct + Indirect)	$273,949	$46,362	$227,587

Estimated total budget expenses for Jobs 1-4, through January 31, 2004.

Total Budget	Allocation	Expenses	Balance
Personnel (Wages & Benefits)	$366,625	$143,911	$222,714
Travel	$74,446	$9,606	$64,840
Commodities	$81,323	$46,760	$34,563
Equipment	$10,635	$10,635	$0
Contractual	$234,747	$9,127	$225,620
Direct Costs (includes Personnel, Travel, etc.)	$767,776	$220,038	$547,738
Indirect Costs	$106,288	$21,169	$85,119
TOTAL (Direct + Indirect)	$874,064	$241,207	$632,857

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