

OFFICE OF RESOURCE CONSERVATION
State of Illinois
DRAFT Grant Segment

PROJECT NUMBER:

PROJECT TITLE: The Effects of Bottomland Forest Restoration on the Breeding Bird Community in the Cache River Watershed

PURPOSE: During the past 18 years, the Cache River Joint Venture Partnership (JVP: ILDNR, USFWS, TNC) has successfully acquired and re-forested over 20,000 acres of non-forested land. With the backing of the JVP, scientists from the Illinois Natural History Survey collected baseline data during 1993-1995 documenting breeding bird densities, breeding bird diversity, and nesting success of various bird species prior to most of this land-use conversion. These conservation activities are predicted to result in increased nesting success and increased densities for many bottomland forest birds. This project will document how the restoration of bottomland forests has affected the diversity, abundance, and nesting success of Neotropical migratory birds breeding within a bottomland forest ecosystem, thereby measuring the success of conservation actions.

NEED: Neotropical migratory birds face continued threats resulting from the fragmentation and degradation of natural habitats (Askins 2000). Research during the past 20 years has led to a better understanding of the negative effects of habitat fragmentation (increased brood parasitism by cowbirds and increased nest predation) on migratory songbirds breeding in temperate bottomland forests, and land acquisition/conservation efforts that “un-fragment” forests are possibly the best solution to restore or improve bottomland forest ecosystems.

In 1991, the Cache River JVP formed in an effort to conserve and restore (through land acquisition and reforestation) bottomland forest habitat in the Cache River watershed in Illinois. During 1993-1995, prior to most land acquisition and reforestation, nesting data (nearly 2,000 nests) was collected from sites within the Cache River watershed documenting rates of nest predation and cowbird parasitism for many species (e.g. Prothonotary and Kentucky Warblers, Acadian Flycatcher, Wood Thrush). During that same period, point counts were conducted in >30 tracts of bottomland forest throughout the watershed documenting bird abundance and diversity. Since then, over 20,000 acres of non-forested land have been acquired by the JVP and are in different stages of succession (1-17 years post-agriculture).

I am now seeking support to conduct the last two years of a three-year follow-up study (an effort funded, in part, by the JVP) to determine whether nesting success has increased relative to the amount of restoration that has occurred. This proposed project will run from April 1, 2011 to March 31, 2013. Each of the hundreds of point-count locations will be re-visited to document the current abundance and diversity of breeding birds and determine cowbird-to-host ratios (this ratio is a good index of the community-wide rate of cowbird parasitism; Robinson et al. 2000, Hoover et al. 2006). In addition, the movements of female cowbirds in the current landscape will be compared to their movements that were documented prior to most of the reforestation in the watershed. This current data will allow us to compare changes in nesting success, bird abundance and bird diversity to changes in habitat configuration that are a direct result of the restoration efforts of the JVP.

Too often the effects (i.e. success) of conservation/restoration efforts are not measured in terms of responses of the biota to specific conservation actions. The research described here is designed to address required elements i-v (i.e. elements 1-5) in the Illinois Wildlife Action Plan (IWAP; section iv, pages viii-xvi) and evaluate the success to date of conservation actions implemented to benefit birds breeding in bottomland forests in Conservation Opportunity Areas (COAs) identified within the IWAP. This research will document the distribution, abundance, nesting success, and overall health of breeding bird populations in bottomland forests that are becoming less fragmented through the conservation efforts of a Joint Venture Partnership. Results from this research will provide guidelines to promote restoration and management practices that provide the greatest benefit to birds breeding in bottomland forest ecosystems, which will have broad application to and assist with other bottomland forest restoration efforts in Illinois and throughout the U.S.

OBJECTIVES: By comparing current conditions to the preliminary data gathered during 1993-1995, the objectives of the proposed research are to:

- 1) **Test the prediction that rates of nest predation and cowbird parasitism have decreased more in areas where there has been land acquisition and bottomland forest restoration than where there has been little restoration activity.** This information will be critical to identifying where “source” habitats exist and will aid in prioritizing land acquisition and will directly measure the effect of bottomland forest restoration on the nesting success of various “species in greatest need of conservation” including the Wood Thrush, Prothonotary Warbler, Acadian Flycatcher, and Kentucky Warbler (Section X, pages 307-308). Timeframe: April-July 2011, 2012. Estimated % of budget: 20
- 2) **Document changes in bird densities, species diversity, and the cowbird-to-host ratio in relation to restoration.** This information will tell us how changes in landscape configuration that result from restoration may benefit the diversity and density of breeding forest birds (including area-sensitive species and all of the bird “species in greatest need of conservation” found in bottomland forest habitat) while at the same time reducing the community-wide rate of cowbird parasitism. Timeframe: April-July 2011, 2012. Estimated % of budget: 20
- 3) **Document the distances moved by female cowbirds between breeding (i.e. forest) and feeding (i.e. open-land) habitat and compare these distances to movements documented during 1994 prior to reforestation.** This data will tell us whether efforts to reforest areas adjacent to particular tracts of existing bottomland forest have made it so that female cowbirds now have to travel farther between breeding and feeding sites each day, which would potentially reduce their ability to parasitize as many nests. Timeframe: May-June 2011, 2012. Estimated % of budget: 20
- 4) **Survey restoration plots that vary in age (e.g. 1, 3, 5, 7, 10, 16 years post-agriculture) to document how the bird community changes in the restored areas (and the adjacent forest) as these agricultural fields transition to grassland, shrubland, and eventually to mature forest.** This will provide important information to land managers at other sites who are managing for particular successional stages and their associated bird communities. Timeframe: May-June 2011, 2012. Estimated % of budget: 20
- 5) **Collect preliminary data (prior to partial reconnection) from sites that will be affected by the proposed partial reconnection project which will divert a portion of the flow from the upper Cache River into the lower Cache River.** We will collect baseline data on the flooded surface area and average

water depth (during the breeding season of birds) within the affected swamps to the west of where the partial reconnection is to occur (e.g. Porter Bottoms, Main Tract, Section Eight Woods), quantify the pre-reconnection bird community, and measure the pre-reconnection nesting success of the Prothonotary Warbler (a forested wetland specialist), for comparison with future conditions after the partial reconnection is completed. Timeframe: April-July 2011, 2012. Estimated % of budget: 15

6) Determine the effects and success of restoration efforts within the Cache River COA to date, and provide information (recommendations and final report) critical to the continued conservation efforts of the JVP and others in Illinois. This proposed research will result in a comprehensive (management-oriented) report and peer-reviewed manuscripts that will further the science of restoration ecology and be useful to both local and regional bottomland forest ecosystem management efforts. This research fits perfectly within the purview of the Forests Campaign of the IWAP (Section III.E, pages 65-70) by documenting the effects of the actions of conservation partners on breeding bottomland forest birds. Timeframe: Report due March 2013. Estimated % of budget: 5

EXPECTED RESULTS OR BENEFITS: This research will measure the success of conservation efforts aimed at restoring imperiled and important bottomland forest ecosystems, and will determine how the acquisition and reforestation of agricultural lands within fragmented bottomland forests benefits the bird community. Species in the greatest need of conservation likely to benefit the most include the Wood Thrush, Acadian Flycatcher, Prothonotary Warbler and Kentucky Warbler (Section X, pages 307-308). Other species benefiting from this research (e.g. Louisiana Waterthrush, Yellow-throated Warbler) are Birds of Conservation Concern within the Bird Conservation Regions (BCRs) where the research will occur, or in neighboring BCRs. In aggregate, these species are also on the Partners in Flight (PIF) U.S. Watch List as either Extremely or Moderately High Priority. This research represents the merging of research with conservation in action and will, by monitoring wildlife responses to bottomland forest restoration efforts by a Joint Venture partnership within a Conservation Opportunity Area identified in the IWAP (Section IV.A, pages 127-128; also pages 290 and 293), provide feedback to both conservation plans and actions. The research will also document how conservation actions that “un-fragment” bottomland forests affect breeding birds, thereby providing a measure of restoration success.

The Forests Campaign is one of the seven important campaigns outlined in the Illinois Wildlife Action Plan (Section III.E, pages 65-70). These campaigns are to address the most widespread and urgent issues facing wildlife and habitats in an efficient, effective, and comprehensive manner. The wildlife action plan highlights very well the many current conservation issues involving Illinois’ wooded habitats including the extensive levels of forest fragmentation that reduce breeding songbird diversity, density and nesting success in bottomland forest ecosystems. The research proposed here is the final important step in the iterative process listed below and will merge seamlessly with the Forests Campaign which promotes the following:

- 1) Forging conservation partnerships consisting of those committed to improving Illinois’ forests and forest wildlife – the Cache JVP has been championing such efforts for many years;
- 2) Developing strategies to see the priority actions outlined in the wildlife action plan happen – the Cache JVP has had a habitat restoration plan in place for many years;

3) Implementing specific forest wildlife conservation activities, emphasizing the already-identified Conservation Opportunity Areas (COAs) – the Cache River JVP was formed to conserve and restore bottomland forests within the vast and important Cache River COA;

4) Establishing goals and targets for what the response of the wildlife and habitat to these actions should be – the Cache JVP restoration plan set goals for re-forested acres and improved conditions for breeding songbirds;

5) Using the best science available to measure the effectiveness of management activities and determine whether or not wildlife and habitat goals are being achieved – the research proposed here will document the responses of the breeding bird community to a substantial amount of land acquisition, conversion, and bottomland forest restoration. This proposed research provides the unique opportunity to measure the success of conservation actions by comparing pre-restoration (1993-1995) to current conditions across a broad spectrum of bottomland forest tracts that have had from little to much reforestation occur around them. This information can then be fed back into this 5-step process, thereby improving the Forests Campaign and IWAP by identifying what worked and what can be improved upon.

The research proposed here also addresses 5 of the 8 required elements of the IWAP by producing information on the abundance, diversity and nesting success of birds at various locations in relation to habitat fragmentation and restoration (elements i, ii, iii), identifying how the configuration of bottomland forest habitat either harms or benefits songbird populations (ii, iii), and monitoring breeding bird populations to measure the success of conservation actions and prioritize subsequent restoration efforts (iv, v) (IWAP; section iv, pages viii-xvi).

This research contributes not only to the IWAP and the Forests Campaign, but also to regional PIF conservation plans for birds breeding within bottomland forest ecosystems. In summary, this research will determine the response of the bird community to bottomland forest restoration, measure the success of the restoration effort of conservation partners, and provide results that are directly applicable to conservation plans and restoration efforts in other bottomland forest ecosystems. Specifically, by comparing the pre-reforestation composition (diversity and density) and nesting success (rates of nest predation and cowbird parasitism) of the bird community to current conditions, we can determine how successful conservation partners have been in promoting self-sustaining “source” bottomland forest habitat for songbirds. This information will be critical for 1) further developing the Forests Campaign within the Illinois Wildlife Action Plan, 2) establishing and refining land acquisition priorities, and 3) promoting the formation of and guiding other conservation partnerships wanting to enhance bottomland forest ecosystems in Illinois.

APPROACH:

Objective 1) **Test the prediction that rates of nest predation and cowbird parasitism have decreased more in areas where there has been land acquisition and bottomland forest restoration than where there has been little restoration activity.** A field crew will search for and monitor the nests of a variety of bottomland forest bird species during April through mid-August during 2011-2012 on the same sites in the Cache River watershed that were monitored intensively during 1993-1995. Using standard nest monitoring protocols, they will record the number of cowbird eggs present in each nest, the ultimate fate of each nesting attempt (success or failure) and the number of offspring that fledge. Prothonotary Warbler nest boxes, which are distributed among these sites and an additional 20 sites, will be monitored to determine rates of cowbird parasitism over the spectrum of sites surrounded by more versus less restored habitat. Modern analytical tools

(e.g. Chapa-Vargas and Robinson 2006, 2007) will be used to determine the effects of changes in land-use configuration (as a byproduct of restoration that has occurred) on rates of nest predation, cowbird parasitism, and productivity of the forest songbirds. We will use this information to identify where “source” habitats exist and determine the role that habitat restoration has played in producing source habitat.

Objective 2) Document changes in bird densities, species diversity, and the cowbird-to-host ratio in relation to restoration. J. Hoover and one additional observer will re-survey the birds at the >300 point-count locations (initially surveyed during 1993-1995) using a standard point-count technique (Ralph et al. 1995, Hamel et al. 1996). These data will be analyzed using the computer program DISTANCE (Buckland et al. 2001). Program DISTANCE develops detection functions for each species that account for variation in observer abilities to detect each species. Based on these detection functions, density values for each species are estimated. This bird survey technique will be used in Objectives 4 and 5 as well. Each point will be visited twice during the survey period (May 20 to June 30) each year, one time by each observer. Data from these censuses will yield diversity and density estimates. Changes in diversity and density will be compared to changes in land-use that have occurred as a result of restoration efforts. The cowbird-to-host ratio will be documented for each forest tract and we will determine whether restoration efforts have reduced this ratio (and therefore reduced the risk of cowbird parasitism).

Objective 3) Document the distances moved by female cowbirds between breeding (i.e. forest) and feeding (i.e. open-land) habitat and compare these distances to movements documented during 1994 prior to reforestation. During May-June in both 2011 and 2012, ten female cowbirds will be captured each year among four study sites (the same sites as in 1994). Each female cowbird will be fitted with a backpack radio transmitter (less than 5% of body weight) that will last for approximately one month before falling off. Once captured and fitted with a transmitter, we will use telemetry equipment to locate each female cowbird at least two times each day: in the morning when they are in the forest searching for and monitoring nests, and in the afternoon when they are feeding in surrounding open-land habitat. With three weeks to one month of data for each female cowbird, we will calculate the average distances travelled between breeding and feeding areas, and compare these distances to distances of females followed in 1994.

Objective 4) Survey restoration plots that vary in age (e.g. 1, 3, 5, 7, 10, 16 years post-agriculture) to document how the bird community changes in the restored areas (and the adjacent forest) as these agricultural fields transition to grassland, shrubland, and eventually to mature forest. Reforested sites that vary in age (e.g. 1, 3, 5, 7, 10, 16 years post-agriculture) will be surveyed to determine how the breeding bird community responds to the succession of land from agriculture to bottomland forest. We will select two sites in each age category, survey the birds at 10 locations per site using a standardized point-count method, and visit each site two times each breeding season.

Objective 5) Collect preliminary data (prior to partial reconnection) from sites that will be affected by the proposed partial reconnection project which will divert a portion of the flow from the upper Cache River into the lower Cache River. We will measure the perimeter and flooded surface area of various swamps that are likely to be affected by the proposed partial reconnection of the upper Cache River to the lower Cache River as a baseline to determine changes in the flooded surface area that are attributable to the eventual restoration process (partial reconnection). We will measure the flooded surface area in each month during April through July in 2011. During the same time period, we will monitor nest boxes (for Prothonotary Warblers) already in place within these swamps. Nest boxes consist of 1.9-liter milk and juice cartons placed approximately 1.7 m above ground on trees over water within forested wetlands. Nesting success in nest boxes

is similar to that in natural cavities (Hoover 2003). We will monitor nest boxes every four days from April through July and measure the water depth beneath each nest box on every visit. Nesting success for these warblers increases with an increase in water depth beneath nests (Hoover 2006). For every nest predation event, we will identify the nest predator (based on the condition of the nest and its contents) and document the depth of the water beneath the nest at the time of predation. For each swamp we will create a hydrologic profile (flooded surface area and depth of water) for the breeding season, and record all nesting activity and the fate of each nest. Rates of nest predation will be estimated for water-depth categories within the range of 0-150 cm. We will survey the breeding bird community in these swamps as part of Objective 2 above.

Objective 6) Determine the effects and success of restoration efforts within the Cache River COA to date, and provide information (recommendations and final report) critical to the continued conservation efforts of the JVP and others in Illinois. Upon completion of the field portion of this project we will analyze data, synthesize results and create management recommendations that will be distributed to the Joint Venture Partners (ILDNR, USFWS, TNC) as well as to the Forest Service, Natural Resources Conservation Service, and other relevant agencies and organizations. We will also prepare various manuscripts to be submitted to journals such as Landscape Ecology, Restoration Ecology and Conservation Biology.

LOCATION: This project will take place in the Cache River watershed in southern Illinois, specifically in Alexander, Johnson, Massac, Pulaski, and Union counties within the Cache River COA (see attached map).

PROJECT SCHEDULE:

2011

April Census points and nest-searching transects flagged, nest boxes made ready.

April-August All aspects of the first summer of field work completed.

August-December All data entered into computer database, preliminary analyses and data summaries completed.

2012

January-March Annual report prepared and submitted. Landcover databases worked on, verified and updated for landcover present during 1993-1995, and also during 2010-2012. Nest locations from 1993-1995 plotted on sites using GIS programs, and nesting data from 1993-1995 entered into modern computer program for analyses..

April Census points and nest-searching transects flagged, nest boxes made ready.

April-August All aspects of the second summer of field work completed.

August-December All data entered into computer database, preliminary analyses and data summaries completed. Begin work on final report and manuscripts.

2013

January-March Data analyses completed. Management recommendations and final report prepared and submitted.

CONTACT INFORMATION:

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ESTIMATED COSTS:

PROJECT BUDGET Expense Line Item	Year 1			Year 2			Project Total		
	Request	Match	Total	Request	Match	Total	Request	Match	Total
Salaries and Wages									
Professional		\$3,446	\$3,446		\$3,446	\$3,446	\$0	\$6,892	\$6,892
Grad Res Asst ac yr			\$0			\$0	\$0	\$0	\$0
GRA - summer (no classes)			\$0			\$0	\$0	\$0	\$0
Student Hourly - part time			\$0			\$0	\$0	\$0	\$0
Student Hourly - full time student			\$0			\$0	\$0	\$0	\$0
Non-student hourly or Off-campus	\$10,000		\$10,000	\$10,000		\$10,000	\$20,000	\$0	\$20,000
Total Salaries and Wages	\$10,000	\$3,446	\$13,446	\$10,000	\$3,446	\$13,446	\$20,000	\$6,892	\$26,892
Fringe Benefits									
Professional @ 35.59%	\$0	\$1,226	\$1,226	\$0	\$1,226	\$1,226	\$0	\$2,453	\$2,453
Grad Res Asst ac yr @ 6.36%	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
GRA - summer (no classes) 14.01%	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Student Hourly - part time 7.79%	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Student Hourly - full time student 0.14%	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Non-student hourly or Off-campus @ 8.88%	\$888	\$0	\$888	\$888	\$0	\$888	\$1,776	\$0	\$1,776
Total Fringe Benefits	\$888	\$1,226	\$2,114	\$888	\$1,226	\$2,114	\$1,776	\$2,453	\$4,229
Total Salaries, Wages, and Fringe Benefits	\$10,888	\$4,672	\$15,560	\$10,888	\$4,672	\$15,560	\$21,776	\$9,345	\$31,121
Travel									
Out of state			\$0			\$0	\$0	\$0	\$0
In state	\$1,000		\$1,000	\$1,000		\$1,000	\$2,000	\$0	\$2,000
Foreign			\$0			\$0	\$0	\$0	\$0
Total Travel	\$1,000	\$0	\$1,000	\$1,000	\$0	\$1,000	\$2,000	\$0	\$2,000
Materials & Supplies - General	\$2,879		\$2,879	\$2,879		\$2,879	\$5,757	\$0	\$5,757
Publication Fees (reprints/page charges)			\$0			\$0	\$0	\$0	\$0
Total Materials & Supplies	\$2,879	\$0	\$2,879	\$2,879	\$0	\$2,879	\$5,757	\$0	\$5,757
Contractual Services - General	\$1,900		\$1,900	\$1,900		\$1,900	\$3,800	\$0	\$3,800
Subcontract(s)			\$0			\$0	\$0	\$0	\$0
Lease/rental (with written contract)			\$0			\$0	\$0	\$0	\$0
Tuition Remission (56% GRA)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Contractual Services	\$1,900	\$0	\$1,900	\$1,900	\$0	\$1,900	\$3,800	\$0	\$3,800
Telecommunication Services			\$0			\$0	\$0	\$0	\$0
Equipment (each item \$5000 and more)			\$0			\$0	\$0	\$0	\$0
Total Direct Costs	\$16,667	\$4,672	\$21,339	\$16,667	\$4,672	\$21,339	\$33,333	\$9,345	\$42,678
Modified Total Direct Costs (MTDC)*	\$16,667	\$4,672	\$21,339	\$16,667	\$4,672	\$21,339	\$33,333	\$9,345	\$42,678
F&A (20% Direct Costs)	\$3,333		\$3,333	\$3,333		\$3,333	\$6,667		\$6,667
F&A (44.2% Total Direct Costs)		\$2,065	\$2,065		\$2,065	\$2,065		\$4,130	\$4,130
Unrecovered F&A (20% vs. 44.2%)		\$4,033	\$4,033		\$4,033	\$4,033		\$8,067	\$8,067
Total Proposed Project Budget	\$20,000	\$10,771	\$30,771	\$20,000	\$10,771	\$30,771	\$40,000	\$21,542	\$61,541
Percentage of Project Costs	65.0%	35.0%		65.0%	35.0%		65.0%	35.0%	
(No Exemptions - Reduced F&A Rate)									

BUDGET JUSTIFICATION: The field portion of this proposed project will occur during April through mid-August in both 2011 and 2012. Funds requested from the Illinois SWG grant program would cover a portion of the cost to conduct the second and third years of research for this 3-year project that involves locating and monitoring nests of birds found on several sites, and surveying the birds at over 300 census points throughout the Cache River watershed during the breeding season. Funds are also being requested from the Cache River Joint Venture Partners (each year USFWS: \$15,000; and Illinois TNC: \$15,000) to compliment the research outlined in this proposal. These other funds, if obtained, would provide support for additional field assistants, field vehicle use, and field station use that would bolster the amount of data we will be able to collect. These other funds would **not** be used as matching for this grant. Funds requested here will pay the hourly salaries of the field help necessary to search for and monitor nests, monitor warbler nest boxes, assist with bird surveys, capture and track female cowbirds, and enter data. The requested funds will also pay for a portion of the mileage necessary to travel to and among the many study sites in the Cache River watershed. The funding request will also pay for a portion of field station expenses during the project period including utilities. Funding for supplies includes money for rubber boots, flagging, poles and mirrors needed to monitor nests, 20 radio transmitters for cowbirds, insect repellent, and other various items necessary to complete the field work. INHS will contribute 5.34% of PI J. Hoover's time each year (plus fringe benefits) as cost share. Facilities and Administration (F&A): 20% is assessed to the sponsor's direct costs request. 44.2% is assessed to UI's direct costs. Un-recovered is claimed as INHS cost share for the difference between the negotiated 20% vs. the campus 44.2% rates.

Additional Information:

Permits: I currently hold, and renew annually, the appropriate permits to conduct bird research on the following Illinois Nature Preserves: Heron Pond/Little Black Slough, Section Eight Woods, Deer Pond, Cypress Pond and Horseshoe Lake. I also have permission to work on the Cache River State Natural Area and TNC's Grassy Slough Preserve. I have permission to conduct bird research on the Cypress Creek National Wildlife Refuge and possess Federal Fish and Wildlife Permit (MB 815400-1, SCCL-815400), which allows me to study migratory birds. Finally, I am a sub-permittee on federal Master Banding Permit number 06507 and have all of the necessary University of Illinois IACUC protocols in place for studying vertebrate animals.

Personnel: Dr. Jeff Hoover (the "professional" in the project budget) with the Illinois Natural History Survey at the University of Illinois will serve as the point person for the project, will be responsible for its successful completion, and will lead efforts to collect, enter and analyze data. Jeff was the project manager for the research conducted during 1993-1995. Qualified field assistants (the "non-student hourlies" in the project budget) will be hired each year to assist with data collection, entry, and analyses. Jody Shimp will be the Illinois Department of Natural Resources' leader for this project.

LITERATURE CITED:

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SITE MAP



(31) Cache River
 Joint Venture Partnership Project
 Conservation Opportunity Area

- Proposed COA Boundary
- COA - Action Plan Point Location
- IDNR Property
- Federal Property
- Water
- Forest
- Grassland
- Development

