STATE WILDLIFE GRANT (SWG)

State of Illinois

Grant Narrative

PROJECT TITLE: Survey of the distribution, size, and development of canebrakes in southern Illinois

PROJECT NUMBER: T-48 D-1

PURPOSE:

Canebrakes (giant cane; *Arundinaria gigantean*) are a critical and unique component of bottomland forest ecosystems (Platt and Brantley 1997), hosting numerous organisms that are species of conservation concern in Illinois (including Swainson's Warblers, *Limnothlypis swainsonii*; swamp rabbits, *Sylvilagus aquaticus*; and golden mice, *Ochrotomys nuttalli*; Eddleman et al. 1980, Thomas et al. 1996, Zollner et al. 2000, Morzillo et al. 2003) while simultaneously reducing sediment runoff (Lee et al. 2003). However, we know remarkably little about the current status and distribution of canebrakes in Illinois. The proposed research will document the size, stem density, and spatial distribution of canebrake habitat in southern Illinois, and survey existing stands of cane for Swainson's Warblers (a canebrake specialist listed among the Species in the Greatest Need of Conservation (SGNC). Specifically this research will provide critical information on the current status of canebrake habitat to the many conservation agencies and organizations in Illinois that have as a stated management priority the maintenance and restoration of this valuable and unique habitat.

NEED:

Biological diversity in bottomland/riparian forest ecosystems is driven by the complexity and diversity of habitats that occur there. Canebrakes are a critical and unique component of these ecosystems (Platt and Brantley 1997), hosting numerous organisms that are species of conservation concern in Illinois (including Swainson's Warblers, swamp rabbits, and golden mice) (Eddleman et al. 1980, Thomas et al. 1996, Zollner et al. 2000, Morzillo et al. 2003) while simultaneously reducing sediment runoff (Schoonover et al. 2005, 2006). Many historical accounts indicate that canebrakes were once a dominant landscape feature within riparian ecosystems in the southeastern U.S. at the time of European settlement (see Platt and Brantley 1997 for review). The canebrake ecosystem is nearly non-existent today (see Brantley and Platt 2001 for review of ecosystem decline) and canebrakes are now classified as a critically endangered ecosystem (Noss et al. 1995) with <2% historical extent remaining. Historically, canebrakes have supported a diverse fauna (Platt et al. 2001). Attempts to reestablish canebrakes using a variety of vegetative planting methods had proved unsuccessful through the 1990s (Feeback and Luken 1992, Pratt and Brantley 1993). Recent advances have resulted in successful

techniques for reestablishing canebrakes (J. Zaczek, personal communication), setting the stage for restoration of this critical component of bottomland/riparian ecosystems.

Despite the importance of canebrakes (Gagnon et al. 2007), there is no current or comprehensive information on their status and distribution in Illinois, and regional information on canebrakes is only sketchy (W. C. Hunter, personal communication). Canebrakes typically establish in tree-fall gaps or in more open habitats along river edges in bottomland/riparian systems. Canebrakes are ephemeral and typically develop, grow, and regress during a period of 10-25 years. Organisms that depend on canebrakes require other patches of cane nearby (at various stages of growth) for their populations to persist. In other words, as one canebrake regresses (dies out), other canebrakes need to be available for organisms to disperse to. Therefore, a basic knowledge of the spatial distribution, size and age (development) of different canebrakes is critical to the effective and efficient management of this naturally-ephemeral and patchily-distributed habitat. This research addresses objectives 1-5 of the Eight Required Elements in the Illinois Comprehensive Wildlife Plan (CWCP; http://www.dnr.state.il.us/ORC/WildlifeResources/theplan/elements.htm) by 1) documenting the distribution of a rare and important habitat (and its associated organisms), 2) being the precursor to studying how the size and spatial distribution of canebrakes affect populations of several species of conservation concern in Illinois that are associated with this habitat, and 3) informing several conservation practitioners of where to prioritize the establishment or enhancement of canebrake habitat.

In addition to documenting the current location and condition of canebrake habitats in southern Illinois, we will focus much of our research effort on Swainson's Warblers. Swainson's Warblers are a Neotropical migratory songbird that breeds in forests (typically bottomland and riparian) throughout the southeastern U.S. and over-winters in the Bahamas, Cuba and the Yucatan Peninsula (Brown and Dickson 1994). Populations of Swainson's Warblers have been declining during the past 3 decades (Somershoe et al. 2003) and some of the northernmost breeding populations in Maryland, Delaware, Missouri, and Illinois have disappeared during this same period (Graves 2001). Population declines have been attributed, in part, to loss of bottomland forest and conversion of bottomland forests to other land uses (Graves 2001). Swainson's warblers are often associated with canebrakes in bottomland forests and are found nearly exclusively in canebrakes in the northern portion of their breeding range (southern Illinois/Missouri) (Brown and Dickson 1994). Population declines in concert with loss of canebrake habitat within bottomland forests have contributed to making this species a top conservation priority (Hunter et al. 1993, Thomas et al. 1993). Presently, Swainson's Warblers are a species of conservation priority in the Partners in Flight (PIF) Bird Conservation Regions (BCRs) that include or are adjacent to southern Illinois (Mississippi Alluvial Valley BCR, Central Hardwoods BCR, and Southeastern Coastal Plain BCR). This bird is therefore a species for which there is both regional and continental conservation concern (http://www.rmbo.org/pif/jsp/BCRmap.asp).

In Illinois, Swainson's Warblers are classified as state-endangered and on the list of Illinois Conservation Priority Birds as part of the Illinois Wildlife Action Plan (IWAP) (http://dnr.state.il.us/ORC/WildlifeResources/theplan/birds.asp). The research proposed here will document the status and distribution of critical Swainson's Warbler breeding habitat (canebrakes) in Illinois, determine whether any Swainson's Warblers are currently breeding in

Illinois, and determine whether the breeding densities of other bird species are affected by various attributes (size, height, density) of canebrakes.

Information on the current distribution and attributes of canebrakes in southern Illinois is being sought by biologists and site superintendents within the Illinois Department of Natural Resources (IDNR), refuge managers at the Cypress Creek and Crab Orchard National Wildlife Refuges (NWRs), biologists with the Shawnee National Forest (U.S. Forest Service), as well as members of the National Resources Conservation Service (NRCS). These agencies and organizations all recognize that knowledge of the current locations and conditions of canebrakes is a required precursor to the effective implementation of any management plans to reestablish or promote canebrakes, and necessary for prioritizing where the restoration of canebrakes will provide the greatest benefits to wildlife, water quality, and ecosystem health.

OBJECTIVES:

The primary objectives of this proposed research are to:

1) Gather information on known or suspected canebrake habitat in Illinois from a network of staff from state/federal/private conservation agencies and organizations, birdwatchers, etc. (Timeframe is from time of enactment of grant through October of 2008, 13% of budget).
2) Document the locations, distribution and attributes of canebrakes in southern Illinois (from enactment of grant through March of 2009, 40% of budget)
3) Survey bird density and diversity within canebrakes using point-count methods during breeding season (May-June in 2008 and 2009, 20% of budget).
4) Survey stands of cane for Swainson's Warblers using song playback (May- June in 2008 and 2009, 20% of budget)
5) Create a map depicting the spatial distribution, size, and condition of canebrakes that can then be distributed to agencies, organizations and individuals interested in a) conserving or managing for canebrake habitat and/or b) studying flora and fauna associated with canebrakes. This map will be one of the deliverables associated with this grant. (from October 2009 through January 2010, 7% of budget)

EXPECTED RESULTS AND BENEFITS:

This research will lead to a better understanding of the current state (spatial distribution, size, estimated age) of canebrakes in southern Illinois. Once these canebrakes are mapped out, scientists can directly study the effects of spatial distribution, size and age of canebrakes on populations of the diverse, yet often rare, organisms that reside in canebrakes. Knowledge of canebrake distribution will also assist conservation agencies and organizations with prioritizing where and when to establish canebrakes. Completion of this research will 1) foster multi-agency cooperation to create a large-scale network of canebrake habitat once the current distribution is known, 2) facilitate studies by scientists who want to study the diverse organisms that use canebrake habitat and document the importance of canebrakes to bottomland/riparian ecosystems, and 3) promote collaborations between agency staff who implement canebrake

management/restoration plans and scientists who can monitor the responses of wildlife populations to these conservation actions that create/enhance canebrakes. In addition, this research will be a valuable component of the habitat/wildlife management plans of numerous conservation organizations in Illinois (e.g. IDNR, USFWS, USDAFS, TNC) and can assist in the development of ecoregional and regional plans to enhance canebrake habitat.

Information collected in Illinois will be shared with resource managers interested in conserving canebrake habitat in nearby states (e.g. Missouri and Kentucky) and in associated ecoregions (e.g. Lower Mississippi River Alluvial Valley) and Bird Conservation Regions (e.g. Central Hardwoods, Southern Coastal Plain). While there is currently no organized or coordinated effort to inventory canebrake habitat in these other areas, we hope that our efforts in Illinois serve as an example and act as a springboard to the development of inter-state and regional plans to locate, inventory, reestablish and conserve canebrakes in bottomland forest ecosystems.

The data collected in this study will be disseminated in the form of a final report to the granting agency (report will be available to any interested parties) that will also include a map depicting the location and attributes of the canebrakes we monitor. In addition, the results of this study will be submitted to at least one or two peer-reviewed journals for publication, and presented at an appropriate regional or national conference. Information on the current distribution and attributes of canebrakes in southern Illinois will be provided (in the form of a report or presentation) to biologists and site superintendents within the Illinois Department of Natural Resources (IDNR), refuge managers at the Cypress Creek and Crab Orchard National Wildlife Refuges (NWRs), biologists with the Shawnee National Forest (U.S. Forest Service), as well as members of the National Resources Conservation Service (NRCS). These agencies and organizations are all seeking knowledge of the current locations and conditions of canebrakes so that this information can be used in emerging management plans to reestablish or promote canebrakes, and in prioritizing where the restoration of canebrakes will provide the greatest benefits to wildlife, water quality, and ecosystem health.

APPROACH:

This proposal seeks funding to complete a survey that will document the spatial distribution, size and approximate age of canebrake habitat in southern Illinois. Information will be obtained from a network of staff from state/federal/private conservation agencies and organizations, birdwatchers, etc., regarding the known or likely locations of canebrakes in the 17 southernmost counties of Illinois, with the intent of prioritizing search efforts. PI (J. Hoover) and field assistants will hike and kayak as many suitable areas of publicly-held land as possible to look for canebrakes. GPS units will be used to record the 1) location of the center, and 2) size of each canebrake found. Additional information (e.g. height, stem density) will be collected for each canebrake using a standardized protocol (see Detailed Methodology below for specifics on research protocols). The primary focus will be on publicly-held land initially, with the potential to branch out into private land if time and money allow. The location and attributes (size, height, stem density) of canebrakes will be mapped onto existing habitat databases using the GIS and ARCINFO capabilities available at INHS, and maps will be made available to conservation practitioners, resource managers, and scientists interested in studying organisms using canebrake habitat.

During the breeding season (mid-May through June) in each of 2 years (2008, 2009), birds within and outside of canebrakes will be censused to document the density and diversity of birds using canebrakes, and to assess the effects of canebrake attributes (e.g. size, height, density) on the density and diversity of birds. Also during this same window of time, song playbacks will be used to survey 50 of the most promising canebrakes (identified during the winters preceding each time period) for Swainson's Warblers. The budget reflects the costs of surveying vast areas of land for canebrakes and includes the necessary field assistants, field vehicle use, field station use, and research supplies. The field assistants, along with PI Hoover, will implement the research during a two-year period (beginning in February 2008). At the end of each field season data will be entered and analyzed. Reports, publications and a map will all be submitted at the end of the grant period (31 January 2010).

Detailed Methodology

Study Area and Searches for Canebrakes: This research will be conducted within the 17 southernmost counties within Illinois, USA (Fig. 1). This area includes the Shawnee National Forest, Cache River Wetlands Joint Venture (USFWS, IDNR, TNC, DU), as well as other state- and federally-owned land (e.g. Union County Conservation Area, Oakwood Bottoms, Crab Orchard National Wildlife Refuge, etc.). We will interview (in person, or via email or phone) field staff of these various organizations and agencies (listed above) to obtain information on where canebrakes may presently occur on public lands. We will mark these areas on topographic maps and use this information to prioritize our search efforts initially. Canebrakes are typically located along watercourses in bottomland/riparian ecosystems, and we will therefore concentrate our search efforts in this habitat type. We will travel along as many navigable streams/rivers as possible within the study area by kayak, and hike through those areas that are not conducive to travel by water. In some of the wider forested floodplains (>500m) we will also hike the floodplain forest on either side of the watercourse in search of canebrakes occurring within the forest away from the stream channel or along the outer edge of the floodplain forest. We will keep a running record of all of the areas that have been searched, along with those areas that have yet to be searched.

Measuring Canebrake Attributes: We will geo-locate (using GPS) the center of each stand of cane we find during our searches which will occur from enactment of this grant through March of 2009. We will also place a point on a topographic map for each canebrake to serve as an additional point of reference. For each canebrake greater than 10-m in length and/or width, we will measure the following attributes: approximate length and width of the canebrake; stem density (stems/m^2) and height of cane at 5 locations along each of 2 perpendicular transects running through the canebrake; percent forest cover; predominant over-story trees and canopy height; and proximity to habitat edge (e.g., river, swamp, agriculture). The location and attributes (size, height, stem density) of canebrakes will be mapped onto existing habitat databases using the GIS and ARCINFO capabilities available at INHS, and maps will be made available to conservation practitioners, resource managers, and scientists interested in promoting/enhancing canebrake habitat and studying organisms that use canebrakes.

Bird Surveys: Birds within and outside of canebrakes will be censused during the breeding season (May-June 2008 and 2009) using a standardized point-count method (Ralph et

al. 1995). We will conduct a point-count in the approximate center of each canebrake, and at a location near to but outside of each canebrake (150m from the edge of the canebrake). This will allow us to compare the diversity and density of birds among canebrakes of various sizes and between canebrake and non-canebrake habitats within the forest. For these surveys we will use a modified version of the point-count method where observers stop for 6 minutes at points that are at least 150 m apart. Each day, point counts will begin half an hour after sunrise and continue until points to be censused that day are completed (always before 1030 h). At each stop, we record the species, vocalization (song, call, chip, etc.), compass direction, and distance of each bird heard or observed. For cowbirds, we separately record "rattle" calls, which are usually given by females (S. K. Robinson pers. comm.). We will visit each census point one time during the breeding season. Point counts will not be conducted on days when it is raining or when wind speeds exceed 10 mph. Data from these censuses will result in a list of the species present in canebrake and non-canebrake habitat (diversity) as well as a density estimate for each species.

Playback Surveys for Swainson's Warblers: Swainson's Warblers are a Neotropical migratory songbird that breeds in forests (typically bottomland and riparian) throughout the southeastern U.S. and over-winters in the Bahamas, Cuba and the Yucatan Peninsula (Brown and Dickson 1994). Swainson's Warbler males sing within their breeding territories and defend their territories by aggressively chasing away intruding males of the same species (conspecifics). Therefore, these birds show a strong response to audio playbacks of a conspecific male's song. We will conduct playback surveys for Swainson's Warblers at the 50 most-promising (largest and densest) canebrakes we find, looking for any evidence of the presence of a territorial male and/or a breeding pair. We will use a CD containing a 30-sec Swainson's Warbler song segment recorded from the Peterson bird song collection. We will broadcast the song through the CD player and an attached compact speaker system. The song will be looped on the CD and will be played for two bouts of 5-min each, with a 5-min interval of silence between each bout (total 15-min trial period). We will do the audio playback at each of the 50 canebrakes in both years during the early portion of the breeding season (May-June). For each playback, the song will be broadcast sometime between the hours of 0630 and 1030. The song will be broadcast from near the edge of the canebrake inward. Observers will record any response to the playback (e.g., counter-song from male Swainson's Warbler, approach by warbler) during each trial. If a Swainson's Warbler is thought to have been heard or possibly seen, observer will attempt to verify presence of male and/or female. We will record the location and attributes of each canebrake surveyed for Swainson's Warblers, and document the presence or apparent absence of warblers in each canebrake.

Objectives	**Feb-April 2008**	**May-July 2008**	**Aug-Oct 2008**	**Nov-Jan 2008/09**	**Feb-April 2009**	**May-July 2009**	**Aug-Oct 2009**	**Nov-Jan 2009/10**
Obj. 1: Search for and locate canebrakes	**X**	**X**	**X**	**X**	**X**			
Obj. 2: Measure attributes of canebrakes	**X**	**X**	**X**	**X**	**X**	**X**		

Obj. 3: Survey bird density and diversity using point-count methods during breeding season		**X**				**X**		
Obj. 4: Conduct playback surveys for Swainson's Warblers		**X**				**X**		
Obj. 5: Produce map of canebrake distribution in southern Illinois							**X**	**X**
Obj. 6: Produce final report and manuscripts								**X**

LOCATION:

The 17 counties that make up southernmost Illinois: Alexander, Franklin, Gallatin, Hamilton, Jackson, Jefferson, Johnson, Massac, Monroe, Perry, Pope, Randolph, Saline, Union, Washington, White, Williamson. See Figure 1 for general location of study.

PERSONNEL:

One contract employee, the PI, will work on this project at a rate of 10.94% time. Additionally, 2 hourly field assistants will be hired for the various field-work. Field assistants will be experienced in map reading, orienteering, use of GPS units, identifying birds by sight and sound and conducting point-counts, and conducting simple vegetation surveys.

Research will be directed by Dr. Jeff Hoover, Avian Ecologist with the Illinois Natural History Survey based in Champaign, and conducted by J. Hoover and the hourly field assistants. PI and field crew will be housed at a field station provided by USFWS that is located within the Cache River watershed. Dr. Hoover's past work includes applied research with a general theme of understanding how human-induced changes to the landscape threaten populations of organisms and the integrity of ecosystems, and how conservation actions may reduce or reverse these threats and restore ecosystem function. Results from his research have been used in the development of ecosystem restoration plans and he has worked closely with land managers to conduct "before and after" experiments that measure the success of conservation and restoration efforts. For the past 17 years, he has studied the ecology of birds (particularly neotropical migratory songbirds) in forest and grassland ecoystems of the midwestern and eastern U.S. He has conducted rigorous experimental and correlational field studies to address ecological questions and conservation issues. A primary focus of his research is determining how landscape composition affects selective ecological forces such as nest predation and brood parasitism in breeding birds. He examines how these forces directly influence community structure, population dynamics, and breeding decisions in birds and applies the results of his research to ongoing ecosystem restoration projects.

For the past 15 years Dr. Hoover has conducted research on the bird communities in parts of southern Illinois including the bottomland forests of the Cache River watershed (Cache River Joint Venture partners include USFWS, Illinois DNR, The Nature Conservancy, and Ducks Unlimited), upland forests within The Shawnee National Forest, and grassland habitat at Pyramid State Park. Dr. Hoover's research experience includes the gathering of data on breeding bird communities to measure long-term changes as habitat restoration proceeds, to provide information that assists in determining management land acquisition priorities, and to measure the success of specific restoration and management techniques. Over the years he has developed a great working relationship with the private, state, and federal organizations that manage the land, and he interacts extensively with staff members from each organization.

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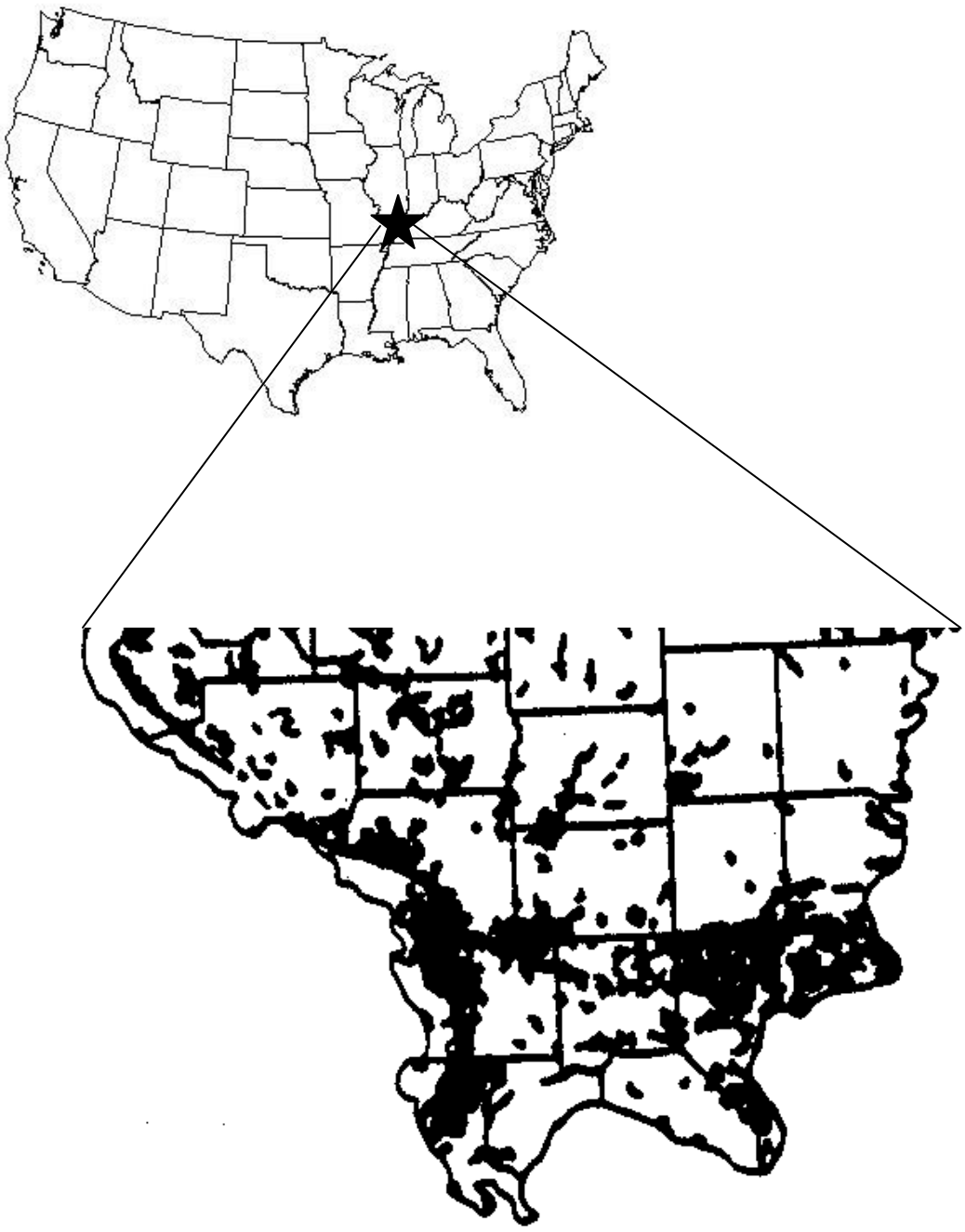

Figure 1. Approximate area in southern Illinois to be surveyed for Canebrakes. Dark lines represent county boundaries, shaded-in areas represent forest habitat.