Final Report for W-162-R-1

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Overview and Objectives of Segment 1

The Forest Campaign is one of the seven important campaigns outlined in the Illinois Comprehensive Wildlife Conservation Plan and Strategy (wildlife action plan). 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 alteration or loss of natural disturbance processes, changing composition of forested habitats away from oak-hickory dominance to maple dominance, general decline in forest quality caused by increasing numbers of invasive exotic plant species, and extensive forest fragmentation. While the wildlife action plan

provides direction in the form of a general list of priority actions, the Forest Campaign, over the next several years will specifically move the wildlife action plan forward by addressing the following needs:

1) Forging new and reinvigorating existing conservation partnerships consisting of those groups committed to improving Illinois' forests and forest wildlife;

2) Identifying and collaborating with organizations that are implementing specific forest wildlife conservation activities, particularly those emphasizing the already-identified Conservation Opportunity Areas (COAs) around the state;

3) Developing strategies to facilitate additional priority forest management actions outlined in the wildlife action plan;

4) Establishing goals and specific targets for what the response of the wildlife and habitat to these actions should be;

5) Using the best science available to establish monitoring protocols to measure the effectiveness of management activities and determine whether or not wildlife and habitat goals are being achieved;

6) Establishing demonstration sites where land managers and the public can observe and learn more about forest management in action and how it benefits wildlife.

In addressing these needs, the Forest Campaign will establish or reinforce forest management partnerships in Illinois, create protocols for monitoring the effects of forest management activities on Illinois' wildlife, and document whether or not forest

management activities are successfully promoting populations of focal wildlife species and meeting the goals of the wildlife action plan.

To better understand the response of wildlife populations to forest management activities under the wildlife action plan, Segment 1 of the Forest Campaign was devised to meet the following objectives during the first year of the campaign (1 September 2010 – 30 August 2011):

1) Identify forest management partners and determine their forest management goals, the amounts of forests managed, and the management tools they use;

2) Establish priority species or groups of species in which to monitor responses to forest management activities, and determine how to set appropriate population goals based on the species chosen;

3) Develop monitoring protocols and identify priority locations for implementing wildlife monitoring and opportunities for volunteer-based monitoring programs;

4) Identify opportunities for forest management demonstration sites.

Following Segment 1, additional grant segments will focus on implementing monitoring protocols that measure the response of the forest wildlife to management activities, and on developing various demonstration sites that highlight successful forest management techniques and actions.

Forest Management by Member Organizations and Groups Associated With the Illinois State Wildlife Action Plan

We completed contacting the many organizations and groups involved in the development of the Illinois Wildlife Action Plan and have compiled information on each group's involvement with forest management (e.g. public vs. private land, acreage, locations, types of forest, types of management practices, goals of management, etc.). This information is provided as an appendix at the end of this report with personal information (names, phone numbers, email addresses, etc.) removed from the spreadsheet. This information will be updated as needed and this list will serve as a point of contact for potentially expanding monitoring to additional sites (as time and money allow), for disseminating the results of our research and monitoring program, and for exploring opportunities to establish volunteer monitoring efforts in association with forest management being done by these various organizations.

Survey of Illinois State Biologists and Foresters

We conducted an email survey of state foresters, regional and district wildlife biologists, and district heritage biologists to assess various aspects of forest management (if any) they may be involved with and determine what focal forest-associated wildlife species are of interest and important to them and their constituencies. The response rate to the survey was 50% (33 of 65 surveys emailed). Those that replied stated that they work in upland forest (91% of respondents), bottomland forest (73%), open woodland (48%), and savanna (18%) habitat. Respondents all (100%) work with forest tracts that are <100 acres in size, while only

42% and 24% work with tracts of forest that are 100-500 acres or >500 acres in size, respectively.

Thirty-three percent of respondents work primarily on publicly-owned forests, 42% work primarily on privately-owned forests, and 24% work relatively equally with both. It was obvious from the survey that there are a lot of privately-owned forests in the state of Illinois. While the initial monitoring of the effects of forest management on wildlife will occur on public land, the potential to monitor on privately-owned land will be explored further. In general, most (88%) of those surveyed are using various management tools (e.g. mechanical removal, chemical application, and fire) in an attempt to control invasive exotic plant species. Most respondents are also using various forms of Timber Stand Improvement (TSI) (79% of respondents) and/or fire (64% of respondents) as tools to manage for particular forest structure or species composition and to promote forest health. Respondents listed several different organisms that they thought forest management should emphasize, partly influenced by whether the management is being done on private or public land. According to the respondents, private land owners that they work with are generally interested in managing their forests for deer, turkey, game species in general, and forest songbirds. When asked what wildlife should be emphasized when managing forests, the following things were mentioned by respondents: all wildlife (45% of respondents); turkeys (30%); deer (27%); songbirds (21%); game species (21%); threatened and endangered species (18%); species in greatest need of conservation (15%); native vegetation (12%); furbearers (6%); and herps (6%). Many of the respondents mentioned that it is

becoming more challenging (or impossible) to come up with the resources felt necessary to do as much forest management as they would like to do.

Choice of Locations for Monitoring Activities

Monitoring will begin with segment 2 of the Forests and Woodlands Campaign (we have modified the name of the campaign to make it more inclusive) at five sites in Illinois. Sites were selected based on the potential for there to be, at each site, multiple units or plots that are going to be or are being managed (treatments) as well as areas that are not being managed (controls). A goal is to have, at each location, a number of replicates each of treatment and control areas. Sites selected include Oakwood Bottoms (Shawnee National Forest), the Cache River watershed (including the Cache River State Natural Area and Cypress Creek National Wildlife Refuge, Trail of Tears State Forest, Siloam Springs State Park, and Lake Shelbyville Fish and Wildlife Management Area. These areas all have the capacity for the establishment of programs monitoring wildlife responses to forest management (i.e. a before-after-treatment-control monitoring protocol).

Oakwood Bottoms has an ongoing forest management plan involving fire and Timber Stand Improvement (TSI) to promote oak regeneration and a return to an oak-dominated forest composition. Oakwood Bottoms in particular has multiple units or plots that are going to be or are being managed (treatments) and also has areas that are not being managed (controls), allowing for a true assessment of how the management is affecting both the forest and wildlife. The Cache River Joint Venture site possesses areas where there has been much, little, or no re-forestation, again allowing for

comparisons that allow for an assessment of how this approach to managing bottomland forests, with an emphasis on “unfragmenting” the forests, affects wildlife. Both of these locations are excellent candidates for demonstration areas. In addition, all 5 sites are situated in landscapes dominated by non-forest land-use. However, the relative amounts of forest in the surrounding landscape can vary considerably from site to site. This provides us with the potential to not only look at local effects (e.g. considering land-use within a 1-km radius) of habitat fragmentation on populations of our target species, but also the effects of habitat fragmentation at larger spatial scales (e.g. 5-km radius, 10-km radius). In order to maximize the effectiveness of our monitoring protocols, we will need to work closely and communicate regularly with site managers and staff, biologists, and foresters associated with these locations.

Oakwood Bottoms

Oakwood Bottoms Greentree Reservoir, located in Jackson County northeast of Grand Tower, Illinois, is part of the Shawnee National Forest. The site, which lies in the Mississippi River and Big Muddy River floodplains (Fig. 1), was drained by a series of channels and intensively farmed until acquisition by the federal government as part of the national forest. The land came under federal ownership in the 1930s and has been managed since 1964. Pin oaks and scattered cherrybark oaks are flooded during the fall and drained before the onset of the growing season to simulate flooding conditions that would naturally be expected in the Mississippi River bottomlands. Because the Big Muddy River levee prevents natural flooding of this site, flooding is accomplished by

pumping water. As a result of tight soils and little drainage relief, the area is primarily a wet forest.

The original Forest Service plan for the site was to clearcut sections of the oaks on a 40 year rotation, to reduce competition from more shade-tolerant tree species and allow the fast growing oaks to prevail. Fire was also to be used as an additional tool to manage the forest to promote oaks. After acquisition and development of the area, the use of fire and other forestry practices that favored the oak forest were largely eliminated, leading to a decline in the condition of the oaks in the overstory, with shade-tolerant trees in the understory preventing oak regeneration beyond the seedling stage. Without management, the Forest Service has estimated that these shade tolerant species would replace the oak and hickory component of the area in 25 to 30 years, and with that loss will follow the loss or decline of a many wildlife species that depend on the acorns and mast crops produced by those trees.

Beginning in 2007 TSI was employed to thin and open the forest canopy on almost 1400 acres of the forest, nearly 17,000 container stock oaks were planted, and prescribed fires were initiated when and where conditions allowed. The TSI is being done within smaller subplots (ranging in size from 1 to 7 acres) within various units of the site and includes the thinning of non-oaks in the understory and overstory within sub-plots. Smaller trees and saplings are cut down while larger non-oak trees are girdled. Fire is also being used in some areas, as conditions and feasibility allow. In combination, this approach provides greater light and less competition for the oak seedlings and saplings present in the understory while leaving the larger non-oaks to serve as snags and cavity trees for use by various wildlife.

The National Wild Turkey Federation and the Illinois Department of Natural Resources are cooperating with the Forest Service on this project with the goals of improving the integrity and regeneration of the oak forest and increasing the complexity of both the vertical and horizontal vegetation structure of the forest. The management plan along with the sub-plot and unit structure of Oakwood Bottoms are ideal for monitoring the wildlife (and forest) responses to the ongoing management activities. The management activities at Oakwood Bottoms allow us to make comparisons among pre- and post- TSI plots (both with and without fire), and plots within units where there is no TSI or fire to truly document the effects of this management approach on populations of turkeys of songbirds .

Trail of Tears State Forest

The Trail of Tears State Forest in southern Illinois consists of over 5,000 acres of forest (Figs. 2, 3). Trail of Tears State Forest is a multiple-use site managed for timber, wildlife, ecosystem preservation, watershed protection and recreation. Trail of Tears State Forest lies within the southern section of the Ozark Hills, one of the most rugged landscapes in Illinois. Ridge tops are narrow, rocky, and dry, and soils are shallow and susceptible to erosion. Clear streams with gravel bottoms flow in the narrow forested valleys, hemmed in by the steep terrain.

The variety in plant communities is influenced by the terrain. Dry ridgetops and south-facing slopes have black oaks, white oaks and hickories. Extremely dry sites contain prairie-like openings (barrens and hill prairies) mingled with gnarled open-grown trees and shrubs. The shaded north-facing slopes and protected coves support stands

of American beech, tuliptree and sugar maple, or red oak, tuliptree and sweetgum. A rich understory of shrubs (including pawpaw, buckeyes, bladdernut and hornbeam), exists in moister sites. In stream valleys, a canopy of American elm, sweetgum, tuliptree, sycamore and sugar maple over a shrub layer of redbud, deciduous holly and spicebush, and thickets of wild cane (bamboo) occur.

The Trail of Tears State Forest is divided into 27 management compartments where researchers and site managers have studied the relationships between different timber harvest techniques and the production of forest materials, and how the different timber harvest techniques affect ecosystem function. These various timber harvest techniques included small clearcuts, as well as group- and single-tree-selection. The amount, frequency and predictability of timber harvests or TSI at the site have more recently been diminished. There is a push to write a new forest management plan for the site in the next year and it is hoped that the plan will include a blend of timber harvest, TSI, and prescribed fire that will be implemented in the coming years. We hope to be involved in developing the forest plan as it will greatly improve our ability to overlay the best monitoring scheme possible if we know when, where, and how forest management is going to be done on the site.

The Trail of Tears State Forest is relatively large and non-fragmented enough to boast a fair amount of forest-interior habitat (at least by Illinois' standards). In addition to these interior areas where there is relatively little human activity, there are various roads, trails (hiking, horse and fire), and picnic areas throughout the site. This juxtaposition of more and less human use within the forest provides an opportunity for us to study whether the roads, trails or picnic areas have any discernible effects on

populations of our target species. At this location we will begin by collecting baseline data on turkeys and songbirds from much of the site so that we are poised to document the effects of any upcoming forest management on populations of these species.

Siloam Springs State Park

Siloam Springs State Park and the associated Buckhorn Unit stand out as one of the most heavily forested areas within the relatively non-forested west-central part of Illinois (Figs. 4, 5). Siloam Springs was dedicated as a state park in 1956, followed by efforts to develop recreational facilities at the site. The site boasts over 3,000 acres of land, with much of it consisting of ridge/gully and rolling topography that is primarily wooded. The site has a history of practices including bulldozing and brush clearing, excessive deer browsing, and livestock grazing that have led to the degradation of the forest structure and floral diversity. Challenges in implementing timber management, minimal use of prescribed fire, and the influx of invasive-exotic plant species have all contributed to a reduction in the amount of oak-hickory and open woodland habitat present on the site.

There is a lot of potential at Siloam Springs State Park to manage the site more extensively for upland oak-hickory forest, open woodland and savanna habitat, as well as prairie remnants. There are some areas in the park, particularly in the southern portion to the south of the lake, where TSI and fire are being used to promote open oak woodlands. The site also includes adjacent forested areas where management has not occurred. Our goal at this site will be to get information on turkeys and songbirds from the limited areas that are currently being managed, and to also collect data from

throughout the remainder of the site to serve as baseline data for comparison to what happens at the site as more areas of the park are actively managed. This site has great potential to showcase a substantial amount of a forest-woodland-savanna-prairie habitat mosaic. It will be both important and exciting to document any changes in populations of turkeys and various songbirds in response to ongoing management at the site.

Lake Shelbyville Fish and Wildlife Management Area

At the Lake Shelbyville Fish and Wildlife Management Area (including the West Okaw and Kaskaskia Fish and Wildlife Units) located in east-central Illinois (Figs. 6, 7), oak, hickory and hard maple flourish in the uplands, while cottonwood, sycamore, soft maple and willow dominate the lowlands. Portions of the area are also managed under a farm lease program to promote upland wildlife habitat and to demonstrate the potential for producing wildlife on farm lands. Site personnel supplement natural habitats with tree and shrub plantings, native grass seedings, specialty food crop production and succession control. A wide variety of songbirds associated with forests, shrublands, and early successional habitats within a forest mosaic are known to occur on the site.

At the Lake Shelbyville area, annual hunter surveys to assess turkey populations have been conducted since the spring of 2007. Results are helping to focus habitat management in areas of Lake Shelbyville that have low populations of turkeys. Timber Stand Improvements which consist of thinning the timber to enhance mast production and understory growth (150 acres in 2008, 370 acres in 2009 and 337 in 2010), nesting cover establishment, prescribed burning, wildlife plantings, and invasive species

eradication (such as bush honeysuckle and autumn olive), are all being implemented on Lake Shelbyville to enhance the overall habitat. The active management on the site, including TSI, prescribed fire, and invasive-exotic plant species eradication, lends itself to obtaining before-after-treatment-control data to better understand the effects of this management on wild turkeys (and possibly other species of gamebird) and various species of songbird.

Cache River Watershed

The Cache River Joint Venture Partnership (JVP; TNC, ILDNR, and USFWS) formed in 1991 in an effort to conserve and restore some 60,000 acres of bottomland forest habitat in the Cache River watershed of southern Illinois (Figs. 8-12). During the past 18 years, the JVP 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 species of bird prior to most of this land-use conversion. The ongoing conservation activities in the Cache River watershed should result in increased densities and increased nesting success for many bottomland forest birds. We now have the unique opportunity to document how the restoration of bottomland forests (acquiring and “reforesting” non-forested land) has affected the diversity, abundance, and nesting success of songbirds breeding within a large bottomland forest ecosystem.

The bottomland forests in the Cache River watershed are diverse in tree-species composition, but are predominantly oak-hickory with representation of various other

species including elm, ash, maple, hackberry and sycamore. There are also some vast areas of baldcypress and water tupelo that exist in the wetter zones of the watershed. The primary forest management occurring in the watershed has been the acquisition and reforesting of non-forested land, with the priority being to reduce forest fragmentation by consolidating and connecting existing tracts of bottomland forest. This approach has resulted in there being bottomland forest sites that fall along a gradient from those that have had little or no reforestation in the surrounding landscape to those that have had much reforestation. We now have the opportunity to document how the degree of reforestation in the surrounding landscape affects populations of our target species of wildlife in the original tracts of mature forest.

The presence of reforested areas ranging in age from newly acquired (0-years old) to 20-year-old fairly well developed young forests provides us with the opportunity to document how the presence of and numbers of our target wildlife species change across this continuum of forest succession. There is currently only limited forest management in the form of some prescribed fire along relatively steep south-facing slopes where the bottomland forest quickly transitions into upland forest at Wildcat Bluff, and some mechanical/chemical/prescribed-fire treatment of invasive-exotic plant species on Boss Island in Little Black Slough. We will remain flexible in our monitoring protocol to allow us to collect information from particular locations if we become aware of any pending or planned forest management.

Selection of Wildlife to Monitor

Based on input from various biologists, foresters, and other professionals, wild turkeys and songbirds will be two initial priorities for establishing monitoring programs (in subsequent segments of this campaign) in conjunction with forest management. Turkeys, and in particular songbirds, can be monitored in ways that can be standardized among locations and across forest management practices. The monitoring of other species or groups of organisms may be added as opportunities and needs arise. Several potential sites were visited and we selected 5 areas (described above) where monitoring will begin during Segment 2 of the Forests and Woodlands Campaign. During segment 2 of this campaign, **pre-treatment**, **post-treatment**, and **control** areas at each location will be delineated and plotted using GPS units and maps, and several census/survey point locations (each separated by at least 200 m) will be established in each type of area. Surveys will be completed at these points during the spring/summer of 2012. We will try to sample similar amounts of habitat and have similar numbers of survey points in each type of area.

Wild Turkeys

There are entire books devoted to wild turkey biology and management. Much of our current understanding of what types of habitat are needed or used by populations of turkeys throughout their annual cycle comes from observational studies that correlated turkey densities with various habitat attributes. Radio-telemetry studies of the selection and use of habitat by turkeys have greatly improved our understanding of the composition and structure of habitat associated with critical periods like nesting and the

rearing of turkey polts. Information from these studies of habitat use by wild turkeys has been used to promote forest management practices that are intended to result in a desired forest structure and ultimately increase turkey populations. There has been surprisingly little research published that has taken the approach of trying to monitor changes in local populations of turkeys in response to local forest management (at "treatment" sites) while also monitoring nearby local populations where management is not occurring (at "control" sites). In this regard, our approach will hopefully provide information on whether or not the local forest management is in fact having the desired effect on local turkey populations.

Wild turkey use of (or relative abundance in) pre-treatment, post-treatment and control areas will be assessed using a variety of techniques including spring gobbling counts, turkey-call playback surveys, and the deployment of trail (i.e. game) cameras. Gobble counts are an auditory survey, playbacks typically result in both auditory and observational detections, and the trail cameras provide information on how many turkeys cross a particular field of view per unit time. These various techniques each can provide a relative index of wild turkey use/activity/abundance among different habitat areas and all have their good points and their limitations. These and possibly other survey techniques for turkeys (e.g. harvest surveys, hunter surveys, brood surveys) will be used to complement each other to get the best information possible on wild turkey numbers in pre-treatment, post-treatment and control areas at multiple locations across Illinois. We will make every effort to keep the wild turkey surveys from interfering with turkey hunters. Trail cameras will yield information not only on wild turkeys but also on medium- to large-sized mammals that are using the habitat where cameras are

deployed. At a subset of the survey points in each area, vegetation data (e.g. visual obstruction measures in the understory, ground cover amount and type, shrub density and diversity, canopy cover, tree-species composition, etc.) will also be collected using standardized vegetation sampling techniques. The vegetation data will be important to explaining variation in use of different areas by both wild turkeys and songbirds and will also complement any additional data being collected by forest managers to document the response of the forest to the management activities.

Forest Songbirds

Breeding forest songbirds in Illinois include more than 40 different species that fall into various guilds (e.g. nesting on the ground, in shrubs, sub-canopy, or canopy; foraging in leaf litter, on bark, on shrub or tree foliage; nesting on or near the ground, in shrubs, or in the canopy; etc.), making them highly responsive to changes in forest structure and composition and, therefore, a great group to monitor in association with various forest management practices. Over 20 of these species are on the list of Species in Greatest Need of Conservation (SGNC) for Illinois. There are additional species of raptors and wading birds that are on the SGNC and also associate with the various types of forest being managed.

There are a number of attributes of forest songbirds that make them particularly well suited for studying responses to forest management. One is that most if not all of these species are territorial during the breeding season and their territory sizes are typically between 1-3 acres in size. Therefore local forest management activities done at scales of 1, 5, 10, 50, or 100 acres are all highly relevant to these birds that occupy a

relatively small area throughout the breeding season. Another attribute of songbirds is that several species are known to return the next breeding season to places where they reproduced successfully, and to move away from those areas where they failed to reproduce. This behavior tends to lead to an increase of densities in the “better” habitats and a decrease of densities in the “poorer” habitats. In this regard, relative densities are a good predictor of habitat quality with densities being highest in the best habitats. These two attributes in combination should make the songbirds highly responsive to the various types of forest management being done, and changes in their densities will tell us whether the forest management is having a positive, negative, or neutral effect on their local populations.

There is a large body of literature associated with the effects of habitat loss and fragmentation (forest loss and fragmentation here) on populations of breeding forest songbirds. In general, species diversity and the densities of some “area sensitive” species tend to decrease with decreasing forest tract size. In addition, rates of nest predation and cowbird parasitism tend to be higher in small tracts of forest and in landscapes where the forests are more highly fragmented by permanent non-forest land uses. These patterns have been well documented in Midwestern forests. Forests with a mosaic of habitat (e.g. forests where disturbance – either natural or management related – creates structural and compositional complexity) tend to have higher songbird species diversity than a similarly-sized forest lacking disturbance. In addition, disturbances within the forest, as long as they do not remain non-forest permanently, tend to have little or no negative effect on rates of nest predation and cowbird parasitism.

Similar to wild turkeys, much of what we know about habitat requirements and habitat use in songbirds comes from observational studies documenting attributes of the forest where songbirds set up their territories. This has led to recommendations to manage forests for songbirds by achieving a particular tree species composition or vegetation structure and complexity, but the actual responses of the songbirds to the management have usually not been measured. There have been some studies that have documented songbird responses to various kinds of silvicultural practices, but relatively few have had a research design that included a before-after-treatment-control approach. The data on songbird responses to different types of forest management (e.g. prescribed fire, TSI, reforestation, etc.) being collected as part of the Forests and Woodlands Campaign will add valuable and much needed information to the vast songbird literature.

To document the effects of forest management on forest songbird, survey points will be visited and a standard point-count technique used to determine forest songbird species diversity, density, and a cowbird-to-host ratio (this ratio of female cowbirds to songbirds provides a good relative index of community-wide cowbird parasitism rates) for the pre-treatment, treatment and control areas at each location. This point-count survey technique also documents the presence and number of all individuals birds seen and/or heard (including non-songbirds) and will allow us to better understand the effects of forest management on all species of bird occupying the forests and woodlands.

Songbird survey data will be analyzed using the computer program DISTANCE. This program 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 will be estimated. Each survey point will be visited 2-3 times during the breeding survey period (May 15 to July 15), one time by each observer. Estimates of diversity, density, and the cowbird-to-host ratio will be compared among the pre-treatment, post-treatment and control areas at a given location to determine the effect of a given treatment on these metrics of the breeding bird community. Breeding Bird Survey data from the region of each of the forest management sites may be used (when appropriate) to further verify that any changes in bird populations thought to be associated with local forest management are not simply the result of a larger region-wide change in populations.

We are compiling a reference list associated with a literature search of relevant "forest management for wild turkeys and/or songbirds" research articles in peer-reviewed journals and book chapters to assist us in designing monitoring and management activities as we move forward with the next segments of this campaign. Both the forest management database (see Appendix 1) and the reference list will be living documents and will be added to and modified over time as we become aware of new management activities or published research. One of the main goals of the Forests and Woodlands Campaign in Illinois is to contribute substantially to the growing body of research associated with the effects of forest management on populations of wildlife, and to use the data collected in Illinois to reinforce existing or to establish new approaches to forest management that are applicable to forests throughout Illinois and other states in the Midwest.

Figure 1. Satellite image of Oakwood Bottoms in the Shawnee National Forest in southern Illinois.

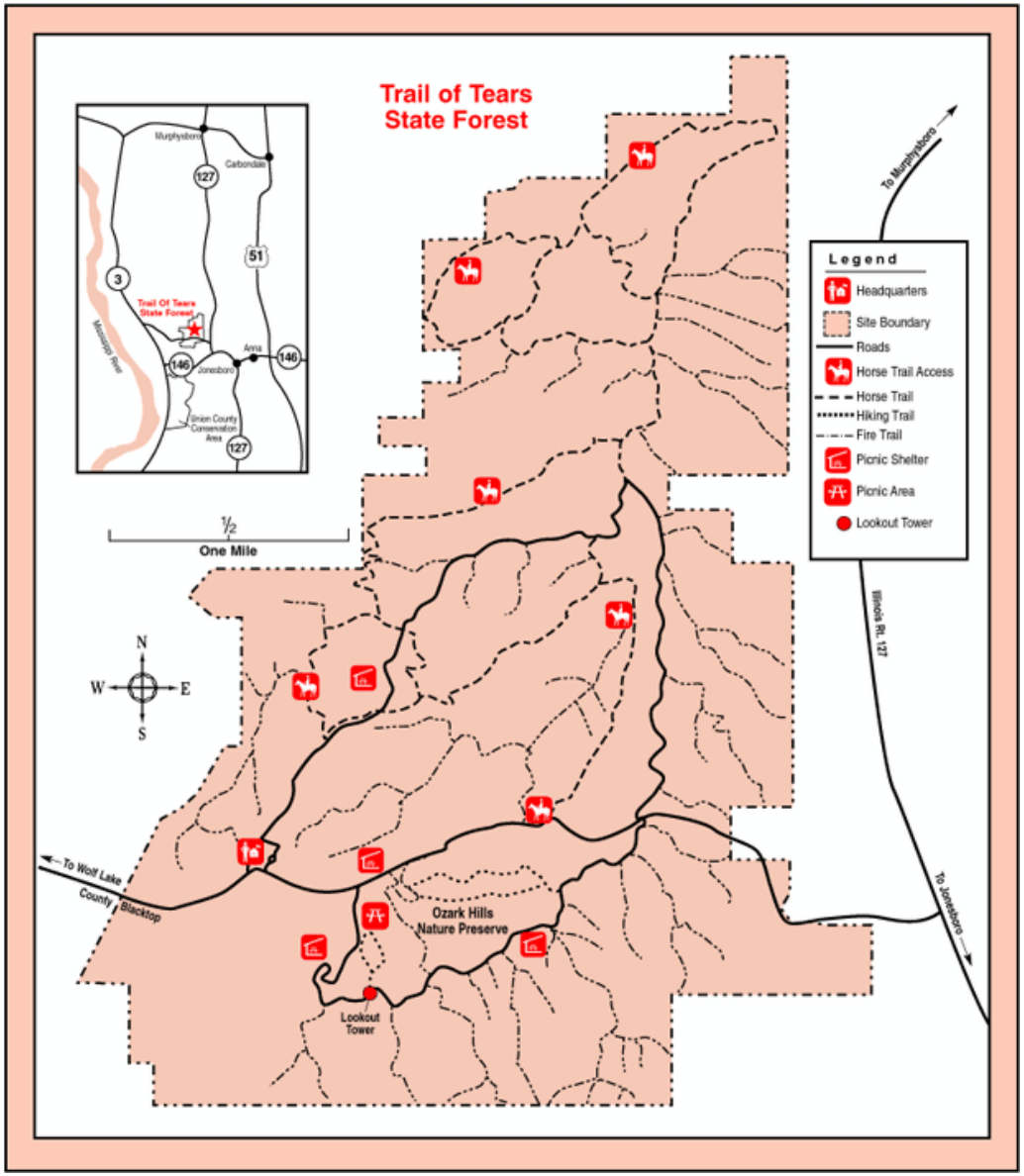

Figure 2. Map of Trail of Tears State Forest in southern Illinois.

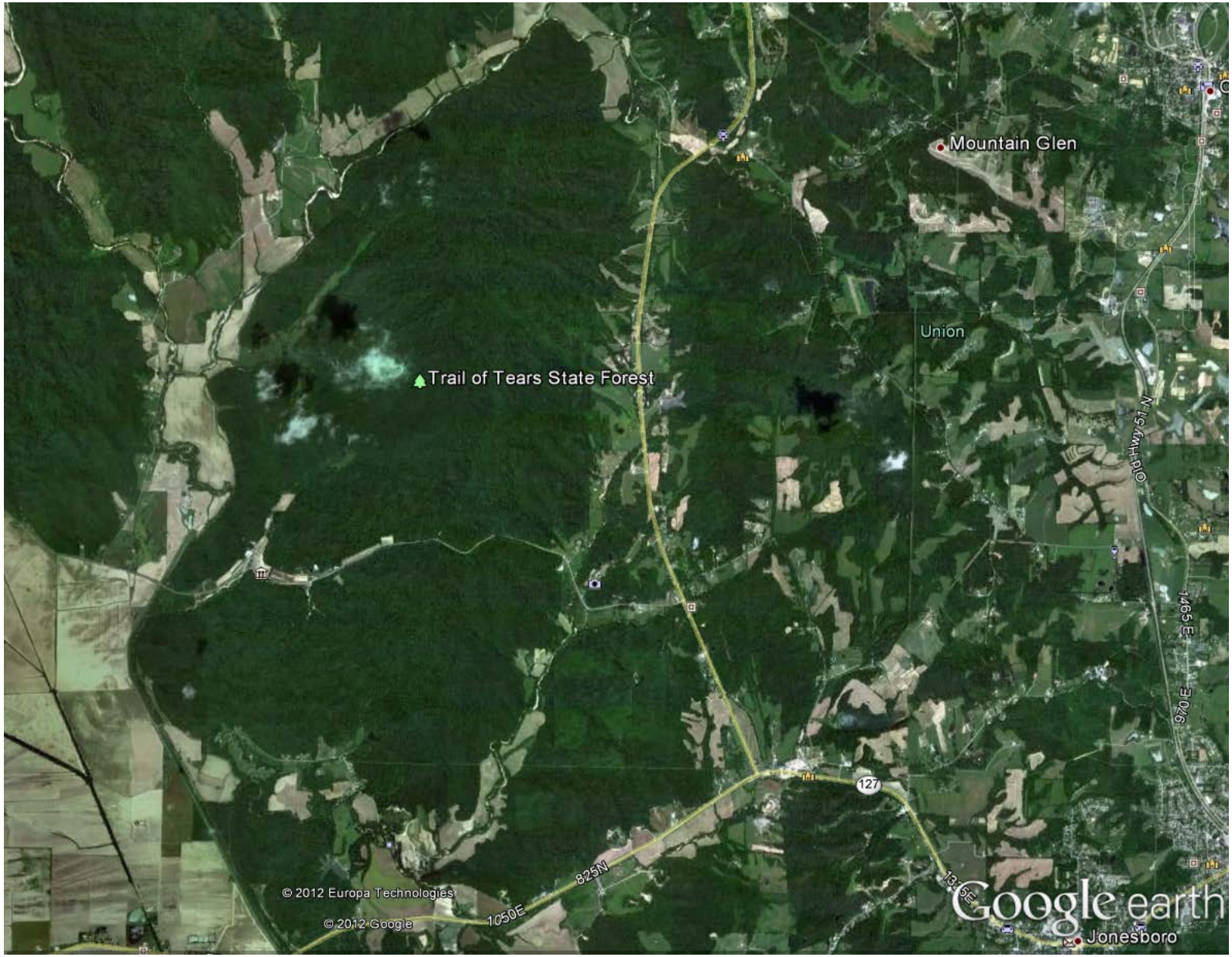

Figure 3. Satellite image of Trail of Tears State Forest in southern Illinois.

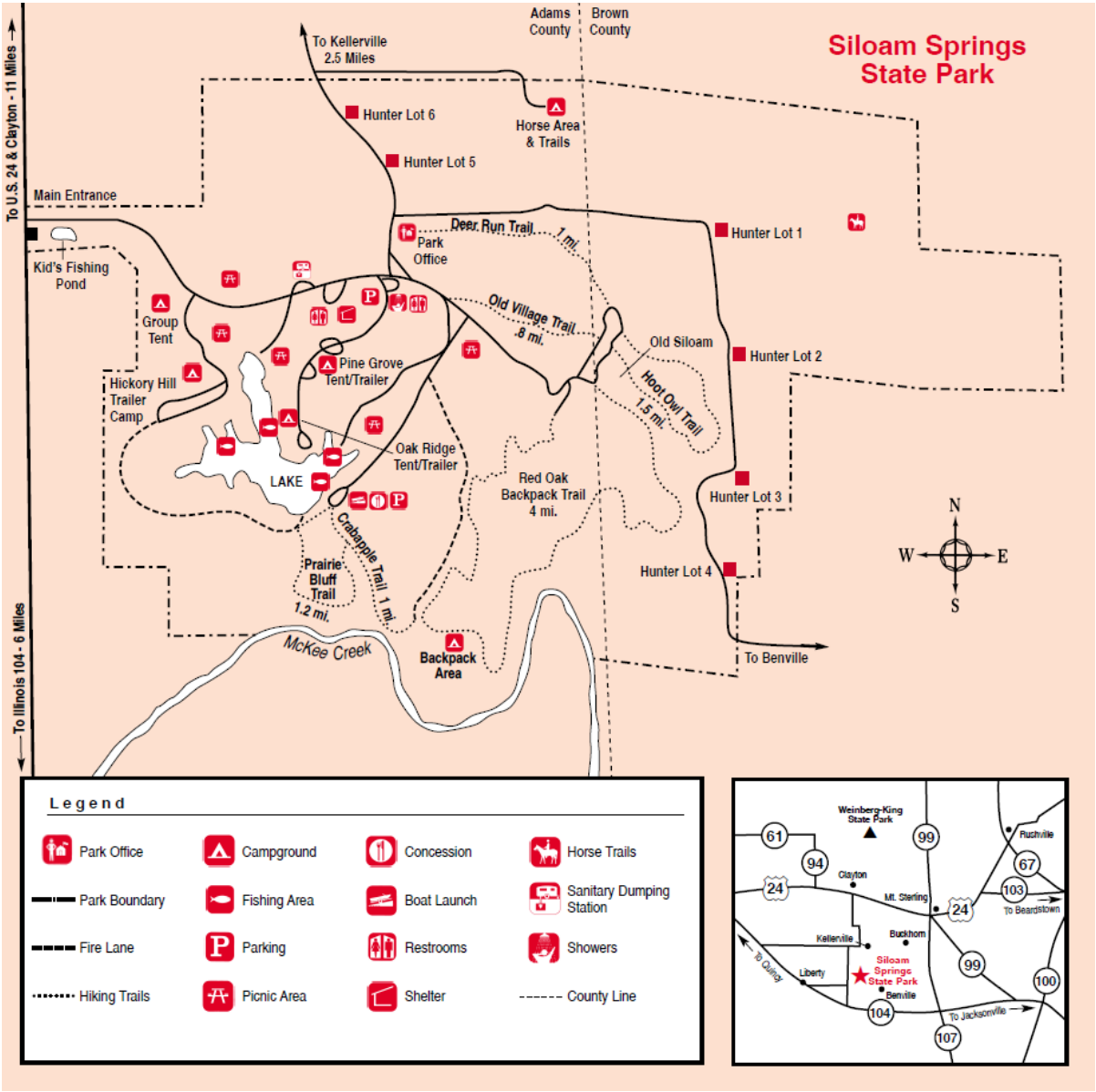

Figure 4. Map of the Siloam Springs State Park in western Illinois.

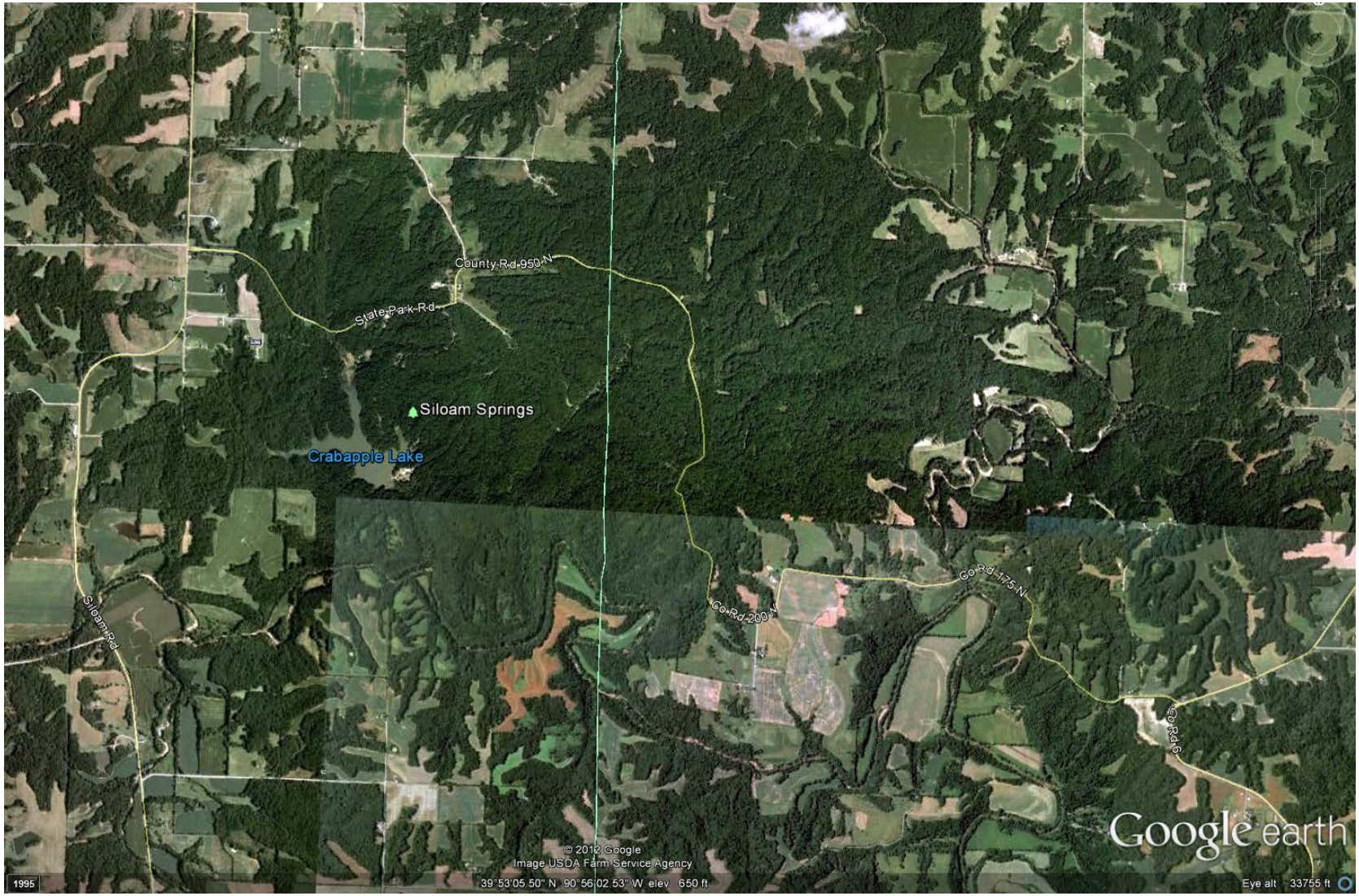

Figure 5. Satellite image of the Siloam Springs State Park in western Illinois.

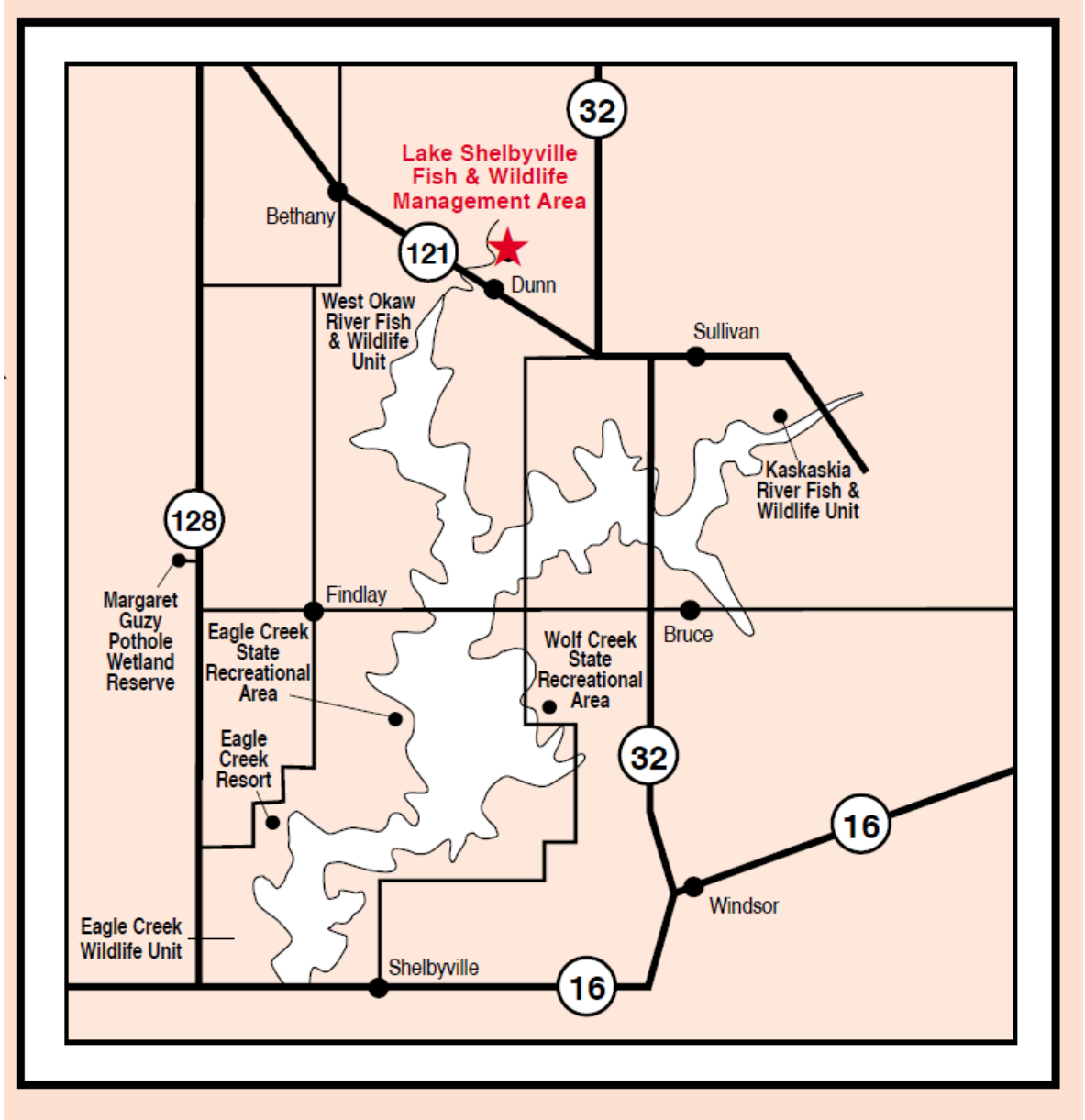

Figure 6. Map of Lake Shelbyville State Fish and Wildlife Management Area in east-central Illinois.

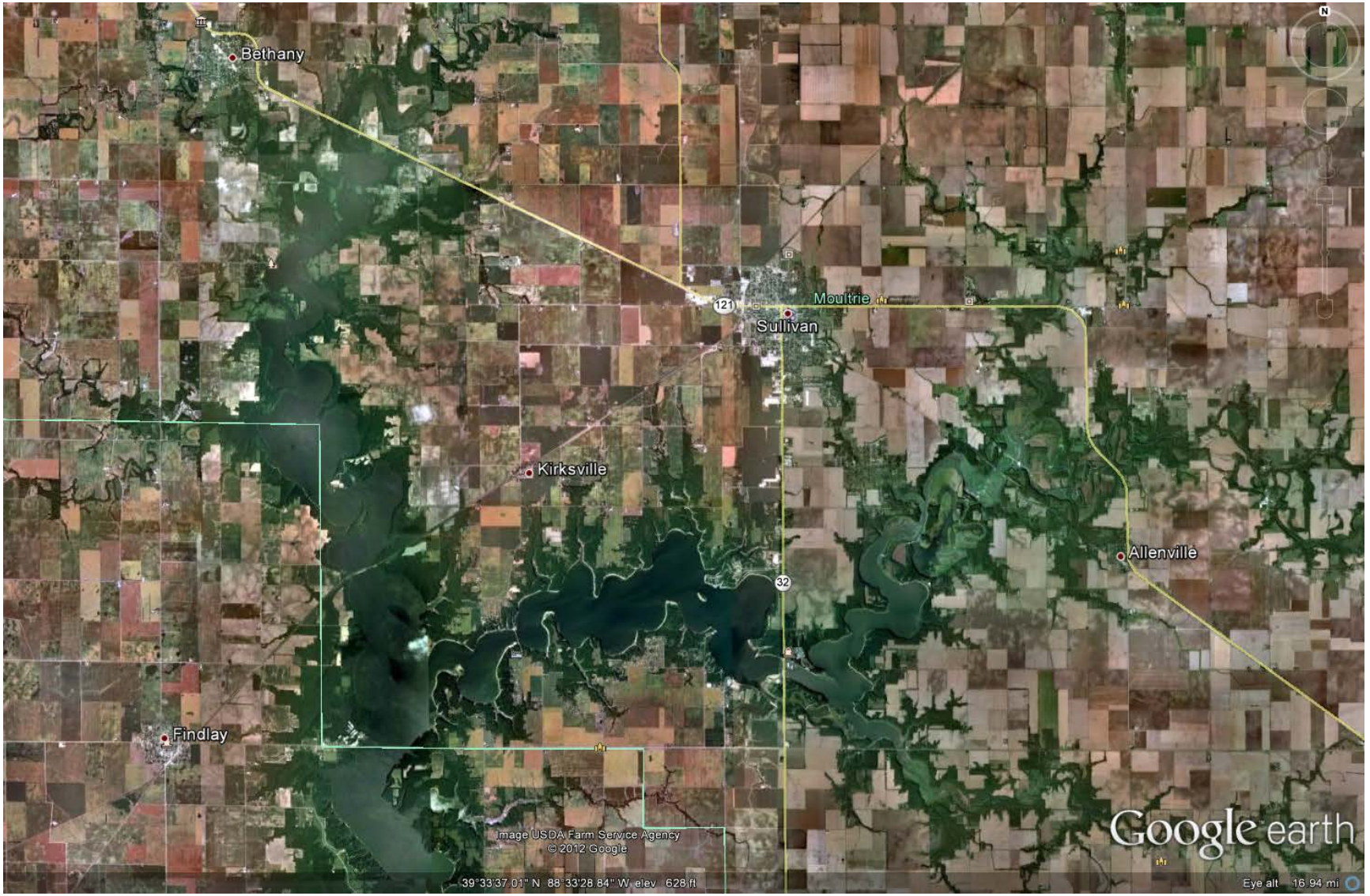

Figure 7. Satellite image of Lake Shelbyville State Fish and Wildlife Management Area in east-central Illinois.

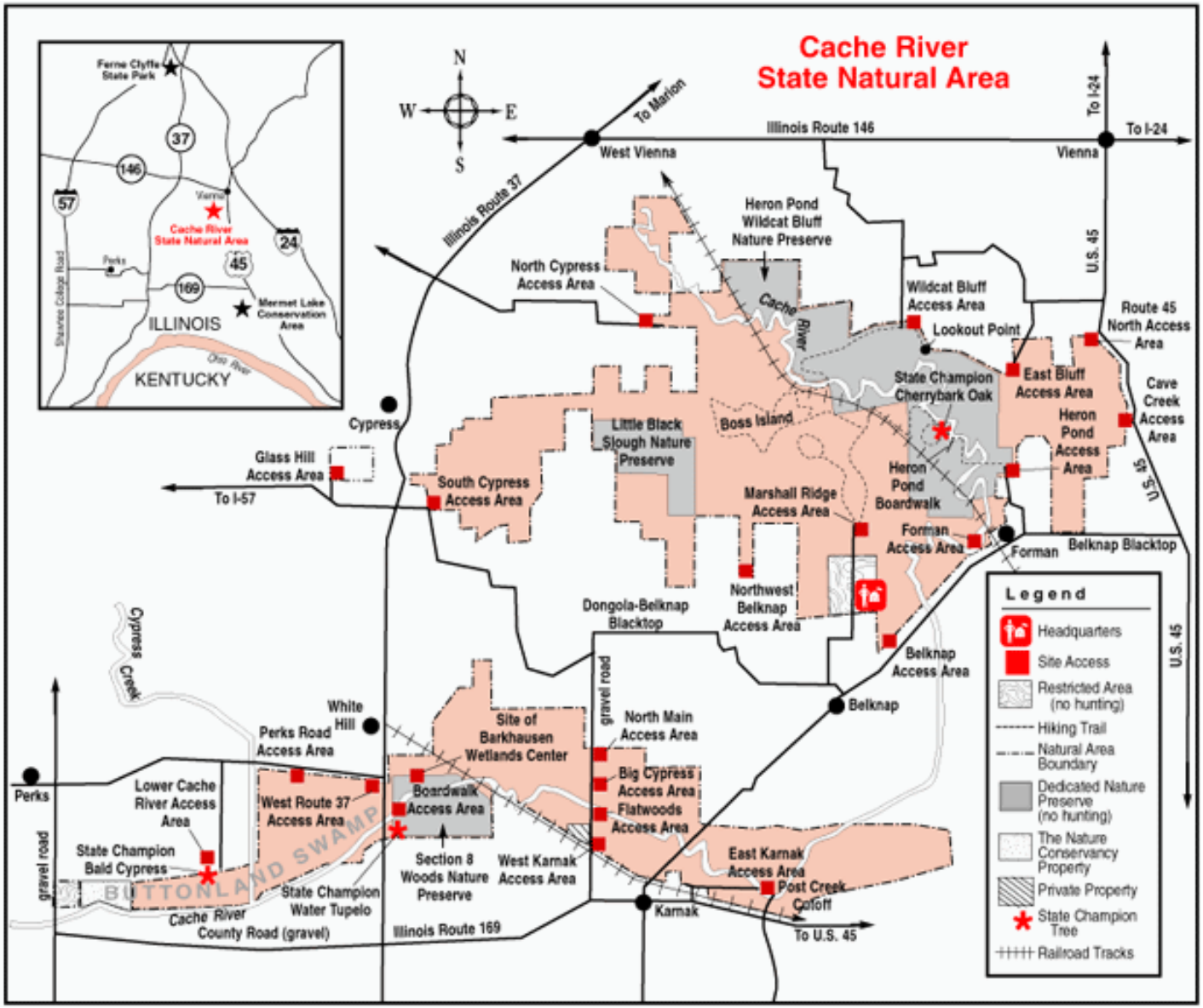

Figure 8. Map of the Cache River State Natural Area in southern Illinois.

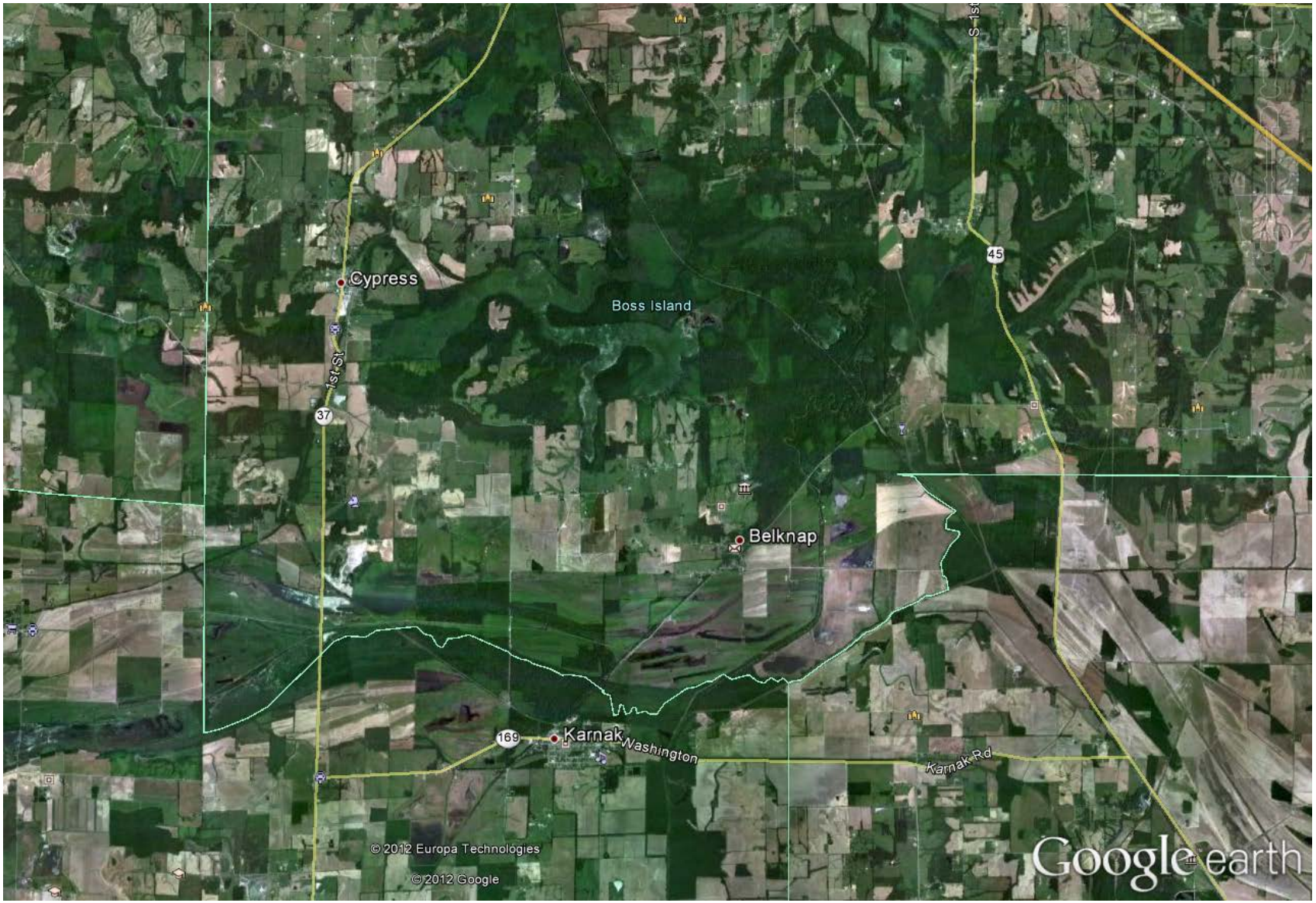

Figure 9. Satellite image of the Cache River State Natural Area in southern Illinois.

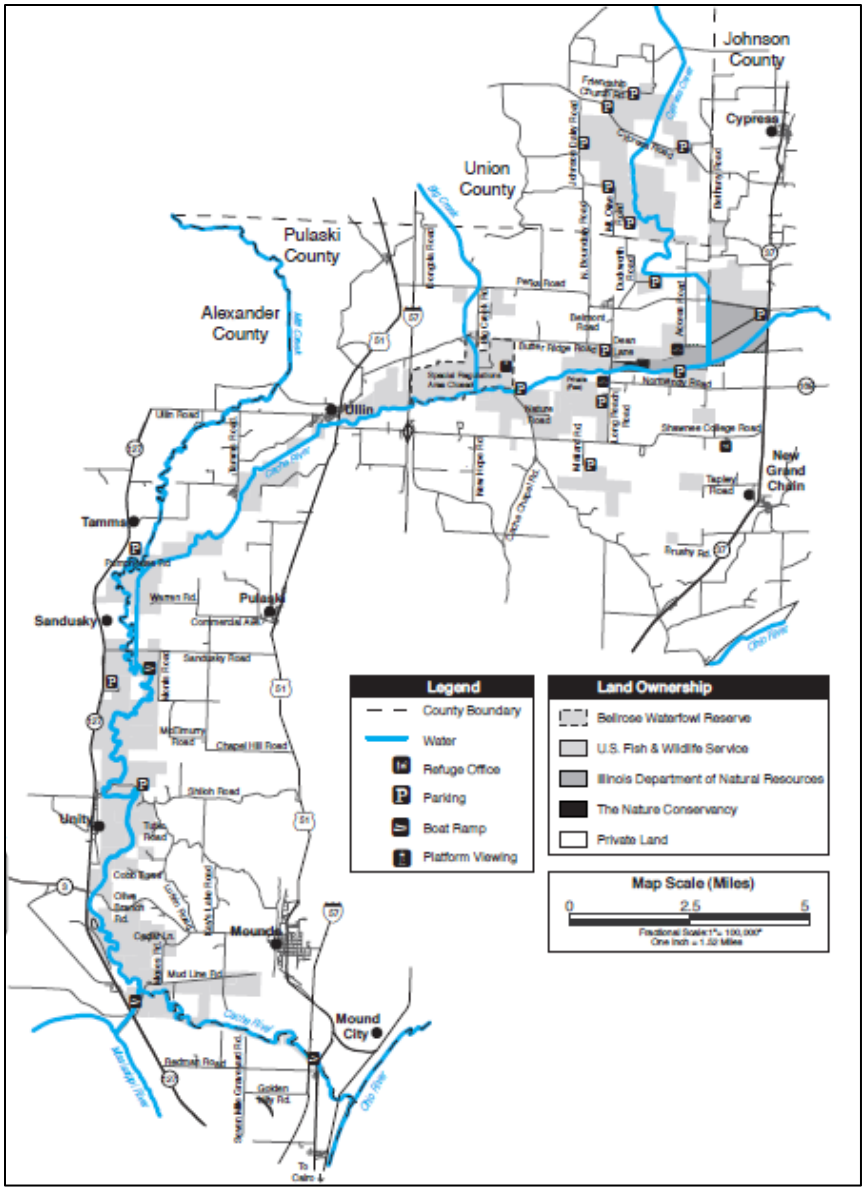

Figure 10. Map of the Cypress Creek National Wildlife Refuge in southern Illinois.

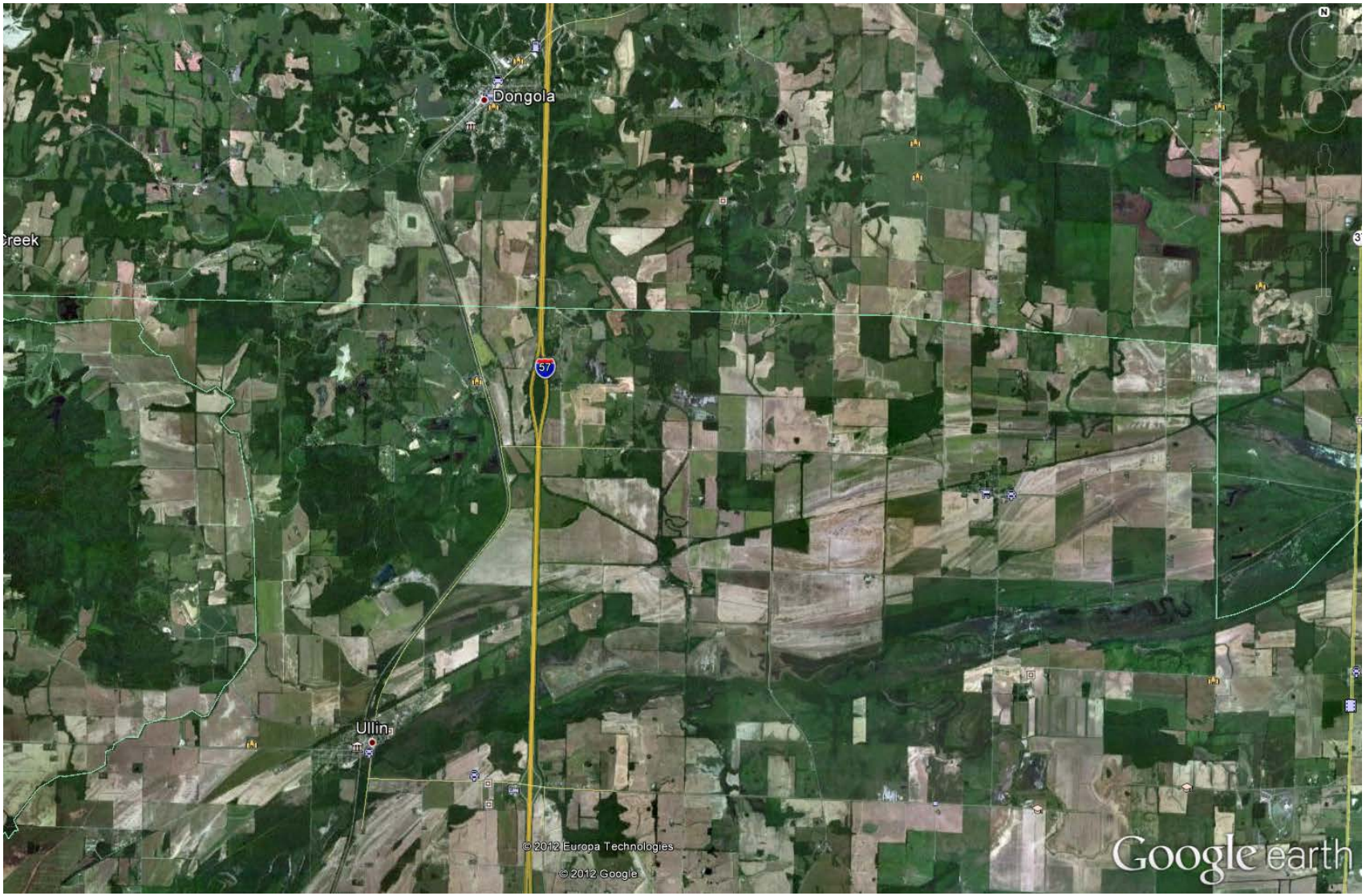

Figure 11. Satellite image of the Cypress Creek National Wildlife Refuge (northern portion) in southern Illinois.

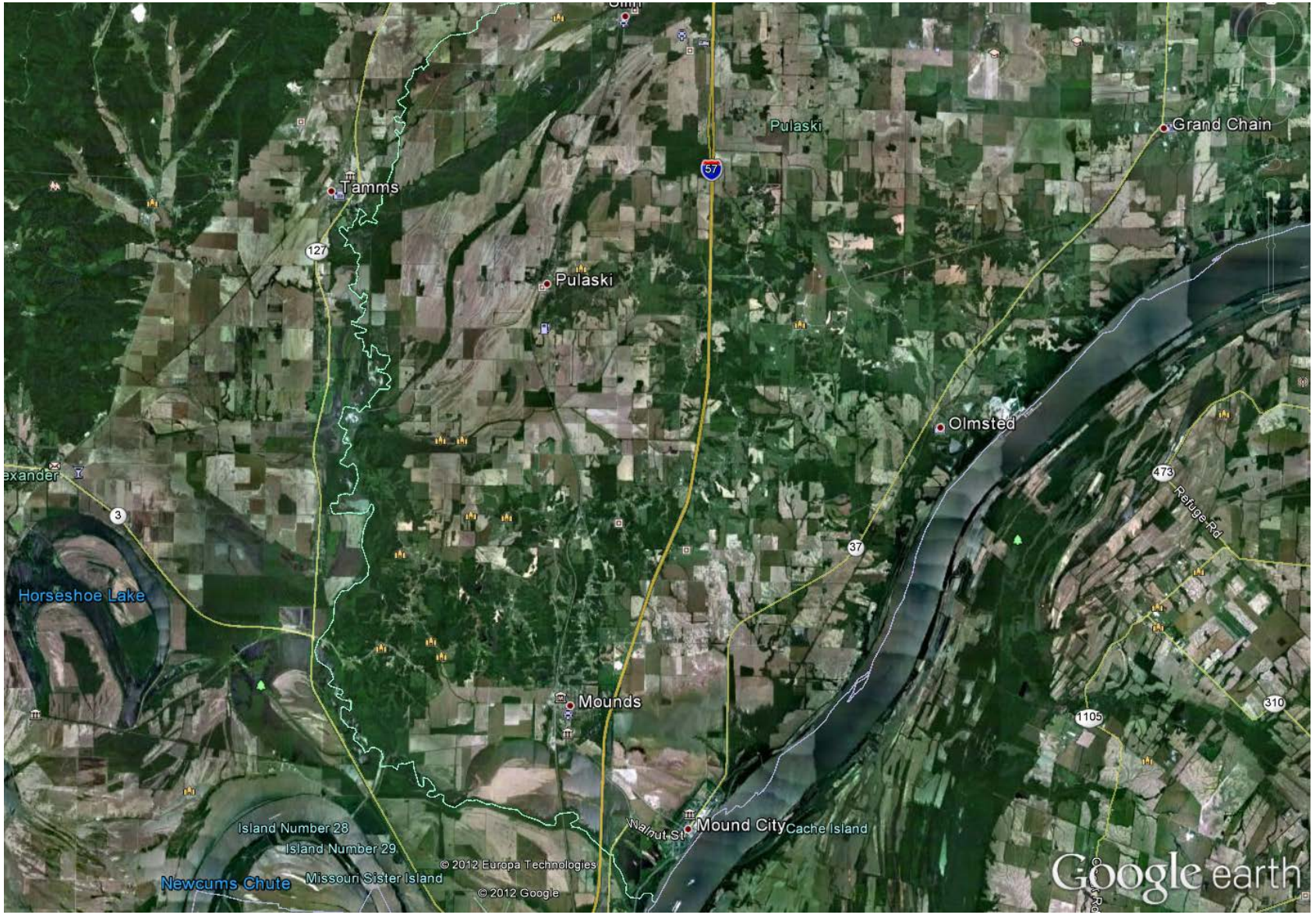

Figure 12. Satellite image of the Cypress Creek National Wildlife Refuge (southern portion) in southern Illinois.

Group/Organization	IL counties	Forest type	Forest acreage	Forest management	demonstration areas	target/priority wildlife	Comments
		B (bottomland), U (upland), or O (open woodland)		F=fire, TSI=Timber Stand Improvement, IE=Invasive exotic removal, P=planting			
American Bird Conservancy	Sangamon	n/a	0	none		birds	
Association of Illinois Soil & Water Conservation Districts	statewide	B, mostly U	1.5	Plan to manage : IE		water conservation	
Audubon Chicago Region	Lake, Cook	n/a	0	none		birds	
Bird Conservation Network - conservation for Cook Co Forest Preserve District	Chicagoland	n/a	0	see Cook Co Forest Preserve Dist	none	birds	
Boone County Conservation District	Boone	B, O	~1400, mixed w/prairie and savannah, cumulative amongst ~ 10 different areas	IE, F	possibly	birds, turtles, plants, wildlife surveys	

Brookfield Zoo/ Chicago Zoological Society	Chicago region, also southeast Wisconsin, and northwest Indiana	savannah, woodland, forest	225,000 of protected areas, no specifics about habitat types, see pdf of chicago wilderness biodiversity atlas, pg 56	see CW biodiversity recovery plan	possibly	native plants and animals	
Champaign County Forest Preserve District	Champaign	U, B (most acres riparian)	1,000	IE, F , P			removing both woody and herbacious invasive species
Chicago Botanic Garden	Cook	O	385 (forest not specified)	IE, P	none listed	none listed	Occupies property of the Cook County Forest Preserve
Chicago Wilderness/Chicago Environmental Network	Chicago region, also southeast Wisconsin, and northwest Indiana	U, B, O	225,000 of protected areas, no specifics about habitat types, see pdf of chicago wilderness biodiversity atlas, pg 56	see CW biodiversity recovery plan	possibly	native plants and animals	

Cook County Forest Preserve District	Cook	U, O	67,000 total acres (10,500 with veg management plans)	Vegetation management plans are approved by the Board of Commissioners, and are in place for approximately 10,500 of the district's 67,000 acres.	none listed	native plants and animals	Includes Brookfield Zoo and Chicago Bontanic Garden
Cosley Zoo - Managed by the Wheaton Park District	Dupage	O, successional woodland	829 (forest not specified)	IE		native plants and animals	
Ducks Unlimited	Many	B, U, O	44,207 (forest not specified, 178,000 reforested in Mississippi Alluvial Valley)	IE, P	none listed	waterfowl	
Educational Resources for Environmental Sciences	Champaign	O	30 MILES	IE	none	prairie species	Focused on prairie conservation! Forests=bad!
Embarras Volunteer Stewards	Coles, Cumberland, Clark, Douglas, Edgar, Moultrie, and Shelby	O- oak-hickory woodlands	0	F,IE,P	none		does not own property- private and municipally owned property - Grand Prairie , IDNR

Environmental Education Association of Illinois	ALL	n/a	0	none	none listed	none listed	Provides network for environmental education and sponsors conferences
Environmental Law & Policy Center	ALL	n/a	0	none	none listed	Rivers, lakes, energy solutions	
Forest Preserve District of DuPage County	Dupage	O, B, U	25,000	IE, P, F	Fullersburg Woods Nature Education Center	native plant and animal communities	
Forest Preserve District of Kane County	Kane	O, B, U	17,358	TSI, IE, P		native plants and animals	
Forest Preserve District of Will County	Will	O, B, U	21,000	F, IE, P		native plants and animals	
Grand Prairie Friends	Champaign	O	70 (Does not Specifiy forest)	F, IE, P		Native fauna and flora	
Henson Robinson Zoo - Springfield Park District	Sangamon	U	2,500 (total in park dist. Does not specify forest)	not listed			
Illinois Association of Conservation Districts	ALL	U, B, O	400	F, TSI, P, IE		Turkey, deer	

Illinois Association of Resource Conservation and Development Areas	ALL	n/a	0	F, TSI, IE			develops management plans for private land owners
Illinois Audubon Society	ALL	O, B, U	1357.5 (864 woodland)	F, TSI, P, IE		Birds, Indiana Bat, Spotted Dusky Salamander, State listed plants, Greater Prairie Chicken	Very excited about the campaign and extremely helpful!, Management plans executed by stewardship volunteers and working with Natural Presservation Commission
Illinois Conservation Foundation	ALL	n/a	0	Does not own forests --> 0 acres but more than $1,000,000 has been donated for land acquisition.		none	Nonprofit that raises money for IDNR
IDNR C2000 Ecosystems Program	MOST	U, B, O	70,500 (restored acres)	F, IE, TSI, P		Illinois plant and animals	C2000 does not have management plans and has not been funded in 4 years
IDNR Office of Resource Conservation	MOST	U, B, O	Difficult to estimate - refered to paul brewer				
Illinois Nature Preserves Commission		see IDNR	see IDNR	see IDNR			

Illinois State Museum	Randolph	U	142	IE, P			
Izaak Walton League Illinois Division Champaign County Chapter	Champaign	not specified	not listed	IE,P	none listed	none listed	
Jo Daviess Conservation Foundation	JoDavies	B, U, O	180	IE, F	Schurmeier Teaching Forest	none listed	
Kankakee County Soil & Water Conservation District	Kankakee	B	4025	P	none listed	none listed	
Lake County Forest Preserve District	Lake	U	29,200	IE	none listed	none listed	
Lincoln Park Zoo	Cook	O	14	none listed	none listed	none listed	
Macon County Conservation District	Macon	U, B	3,200	IE	none listed	none listed	
McHenry County Conservation District	McHenry	O	4,300	IE, P, F, TSI	all conservation areas	none listed	
National Wild Turkey Federation Illinois Chapter	All	n/a	0	none listed	none listed	upland wildlife,wild turkey	

Northern Illinois Conservation Club	not listed	not listed	62.5 total (forest not specified)	none listed	none listed	none listed	
Pheasants Forever	ALL	n/a	0	none listed	none listed	pheasant	acquires land and turns it over to IDNR
Sand Bluff Bird Observatory - at Colored Sands in Winnebago County Forest Preserve District	Winnebago	not listed	not listed	none listed	none listed	songbirds and raptors	part of Winnebago County Forest Preserve District
Shawnee Audubon Society	S. IL	B, U	not listed	none listed	War Bluff Valley Sanctuary and Lusk Creek Sanctuary	native flora and fauna	
Southwestern Illinois RC & D	Bond, Madison, Randolph, Washington, Clinton, Monroe, St. Clair	n/a	0 (temporarily owns land before passing it off to private land owners or public agencies)	Follows management guidelines set by IWAP	none listed	none listed	

The Natural Lands Institute	Winnebago, Ogle, JoDavies, Bureau, Carroll, DeKalb, Lake, McHenry, Pope, Sangamon, St. Clair, Stephenson, Whiteside	B, U, O	772	F, IE	none listed	threatened/endangered species	
The Nature Conservancy	Alexander, Jackson, Union	B, U, O	B (3,000), U (1,000), O (2,500) = 6,500	P, IE, TSI, F	none listed	none listed	
Tri-County Regional Planning Commission - Michigan	none	U	none listed	F, TSI, IE	Native American Fellowship Dayspring Church, Ulrich Wildlife Preserve	none listed	
Urbana Park District	Champaign	B, O, U	140	IE, F, P, deadwood pruning, emerald ash borer removal and monitoring	none listed	none listed	
Upper Des Plaines River Ecosystem Partnership	Lake, Cook, DuPage	n/a	0	none		none listed	

Upper Mississippi River and Great Lakes Joint Venture	All except southernmost	B, U	164,008	IE, P	none listed	avian species	
US Army Corps of Engineers Rock Island District	Rock Island, Whiteside, Henry, Bureau, LaSalle, Grundy, Will, DuPage, Kendall, Dekals, Lee, Ogle, Carroll, JoDavies, Stephenson, Winnebago, Boone, McHenry	B (95%), U (small upland)	25328 (forested acres in IL owned by Army CORP	F, TSI, IE, P	none listed	native flora and fauna	manages and monitors wildlife, 85% of property managed by IDNR but CORP retains rights to timber
USDA Midewin National Tallgrass Prairie	Cook	O	920	IE, F, P (planned)	none listed	none listed	
USDA Natural Resources Conservation Service	none listed	n/a	0 - assists private land owner with management	none	none listed	none listed	
USDA Shawnee National Forest	Union, Johnson, Pope, Alexander, Pulaski	B, U	277,506 acres	F, IE, P		native flora and fauna	

USFWS Region 3 Development Assistance Team	All	U, B	works to conserve ~100,000 upland acres	P, IE	not listed	threatened/endangered species	
USFWS Chicago Field Office	McHenry, Lake, Kane, DuPage, Cook, Will	none listed (focus on wetlands)	0	IE, P	none listed	migratory birds, waterfoul	Coordinates with private and public land owner to restore native communities on their property
USFWS Illinois River National Fish & Wildlife Refuges Complex	Putnam, Marshall, Peoria, Woodford, Tazewell, Mason, Fulton, Menard Cass, Morgan, Schuyler	B, U, O	5,000 (6,000 by 2017)	P, IE	none listed	waterfoul, migratory birds, listed species	
USFWS Two Rivers National Wildlife Refuge	Calhoun, Jersey	B (94%) O (4%) U (2%)	3,500	IE, P, TSI			
USFWS Great River National Wildlife Refuge	Hancock, Adams, Pike, Madison, St. Clair, Monroe, Randolph, Jackson, Union, Alexander	B	6,500	P, TSI	none listed	bottomland hardwood species	5 refuges, 2 in IL -- >Two Rivers and Great River

USFWS Upper Mississippi River National Fish & Wildlife Refuges Complex	Jo Daviess, Carrol, Whiteside, Mercer, Henderson, Hancock, Rock Island	B	51,000	TSI, P		none listed	
Whiteside County Soil and Water Conservation District	Whiteside	U, B	0	P, TSI, IE	none listed	none listed	works with land manager through CRP and developing management plans--IE (honey suckle, garlic mustard), TSI (thinning), P (reforestation)
Will County Forest Preserve District	Will	hardwood	21,000 (managed acres, forest acres not specified)	F, IE, P	none listed	none listed	
Winnebago County Forest Preserve District	Winnebago	O (141), B (1.050), U (2,320)	3,500	F, IE	none listed	none listed	
C2000 AMERICAN BOTTOM	Jersey, Macoupin, Madison, Montgomery , St. Clair, Monroe, Randolph	B, U	30,000	IE	none listed	none listed	

C2000 BIG RIVERS	Calhoun, Jersey, Greene, Macoupin, Montgomery	B, U, O	500,000	IE	none listed	none listed	
C2000 CACHE RIVER	Union, Johnson, Alexander, Pulaski, Massac, Pope	B, U, O	32,500.00	P	none listed	none listed	
C2000 CARLYLE LAKE	Shelby, Christian, Effingham, Montgomery , Fayette, Marion, Clinton, Bond	B, U	26,000 total (forest not specified)	F, IE, P	none listed	none listed	
C2000 CHICAGO WILDERNESS	McHenry, Lake, Kane, Will, Cook, DuPage	U, B, O	225,000 total (forest not specified)	IE	none listed	none listed	
C2000 DRIFTLESS AREA	JoDavies, Stephenson, Carroll, Whiteside	B, U, O	127,517	F, IE	none listed	none listed	
C2000 DUPAGE RIVER COALITION	Cook, DuPage, Kane, Kendall, Will	B, O, U	26,793	IE, P	none listed	none listed	

C2000 EMBARRAS RIVER	Douglas, Edgar, Clark, Crawford, Lawrence, Richland, Jasper, Cumberland, Coles	B, U	2,000+	IE	none listed	none listed	
C2000 FOX RIVER	McHenry, Lake, Kane, Cook, Dupage, Kendall, Will, LaSalle, Dekals	U, B	840	P, IE	none listed	none listed	
C2000 HEADWATERS	Ford, Champaign, McLean, Livingston	B, O	500+	IE	none listed	none listed	
C2000 HEART OF THE SANGAMON RIVER	DeWitt, Piatt, Macon	B,U	24,000	IE, P	none listed	none listed	
C2000 ILLINOIS RIVER BLUFFS	Lee, LaSalle, Bureau, Putnam, Marshall, Woodford, Peoria, Tazewell, Fulton	U, B	100,000	F, P	Prairie sites	none listed	

C2000 KANKAKEE RIVER	Will, Kankakee, Iroquois, Vermilion, Ford	B, O, U	10,000	P	none listed	none listed	
C2000 KASKASKIA RIVER/SHOAL CREEK	Montgomery, Bond, Marion, Washington, Madison, St.Clair, Jefferson	B, U	87,000+	P, IE	none listed	none listed	
C2000 KINKAID AREA WATERSHED	Washington, perry, Jackson Randolph	B	142+	none listed	none listed	none listed	
C2000 KISHWAUKEE RIVER	Boone, Winnebago, Ogle, Dekalb, Kane, McHenry	U, B	39,430	F, IE	none listed	none listed	
C2000 LAKE CALUMET	Cook	U, B, O	30,000	IE, TSI	none listed	none listed	

C2000 LA MOINE RIVER	Hancock, McDonough, Schuyler, Brown, Adams, Fulton	U, B	294,496	TSI, IE, P	none listed	none listed	
C2000 LOWER DES PLAINES RIVER	Cook, DuPage, Will	U	44,430	IE	none listed	none listed	
C2000 LOWER KASKASKIA/SILVER CREEK	Macoupin, Montgomery, Madison, St. Clair, Washington, Monroe, Randolph	B	30,000	IE	none listed	none listed	
C2000 LOWER ROCK RIVER	Carroll, Ogle, Whiteside, Henry, Bureau, Rock Island, Lee	B, U	1243 (restored)	P	none listed	none listed	

C2000 LOWER SANGAMON VALLEY	Mason, Tazewell, Logan, Macon, Christian, Shelby, Sangamon, Menard, Cass, Mogan, Fulton, McLean	B, O	200,698	P	none listed	none listed	
C2000 MACKINAW RIVER	Woodford, McLean, Tazewell, Mason, Ford, Livingston	O, U	870.8 (restored)	F, P	Lake Eureka Park Restoration	none listed	
C2000 NORTH BRANCH OF THE CHICAGO RIVER	Lake, Cook	O	131 (restored)	IE, P	none listed	none listed	
C2000 OZARK	Randolph, Jackson, Union, Alexander	U	326 (restored)	IE, P	none listed	none listed	
C2000 PRAIRIE PARKLANDS	Kendall, Grundy, Ford, Will, LaSalle, livingston, Cook	U, B	98.7 (restored)	F, IE	none listed	none listed	
C2000 ROCK RIVER	Ogle	O	1,576.45	F, IE	none listed	none listed	

C2000 SALINE BASIN	Hamilton, White, Gallatin, Hardin, Saline, Pope, Johnson, Williamson, Franklin	U, B	927	F	none listed	none listed	
C2000 SHAWNEE WATERSHED	Johnson, Pope, Saline, Gallatin, Hardin, Massac	U, B	4,945	F, IE, P	5 - Oak Ecosystem Restoration and Maintenance in Southern Illinois	none listed	
C2000 SPOON RIVER	Henry, Bureau, Stark, Knox, Peoria, Fulton, Warren, Marshall	B, U	165,041	P	none listed	none listed	
C2000 SUGAR-PECATONICA RIVERS	JoDavies, Carroll, Stephenson, Winnebago	B, U	7,900	IE, P	none listed	none listed	
C2000 THORN CREEK MACROSITE	Will, Cook	U, B	13,000	IE, P	none listed	none listed	

C2000 UPPER DES PLAINES RIVER	Lake, Cook, Dupage	U, B	1,900	IE, P, TSI			
C2000 UPPER KASKASKIA RIVER	Champaign, Douglas, Coles, Shelby, Moultrie, Piatt, Macon	U	1,300	none listed	none listed	none listed	focus on river restoration and sedimentation
C2000 UPPER LITTLE WABASH	Effingham, Clay, Shelby, Coles, Cumberland, Jasper, Marion, Fayette	O	1,632	F, IE	none listed	none listed	
C2000 UPPER ROCK RIVER	Winnebago, Boone, Stephenson	U, B, O	60.9 total land	F	Rock River Shoreline Stabilization	none listed	
C2000 UPPER SALT CREEK OF THE SANGAMON	Logan, DeWitt, McLean, Macon, Piatt	U, B	17	P	none listed	none listed	
C2000 VERMILION RIVER	Vermilion	U	348 restored acres	none listed	none listed	none listed	

C2000 VERMILION WATERSHED TASK FORCE	La Salle, Livingston, Ford, McLean, Woodford, Marshall	B, U	17,366	TSI, F	none listed	none listed	
Cypress Creek National Wildlife Refuge	Union, Pulaski, Alexander	B, U	16,000	reforestation	none listed	waterfowl, migratory birds, endangered species, and resident wildlife	
Crab Orchard National Wildlife Refuge	Jackson	U	43,890 total (4,050 Crab Orchard Wilderness)	TSI, F, P	none listed	none listed	
Cache River State Natural Area	Johnson and Pulaski	B, U	14,500	F, P, IE, TSI	none listed	Recreational game species	
Middle Mississippi National Wildlife Refuge	Alexander, Union, Jackson, Randolph, Monroe	B	7,000	P, natural regeneration		waterfowl, migratory birds, fish	

Appendix 1. Table of organizations associated with the development of the Illinois Wildlife Action Plan. Columns included here are, from left to right, name of the organization, counties where organization manages natural resources, type of forested habitat associated with organization (B=bottomland, U=upland, O=open woodland), acreage of land associated with each organization, types of management that have occurred (F=fire, TSI=timber stand improvement, IE=removal of invasive exotic plants, P=planting), potential demonstration sites, species of wildlife emphasized on land, and any additional comments. Names, email addresses and phone numbers have been removed from this table.