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Final Report for Marathon Project

Department of Natural Resources – Natural Resources Damage Assessments

2009 Field Season

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Project 1 – Vernal Pond Construction

Introduction

Vernal ponds are beneficial by creating breeding locations for a majority of amphibians and reptiles located in Illinois. Following the Illinois Landowners Guide to Amphibian Conservation and A Guide to Creating Vernal Ponds, a minimum of 40 vernal ponds were built at various locations in Clark, Cumberland, Coles, Jasper, Crawford, Richland, Effingham and Fayette Counties. The entire vernal pond should be approximately one-eighth of an acre in size and have an average of twenty inches in depth. Shape and location of the ponds were determined by each county's district biologist.

Methods

Pond construction sites at Fox Ridge State Park, Coles County, were monitored once during the summer season of 2009, before construction was initiated. One photo-station was placed near the center of the open field, with photographs being taken in each of the cardinal directions. Numerous photographs were also taken near potential building sites, with all the photographs being near or between pond locations.

Ending Statements/Summary

Approximately 36 vernal ponds will be constructed in a former agricultural field or near forested communities at Fox Ridge State Park. No amphibians or reptiles were seen or heard calling during the monitoring visit on the 20th of August, 2009. Although it is likely there are amphibians and reptile species utilizing this restored prairie, these vernal ponds will provide critical breeding habitat for numerous herp species. Further monitoring of this site will be necessary after the construction of these ponds to see the response of species, both reptiles and amphibians, which will utilize these ponds.

Figure 1a: Photograph from Fox Ridge, vernal pond site.

Figure 1b: Photograph from Fox Ridge of an open area and the field. Multiple vernal ponds to be built in this section.

Figure 1c: Photograph from Fox Ridge, vernal ponds to be built on or near this trail. These ponds will be directly adjacent to the woodland.

Figure 1d: Photograph from Fox Ridge, vernal pond construction site.

Figure 1e: Photograph from Fox Ridge, vernal pond construction site.

Figure 1f: Photograph from photo-station at Fox Ridge. This photograph is looking towards the North.

Figure 1g: Photograph from photo-station at Fox Ridge. This photograph is looking towards the East.

Figure 1h: Photograph from photo-station at Fox Ridge. This photograph is looking towards the South.

Figure 1i: Photograph from photo-station at Fox Ridge. This photograph is looking towards the West.

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Figure 1j: Photographs from Fox Ridge, showing open areas for vernal pond construction.

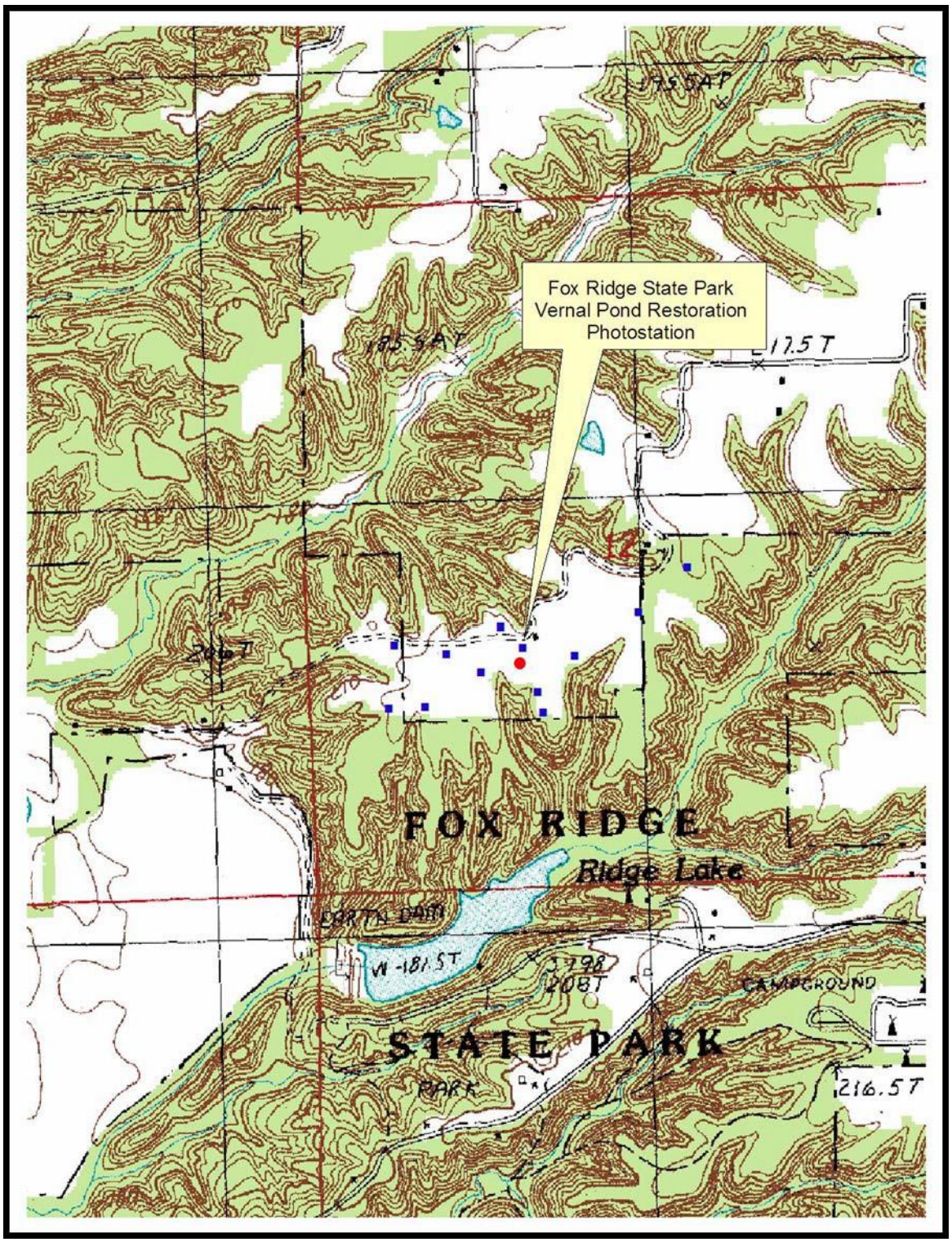

Figure 1k: Topo-map of the proposed locations for the vernal ponds (blue squares) and location of photo-station (red circle) at Fox Ridge State Park.

Project 4 – Application of herbicide to tall fescue for habitat restoration

Introduction

Herbicide application for habitat restoration at Prairie Ridge State Natural Area during 2007 assisted in creating better habitats for many animal species, specifically grassland birds and especially the Illinois State Endangered Greater Prairie Chicken. Application of herbicide, in this case Round-up and Plateau, reduces the amount of weedy grass species, such as fescue. After the herbicide application, site managers can then reseed the field to increase the amount of nesting and brood cover and food availability for grassland specific birds.

Methods

Two treatments, Round-up and Plateau applied simultaneously or only Plateau, were monitored at both Prairie Ridge State Natural Area (PRSNA) Jasper County and PRSNA Marion County. Two control sites were identified at PRSNA, Jasper County. One control site was used for all the Round-up and Plateau treatment sites and one control site for the Plateau only treatment sites. Photoboards were used at all sites, treatment and control. Photographs were taken in each of the cardinal directions; one photograph at each site was taken in the northerly direction with the photoboard being placed in the center of the frame.

Ending Statements / Summary

12 tracts, a total of 190 acres, were treated with the Round-up and Plateau treatment and 7 tracts, totaling 96 acres, were treated with Plateau only. Of these 19 tracts, 7 tracts plus 3 controls were monitored in the summer season of 2009 (see photos below). Tracts will continue to be treated with the appropriate treatment, under the discretion of the site supervisor. Rotation of treatments will be necessary to maintain the proper communities needed for the wildlife utilizing the tracts.

		Treatment (acres)	
		Round-Up and Plateau	Plateau Only
Jasper County	McCormick	10	0
	McCormack	15	8
	Donsbach	10	18
	Mark 40	0	8
	YFM	12	47
	Fuson	40	0
	Otis	20	0
	Donnelley	9	8
	Woods	8	0
	Frohning	0	(not listed)
Marion County	Loy 100	16	0
	Loy 40	10	0
	Bainbridge/Bartels	0	0
	Copple	0	0
	INHS	0	7
	Butler/Guymon	25	0
	Perbix-Lacey II	15	0
Total Treated Acres		**190**	**96**

Table 4a: Table shows the tracts that were treated at both PRSNA Japer County and PRSNA Marion County, what treatment was used and how many acres were treated.

Figure 4a: Mark 40 photoboard, Jasper County. 5 August 2009. The Mark 40 tract was treated with Plateau only.

Figure 4b: Photo-station taken at the Mark 40 tract, facing in the Eastern direction.

Figure 4c: Photo-station taken at the Mark 40 tract, facing in the Northern direction.

Figure 4d: Photo-station taken at the Mark 40 tract, facing in the Southern direction.

Figure 4e: Photo-station taken at the photoboard of the Mark 40 tract, facing in the Western direction.

Figure 4f: YFM photoboard, Japer County, 5 August 2009. The YFM tract was treated with Plateau.

Figure 4g: Photo-station taken at the YFM Plateau treated tract, facing in the Eastern direction.

Figure 4h: Photo-station taken at the photoboard of the YFM Plateau treated tract, facing in the Northern direction.

Figure 4i: Photo-station taken at the photoboard of the YFM Plateau treated tract, facing in the Southern direction.

Figure 4j: Photo-station taken at the photoboard of the YFM Plateau treated tract, facing in the Western direction.

Figure 4k: Illinois Natural History Survey (INHS) photoboard, Marion County, 15 August 2009. Tract treated with Plateau. This tract is also being grazed by cattle.

Figure 4l: Photo-station taken at the photoboard of the Illinois Natural History Survey (INHS) tract, facing in the Eastern direction.

Figure 4m: Photo-station taken at the photoboard of the Illinois Natural History Survey (INHS) tract, facing in the Northern direction.

Figure 4n: Photo-station taken at the photoboard of the Illinois Natural History Survey (INHS) tract, facing in the Southern direction.

Figure 4o: Photo-station taken at the photoboard of the Illinois Natural History Survey (INHS) tract, facing in the Western direction.

Figure 4p: Plateau control photoboard, Jasper County, 5 August 2009. The Plateau control photoboard was located on the YFM tract.

Figure 4q: Plateau control photoboard photo-station located on the YFM tract, facing the Eastern direction.

Figure 4r: Plateau control photoboard photo-station located on the YFM tract, facing the Northern direction.

Figure 4s: Plateau control photoboard photo-station located on the YFM tract, facing the Southern direction.

Figure 4t: Plateau control photoboard photo-station located on the YFM tract, facing the Western direction.

Figure 4u: McCormick photoboard, Jasper County, 5 August 2009. The McCormick tract was treated with both Plateau and Round-Up.

Figure 4v: McCormick photo-station, with the photograph facing in the Eastern direction.

Figure 4w: McCormick photo-station, with the photograph facing in the Northern direction.

Figure 4x: McCormick photo-station, with the photograph facing in the Southern direction.

Figure 4y: McCormick photo-station, with the photograph facing in the Western direction.

Figure 4z: YFM photoboard, Jasper County, 5 August 2009. The YFM tract had both Plateau and Round-Up applied.

Figure 4aa: YFM photo-station, with the photograph facing in the Eastern direction.

Figure 4ab: YFM photo-station, with the photograph facing in the Western direction.

Figure 4ac: McCormick photo-station, with the photograph facing in the Southern direction

Figure 4ad: McCormick photo-station, with the photograph facing in the Western direction.

Figure 4ae: Fuson photoboard, Jasper County, 5 August 2009. Plateau and Round-Up were both applied to the Fuson tract.

Figure 4af-: Fuson photo-station, with the photograph facing in the Eastern direction.

Figure 4ag: Fuson photo-station, with the photograph facing in the Northern direction.

Figure 4ah: Fuson photo-station, with the photograph facing in the Southern direction.

Figure 4ai: Fuson photo-station, with the photograph facing in the Western direction.

Figure 4aj: Butler photoboard, Marion County, 15 August 2009. The Butler tract had both Plateau and Round-Up applied to the tract.

Figure 4ak: Butler photo-station, with the photograph facing in the Eastern direction.

Figure 4al: Butler photo-station, with the photograph facing in the Northern direction.

Figure 4am: Butler photo-station, with the photograph facing in the Southern direction.

Figure 4an: Butler photo-station, with the photograph facing in the Western direction.

Figure 4ao: Plateau and Round-Up control photoboard, Jasper County, 5 August 2009. The Plateau and Round-Up control was located on the Donsbach tract.

Figure 4ap Plateau and Round-Up control photo-station, with the photograph facing in the Eastern direction.

Figure 4aq: Plateau and Round-Up control photo-station, with the photograph facing in the Northern direction.

Figure 4ar: Plateau and Round-Up control photo-station, with the photograph facing in the Southern direction.

Figure 4as: Plateau and Round-Up control photo-station, with the photograph facing in the Western direction.

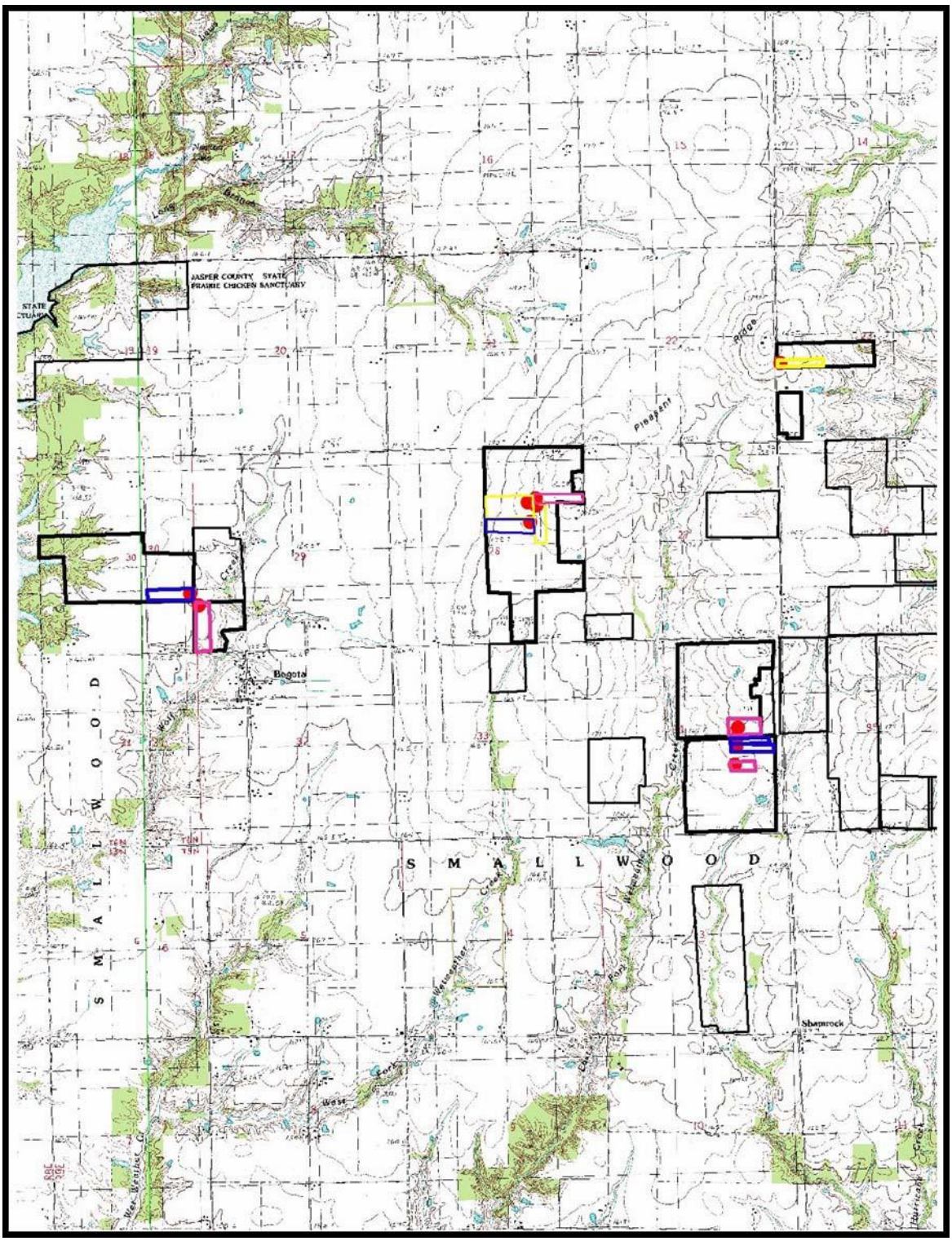

Figure 4at: Topography map showing the tracts of Prairie Ridge State Natural Area, Jasper County. The blue outlines are tracts treated with fertilizer and limestone. The pink outlines are tracts treated with Plateau and Round-Up. The yellow outlines are tracts that were treated with Plateau only. The red dots indicate locations of the photo-stations.

Project 5: Application of fertilizer and agricultural limestone at Prairie Ridge State Natural Area

Introduction

Prairie Ridge State Natural Area promotes one of the largest breeding populations of the Illinois State Endangered Greater Prairie Chicken. Brood and nesting coverage is critical in order for this species to survive in the open grassland. Increasing soil nutrients with limestone and nitrogen provides a thicker grass stand, thus better coverage for this species and all grassland dependent species. For these reasons, 100 pounds of actual nitrogen, phosphorous and potassium, plus 2Tag limestone, per acre was applied to the 75.3 acres at PRSNA, Jasper County and Marion County, prior to 30 November 2007.

Method

Three tracts, all in Jasper County, were visited in the summer of 2009 to monitor the effects of fertilizer and agricultural limestone application. One tract, located in Jasper County, was monitored as a control site. A photoboard was used at all three treatment sites and the control site. One photograph was taken in the northern direction with the photoboard being placed in the center of the camera frame. Photographs were then taken in each of the cardinal directions.

Ending Statements / Summary

7 tracts with a total of 73.5 acres were treated with fertilizer and agricultural limestone. Of these 7 tracts, 3 tracts and one control tract were monitored in the summer season of 2009 (see photos below). Tracts will continue to be treated with the appropriate treatment, under the discretion of the site supervisor. Rotation of treatments will be required to maintain the proper communities necessary for the wildlife utilizing the tracts. When fields get over-run with fescue, the fescue will continue to be sprayed and/or disked out, with fertilizer and agricultural limestone then being applied. Fertilizer and agricultural limestone increase soil fertility, thus providing increased nesting cover.

		Treatment (acres)
		Fertilizer/ Limestone
Jasper County	McCormick	10
	McCormack	0
	Donsbach	7
	Mark 40	0
	YFM	5
	Fuson	7
	Otis	7
	Donnelley	0
	Woods	0
	Frohning	0
Marion County	Loy 100	0
	Loy 40	0
	Bainbridge/Bartels	7.5
	Copple	15
	INHS	0
	Butler/Guymon	15
	Perbix-Lacey II	0
		73.5

Table 5a: Table above lists tracts in PRSNA Jasper County and PRSNA Marion County, as well as acreage that had fertilizer and limestone applied in 2007.

Figure 5a: Donsbach photoboard, Jasper County, 5 August 2009. The Donsbach tract was treated with fertilizer and agricultural limestone. Following the disking out of the fescue, the tract was then reseeded to Timothy.

Figure 5b: Donsbach photo-station facing the Eastern direction.

Figure 5c: Donsbach photo-station facing the Northern direction.

Figure 5d: Donsbach photo-station facing the Southern direction.

Figure 5e: Donsbach photo-station facing the Western direction.

Figure 5f: Fuson photoboard, Jasper County, 5 August 2009. The Fuson tract was treated with fertilizer and agricultural limestone. This treatment followed the disking out of weedy goldenrod and fescue, the tract was then reseeded to Timothy.

Figure 5g: Fuson photo-station facing the Eastern direction.

Figure 5h: Fuson photo-station facing the Northern direction.

Figure 5i: Fuson photo-station facing the Southern direction.

Figure 5j: Fuson photo-station facing the Western direction.

Figure 5k: YFM photoboard, Jasper Couty, 5 August 2008. The YFM tract was treated with both fertilizer and agricultural limestone. The field was a fescue field prior to the disking and was then reseeded to Timothy.

Figure 5l: YFM photo-station facing the Eastern direction.

Figure 5m: YFM photo-station facing the Northern direction.

Figure 5n: YFM photo-station facing the Southern direction.

Figure 5o: YFM photo-station facing the Western direction.

Figure 5p: Fertilizer and limestone control photoboard, Jasper County, 5 August 2009. The fertilizer and limestone control tract, located on the Donsbach tract, is being used as the control for all fields that were treated with fertilizer and limestone. This tract had no fertilizer and limestone applied to the field. This control tract was a weedy fescue field at the time that the other fertilizer and limestone tracts on the NRDA monitoring contract had the treatment applied.

Figure 5q: Fertilizer and limestone control photo-station facing the Eastern direction.

Figure 5r: Fertilizer and limestone control photo-station facing the Northern direction.

Figure 5s: Fertilizer and limestone control photo-station facing the Southern direction.

Figure 5t: Fertilizer and limestone control photo-station facing the Western direction.

Project 9: Natural Community Restoration at Red Hills Woods Nature Preserve, Chauncey Marsh Nature Preserve, Miller Shrub Swamp Nature Preserve and Ping's Prairie.

Project Introduction

Natural community restoration is necessary in many natural communities located in Illinois. Exotics and invasive woody species can be detrimental to both the flora and fauna found in any type of community. Many of these natural areas that were treated in this NRDA project are rare community types, and woody encroachment can change the composition of the site forever. Contractors were hired for the removal of exotic and invasive woody species, thus improving forested, prairie, wetland and old field communities. Lance injection, basal barking or cut stump application of chemicals were used to treat the invasive and exotic species. If ground conditions were wet, Rodeo was to be applied instead. All work was completed prior to 30 December 2008.

Red Hills Woods Nature Preserve

Methods

Red Hills Woods Nature Preserve was visited once during the monitoring season of summer 2009. A photo-station was placed near the center of the preserve, with photographs being taking in each of the cardinal directions. General community descriptions were noted at the site.

Ending Statements/Summary

Red Hills Woods Nature Preserve was monitored in August of 2009. Hickory and Sassafras cut stumps were obvious at the site, thus enabling more light to enter onto the forest floor. Elm seedlings are thick in the preserve and could be a potential problem in the future. The general herbaceous community includes green dragon, poison ivy, blackberry, wild yam, boneset, carex species, mayapple, bedstraw, Virginia creeper, Indian physic, violet species, and aster specie. Sassafras and hickory seedlings are also apparent on the forest floor. Overstory tree composition consists of hickories, White Oak, American Elm, and Sassafras. Recommended follow-up treatment would be prescribed burning to set back the elm seedlings, as well as the hickory and sassafras seedlings that will definitely present a problem in the future.

Figure 9a: Red Hills Woods Nature Preserve photo-station. Photograph was taken towards the East.

Figure 9b: Red Hills Woods Nature Preserve photo-station. Photograph was taken towards the North.

Figure 9c: Red Hills Woods Nature Preserve photo-station. Photograph was taken towards the South.

Figure 9d: Red Hills Woods Nature Preserve photo-station. Photograph was taken towards the West.

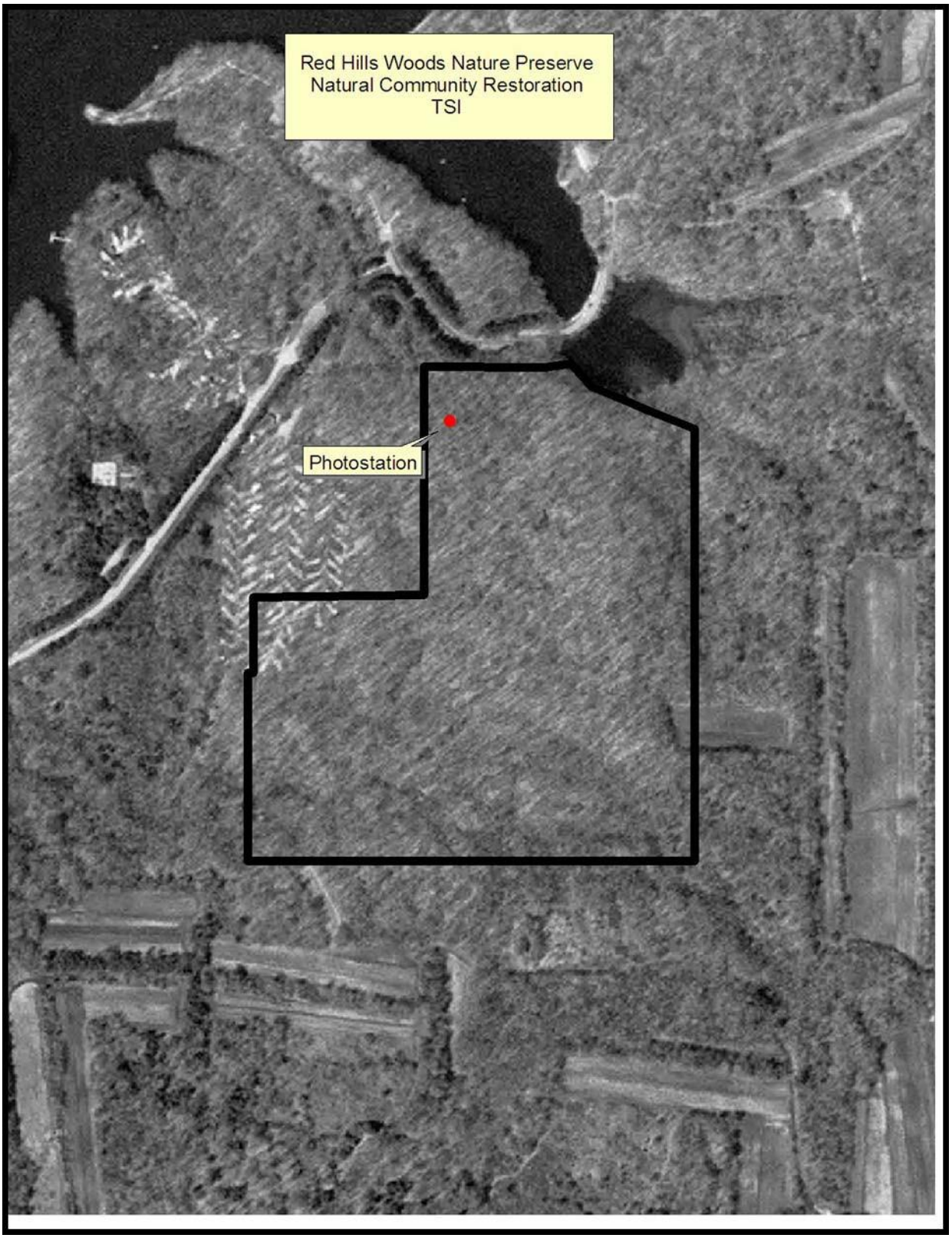

Figure 9e: Aerial photograph showing boundary of the Red Hills Woods Nature Preserve TSI. The red dot represents the location of the photo-station.

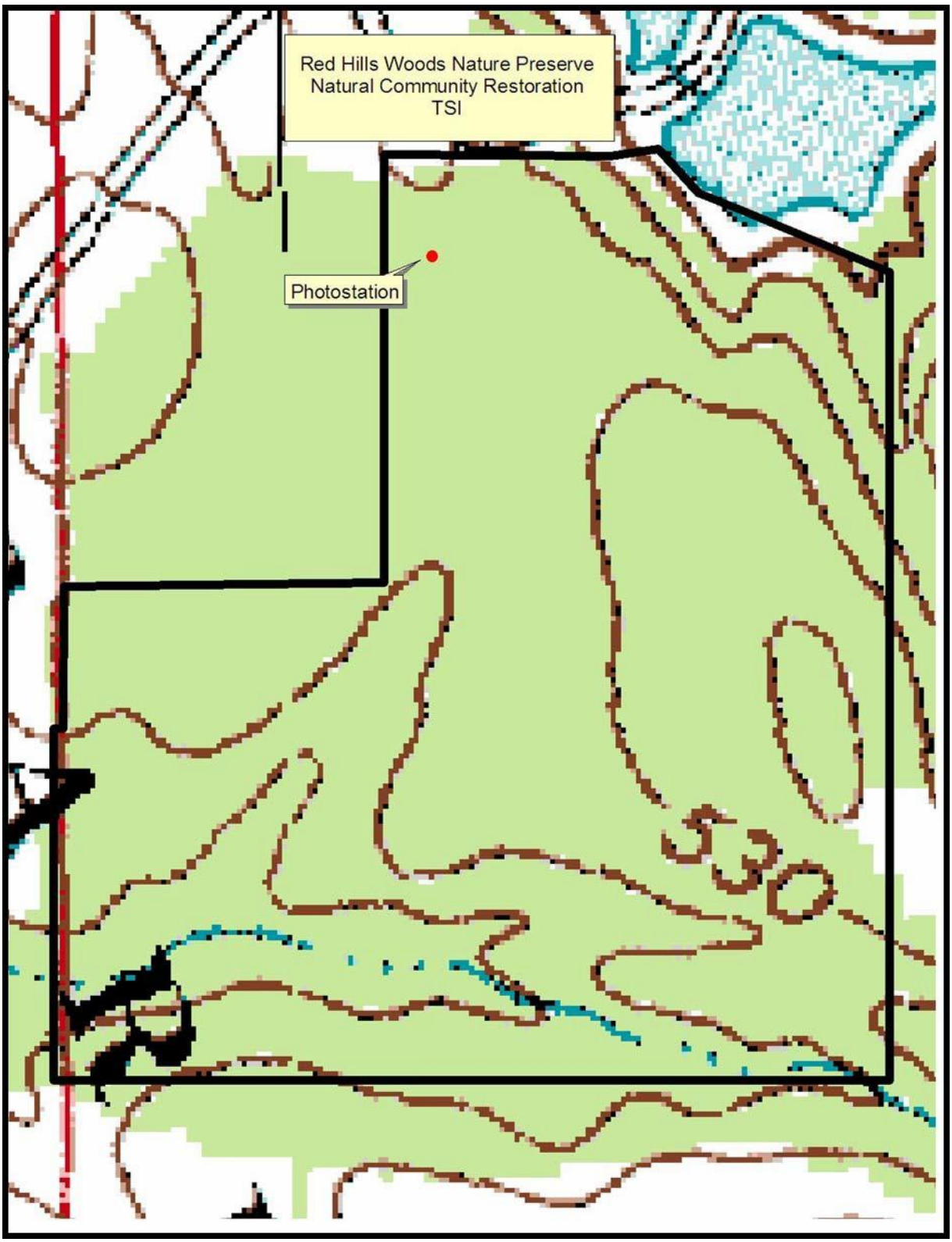

Figure 9f: Topography map showing boundary of the Red Hills Woods Nature Preserve TSI. The red dot represents the location of the photo-station.

Chauncey Marsh Nature Preserve

Methods

Chauncey Marsh Nature Preserve was visited 7 August 2009. Due to the excessive amount of rainfall during the summer season, the Marsh was too wet to walk through, thus the photo-station was taken along the west side of the marsh on the gravel roadway. Multiple pictures were then taken along the access road to allow for a better visual of the treatment. Willow mortality was obvious; however, re-sprouting was not able to be observed due to the high water. The following photographs show the dead willow trees.

Ending Statements/Summary

Chauncey marsh was visited once during the summer monitoring project. The marsh was extremely healthy, with large button bush and hibiscus plants. Willow mortality was extremely high, although re-sprouting was not able to be monitored. There were some willow plants that had either been missed or that the herbicide did not kill, however the results of the contractor's work was extremely beneficial to the community.

Figure 9g: Chauncey Marsh, photograph shows willow mortality.

Figure 9h: Chauncey Marsh, photograph shows dead willow limbs in the background.

Figure 9i: Chauncey Marsh, photograph shows willow mortality.

Figure 9j: Chauncey Marsh, photograph showing dead willow limbs.

Figure 9k: Chauncey Marsh. Panoramic photograph showing a larger extent of willow mortality with marsh in the foreground and larger trees in the background.

Figure 9l: Chauncey Marsh, photograph showing willow mortality in the foreground and willow survivability in the background.

Figure 9m: Chauncey Marsh, photograph showing willow mortality.

Figure 9n: Chauncey Marsh, photograph showing larger willow trees in the far background.

Figure 9o: Chauncey Marsh, photograph showing small willow in foreground.

Figure 9p: Chauncey Marsh photograph showing small willow trees.

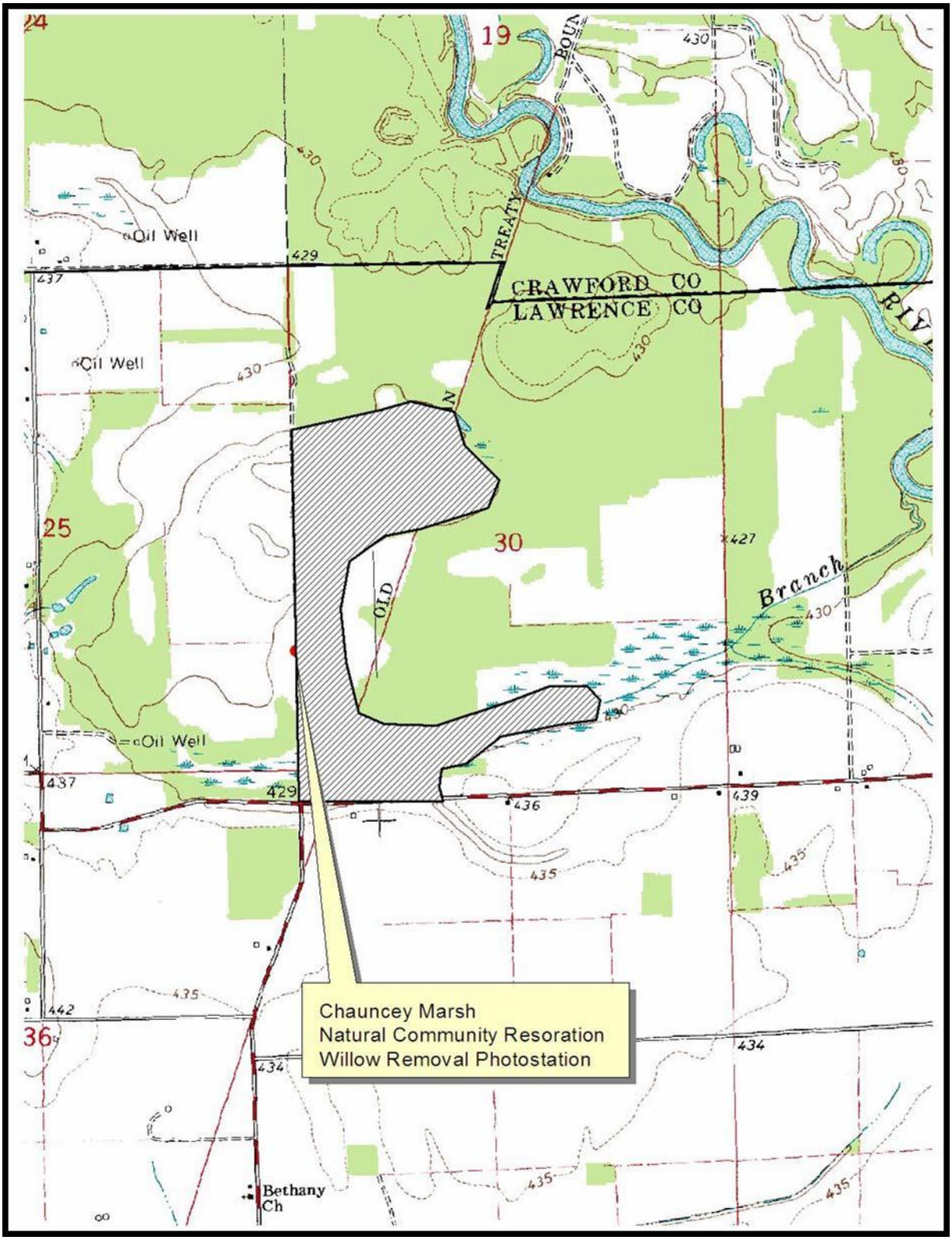

Figure 9q: Topography map showing boundary of the Chauncey Marsh willow removal. The red dot represents the location of the photo-station.

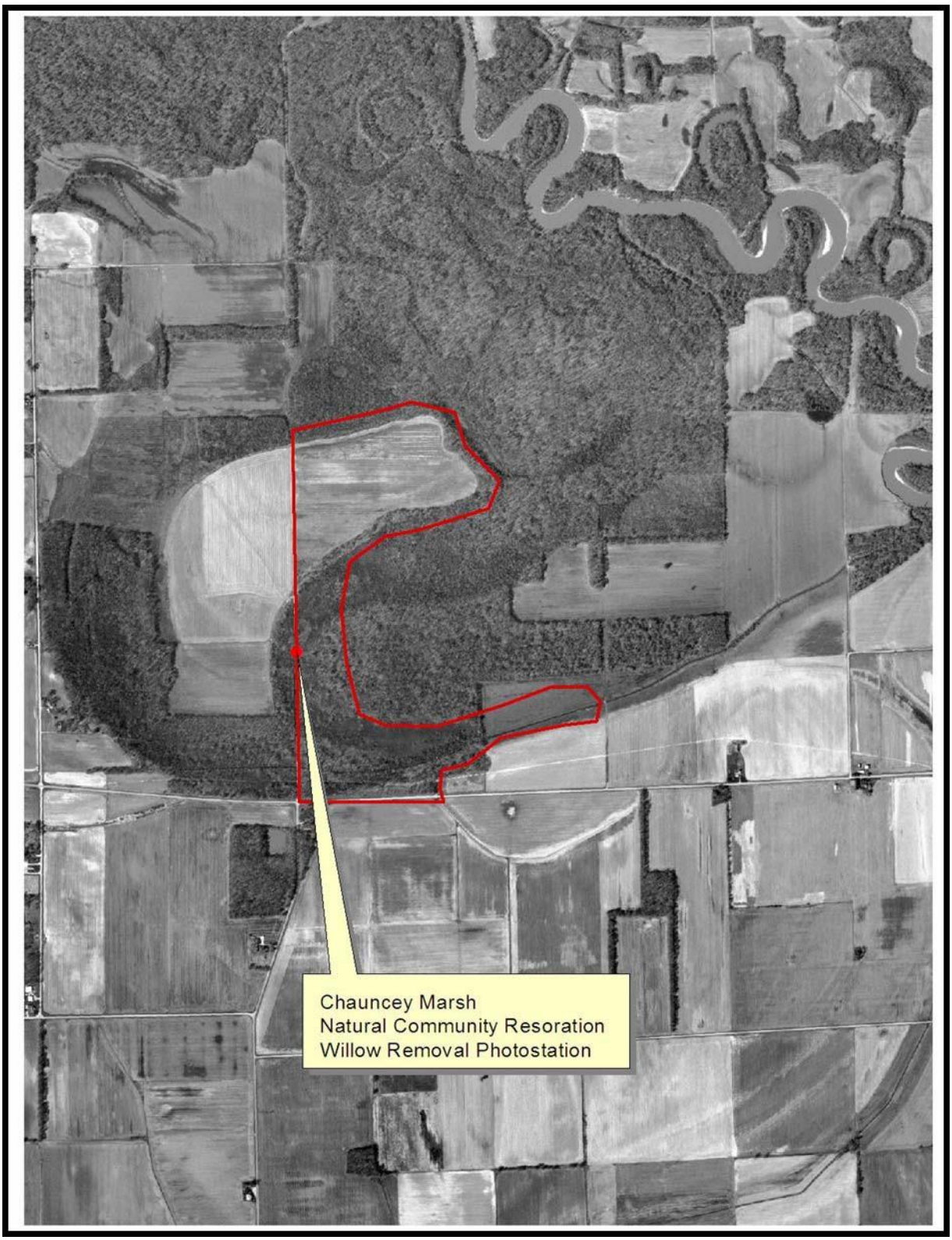

Figure 9r: Aerial photograph showing boundary of the Chauncey Marsh willow removal. The red dot represents the location of the photo-station.

Miller Shrub Swamp Nature Preserve

Methods

Miller Shrub Swamp Nature Preserve was monitored on 12 August 2009. Due to the high water, the center of the swamp was unable to be seen. No photographs were taken due to camera malfunction. Due to overcast skies and large canopy trees, no satellites were found for the GPS.

Ending Statements/Summary

Miller Shrub Swamp was unable to be studied due to high water levels and tall button bush surrounding the perimeter. In the thinner spots, the button bush allowed only little parts of the center to be seen, there were no willow trees spotted. No photographs were able to be taken, however ArcView GIS was used to identify where the work had been completed.

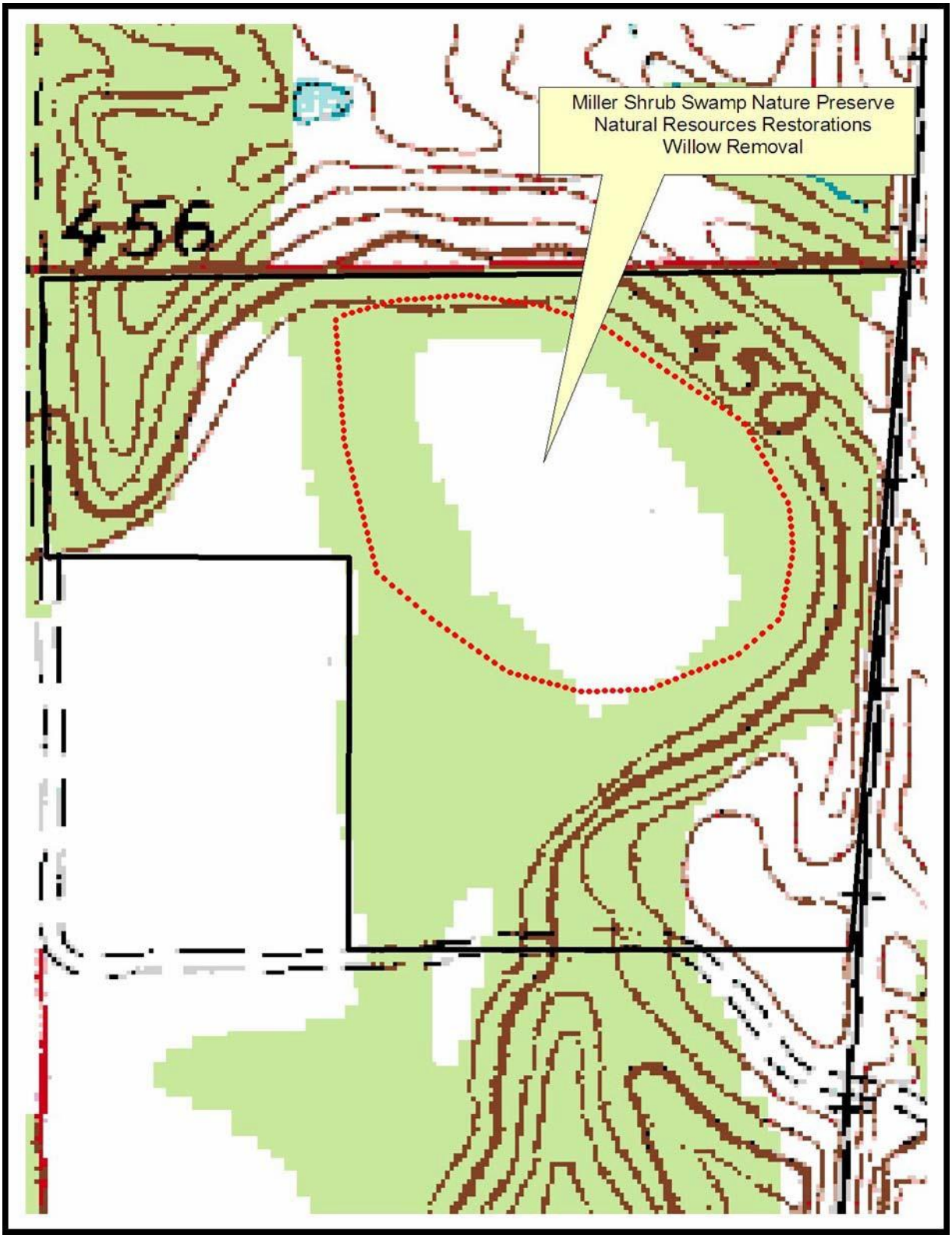

Figure 9s: Topography map of Miller Shrub Swamp. Black outline is the boundary of the swamp. Red outline maps the project area.

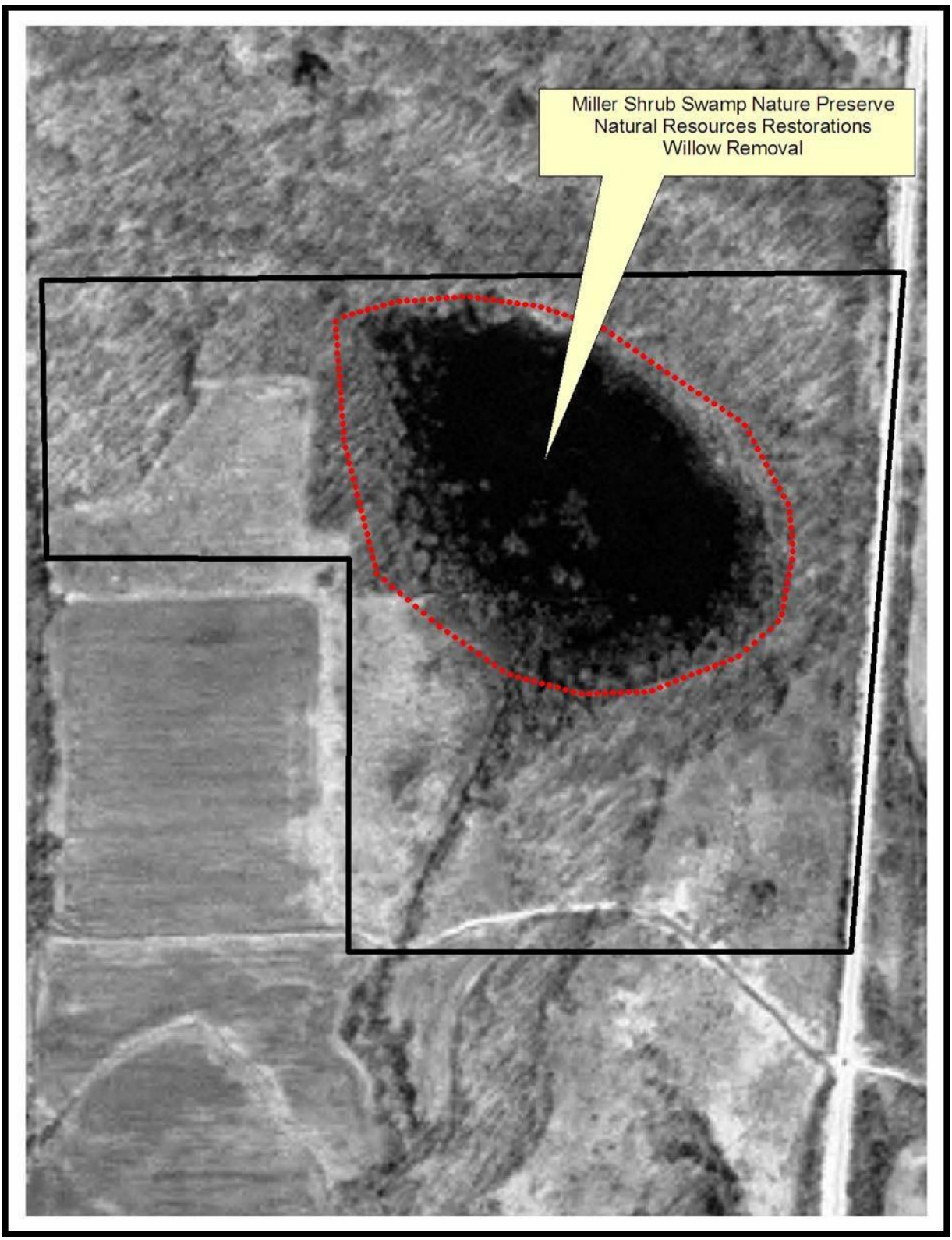

Figure 9t: Aerial photograph of Miller Shrub Swamp. Black outline is the boundary of the swamp. Red outline maps the project area.

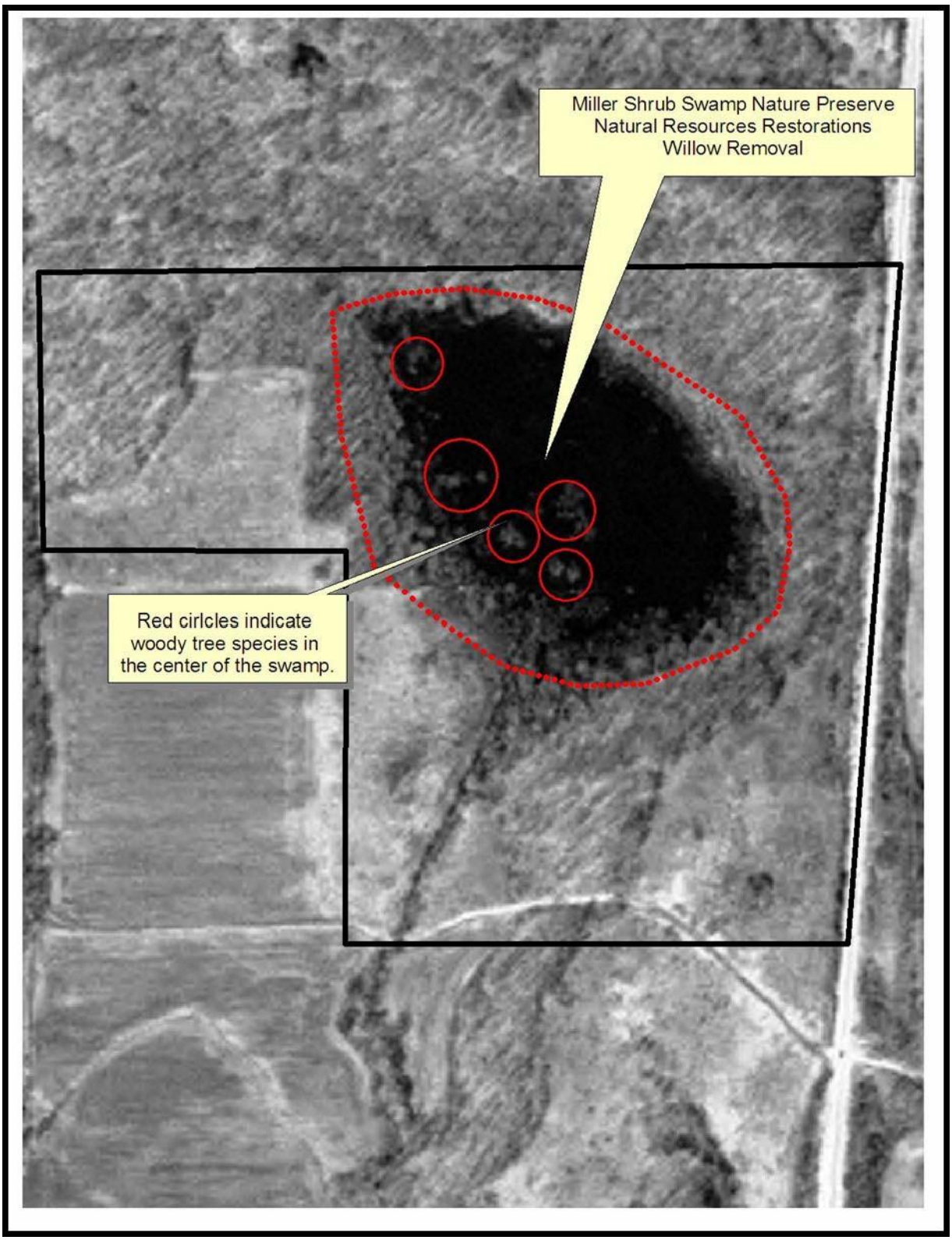

Figure 9u: Topography map Miller Shrub Swamp. Black outline is the boundary of the swamp. Red outline maps the project area. The dotted red outlines the areas of willows that were treated in the swamp.

Ping's Prairie

Methods

Ping's Prairie was visited 22 June 2009. Contractors were hired to remove sassafras, which had started to encroach on the open areas of the hill prairie. A photo-station was placed near the center. One photograph was taken in each of the cardinal directions.

Ending Statements/Summary

Sassafras mortality was obvious throughout the project area on the hill prairie. This site was burnt during the prescribed burning season in 2009, thus it is reasonable to say that some of the sassafras mortality is due to the fire, and not the EZject herbicide treatment. The EZject herbicide treatment, however, was extremely successful on the sassafras trees that were encroaching into the open areas of the hill prairies; this was evident before the prescribed burning took place. Recommendations for this site would be to continue practicing prescribed burning and to provide a follow-up treatment to the sassafras trees that were missed during the initial treatment.

Figure 9v: Ping's Prairie sassafras removal project photo-station. Photograph was taken in the Eastern direction. Notice the dead sassafras trees near the bottom of the hill.

Figure 9w: Ping's Prairie sassafras removal project photo-station. Photograph was taken looking towards the North. Notice the dead sassafras trees and the grasses growing up through the trees.

Figure 9x: Ping's Prairie sassafras removal project photo-station. Photograph was taken looking towards the South. Notice the dead sassafras trees and the grasses growing up through the trees.

Figure 9y: Ping's Prairie sassafras removal project photo-station. Photograph was taken looking towards the West.

Figure 9z: Ping's Prairie sassafras removal. Photograph taken from the Northeast corner of hill prairie showing a larger portion of the dead sassafras trees.

Figure 9aa: Ping's Prairie sassafras removal. Photograph taken from the West side of hill prairie showing a mere portion of the dead sassafras trees.

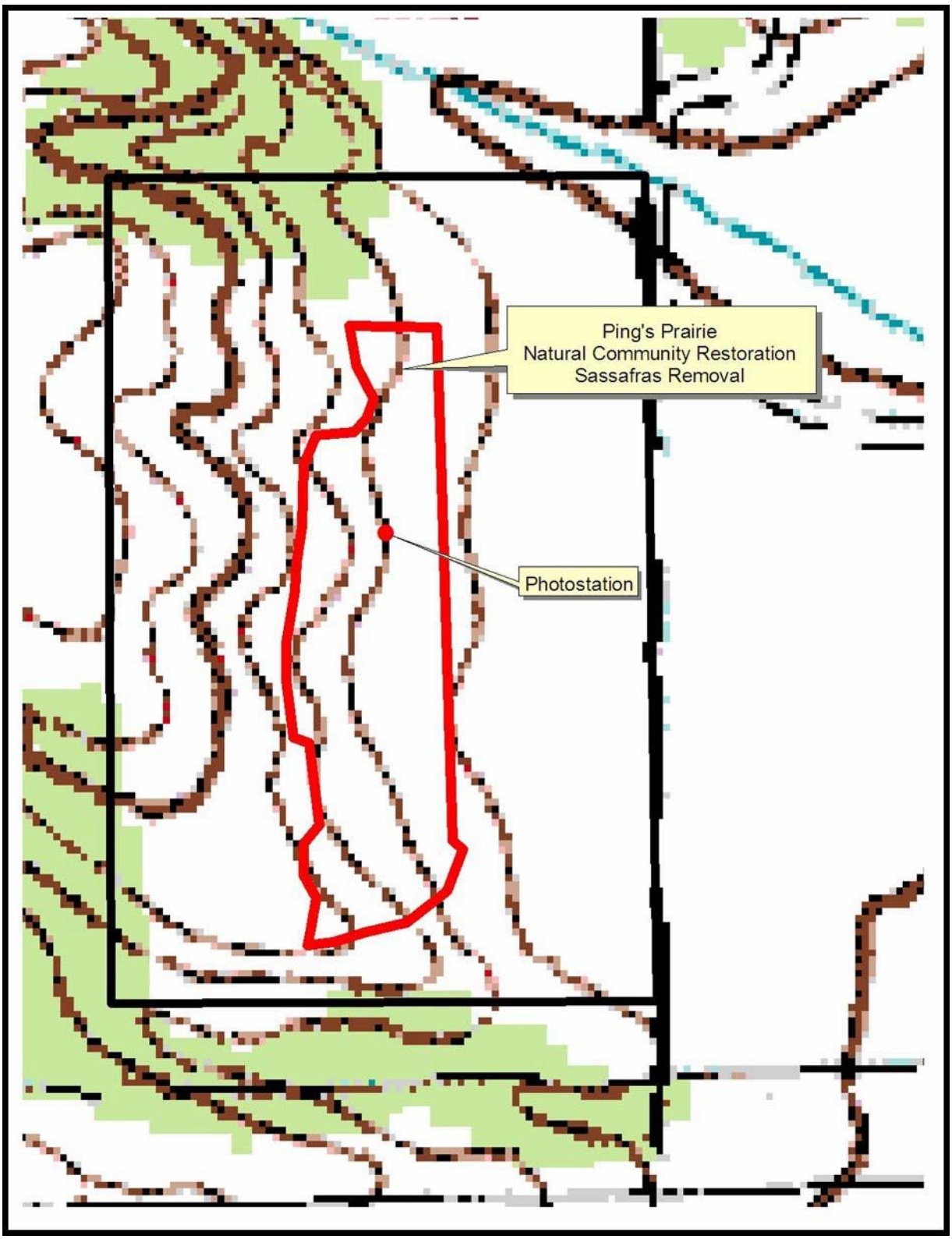

Figure 9ab: Topography map of Ping's Prairie project. Black outline is the boundary of Ping's Prairie. Red outline maps the project area; red dot maps the location of the photo-station.

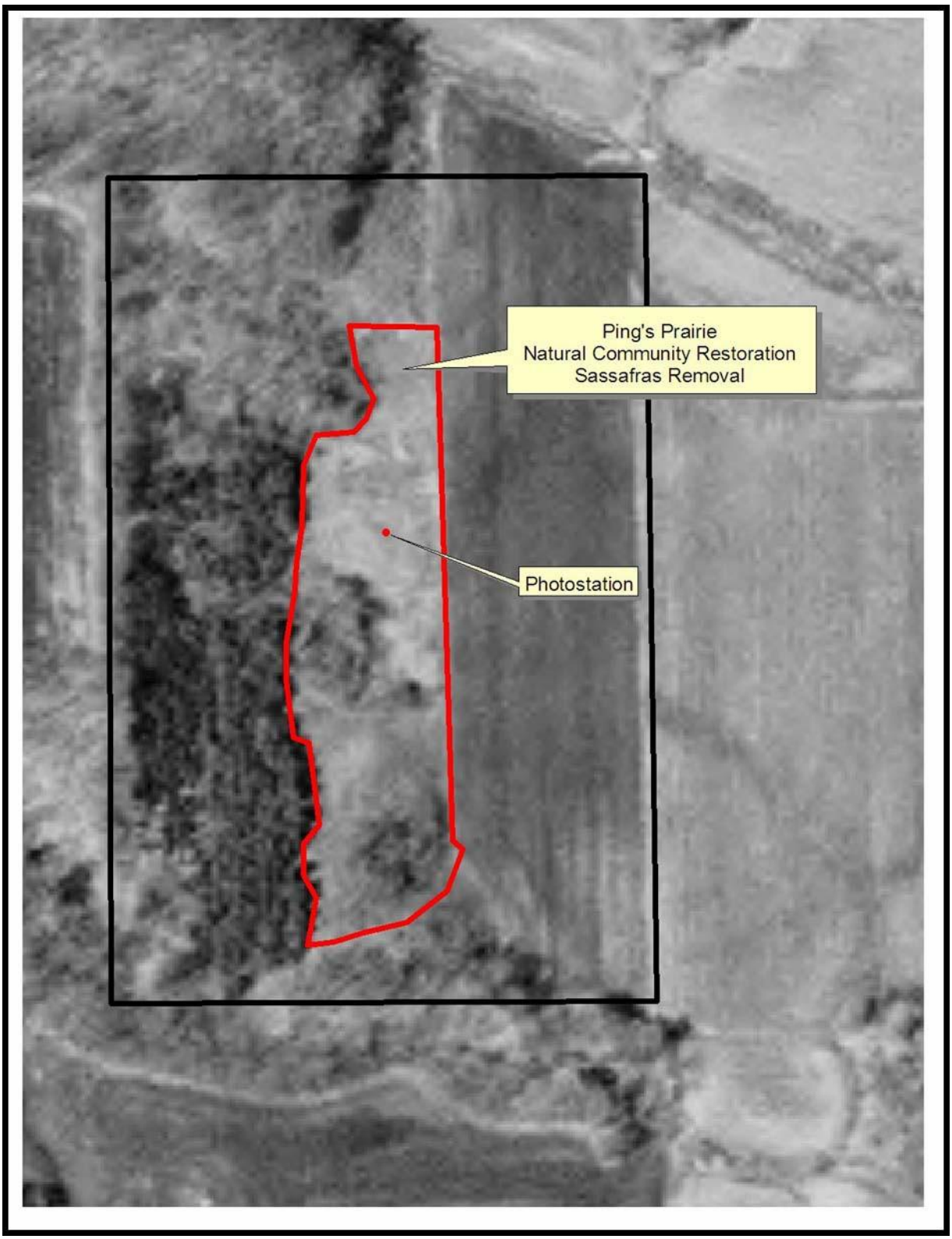

Figure 9ac: Aerial photograph of Ping's Prairie project. Black outline is the boundary of Ping's Prairie. Red outline maps the project area; red dot maps the location of the photo-station.

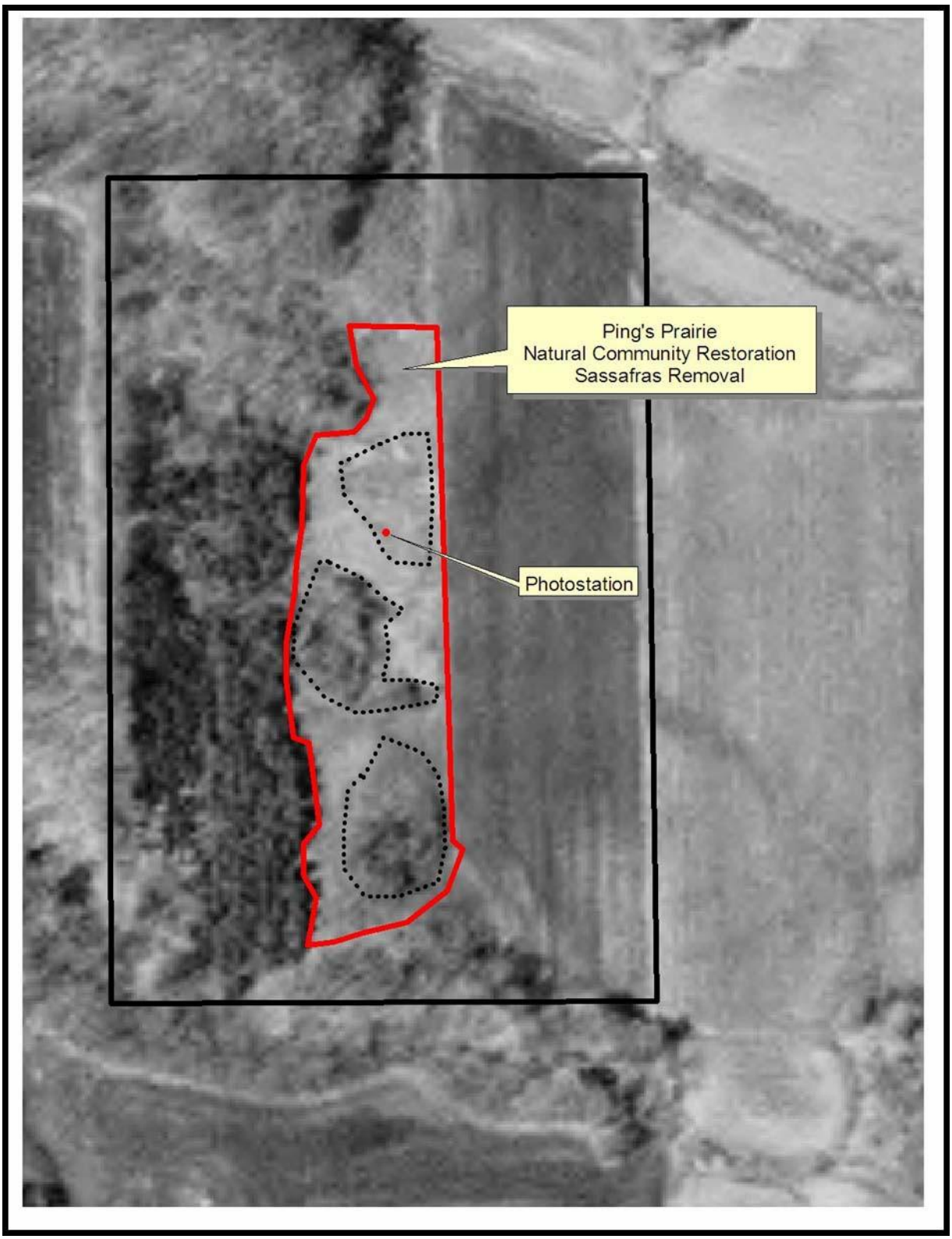

Figure 9ad: Aerial photograph of Ping's Prairie project. Black outline is the boundary of Ping's Prairie. Red outline maps the project area; red dot maps the location of the photo-station. The black dotted line represents the location of the sassafras trees that were treated and killed with the EZ-ject lance.

Project 10: Natural Community Restoration for Stephen A. Forbes State Park, Red Hills State Park, Sam Parr State Park, Wildcat Hollow Habitat Area, and Crawford County Conservation Area.

Introduction

Natural community restoration is necessary in many of the natural communities located in Illinois. The type of species present in a community depicts what kind of forest or woodland is present. Without prescribed burning and other management efforts, many forested areas will go through succession. As time goes on, canopy trees get larger and the understory becomes shaded. The understory tree composition will convert over to shade tolerant species such as hickory, sassafras and sugar maple. These species shade out the forest floor and often times prevent any herbaceous communities from surviving. TSI, or timber stand improvement, can be used to thin out the hickory, sassafras and sugar maples and allow oak regeneration and herbaceous plants to survive. Lance injection, basal barking or cut stump application of chemicals were used to treat the woody species. If ground conditions were wet, Rodeo was to be applied instead. All work was completed prior to 30 December 2008.

Over-all Methods

All sites except for the Wildcat Hollow Habitat Area and the Crawford County Conservation Area were visited during the 2009 monitoring season. A photo-station was placed at each monitoring site, general plant community descriptions were made, and overall summary of the project work was observed.

Forbes State Park and Sam Parr State Park Methods

A GPS system was used to determine the boundary of the project area. One sampling plot was used for Sam Parr State Park and three plots were used for Forbes State Park. A photo-station was used as the center of the plot, with photographs being taken in each of the cardinal directions. A transect of 15m will be placed in each of the cardinal directions. The center of three circular plots, varying in diameter, will be placed at the end of each 15m line. The overstory and large sapling category plot will be 5.52m radius. The small sapling category plot will be 1.78m radius. The seedlings and herbaceous category will have 5 - 1m² plot. Each seedling and herbaceous plot will consist of one 1m² plot in the center and four 1m² plots in each of the cardinal directions. This sampling

method will be conducted at the end of each of the 15m lines in the four cardinal directions, as well as at the center plot (the photo-station). See figure 10a. In each sampling plot the seedlings, saplings and overstory trees will be identified and DBH recorded. All the cut stumps will also be identified and have DBH recorded; this will allow for an idea of what the site looked like before the treatment started.

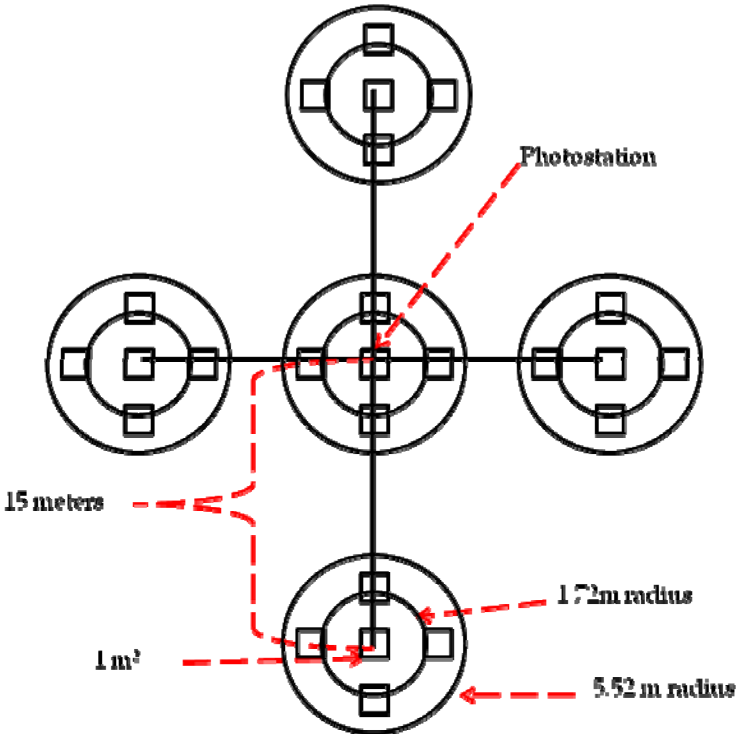

Figure 10a: Chart representing the structural design of the TSI sampling methodology used at Forbes State Park and at Sam Parr State Park.

Results for Sam Parr State Park

Sam Parr State Park was sampled using the above described sampling technique on 1 July 2009. In the overstory sampling plot (the 5.52m radius plot) basal area, the total number of trees, tree density, relative density, relative basal area and the importance values were all lower after the treatment was finished (see table 10a). The understory sampling plot, consisting of sugar maple, hickory species and sassafras also saw a decrease in total stem density after the treatment was finished at the Sam Parr State Park project site (tables 10b and 10c). Tables 10b and 10c show the difference of sugar maple density in the 5.52m and the 1.78 m plots. There was no record of herbaceous layer prior to the treatment.
Table 10d shows the plant species and the number of plants that were found in the twenty-five herbaceous plots.

	Basal area	Number of trees	Density (trees/ha)	Relative density	Relative basal area	Importance value
	Pre-Treatment					
Hickory	0.545	12	240.0	21.4	3.7	3.7
Sugar Maple	0.878	38	760.0	67.9	5.9	5.9
Post Oak	0.612	2	40.0	3.6	4.1	4.1
American Elm	0.190	7	140.0	12.5	1.3	1.3
Hackberry	0.051	2	40.0	3.6	0.3	0.3
White Oak	0.057	1	20.0	1.8	0.4	0.4
Totals	**2.333**	**62**	**1240.0**	**110.7**	**15.6**	**15.6**
	Post-Treatment					
Hickory	0.545	4	80.0	7.1	3.7	3.7
Sugar Maple	0.450	20	400.0	35.7	3.0	3.0
Post Oak	0.612	2	40.0	3.6	4.1	4.1
American Elm	0.190	7	140.0	12.5	1.3	1.3
Hackberry	0.051	2	40.0	3.6	0.3	0.3
White Oak	0.057	1	20.0	1.8	0.4	0.4
Totals	**1.906**	**36**	**720.0**	**64.3**	**12.8**	**12.8**

Table 10a: Table showing the pre and post- treatment values of basal area, total number of trees, tree density, relative density, relative basal area and importance value of overstory tree species at the Sam Parr State Park project site.

Species	5.62 m radius ≥2.50 - 9.99 cm	1.78 m radius > 50 cm tall - 2.49 cm dbh
Sugar Maple	27	17
Hickory spp.	2	2
Sassafras		1
Number of stems	29	20
Number of stems per hectacre	580	4000

Table 10b: Table showing the pre-treatment data of the understory sampling plots at Sam Parr State Park project site.

Species	5.62 m radius ≥2.50 - 9.99 cm	1.78 m radius > 50 cm tall - 2.49 cm dbh	<50 cm tall (56.2 cm m radius)				
			Subplot 1	Subplot 2	Subplot 3	Subplot 4	Subplot 5
Sugar Maple	11	13	15	12	12	11	10
Hickory spp.	2	2	1	2	3	4	2
Sassafras		1		1	1		
Number of stems	13	16					74
Number of stems per hectacre	260	3200				Totals	29600

Table 10c: Table showing the post-treatment data of the understory sampling plots at Sam Parr State Park project site.

Species	Total Number of stems
Jack in the Pulpit	40
Touch Me Not	38
False Solomon's Seal	30
Virginia Creeper	21
White Snakeroot	20
Coralberry	14
Trillium	9
Fern spp	6
Wild Yam	6
Poison Ivy	5
Wild Garlic	4
Carex spp.	3
Japanese Honeysuckle	1
Oxalis Spp.	1
Poke Weed	1

Table 10d: List of all species found within the twenty-five 1m² square plots.

Figure 10b: Photograph from the Sam Parr State Park photo-station facing in the Northern direction.

Figure 10c: Photograph from the Sam Parr State Park photo-station, facing towards the East.

Figure 10d: Photograph from the Sam Parr State Park photo-station facing in the Western direction.

Figure 10e: Photograph from the Sam Parr State Park photo-station facing towards the Southern direction.

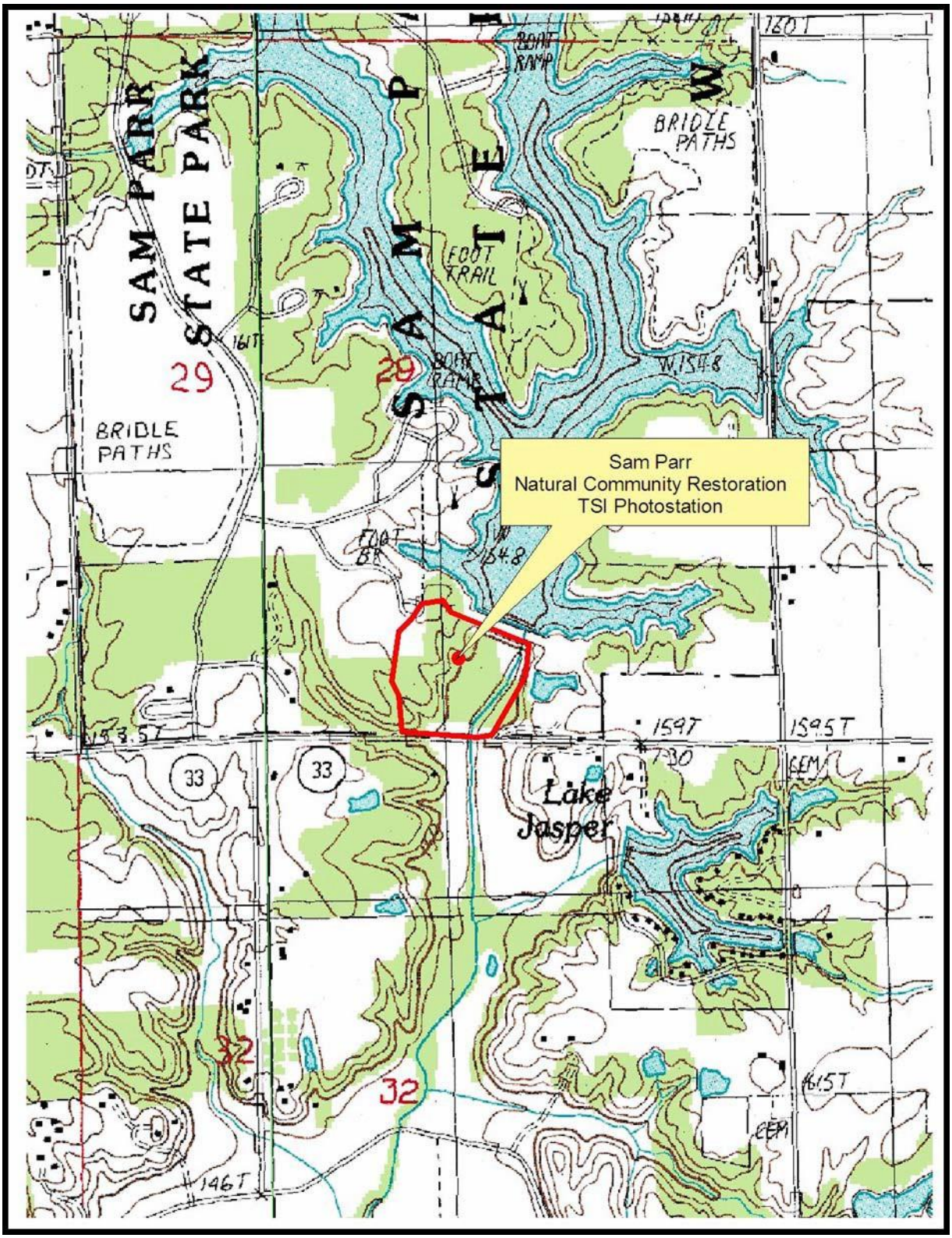

Figure 10f: Topography Map of Sam Parr State Park. The red outline represents the TSI work area, the red dot represents the photo-station location.

Figure 10g: Aerial photography of Sam Parr State Park. The red outline represents the TSI work area; the red dot represents the photo-station location.

Results from Stephen Forbes State Park

Stephen Forbes State Park was sampled on 17 August 2009 using the sampling techniques that have been described in a previous paragraph. In the overstory sampling plot (the 5.52m radius plot) the basal area, the total number of trees, tree density, relative density, relative basal area and the importance values were all lower after the treatment of removing hickory trees was finished (see table 10e). The understory sampling plot, consisting of sugar maple, hickory species, oak species, American Elm and sassafras, also saw a decrease in total stem density after the treatment was finished at the Stephen Forbes State Park project site (tables 10f and 10g). Due to the fact that no monitoring of the site occurred prior to the treatment funded by the NRDA, there was no record of herbaceous layer prior to the treatment. Table 10h shows the plant species and the number of plants that were found in the twenty-five herbaceous plots.

	Plot 1						Plot 2						Plot 3					
	Pre-Treatment																	
	Basal area	Number of trees	Density (trees/ha)	Relative density	Relative basal area	Importance value	Basal area	Number of trees	Density (trees/ha)	Relative density	Relative basal area	Importance value	Basal area	Number of trees	Density (trees/ha)	Relative density	Relative basal area	Importance value
Hickory	0.419	26	520.0	51.0	19.8	35.4	0.376	23	460.0	42.6	21.4	32.0	0.277	23	460.0	43.4	19.2	31.3
Sugar Maple	0.057	4	80.0	7.8	2.7	5.3	0.016	2	40.0	3.7	0.9	2.3	0.096	10	200.0	18.9	6.6	12.8
Red Oak	0.985	9	180.0	17.6	46.4	32.0	0.436	5	100.0	9.3	24.8	17.0	0.362	4	80.0	7.5	25.0	16.3
White Oak	0.635	9	180.0	17.6	29.9	23.8	0.887	19	380.0	35.2	50.4	42.8	0.692	14	280.0	26.4	48.0	37.2
Black Oak	0.008	1	20.0	2.0	0.4	1.2	0.000	0	0.0	0.0	0.0	0.0	0.000	0	0.0	0.0	0.0	0.0
Elm	0.010	1	20.0	2.0	0.4	1.2	0.008	1	20.0	1.9	0.4	1.1	0.000	0	0.0	0.0	0.0	0.0
Sassafrass	0.010	1	20.0	2.0	0.4	1.2	0.037	4	80.0	7.4	2.1	4.7	0.017	2	40.0	3.8	1.2	2.5
Totals	**2.123**	**51**	**1020.0**	**100.0**	**100.0**	**100.0**	**1.759**	**54**	**1080.0**	**100.0**	**100.0**	**100.0**	**1.444**	**53**	**1060.00**	**100.00**	**100.0**	**100.0**
	Post-Treatment																	
Hickory	0.198	10	200.0	33.3	10.8	22.1	0.231	23	460.0	42.6	13.1	27.9	0.142	23	460.0	43.4	9.9	26.6
Sugar Maple	0.000	0	0.0	0.0	0.0	0.0	0.000	2	40.0	3.7	0.0	1.9	0.017	10	200.0	18.9	1.2	10.0
Red Oak	0.985	9	180.0	30.0	53.7	41.8	0.436	5	100.0	9.3	24.8	17.0	0.362	4	80.0	7.5	25.0	16.3
White Oak	0.635	9	180.0	30.0	34.6	32.3	0.887	19	380.0	35.2	50.4	42.8	0.692	14	280.0	26.4	48.0	37.2
Black Oak	0.008	1	20.0	3.3	0.4	1.9	0.000	0	0.0	0.0	0.0	0.0	0.000	0	0.0	0.0	0.0	0.0
Elm	0.010	1	20.0	3.3	0.5	1.9	0.008	1	20.0	1.9	0.4	1.1	0.000	0	0.0	0.0	0.0	0.0
Sassafrass	0.000	0	0.0	0.0	0.0	0.0	0.000	4	80.0	7.4	0.0	3.7	0.000	2	40.0	3.8	0.0	1.9
Totals	**1.835**	**30**	**600**	**100.0**	**100.0**	**100.0**	**1.562**	**54**	**1080.0**	**100.0**	**88.8**	**94.4**	**1.214**	**53**	**1060.00**	**100.00**	**84.1**	**92.0**

Table 10e: Table showing the pre and post-treatment values of basal area, total number of trees, tree density, relative density, relative basal area and importance value of overstory tree species at the Stephen Forbes State Park site.

Pre-Treatment Data						
	Plot			Plot		
	1	2	3	1	2	3
Species	5.62 m radius >2.50 - 9.99 cm			1.78 m radius > 50 cm height - 2.49 cm dbh		
Elm		2	2			1
Hickory - Dead	31	17	5			
Hickory - Alive	9	19	29	16	7	14
Oak	1	2	6	4	5	1
Sassafrass - dead	3	1		3		
Sassafrass - alive						
Sugar Maple - Dead	2	3	8		2	
Sugar Maple - Alive	1		4			3
Number of stems	47	44	54	23	14	19
Number of Stems per hectacre	940	880	1080	4600	2800	3800

Table 10f: Table showing pre-treatment data from the understory sampling plots at Stephen Forbes State Park.

Post-Treatment Data																					
	Plot			Plot			Plot			Plot			Plot			Plot			Plot		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Species	5.62 m radius ≥2.50 - 9.99 cm			1.78 m radius > 50 cm height - 2.49 cm dbh			<50 cm tall (56.2 cm m radius)														
							Subplot 1			Subplot 2			Subplot 3			Subplot 4			Subplot 5		
Elm		2	2			1			1									1			
Hickory - Alive	9	19	29	16	7	14	17	9	6	18	11	15	17	12	10	12	8	8	9	6	7
Oak	1	2	6	4	5	1	7	4	4	7	6	3	2	5	4	3	3	3	3	2	1
Sassafrass - alive							1		3	4		0	0		2	2	1	3	0		0
Sugar Maple - Alive	1		4			3	3	0	2	2	0	1	0	0	0	1	0	2	0	0	0
Number of stems	11	23	41	20	12	19	28	13	16	31	17	19	19	17	16	18	12	17	12	8	8
Number of Stems per hectacre	220	460	820	4000	2400	3800	11200	5200	6400	12400	6800	7600	7600	6800	6400	7200	4800	6800	4800	3200	3200

Table 10g: Table showing the post-treatment data for the three understory sampling plots placed at Stephen Forbes State Park. The less than 50-centimeter-tall sampling category had three subplots within each of the sampling plots.

	Transect 1					Transect 2					Transect 3					Total
Virgina Creeper	13	14	14	17	11	5	8	16	17	13	10	8	6	14	7	**104**
Poison Ivy	5	2	1	7	3	7	17	10	21	10	5	2	1	2	4	**79**
Carex spp.	7		2			7	7	6	3						10	**33**
MayApple								1				9	5			**15**
Oxalis					3		3			5			1		4	**13**
Bee Balm M.b.			6			1	1			4	2		2			**10**
Aster spp.						3		1	1	1	2		1			**9**
Violet				4		5				2			1	1		**9**
Bedstraw				2	11			3	3					2		**8**
Fasle Solomon's Seal	4	1			3	4										**4**
Wild Yam						1					1		2			**4**
Trumpet Creeper												3				**3**
Coral Berry											2					**2**
Touch me Not										1						**1**
Indian Physic		1														**0**
Poa spp.			2													**0**
Woodland Sunflower	6			8	4											**0**

Table 10h: Table depicting the species and the abundance of the herbaceous plants that were found in the transects at Stephen Forbes State Park.

Figure 10h: Photograph from the Stephen Forbes State Park photo-station, at Plot 1, facing in the Eastern direction.

Figure 10i: Photograph from the Stephen Forbes State Park photo-station, at Plot 1, facing in the Northern direction.

Figure 10j: Photograph from the Stephen Forbes State Park photo-station, at Plot 1, facing in the Southern direction.

Figure 10k: Photograph from the Stephen Forbes State Park photo-station, at Plot 1, facing in the Western direction.

Projects 11 and 15: RPM tree planting at Beall Woods State Park, Wabash County and Ballard Nature Center, Effingham County.

Beall Wood

Introduction

Beall Woods State Park contains great examples of upland and bottomland forest communities typical of the Wabash Boarder Natural Division in Illinois. However, approximately 150 acres of the park is a reforestation of soft woods primarily dominated by tulip trees. This reforestation's understory consisted of many exotic species, dominated by autumn olive. This thick understory did not allow for any regeneration of the hardwood trees still surviving in the reforestation area. In the field season of 2008 – 2009, contractors were hired to remove the understory with a hydro-ax and the stumps were treated with herbicide. 1300 RPM (root pruning method) trees were planted as a reforestation project at Beall Woods State Park. The trees consisted of 400 bur oaks, 200 white oaks, 200 pin oaks, 200 Shumard oaks, 100 red oaks and 100 black oaks. The trees were planted with a post hole digger using proper methods and spacing recommended by the nursery that provided the trees. The trees were planted in the 40-acres project area, with approximately 30 trees per acre.

Methods

Monitoring took place twice during the 2009 NRDA monitoring project. The initial monitoring took place on 22nd of July 2009. Twelve 25x25m transects were randomly placed in the 40-acre project site. Each corner of the twelve transects were marked with the GPS system (see table 11b) for future monitoring projects. A photo-station was set up at a random spot within the project area, with photographs being taken in each of the cardinal directions (figures 11a-11d). A follow up observation took place on 22 September 2009 to see survivability of the trees over the summer. The 12 transects were monitored again to see the number of trees surviving the summer. Observations were taken for trees within the twelve transects and trees out of the twelve transects.

Results

Of the twelve transects, only 32 trees were found (table 11a). The observers saw more trees that were surviving in the project area, however all of these trees were not found within the 12 transects.

The RPM trees seemed to be planted in clumps, thus some of the 12 transects had as many as 10 trees, whereas others had none. Approximately 80-85% of the trees in the twelve transects survived the summer. Mortality of the other 15-20% seemed to be due to herbicide overspray. Multiple saplings had full foliage, but the entire tree was dead due to what looked like herbicide.

	Browsing					
Species	None	Light	Medium	Heavy	Dead Trees	TOTAL
Red Oak	2	3	1		2	8
Bur Oak	4	8		2	1	15
Shumard Oak		1	1		1	3
Swamp White Oak		1	1			2
Pin Oak		2				2
unkown					2	2
Totals	6	15	3	2	6	
					TOTAL	32

Table 11a: Table depicting the results from the 12 25x25 meter transects placed at the Beall Woods RPM project site.

GPS CoOrdinates for Beall Woods				
Transect	NW	NE	SE	SW
1	38° 21' 03.5'' 87° 49' 42.4''	38° 21' 04.6'' 87° 49' 41.4''	38° 21' 04.0'' 87° 49' 40.8''	38° 21' 03.6'' 87° 49' 41.8''
2	38° 20' 54.4'' 87° 49' 40.0''	38° 20' 54.8'' 87° 49' 40.1''	38° 20' 53.7'' 87° 49' 40.3''	38° 20' 53.6'' 87° 49' 40.3''
3	38° 20' 56.4'' 87° 49' 38.4''	38° 20' 56.5'' 87° 49' 37.9''	38° 20' 56.2'' 87° 49' 36.6''	38° 20' 55.7'' 87° 49' 37.4''
4	38° 20' 58.4'' 87° 49' 37.1''	38° 20' 59.0'' 87° 49' 36.3''	38° 20' 59.0'' 87° 49' 35.7''	38° 20' 58.0'' 87° 49' 36.3''
5	38° 20' 58.6'' 87° 49' 39.9''	38° 20' 59.2'' 87° 49' 39.4''	38° 20' 58.4'' 87° 49' 38.8''	38° 20' 58.1'' 87° 49' 39.0''
6	38° 20' 57.0'' 87° 49' 43.4''	38° 20' 58.1'' 87° 49' 42.8''	38° 20' 56.9'' 87° 49' 42.7''	38° 20' 56.7'' 87° 49' 42.5''
7	38° 21' 00.8'' 87° 49' 45.1''	38° 21' 01.4'' 87° 49' 44.0''	38° 21' 00.7'' 87° 49' 43.7''	38° 21' 00.4'' 87° 49' 44.2''
8	38° 21' 03.3'' 87° 49' 43.0''	38° 21' 03.7'' 87° 49' 41.9''	38° 21' 03.6'' 87° 49' 41.6''	38° 21' 02.5'' 87° 49' 42.4''
9	38° 21' 04.2'' 87° 49' 40.1''	38° 21' 04.4'' 87° 49' 39.4''	38° 21' 04.1'' 87° 49' 38.6''	38° 21' 03.5'' 87° 49' 39.2''
10	38° 21' 03.2'' 87° 49' 37.2''	38° 21' 03.4'' 87° 49' 37.1''	38° 21' 02.8'' 87° 49' 36.4''	38° 21' 02.4'' 87° 49' 37.0''
11	38° 21' 04.7'' 87° 49' 37.2''	38° 21' 05.4'' 87° 49' 36.4''	38° 21' 05.0'' 87° 49' 35.5''	38° 21' 04.6'' 87° 49' 35.9''
12	38° 21' 02.2'' 87° 49' 44.4''	38° 21' 02.9'' 87° 49' 43.9''	38° 21' 02.1'' 87° 49' 43.4''	38° 21' 01.5'' 87° 49' 44.0''

Table 11b: GPS co-ordinates the Northwest (NW), Northeast (NE), Southwest (SW), and Southeast (SE) corners of the 12 transects.

	Transect Number												
Species	1	2	3	4	5	6	7	8	9	10	11	12	Totals
Red Oak		4							2	1	1		**8**
Bur Oak	2			2		2	4		3			2	**15**
Shumard Oak						1	1			1			**3**
Swamp White Oak												2	**2**
Pin Oak							2						**2**
unkown			1			1							**2**
	2	**4**	**1**	**2**	**0**	**4**	**7**	**0**	**5**	**2**	**1**	**4**	**32**

Table 11c: Table from Beall Woods depicting the tree species found, and in what transect each species was found.

Figure 11a: Photograph facing in the Eastern direction at the Beall Woods photo-station.

Figure 11b: Photograph facing in the Northern direction at the Beall Woods photo-station.

Figure 11c: Photograph facing in the Northern direction at the Beall Woods photo-station.

Figure 11d: Photograph facing in the Western direction at the Beall Woods photo-station.

Figure 11e: Photograph of one of the RPM tree seedlings planted at Beall Woods State Park. The wooden stake was placed in order for relocation of the trees.

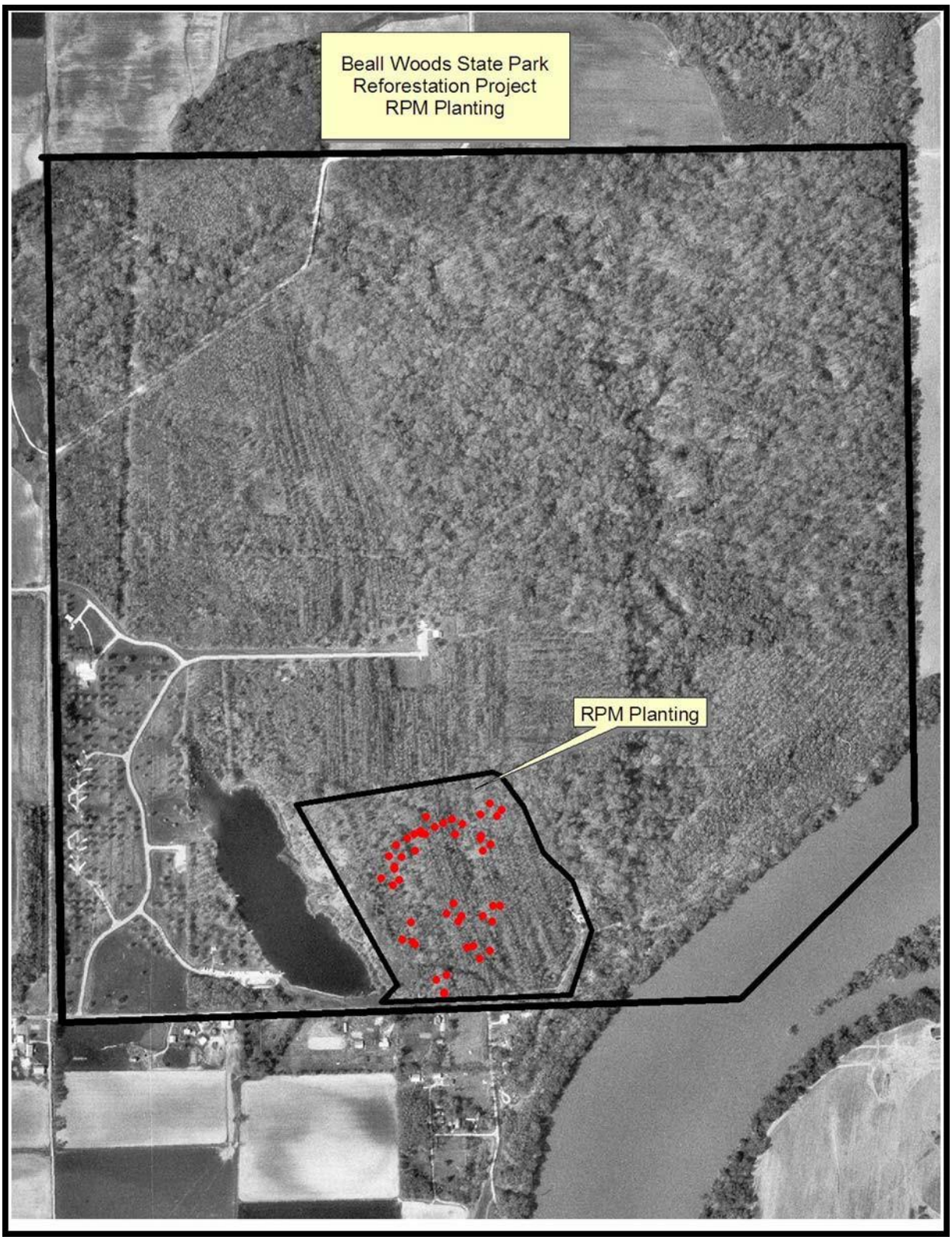

Figure 11f: Aerial photograph of Beall Woods State Park. The smaller black outline is the perimeter of the work area. The red dots depict the corners of each of the 12 transects.

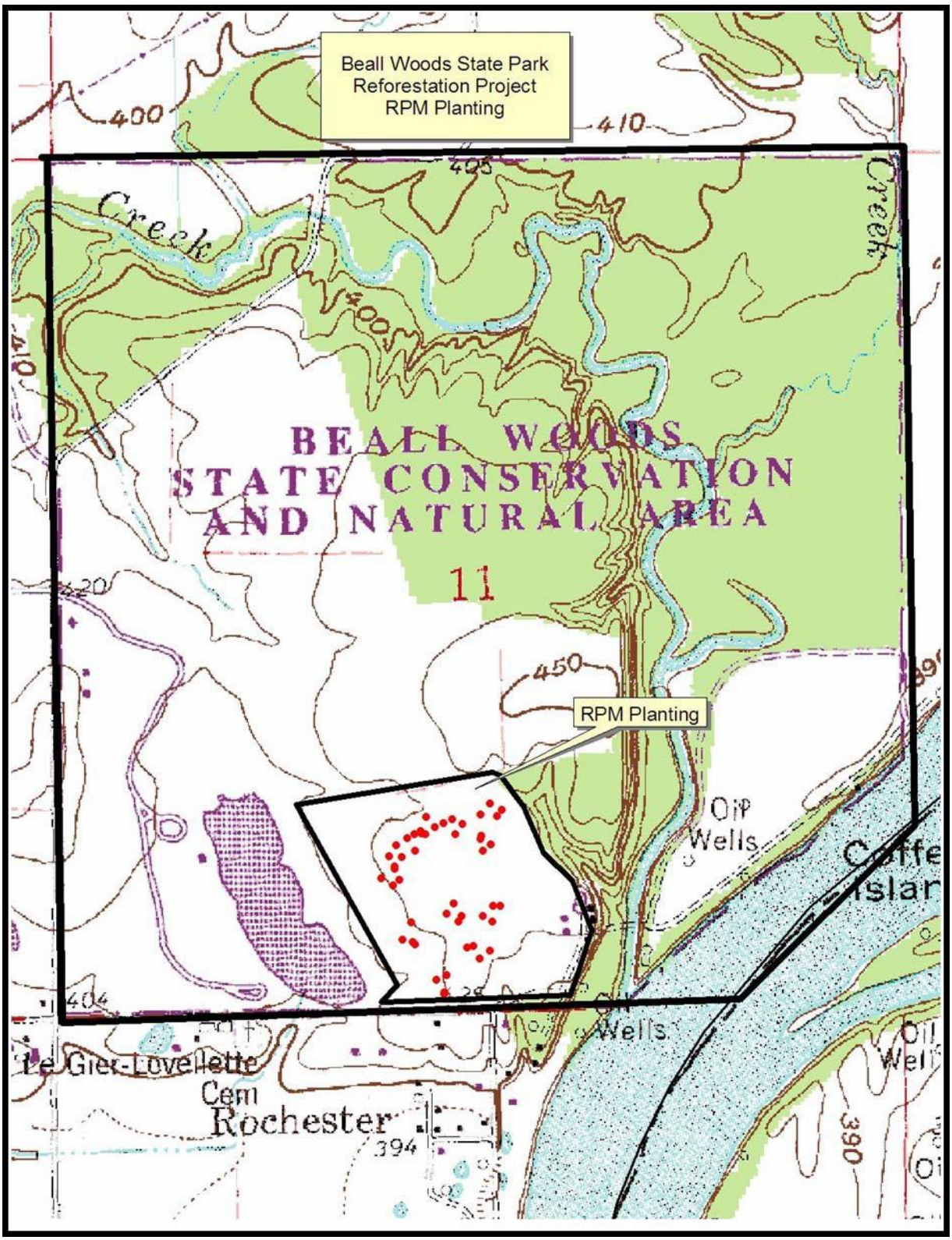

Figure 11g: Topography map of Beall Woods State Park. The smaller black outline is the perimeter of the work area. The red dots depict the corners of each of the 12 transects.

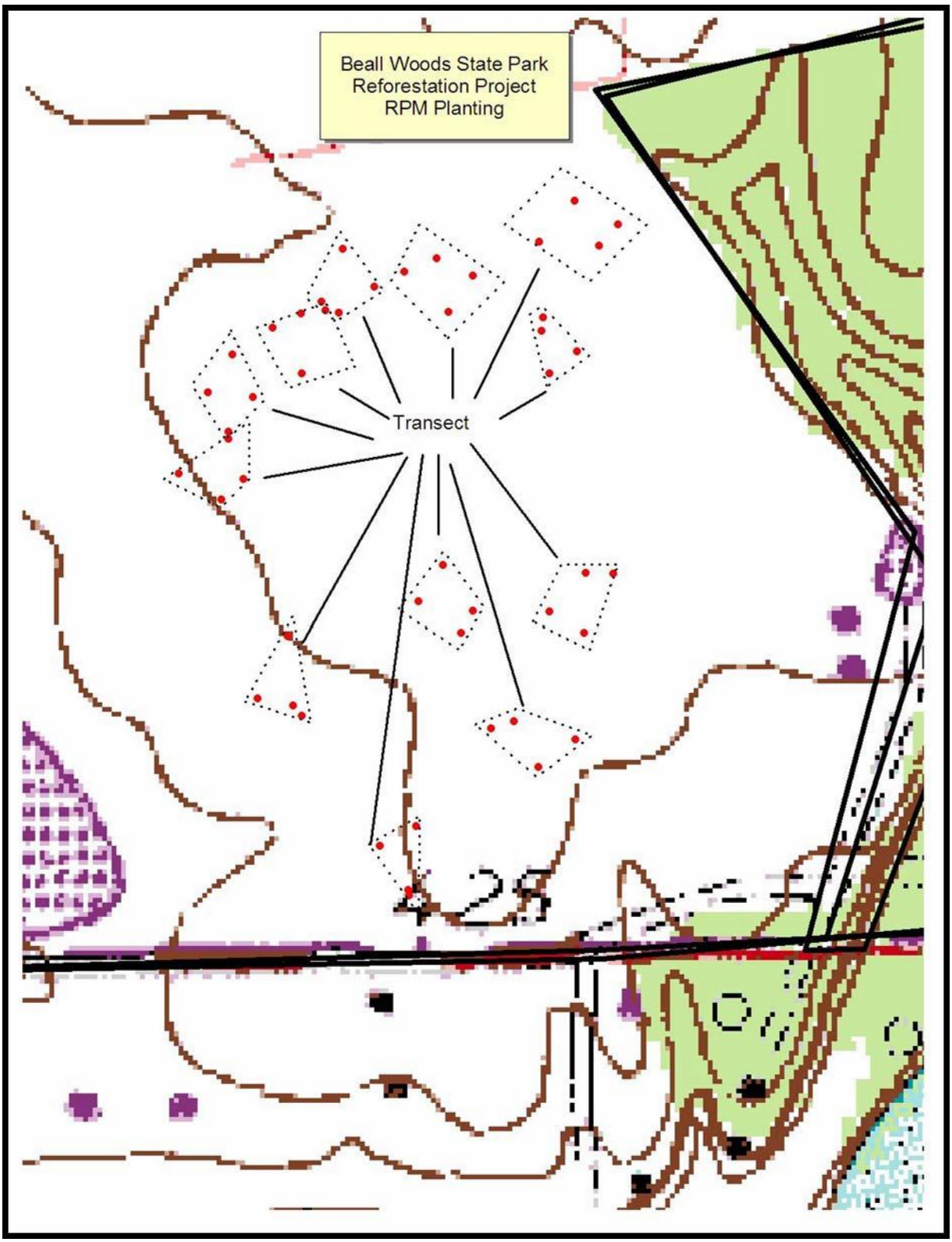

Figure 11h: Topography map of Beall Woods State Park. The smaller black dotted outline represents the approximate boundary of the 12 transects. The red dots depict the corners of each of the 12 transects.

Ballard Nature Center

Introduction

The Ballard Nature Center is located in Effingham County. Multiple community types, such as restored prairie, woodland, and wetlands, are found in the Nature Center. Because the Ballard Nature Center is actively involved in providing natural communities, the center implemented multiple savanna restorations into the habitat matrix. Approximately 375 RPM (root pruning method) trees were planted as a savanna restoration project at Ballard Nature Center. The trees consisted of 175 bur oaks, 75 swamp white oaks, 75 red oaks, and 50 pin oaks. The trees were planted with a post hole digger using proper methods and spacing recommended by the nursery that provided the trees. The trees were planted in an approximately 4-acre project area.

Methods

Monitoring took place twice during the 2009 NRDA monitoring project. The initial monitoring took place on 24 of June 2009. Four 25x25m transects were randomly placed in the 4-acre project site. Each corner of the four transects were marked with the GPS system (see table 11d) for future monitoring projects. A photo-station was set up at a random spot within the project area, with photographs being taken in each of the cardinal directions (figures 11e-11h). A follow-up observation took place on 26 September 2009 to see survivability of the trees over the summer. The four transects were monitored again to see the number of trees surviving the summer. Observations were taken for trees within and out of the four transects.

Results

Of the four transects, only 85 trees were found (table 11d). The observers saw more trees that were surviving in the project area, however all of these trees were not found within the four transects. The RPM trees observed were randomly planted throughout the project area with at least 17 trees in the transect. Many of the trees had severe browsing from deer. The site was visited again 22 September 2009. Deer browsing had occurred, although the browsing was not significantly different from the first visit earlier in the season. Due to the moderate summer, the trees did not exhibit any signs of stress from lack of precipitation. Further monitoring will be needed to address the issue of deer browsing in the future.

	Tansect Number				
	1	**2**	**3**	**4**	Totals
Bur Oaks	19	9	9	8	45
Red Oaks	8	10	12	8	38
Pin Oaks	0	0	0	1	1
Swamp White Oaks	0	0	1	0	1
	27	**19**	**22**	**17**	**85**

Table 11d: Table from Ballard Nature depicting the tree species found, and in what transect each species was found.

	Browsing Level			
	Light	Medium	Heavy	Total
Bur Oaks	3	14	28	45
Red Oaks	7	3	28	38
Pin Oaks	1	0	0	1
Swamp White Oaks	0	0	1	1
	11	17	57	**85**

Table 11e: Table depicting species and browsing level for RPM trees at the Ballard Nature Center.

Figure 11i: Photograph facing in the Eastern direction at the Ballard Nature Center photo-station.

Figure 11j: Photograph facing in the Northern direction at the Ballard Nature Center photo-station.

Figure 11k: Photograph facing in the Southern direction at the Ballard Nature Center photo-station.

Figure 11l: Photograph facing in the Western direction at the Ballard Nature Center photo-station.

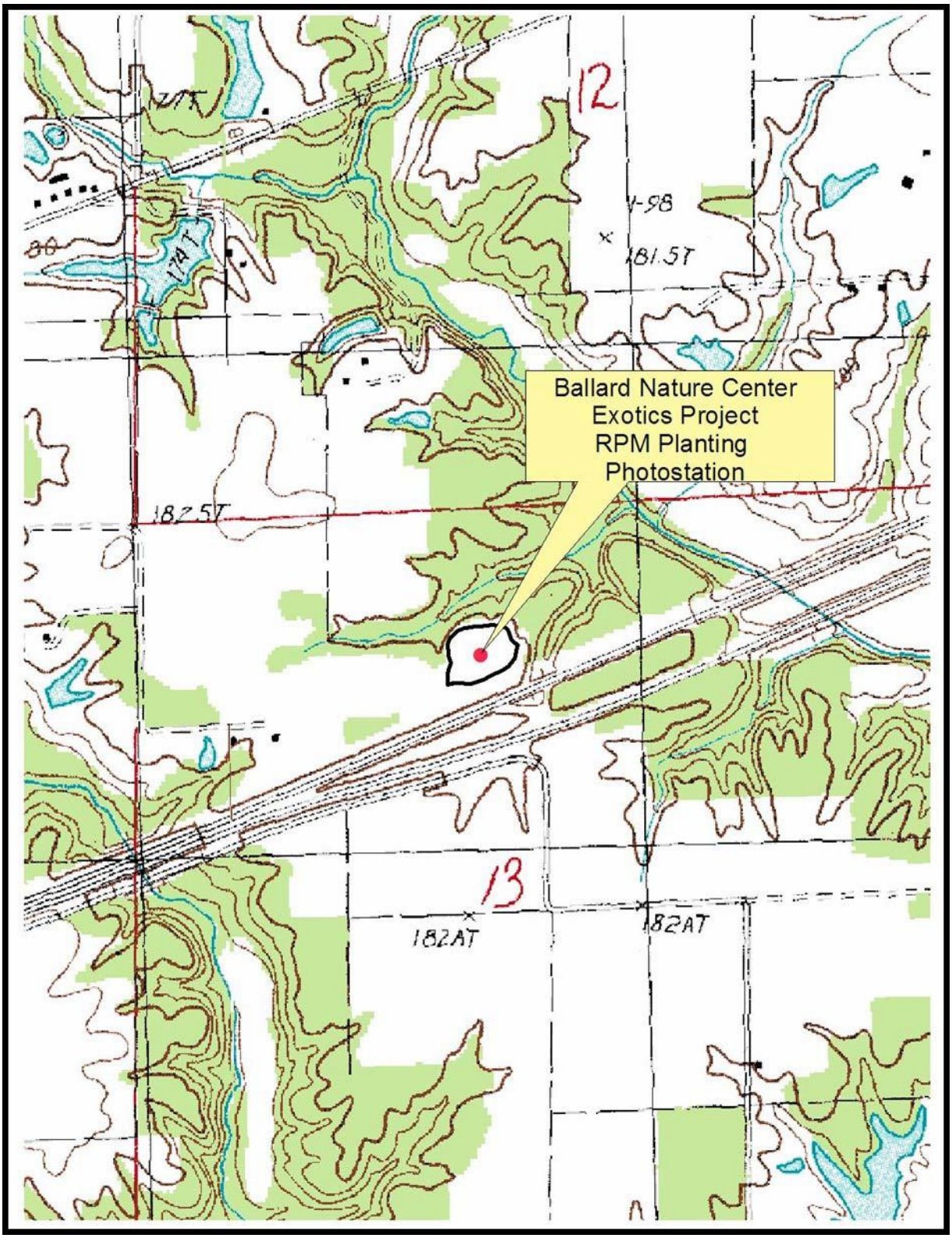

Figure 11m: Topography map of Ballard Nature Center. The black line is the outline of the project area and the red dot depicts the photo-station.

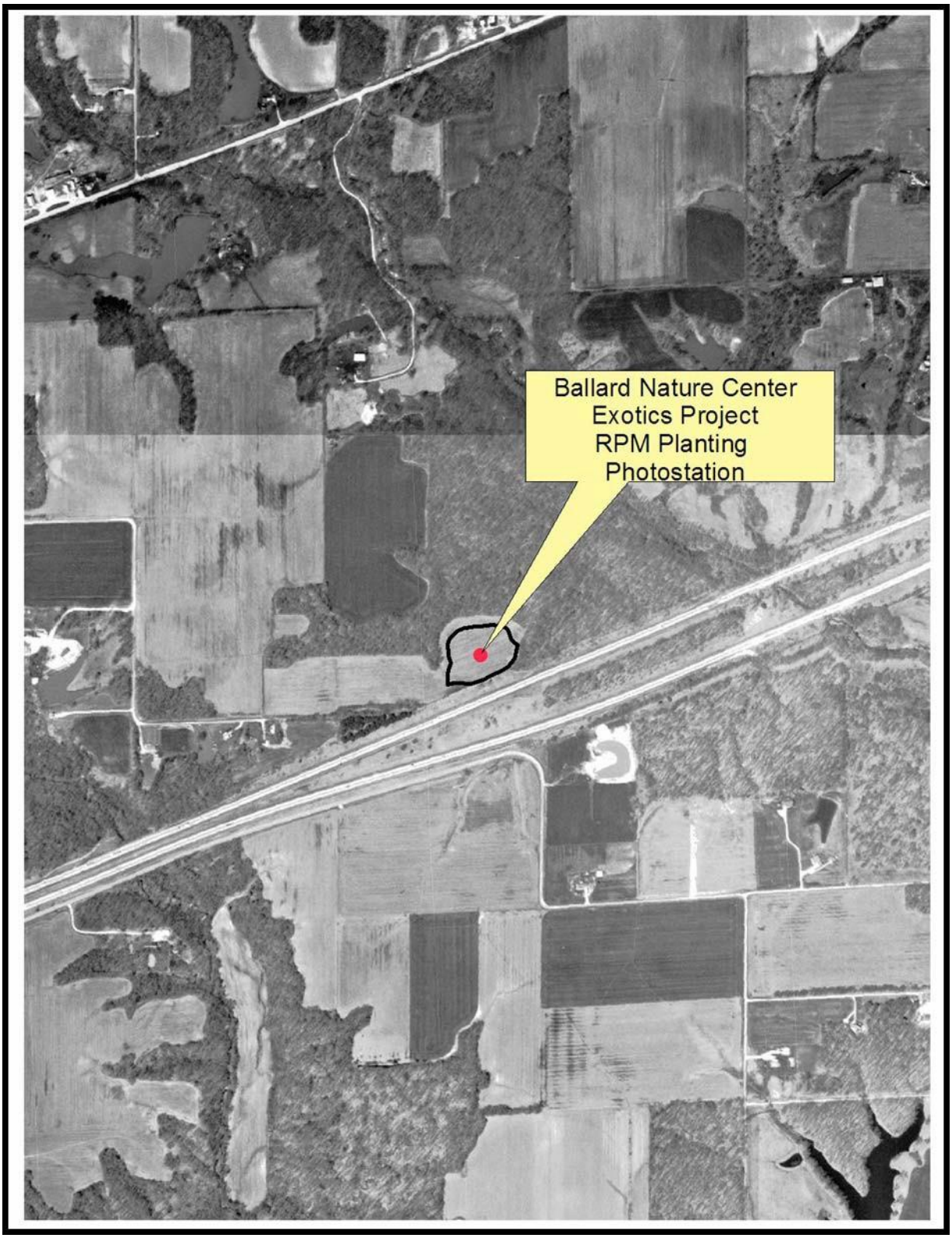

Figure 11n: Aerial photograph of Ballard Nature Center. The black line is the outline of the project area and the red dot depicts the photo-station.

Project 13: Prairie Forb seed for Prairie Restoration at Chauncey Marsh.

Introduction

Chauncey Marsh State Natural Area has prime examples of marsh, prairie, bottomland forest and riverine communities. The Illinois Department of Natural Resources has been making great strides in restoring the native prairies found on the site. Many wildlife rely solely on grassland habitats, however it is common knowledge that Illinois has lost 99.9% of this native prairie land. The restoration and enhancement of the native grasslands at Chauncey Marsh is being conducted in effort to provide the much-needed habitat for the grassland dependent wildlife.

Methods

In an effort to restore the prairie communities, 17 acres of agricultural land was converted to native prairies by plantings of both forb and grass typically found Illinois. All the seeds planted were documented to have occurred in Lawrence County historically. Chauncey Marsh was visited 7 August 2009. A photo-station was placed near the center of the forb planting, with photographs being taken in each of the cardinal directions. The photo-station was also marked using a GPS location for future monitoring. General observations of plant communities were also noted.

Results

The prairie community was thriving during the time that the observation took place. Many prairie species were noted to occur in the Chauncey Marsh prairie restoration project. Species such as Illinois bundle flower, rosinweed, compass plant, prairie dock, goldenrod species, Aster species, coneflower species, blazing star species, black–eyed Susan, partridge pea, tick trefoil species, and rattlesnake master were all found at the site. The prairie also had a dense stand of big bluestem, as well as little bluestem and Indian grass. The photographs taken at the photo-station depict insufficient pictures of the prairie at Chauncey Marsh. This prairie will continue to improve with the management that is being provided by the Illinois Department of Natural Resources. Continued management needs to also include active prescribed burning to keep woody encroachment to a minimum.

Figure 13a: Chauncey Marsh photo-station, photograph facing in the Eastern direction.

Figure 13b: Chauncey Marsh photo-station, photograph facing in the Northern direction.

Figure 13c: Chauncey Marsh photo-station, photograph facing in the Southern direction.

Figure 13d: Chauncey Marsh photo-station, photograph facing in the Western direction.

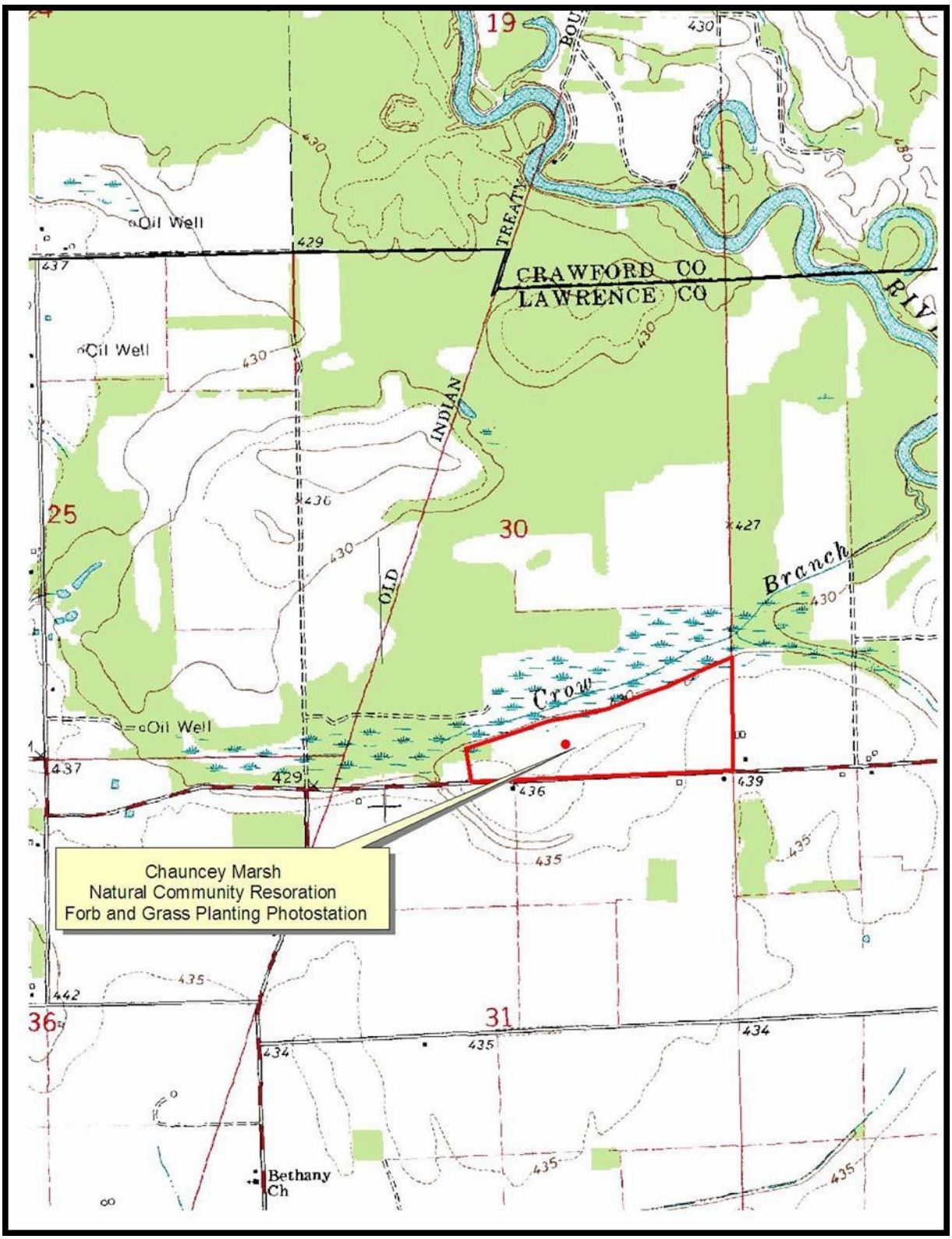

Figure 13e: Topography map of Chauncey Marsh forb and grass planting. The red line is the outline of the project area and the red dot depicts the photo-station.

Figure 13f: Aerial photograph of Chauncey Marsh forb and grass planting. The red line is the outline of the project area and the red dot depicts the photo-station.

Project 14: Shallow Water Wetland Construction at Sam Parr State Park, Jasper County.

Introduction

Shallow water wetlands provide a habitat that benefits marsh birds, waterfowl, shorebirds, reptiles and amphibians as well as moist soil plants. A five-acre shallow water wetland, which followed the NRCS designs and specifications, was created in an agricultural field along Sam Parr State Park.

Shallow water wetlands are critical habitats in the southern region of Illinois, habitats that have basically gone extinct.

Methods

A contractor was hired to construct the wetland using bulldozers and scrapers. Cover crops and grasses were spread over the berms once the wetland construction was complete. A water control structure, pipe, bar guards, animal guards and anti-seep collars were all provided to the contractor for the wetland. The wetland site was monitored three times throughout the 2009 NRDA project monitoring (29 June 2009, 31 July 2009, 7 August 2009). Species counts of all reptiles and amphibians seen at each visit was conducted as well as a 5-minute point count for birds.

Results

The bird census was conducted by Mark Alessi (Natural Heritage Resident Intern for Prairie Ridge State Natural Area) on 7 July 2009. 2 wood ducks, 3 dickcissels, 2 killdeer, 7 red-wing blackbirds, 1 tree swallow and 3 barn swallows were found to be present at the wetland and on the berm. The reptile and amphibian counts came out to a total of 5 southern leopard frogs, 385 cricket frogs and 2 American toads, counted during the three visits to the site. The only reptiles seen at the site were 2 black rat snakes. In following monitoring years, this newly constructed wetland looks as though it will provide critical habitat for many more species of amphibians, reptiles, and birds.

Figure 14a: Photograph of the 5-acre wetland facing the Northern direction.

Figure 14b: Photograph of the 5-acre wetland, taken from the Southeast corner of the wetland.

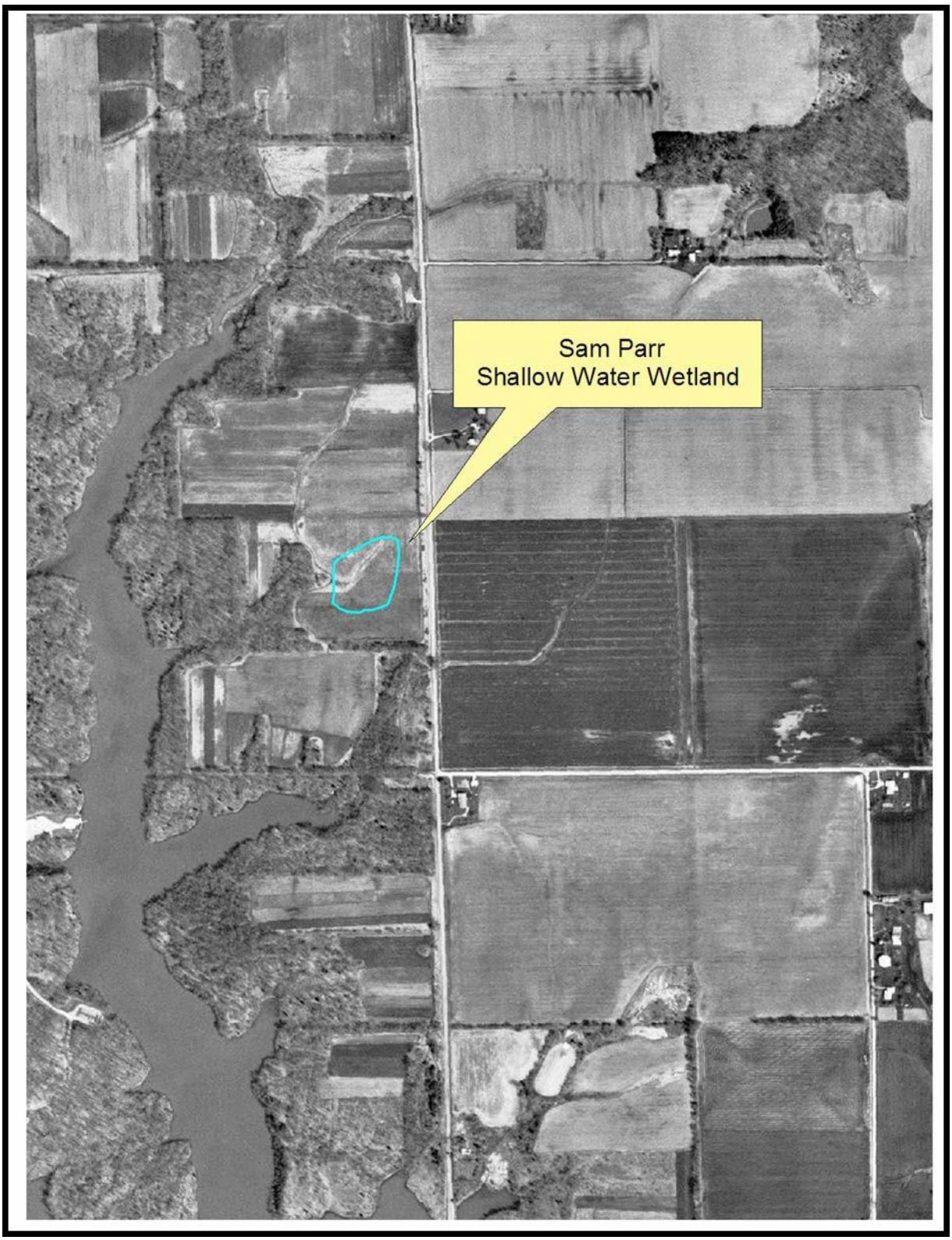

Figure 14c: Aerial photograph of Sam Parr State Park. The blue line is the perimeter of the constructed wetland.

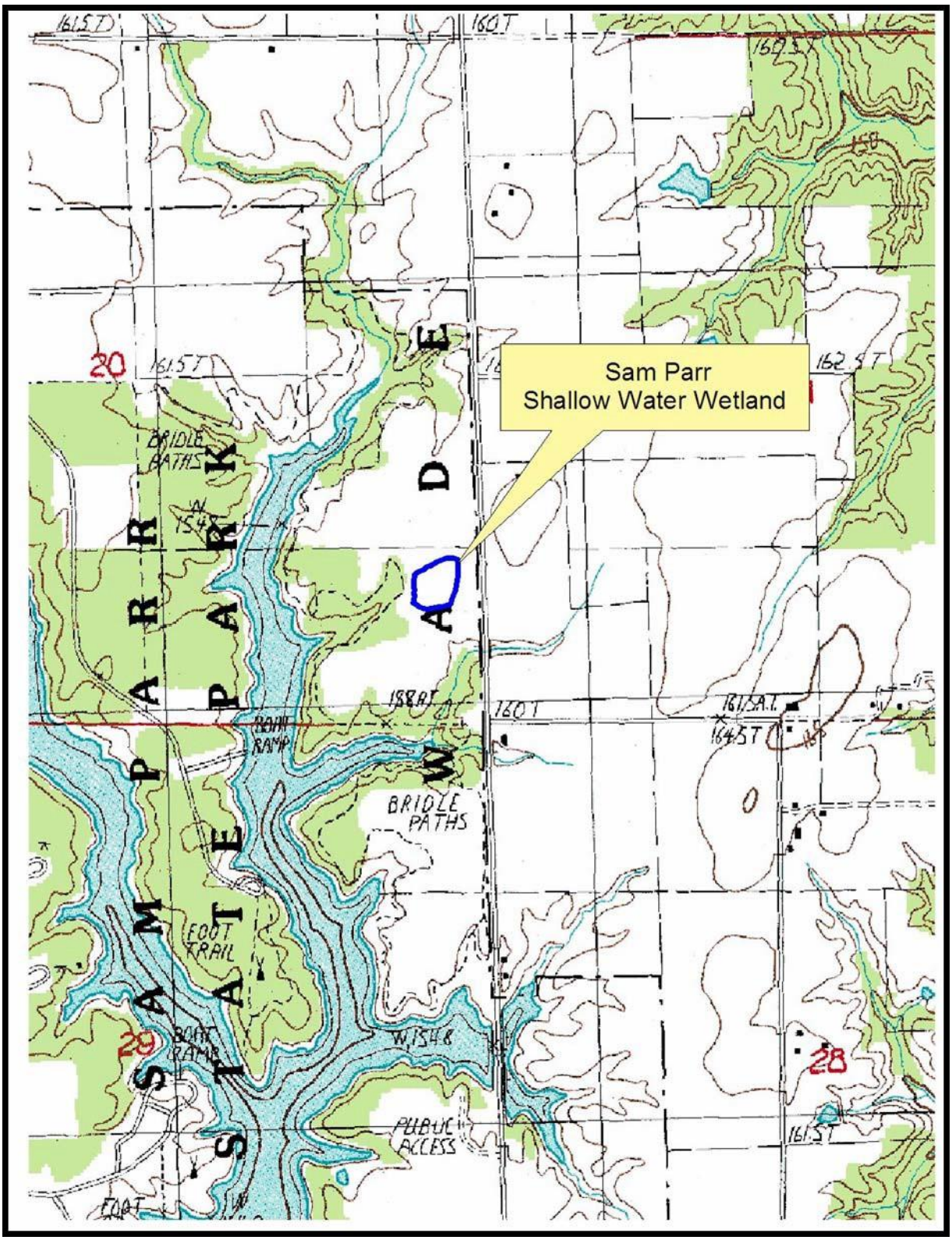

Figure 14d: Aerial photograph of Sam Parr State Park. The blue line is the perimeter of the constructed wetland.