Kankakee Sands Ornate Box Turtle (*Terrapene ornata*) Population & Ecosystem Assessment

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Introduction

The Kankakee Sands Macrosite is a complex of high-quality natural lands including wet/mesic sand prairie, oak barrens/savanna, and sedge meadows in northeast Illinois and northwest Indiana. A project is currently underway which targets over 7,500 acres of cropland and degraded grassland/savanna for restoration into a mosaic of native grasslands, savannas and wetlands which will ultimately restore connectivity to a landscape-scale system exceeding 40,000 acres. The Nature Conservancy, with assistance from professionals from IL DNR, IN DNR, INHS, and state universities, is in the process of completing a viability study for the Kankakee Sands Macrosite. One of the target species in the ornate box turtle (*Terrapene ornata*).

It is easy to see why the ornate box turtle is considered a target species of sand prairies and savannas of the Kankakee Sands ecosystem. The turtle is associated with open habitats characterized by rolling topography with grasses and low shrubs as the dominant vegetation. Disturbance factors such as fire, grazing, and the presence of plains pocket gopher maintain the open structure of prairie and savannas which benefit the turtle. The Kankakee Sands population of ornate box turtles is disjunct from other populations and is the northeastern most population. The ornate box turtle is long lived, and easy to capture, mark, and recapture. Therefore it is an ideally suited vertebrate for long term monitoring of the Kankakee Sands ecosystem. It is also a charismatic species that has ideal characteristics for monitoring by citizen scientists.

As a result of its importance to this particular ecosystem we investigated the status of the ornate box turtle in the Kankakee Sands. The main goal of this study was to determine the presence/absence of the ornate box turtle at various sites throughout the Kankakee Sands Macrosite: In addition, occurrence of pocket gophers and red-headed woodpeckers were noted in the immediate vicinity of all ornate box turtle locations.

Secondary goals were to estimate population size and density of the ornate box turtle and characterize the habitat associated with the ornate box turtle at a subset of sites in the Kankakee Sands Macrosite.

Methods

The main method employed was systematic searching of the area following the Visual Encounter Survey (VES) protocols [for details see Heyer, W.R., M.A. Donnelly, R.W. McDiarmid, L. C. Hayek, and M.S. Foster, eds. 1994. Measuring and Monitoring Biodiversity: Standard Methods for Amphibians. Smithsonian Institution Press, Washington. 364 pp.]. This involves looking for animals in all habitats including under all cover objects (natural and artificial). Effort was recorded in man-hours and area searched. All ornate box turtles encountered were permanently and uniquely marked by filing a notch in one or more marginal scutes. This process took place at the site of encounter, after which turtles were released. The following physical characteristics were measured and recorded: sex, mass, carapace length (CL), carapace width (CW), anterior and posterior plastron lobe length (APL, PPL), and shell height (SH). Air temperature, relative humidity, wind speed, location coordinates (with GPS), other amphibians and reptiles encountered, presence/absence of active pocket gopher mounds and red-headed woodpeckers and canopy cover (using a spherical densiometer) were recorded at all turtle encounters. At a subset of survey sites, the following variables were also recorded at turtle locations: number of red-headed woodpeckers heard or seen during the time it takes to process the turtle and collect all variables (WDPCKR), distance to nearest road (ROAD), distance to nearest forest edge (EDGE), number of active pocket gopher mounds within 40 m radius (GOPHER), and distance to nearest tree and shrub averaged over each of four quadrants within 40 m radius (TREE and SHRUB).

A subset of turtles were fitted with small radio-transmitters and followed for up to 45 days. The transmitters weigh less than 5% of the turtle's mass and were glued to the upper shell of the turtle using marine epoxy. All of the above variables were be recorded at each location of a telemetered turtle.

Results

A total of 58.9 man-hours of Visual Encounter Surveys were conducted at eleven sites from 29 April through 7 July 2003 (Table 1). No ornate box turtles were encountered during the timed VES.

Table 1. Name, owner, search effort, and approximate size of sites searched for ornate box turtles in spring, 2003.

Site Name	**Owner**	Effort (man-hr)	Size (ha)
Bill Barnes Nature Preserve (Willow Slough)	IN DNR	5	~100
Conrad Savanna Nature Preserve	IN DNR	10	202
Bentley/ Crawford-Jordan Property	TNC	2.8	24.3
De Young Property	TNC	4	~50
Harris - Ezell Property (Mt. Fraker)	TNC	1.5	26.3
Hooper Branch Savanna Nature Preserve	IL DNR	10.3	~200
Iroquois State Wildlife Area (ISWA)	IL DNR	12.4	~800
Leesville West Site	IL DNR	6.1	?
Liebert Property	TNC	2.7	259
Sweet Fern Savanna	private	3.1	12.1
Tommy Green Property	TNC	1	~30
Totals		58.9	~1700

*The times reported for Hooper and ICWA do not include the time we spent searching while on the way to or back from tracking the two radio-tracked turtles. This would probably add an additional 12-15 hours for each radio-tracked turtle in ICWA/Hooper.

Site personnel at ISWA encountered two ornate box turtles on County Road 3300 N, one on 22 May (turtle # 1L) and one on 24 May (turtle # 2L). We attached radio-transmitters (Holohil SB-2T) to these turtles and located them approximately every other day until 7 July. Physical characteristics of the two radiotracked turtles are given in Table 2. Movement data are given in Table 3. Turtle 1L established a home range estimated at 8 hectares (see Fig. 1) using the Minimum Convex Polygon method (for details, see Mohr, C.O. 1947. Table of equivalent populations of North American small mammals Am. Midl. Nat. 37(1):223-249). The habitat type of 1L home range was mainly shrub prairie. Turtle 2L never established a home range (see Fig. 1), instead it moved across the SW corner of Hooper Branch and into private property just west of Hooper Branch. The landowner was contacted and requested that we not track the turtle on his property. On 23 June we moved the turtle back into ISWA into 1L home range. It immediately moved NW back toward the same private property. On 7 July we decided to remove 2L transmitter. We also removed 1L at the same time.

Environment and habitat variables associated with the turtle radiolocations are given in Tables 4 and 5, respectively. No woodpeckers or active pocket gopher mounds were detected at any of the turtle radiolocations.

Table 2. Physical characteristics of two radio-tracked ornate box turtles at Iroquois State Wildlife Area, May to July, 2003. All length measurements are in millimeters.

Turtle ID	Sex	Mass (g)	CL	CW	APL	PPL	SH
1L	M	191	90	80	38.6	57.0	53
2L	M	234	101	83	40.4	63.3	47

Table 3. Movement data for two radio-tracked ornate box turtles at Iroquois State Wildlife Area, May to July, 2003. All distances are in meters.

Turtle ID	Total Movement	Average Daily Movement	Range of Distances between Encounters
1L	1697	378	0 - 629
2L	4082*	102*	0 - 529

*excluding distance and time translocated from private property back to ISWA. See Fig. 1.

Table 4. Average environmental variables recorded at turtle radio-locations for two radio-tracked ornate box turtles at Iroquois State Wildlife Area, May to July, 2003.

Turtle ID	Air Temperature (C)	Relative Humidity	Wind Speed (m/sec)
1L	26.1	57%	1.7
2L	25.4	56%	0.9
Mean	25.8	55.5%	1.3

Table 5. Average habitat variables recorded at turtle radiolocations for two radio -tracked ornate box turtles at Iroquois State Wildlife Area, May to July, 2003. Refer to the text for abbreviations. CANOPY is given in percent cover, the remainder are in meters.

Turtle ID	CANOPY	TREE	SHRUB	ROAD	EDGE
1L	4.0	108	0.74	608	161
2L	45.1	18	3.69	253	24
Mean	24.6	63	2.21	431	93

Discussion

The fact that we did not detect any ornate box turtles in over 60 man-hours of searching suggests that either box turtles are scarce in this area or we were not searching the appropriate habitat. The two senior authors have extensive experience with *Terrapene ornata* at other Illinois

locations. For example, ARK spent two field seasons studying *Terrapene ornata* and *T. carolina* at Carlyle Lake for his Master Degree. For May and June searching, ARK encounter rate ranged from 0 to 13 box turtles (of both species) per day. In addition, turtle 1L in this study spent the majority of his time in shrub prairie and sedge meadow, two habitat types that we searched extensively. It is unlikely that we searched inappropriate habitat. It is our opinion that ornate box turtles are rare in the Kankakee Sands Macrosite. As evidence we point to the paucity of historical records for the species in the study area. Table 6 lists all records of *T. ornata* for Kankakee and Iroquois counties known to us. We searched the databases of over 35 North American museums and other natural history collections that were likely to hold Illinois material. Only 15 records of *T. ornata* were found and all but three of those were prior to 1950.

Table 6. Museum records or reliable reports of ornate box turtles from Kankakee and Iroquois counties, Illinois culled from the holdings of over 35 museums, natural history collections, and field personnel.

Source*	**Location**	**County**	**Date**	**Comments**
INHS	3 mi N Watseka	IROQ	June 1948	
INHS	6 mi N Watseka	IROQ	June 1949	
KU		IROQ	1987	skeleton
FMNH	Pembroke Township	KANK	Oct 1935	
FMNH	Pembroke Township	KANK	May 1936	
CA	Pembroke Township	KANK	May 1938	
CA	Pembroke Township	KANK	June 1938	
CA	Pembroke Township	KANK	June 1938	
CA	Pembroke Township	KANK	Oct 1938	
CA	Pembroke Township	KANK	Sept 1938	
FMNH	Pembroke Township	KANK	Sept 1938	
FMNH	Aroma Park, ca 2 mi E Kankakee	KANK	Sept 1938	
CA	St. Anne	KANK	Sept 1939	
INHS	N shoulder Co. Rd. 3000S, ca.	KANK	June 2002	Adult male

	0.3 km (0.2 mi) E of Co. Rd. 15000E			
UNVOUCH	0.2 mi W Co. Rd. 1300E on Co. Rd. 4000S	KANK	Aug 2003	DOR

INHS = IL Nat. Hist. Survey; KU = Univ. Kansas Nat. Hist. Museum; FMNH = Field Museum of Nat. Hist.; CA = Chicago Acad. Science; UNVOUCH = reported by Fran Harty, IL TNC.

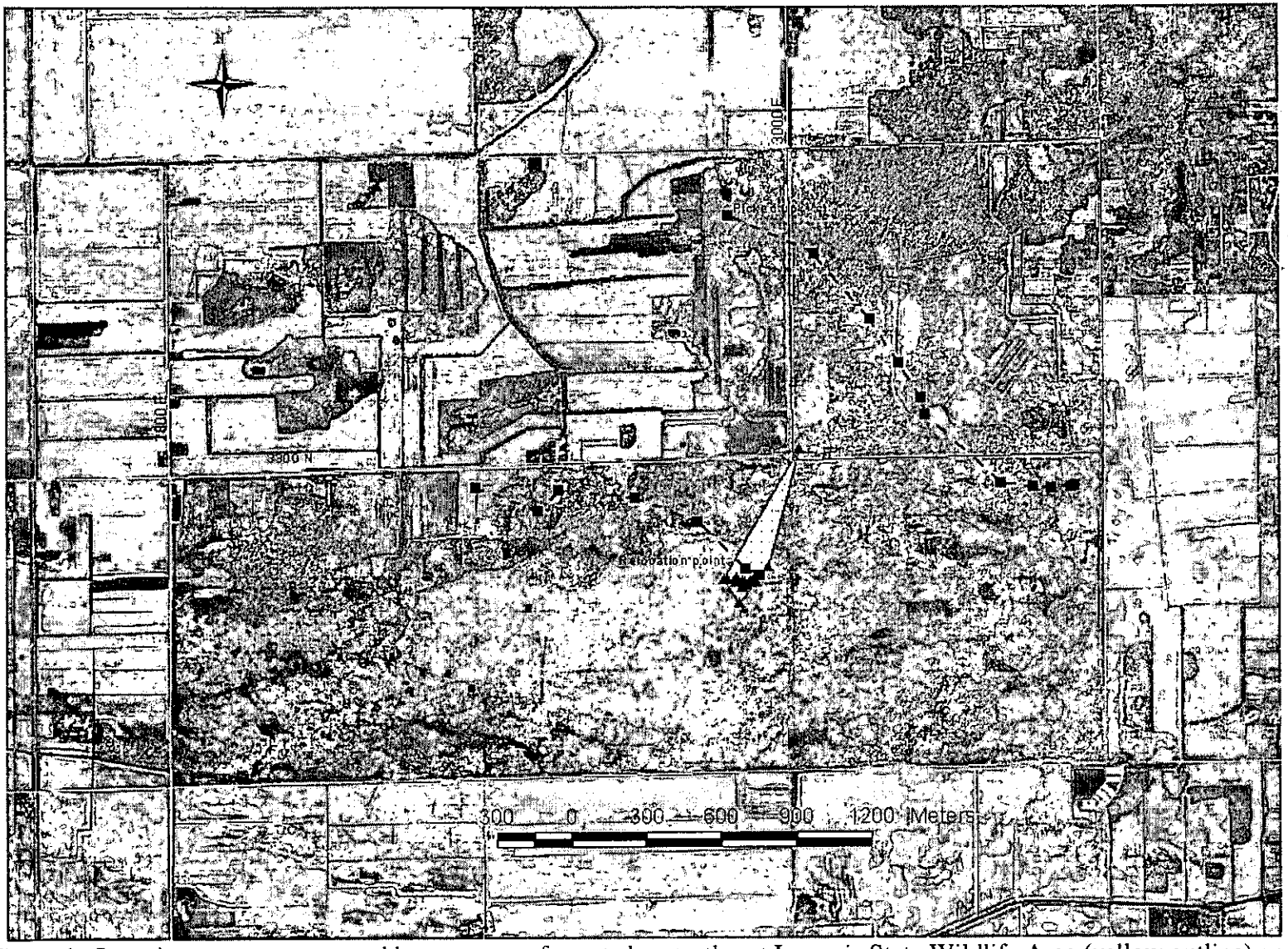

Figure 1. Locations, movements, and home range of ornate box turtles at Iroquois State Wildlife Area (yellow outline) and Hooper Branch Savanna (red outline), May to July 2003. Triangles are turtle 1L, squares are turtle 2L. The white blocked area indicates 1L's home range. Major county roads are marked for reference. Turtle 2L's pick up and relocation points are also marked.