

The Friends of Nachusa Grasslands 2018 Scientific Research Project Grant Report

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Research Project Topic: Development and Implementation of Blanding's Turtle Management Strategies within the Franklin Creek Corridor: We are using inventory methods to determine population status, radio-telemetry to monitor habitat use, and nest protection to promote juvenile recruitment of Blanding's Turtles at Nachusa Grasslands and adjacent properties within the Franklin Creek corridor.

Research Project Purpose: The objectives of this project are to develop and implement on-the-ground management strategies to promote the persistence Blanding's Turtles within the Franklin Creek corridor and north-central Illinois more generally.

Research Project Outcomes to date:

Blanding's Turtle Abundance. – Since 2014, a total of 12 juvenile and adult Blanding's Turtles (7 adult females, 3 adult males, 2 juveniles) have been documented at Nachusa Grasslands. Captures have occurred in two areas, Biven's Pond, a wetland spanning TNC and privately-owned property near Naylor Road, and Tellabs Savanna, a wetland complex at the west end of TNC property adjacent to Franklin Creek. The single female known from the Bivins Pond area was tracked using radio telemetry from 2016-2018 but was found dead (cause unknown) in March 2019. Trapping at other locations (Jay Meiners' Wetland, Clear Creek, Bluestem Bottoms, Prairie Potholes) and deployment of trail cameras (Bivins – 1 camera, C. Walgreen property west of Tellabs – 4 cameras) failed to result in additional Blanding's Turtle detections in 2018.

Blanding's Turtle Reproduction. – *Blanding's Turtle* nest locations ranged from 110-2,035 m from resident wetlands. Multiple females sometimes nested near each other or near their prior nest location. However, females sometimes used different nest sites from one year to the next. An extreme example is female 1L8R whose nest sites in 2016 and 2017 were just 18 m apart and about 340 m from her resident wetland but whose nest site in 2018 was more than 2 km from her resident wetland. Nests were caged using hardware cloth to prevent depredation (2 nests in 2016, 3 nests in 2017, 4 nests in 2018). Daily monitoring of protected nests began in late August of each year. Hatchlings emerged from 21 Aug – 17 Sep. Clutch sizes ranged from 4-11 and resulted in 59 live hatchlings (11 in 2016, 22 in 2017, 26 in 2018). Hatchlings were released at wetlands near nest sites.

Blanding's Turtle Management Plan. – To ensure long-term persistence at Nachusa Grasslands and within the region, a Blanding's Turtle Management Plan for the Rock

and Green River Drainages has been drafted for implementation in 2019 (appendix). This plan includes head-starting as a new next step in regional Blanding's Turtle management. Head-starting involves the harvesting and incubating eggs and captive rearing of hatchling turtles until they attain a size that makes them less susceptible to predation and has been used successfully by managers in DuPage, Lake, and McHenry County, Illinois. Initial head-starting efforts will focus on Blanding's Turtles at Nachusa Grasslands and Richardson Wildlife Foundation but may expand to other sites with the Rock and Green River drainages in the future.

Describe how the grant funds you have received from the Friends of Nachusa Grasslands have been used in regard to the above topic, purpose, and/or outcomes:

D. Mauger – 10 days of trapping	\$2500.00
J. Fliginger – field technician, 159 hr @ \$10/hr	\$1590.00
R. King – partial mileage reimbursement for travel between NIU and Nachusa Grasslands	\$ 410.00
total	\$4500.00

Describe how your project has benefited the work and goals of Nachusa Grasslands:

- Determination of the timing and location (habitat) of key life-history events (active season, nesting, hatching, overwintering)
- Protection of nests and release of hatchlings in wetland habitats
- Development of a regional management plan for Blanding's Turtles

Describe how your findings can be applied to challenges in management practices for restoration effectiveness and species of concern:

- This project has identified areas where encroachment by woody vegetation may reduce habitat quality for Blanding's Turtles, areas where care should be exercised in the application of management practices to avoid negative impacts on Blanding's Turtles, and areas adjacent to Nachusa Grasslands that may be utilized by Blanding's Turtles
- This project has identified areas for possible manipulation of hydrology to benefit Blanding's Turtles, including the discovery (in spring 2019) of drainage tile impacting hydrology within the Tellabs unit

Please list presentations/posters you have given on your research:

- *Promoting Blanding's Turtle recovery at Nachusa Grasslands.* R. B. King, D. Mauger, T. Anton, and J. Fliginger. Nachusa Grasslands 2018 Science Symposium. October 2018.

Have you submitted manuscripts to scientific journals? If so, which ones? If not, do you anticipate doing so? No but as additional are implemented, publication is a possibility.

Appendix

Blanding's Turtle Management Plan for the Rock and Green River Drainages of Illinois

Blanding's Turtle Management Plan for the Rock and Green River Drainages of Illinois

1. GOAL

The goal of this recovery plan is to ensure long-term persistence of Blanding's Turtles within the Rock and Green River drainages of north-central Illinois.

2. INTRODUCTION

The Blanding's Turtle (*Emydoidea blandingii*) is a long-lived, semi-aquatic turtle in decline throughout much of its range (Congdon et al. 2008, King 2013). It was designated as Endangered in Illinois in 2009 (ILL. ADM. CODE, CH. I, SEC. 1010) where its range is largely restricted to the northern third of the state. Occurrences are most numerous in northeastern Illinois and less numerous in north-central and northwestern Illinois (Fig. 1, Henning and Hinz 2016). Proposed triggers for listing status reevaluation from endangered to threatened call for population persistence in at least two of these regions; proposed triggers for listing status reevaluation from threatened to unlisted call for population persistence in all three regions (King 2013). This management plan focuses on north-central Illinois where extant populations of Blanding's Turtles occur in wetlands associated within the Rock and Green River drainages, primarily in Lee County (Fig. 1, Fig. 2).

3. HISTORIC AND CURRENT DISTRIBUTION IN THE REGION

Blanding's Turtles have been documented at 11 distinct locations representing 13 element occurrence points or polygons within the Illinois Department of Natural Resources Natural Heritage Database (Fig. 1, Table 1). Five of these are represented by a single observation from 1982-2004. The other six sites are represented by multiple observations spanning 17-35 and extending through 2015-2018 (Fig. 1, Table 1).

4. FOCAL AND NON-FOCAL SITES

This plan addresses Blanding's Turtle management at two focal conservation areas within the Rock River and Green River drainage systems, Richardson Wildlife Foundation and Nachusa Grasslands. Richardson Wildlife Foundation is a not-for-profit corporation dedicated to the long-term restoration of habitats and judicious use of natural resources. The Foundation was established in 1989 with an initial land donation of 100 ha and has since expanded to 800 ha of remnant and restored grassland and wetland habitat. Blanding's Turtles have been monitored at the site since 2000 and incidental encounters, trapping, and radio telemetry have produced data on 35 individual Blanding's Turtles (Table 2). Nachusa Grasslands was established by The Nature Conservancy in 1986 with the purchase of ca. 160 ha of remnant prairie and has grown nearly 10-fold (to 1457 ha) largely through the conversion of row-crop agriculture to restored tallgrass prairie. Blanding's Turtles remains were found at the site in 1990 and a deceased male was found in 1994; live adults were encountered sporadically from 2000-2014. Since 2014, incidental encounters, trapping, and radio telemetry have produced data on 12 individual Blanding's Turtles (Table 2).

Inventory and monitoring efforts at other sites are on-going and more active management, as described here, may be extended to these non-focal sites in the future.

5. FOCAL CONSERVATION AREA MANAGEMENT PLAN

5.1. *Monitoring.* – Blanding's Turtle populations will be monitored annually through trapping and incidental captures. Trapping will be conducted using baited hoop traps of various sizes. Traps will be baited with canned sardines. Data will be collected on all turtles captured including sex, weight, and shell locations. GPS location will be recorded. Turtles will continue to be marked via a shell notching and Passive Integrated Transponders (PIT tags). Photos of the plastron will also be taken to aid in identification. Radio transmitters will be affixed to a subset of turtle (primarily adult females) to provide data on habitat use and movement patterns and to allow direct observation of nesting activities.

5.2. *Demographic Management.* – Blanding's Turtle populations at focal conservation areas are small and dominated by older age classes. Furthermore, these populations are geographically isolated. Trapping efforts by B. Cosentino at wetlands within ca. 7 km radius of Richardson Wildlife Foundation in 2007-2009 yielded no Blanding's Turtle captures outside of Richardson (C. Phillips, pers. comm.). Similarly, reconnaissance and trapping at Nachusa Grasslands and adjoining properties in 2014-2018 to present has failed to yield Blanding's Turtles outside of core wetlands. To promote population growth, Blanding's Turtle nests have been caged at Nachusa Grasslands (since 2016) and Richardson Wildlife Foundation (since 2018) to prevent depredation by raccoon and other carnivores. To further minimize mortality of vulnerable age classes (hatchlings and first-year juveniles), head-starting is planned commencing in 2019.

5.2.1. *Nest Protection.* – Nest protection involves using radio telemetry to track females as they depart wetlands and move upland for oviposition, typically in late afternoon or evening between late-May and mid-June. Once nests are completed, they are surrounded with a hardware cloth cylinder buried to a depth of about 10 cm and held in place with rebar and zip ties (Fig. 3). Nest are daily for the presence of hatchlings beginning in late-August and continuing until hatching is complete (typically mid-September; Table 3).

5.2.2. *Head-starting.* – Head-starting involves the harvesting of eggs, incubation and captive rearing of hatchling turtles until they attain a size that makes them less susceptible to predation. Eggs will be obtained by collecting eggs from completed nests or by inducing oviposition by females containing fully hardened eggs (detected by digital palpation of inguinal pockets). Females will be induced and eggs will be incubated at McHenry County Conservation District (MCCD) or Forest Preserve District of DuPage County (FPDDC) following their standard protocols. Briefly, oviposition will be induced via injection of Prostaglandin F₂. Eggs will be buried in moist vermiculite and placed in table-top incubators (GQF Manufacturing) to complete development. Clutches will be divided and incubated at 26 or 30 C, resulting in approximately equal number of males and females (Blanding's Turtles have temperature dependent sex determination). Hatchlings will be transported to the Lake County Forest Preserve District (LCFPD) where they will be reared in tubs (Rubbermaid Commercial FG424300BLA Stock Tank, 50 Gallon Capacity) at a maximum density of 25 per tub and fed a commercial turtle food (Mazuri™ Carnivorous Turtle Diet # 5ME0) every other day following LCFPD standard protocols.

Head-started turtles will be marked by shell notching and PIT tagging and released at source wetlands in May 2020. A subset will be equipped with radio transmitters (not to exceed ca. 5% body weight) to facilitate post-release monitoring.

- 5.2.3. *Other Actions.*** – As data accumulates on causes of egg, hatchling, juvenile, and adult mortality, other actions (e.g., mesopredator control) may be incorporated into future versions of this plan to increase Blanding's Turtle survival.
- 5.3. Genetic Management.** – Blood samples are routinely collected from wild-caught Blanding's Turtles and will be banked for future genetic analysis (Anthonysamy et al. 2017). Such analyses may be used to inform translocations of hatchlings or head-started animals to maintain local and regional genetic variability.
- 5.4. Health Assessment.** – Wild-caught and head-started Blanding's Turtles will undergo a standard visual assessment developed by the University of Illinois Wildlife Epidemiology Laboratory (IWEL). In addition oral/cloacal swabs will be collected and banked for future infectious disease status assessment by IWEL.

6. LONG-TERM MONITORING

Nachusa Grasslands and Richardson Wildlife Foundation are committed to long-term monitoring of Blanding's Turtle populations consistent with the Illinois Herps Act ((510 ILCS 68/) Herptiles-Herps Act; <http://www.ilga.gov/legislation/ilcs/ilcs5.asp?ActID=3563&ChapterID=41>).

7. PROJECT PARTNERS

The following is a list of partner agencies and lead individuals participating in activities described in this plan.

The Nature Conservancy Nachusa Grasslands

Bill Kleiman – Project Manager

Cody Considine – Restoration Ecologist

Elizabeth Bach – Ecosystem Restoration Scientist

Richardson Wildlife Foundation

Brian Towey – Manager

Justin Pitzer – Restoration

McHenry County Conservation District

Sara Denham – Wildlife Resource Center Manager

Forest Preserve District of DuPage County

Dan Thompson – Ecologist

Lake County Forest Preserve District

Gary Glowacki – Wildlife Biologist

Natural Resource Consulting LLC

Dave Mauger – Ecologist

Ecological Consulting Group LLC

Tom Anton - Ecologist

Northern Illinois University

Dr. Richard King – Distinguished Research Professor

University of Illinois

Dr. Matt Allender – Wildlife Epidemiology Laboratory Director

8. LITERATURE CITED

- Anthonyamy, W. J. B., M. J. Dreslik, M. R. Douglas, D. Thompson, G. M. Klut, A. R. Kuhns, D. Mauger, D. Kirk, G. A. Glowacki, M. E. Douglas, and C. A. Phillips. 2017. Population genetic evaluations within a co-distributed taxonomic group: a multi-species approach to conservation planning. *Animal Conservation* 21:137-147.
- Congdon, J. D., T. E. Graham, T. B. Herman, J. W. Lang, M. J. Pappas, and B. J. Brecke. 2008. *Emydoidea blandingii* (Holbrook 1838) - Blanding's turtle. In A. G. J. Rhodin, P. C. H. Pritchard, P. P. van Dijk, R. A. Saumure, K. A. Buhlmann, and J. B. Iverson, editors. Conservation biology of freshwater turtles and tortoises: a compilation project of the IUCN/SSC tortoise and freshwater turtle specialist group. Chelonian Research Monographs No. 5, pp 015.1-015.12. Chelonian Research Foundation.
- Henning, B. M., and L. C. Hinz Jr. 2016. Conservation guidance for Blanding's Turtle (*Emydoidea blandingii*). INHS Technical Report 2016 (57): 19 pp.
- King, R. B. 2013. Illinois Conservation Assessment for the Blanding's Turtle (*Emydoidea blandingii*). Unpublished report to the Illinois Endangeres Species Protectino Board. 91 pp.

Table 1. Element occurrence records (EOR) for Blanding’s Turtles included within the Middle Rock – Green River Blanding’s Turtle Management Plan. Years with Blanding’s Turtle observations are denoted “+;” years lacking Blanding’s Turtle observations despite searching are denoted “-.” Focal sites of this plan include Richardson Wildlife Foundation (EOR 94) and Nachusa Grasslands (EOR 19). Some EORs are combined following King (2013).

Year	Element Occurrence Record #										
	94	19	18	36/172	38/58	59	152	160	39	134	151
1980											
1981											
1982											+
1983											
1984				+							
1985			+								
1986				+	+					+	
1987											
1988											
1989					+						
1990		+		+	+				+		
1991				+							
1992				+							
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1998											
1999	+										
2000	+	+	+								
2001	+				+						
2002	+			+		+					
2003	+	+				+		+			
2004	+	+		+	-		+				
2005	+			+	-	+					
2006	+	+		+							
2007	+			+		+					
2008	+	+									
2009	+										
2010	+			+		+					
2011	+			+		+					
2012	+					+					
2013	+				+	+					
2014	+	+				+					
2015	+	+			+	+					
2016	+	+				+					
2017	+	+	+	+		+					
2018	+	+	+	+		+					

Table 2. Capture and telemetry histories of Blanding's Turtles at (A) Richardson Wildlife Foundation and (B) Nachusa Grasslands from 2000-2018. Mass and carapace lengths were obtained upon first capture. Adult females are denoted "F;" adult males are denoted "M;" adults of unknown sex are denoted "A;" juveniles are denoted "J." "C" denotes the capture of a given turtle in a given year; "T" denotes a turtle being monitored with telemetry; "D" denotes a turtle being found dead.

ID	Sex	Mass (g)	Carapace Length (mm)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
A. Richardson Wildlife Foundation																						
L11-12	F		180	C																		
-	F		170	C	D																	
L9-10	F		198	C							C											
L10-11	F		190	C						C				C								
L4-5	F	1800	210		C																	
L8-9	F	1850	205		C																	
-	M		215			C																
R11-12	J						C															
R1L10	F		188					C											D			
L1	M		214						C													
L10	J		38						C													
R2R10	F		203						C													
L9L10	M		195						C						D							
R11-12L11-12	M		206						C								C	C	C			
R10	F		205							C												
R2R11L1	F		220									C										
L3L10	F	1106	199										C									
R2R3	F		224										C									
R11	F	1500	204										C	C	C							
R1R2	F		137											C								
R1L1	M	1960	231											C	C							
R3L3	F		220													C						
R1R3	F		204												C						T	
-	M																	D				

R1R8	A		209															T	C				
R1R9	F		190															T	T				
R2R3L3	F		204																T				
L8L9	F		203																T			T	
L2	F		193																			T	
L3	M		224																			C	
R11-12, R12-L12	M		224																			C	
R2R9L3L10	F		214																			T	
B. Nachusa Grasslands																							
1L1R	F	200	200																C	C	T	T	T
1L2R	F	1185	206																	C	T	T	T
1L3R	F	1230	199																	C	C		
1R8R	F	1030	189																	C	T	T	T
1R9R	M	1600	223																	C	T	T	T
1L8R	F	1070	183																	C	T	T	T
1L9R	F	983	186																		T	T	T
1L10R	M	1430	225																		C	T	
1L11R	M	1420	222																		C	T	T
1L12R	J	154	101																			D	
2L1R	J	114	89																			C	
2L2R	F	1230	199																				C

Table 3. Reproduction by adult female Blanding’s Turtles monitored by telemetry at Nachusa Grasslands, 2016-2018.

ID	Departed Wetland	Nest Attempts	Nesting Date	Hatch Date	Live	Dead	Undeveloped	Comments
1L1R	16-Jun-16	17-Jun-16	18-Jun-16	6-Sep-16	8	0	0	
1L8R	10-Jun-16		10-Jun-16	31-Aug-16	3	0	1	
1L9R	after 2-Jun-16							nested prior to 10-Jun-16
1R8R	2-Jun-16							nested prior to 6-Jun-16
1L2R	3-Jun-16							nested prior to 6-Jun-16
1L1R	-							apparently did not nest in 2017
1L8R	9-Jun-17		11-Jun-17	17-Sep-17	6	0	1	
1L9R	7-Jun-17		9-Jun-17	11-Sep-17	7	0	0	
1R8R	4-Jun-17	8-Jun-17, 9-Jun-17						apparently nested during night of 9-Jun-17
1L2R	8-Jun-17	10-Jun-17, 11-Jun-17	13-Jun-17	17-Sep-17	9	0	2	
1L1R	20-Jun-18		20-Jun-18	16-Sep-18	0	1	8	nest was excavated on 16-Sep-18; 1 hatchling (died within 1 day) and 8 undeveloped eggs were retrieved
1L8R	10-Jun-18		16-Jun-18	29-Aug-18	9	0	0	
1L9R	3-Jun-18		3-Jun-18	21-Aug-18	8	0	0	
1R8R	31-May-18							nested between 1 Jun (eggs detected) and 3 June (post-oviposition)
1L2R	5-Jun-18	6-Jun-18	7-Jun-18	21-Aug-18	9	2	0	

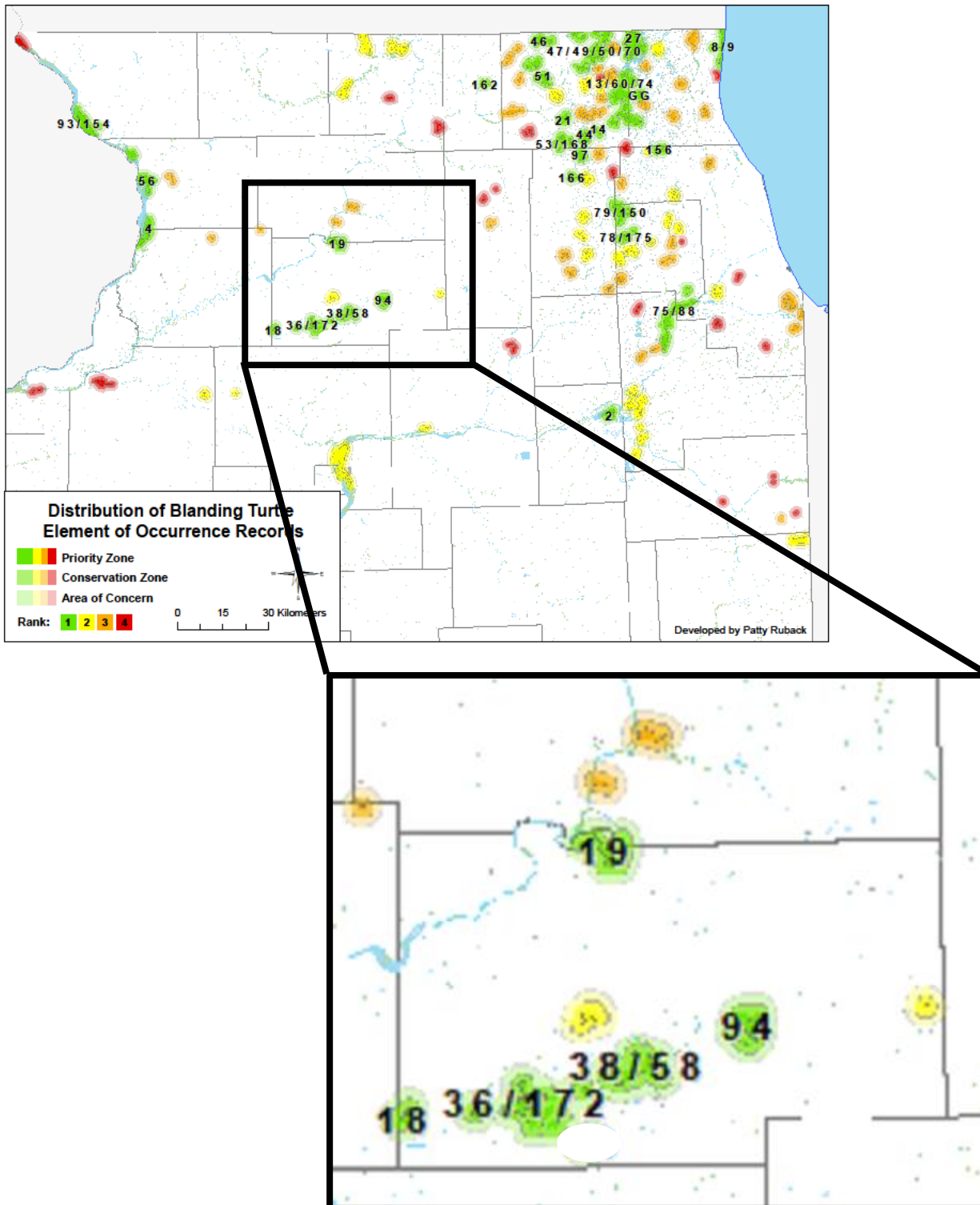


Figure 1. Geographic distribution of Blanding's Turtles in northern Illinois (Fig. 5 from King 2013) with inset centered on Lee County. Sites with frequent records since 1980 and are shaded green and labeled with their corresponding EOR #. Sites with infrequent records since 1980 are shaded yellow, sites with isolated records since 1980 are shaded orange, and sites with no records since 1980 are shaded red. The location of EOR 59 is not shown at the request of site stewards and land managers.

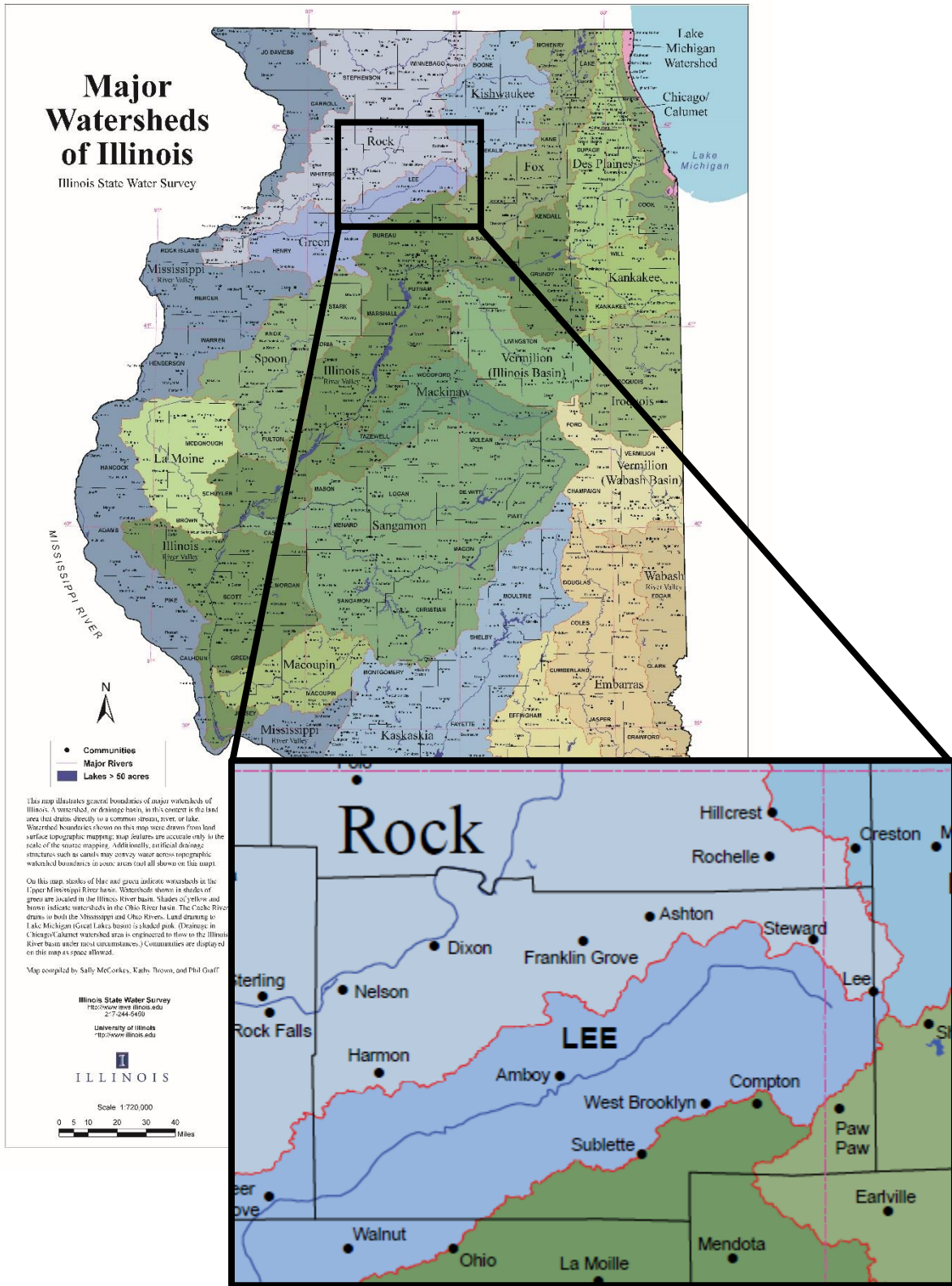


Figure 2. Watershed map of Illinois (<https://www.isws.illinois.edu/maps>) and inset centered on Lee County showing the Rock River watershed (pale blue) and Green River watershed (darker blue).



Figure 3. Hardware cloth nest protector around a Blanding's Turtle nest at Nachusa Grasslands.