

OFFICE OF RESOURCE CONSERVATION

State of Illinois

Grant Proposal

PROJECT NUMBER: T-39 D-1

PROJECT TITLE: Recovery of the Blanding's Turtle (*Emydoidea blandingii*) at Spring Bluff Nature Preserve, Lake County Forest Preserves

PURPOSE: In 2003, the Lake County Forest Preserve District (District) initiated a District-wide survey of historic and potential *E. blandingii* habitat within District preserves. Following two field seasons, it was apparent that only one *E. blandingii* population was potentially viable (Kuhns *et al.* 2004), located at Spring Bluff Nature Preserve (SPNP), a District forest preserve that has been dedicated as an Illinois Nature Preserve. Researchers' efforts shifted to conduct an intensive demographic study of the *E. blandingii* population at SPNP. Initial demographic data indicates that the SBNP population is declining, however at least two more years of data should be collected and applied to the model to draw conclusions with any confidence. To provide for the continued survival of the species at SBNP, the District seeks advice on long-term management of Blanding's turtles at SBNP and hopes to use information gained from the study to contribute to regional conservation efforts of this species.

The goal of the study is to stabilize the Blanding's turtle population at SBNP by developing a better understanding of population threats and implementing and monitoring management actions to mitigate identified threats. To achieve this goal, the following specific objectives will be addressed with this study:

1. Quantify the pressure of meso-predators or "urban carnivores" through scent-station surveys (Job 1, below),
2. Investigate the cause and intensity of nest predation and the efficacy of nest protection via remote camera technology (Job 1, below),
3. Further refine and augment the initial population model (Job 2, below),
4. Evaluate the efficacy of head-starting as a management action to reduce predation on hatchlings (Job 3, below),
5. Investigate the impact of habitat restoration on turtle nesting, and
6. With information gained from the study, develop and implement a long-term adaptive management plan for the long-term conservation of the Blanding's turtle at SBNP (Job 4, below).

NEED: Urbanization of the greater Chicago region has resulted in a dramatic loss of natural wetland communities. Many counties in northeastern Illinois have included wetland restoration, creation and protection among their priorities. However, wetland species that require large expanses of interspersed wetland and upland habitat, such as *E. blandingii* (Banning *et al.* 2006, Kuhns *et al.* 2006, Joyal *et al.* 2001, Ernst *et al.* 1994), remain at risk of extirpation. *E. blandingii* is experiencing range-wide declines and recent research indicates that *E. blandingii* are becoming uncommon in urban areas (Marchand and Litvaitis 2004) including the Chicago region (Kuhns *et al.* 2004, Ludwig *et al.* 1992). Because of their threatened status in Illinois and rarity, recovery efforts must be initiated to halt declines and stabilize local populations of *E. blandingii*. The species is considered to be one of special concern under the Illinois Department of Natural Resources' (IDNR) "Illinois Wildlife Action Plan" (IWAP) (Section X: Appendix I), and the goals and objectives of this study are in agreement with IWAP goals and objectives (Section III: C and F).

An initial survey of District sites in 2004 documented the presence of 10 *E. blandingii* at SBNP (Kuhns *et al.* 2004). In 2005, a multi-year telemetry study was initiated to continue demographic modeling to determine

sex/age structure of the population, estimate population size and assess community structure. Telemetry data was used to determine timing and habitat of nesting, home range size, and general habitat use of both adults and juveniles. Population viability modeling of the first year's data suggest that the SBNP population is declining and management efforts focusing on augmentation via head-starting and nest protection could contribute to stabilization of the population (Kuhns et. al. 2006). IWAP states that the desired conditions for Illinois wildlife and habitat resources for amphibians and reptiles (Section III. C, p. 41) are as follows:

1. The distribution and abundance of reptile and amphibian populations are understood with confidence, and sentinel monitoring can identify conservation needs, and
2. Key species (eastern massasauga and Blanding's turtle) have been recovered and adequate habitat is secure.

Referring to Appendix II (IWAP, p. 325), the most critical stresses to Blanding's turtles in Illinois are habitat-related (fragmentation, hydrologic disturbance, and invasive/exotic species) and related to the population ecology of the species (dispersal, recruitment, and mortality). These threats have or are likely to have a severe effect on population viability or abundance. A community-related threat, predation, was identified as having a moderate effect.

Habitat Stresses: Applicable habitat objectives (Section III. C) are described in terms of "campaigns" in IWAP. As previously noted, *E. blandingii* require large expanses of interspersed wetland and upland habitat, and fragmentation of the wetland to upland (grassland) continuum may be contributing to the decline of the species. The following conservation actions are outlined in IWAP (Appendix III) regarding *E. blandingii* habitat:

Grasslands campaign – restore rare, extirpated populations; fill info gaps, develop improved actions; and  
Wetlands campaign – Improve wetland condition; fill info gaps; and  
Exotic species campaign – prioritize exotic species control areas.

The District is committed to preserving and restoring native habitats throughout our preserves. SBNP is considered a conservation target by IWAP due to its status as an Illinois Natural Areas Inventory (INAI) site and as a dedicated Illinois Nature Preserve. The District manages the site through invasive species monitoring and control and prescribed burning. In 2007, the District will implement large-scale habitat restoration at the site to occur in phases over the next 3-4 years. The project will begin this summer (2007) with cattail control. This species has been slowly advancing into open sedge meadow and grassy wetland areas, and filling in former open-water marshes on the site. In December 2007, invasive woody shrub clearing will begin to restore the open nature of the black oak savannas and dune communities. These actions will open up the habitat and presumably be more conducive to turtle nesting and basking – we will be monitoring the response of *E. blandingii* to the habitat restoration activities throughout the study. None of the habitat restoration work is proposed to be funded by the SWG, however the demographic data collected for the population model will address turtle response to restoration actions.

Population Stresses: As stated previously, the goal of the study is to stabilize the *E. blandingii* population at SBNP by developing a better understanding of population threats and implementing and monitoring management actions to mitigate identified threats. Through collecting additional demographic data, we will be able to identify the extent to which known population stresses (dispersal, recruitment and mortality) are contributing to the population decline of *E. blandingii* at SBNP, thus enabling us to identify the most effective methods for mitigating those threats. Initial research at SBNP indicates that predation may play a significant role in population decline, so we will be investigating predation as well. Effects of the various techniques can be analyzed via population viability modeling. By testing various management scenarios in a population viability model, we can determine if the time and labor associated with long-term use of specific techniques (head-starting, nest protection) is warranted.

The term “head-starting” refers to a technique in which hatchling turtles are raised in captivity for a period of time in order to attain a larger body size in an attempt to alleviate the effects of high mortality that small age classes experience (Heppell et. al., 1996). Hatchlings are typically obtained by one of three methods: 1) trapping gravid females and either inducing oviposition via injection or keeping the female in captivity until she lays eggs, 2) collecting eggs from natural nests in the field, or 3) caging natural nests to protect them from predators and then collecting the hatchlings upon emergence. In all three methods hatchlings are fed throughout the first year of life. By allowing the hatchlings to feed through the winter, they grow faster. After one year, the yearling turtles are equivalent in size to “wild” turtles of 3-4 years. Head-starting, theoretically, mitigates the effects of predation on eggs and on very young hatchlings (Haskell et. al. 1996). All individuals will be reared at the Wildlife Resource Center, a licensed wildlife rehabilitation facility run by the McHenry County Conservation District.

Determining the effects of predation on nests and nest protection are also necessary to stabilize the SBNP population. As the density of humans increases in a region so does the density of subsidized predators such as raccoons (Prange et al. 2003). An increase in subsidized predators can have drastic effects on turtle populations because these mesopredators are most often associated with nest and hatchling predation (Congdon et al. 1993, Christiansen and Gallaway, 1984). Therefore we will also implement nest protection, the use of remote-activated digital cameras, and predator abundance surveys to investigate the contribution of predation to population decline.

The primary goal of this project is to stabilize the SBNP population. Ultimately, the District wishes to re-introduce *E. blandingii* to other appropriate habitats and historic locations within the forest preserves. Information learned from this study will be valuable to recovery of *E. blandingii* in Lake County and the region.

#### OBJECTIVES:

- Job 1. Evaluate nest predation and efficacy of nest protection (30% of overall budget, requires staff time and equipment)
- 1.1 Conduct predator abundance surveys (Quarter 2, 2007 and 2008)
  - 1.2 Determine nest predation rates using motion-triggered cameras (Quarters 3 and 4, 2007 and 2008)
  - 1.3 Monitor protected and un-protected nests (clutch frequency, hatch rate, predation rate) to determine efficacy of nest protection enclosures (Quarters 3 and 4 2007 and 2008)
- Job 2. Population modeling (30% of overall budget, requires staff time only)
- 2.1 Continue data collection for population viability analysis (Quarters 2-4, 2007 and 2008)
  - 2.2 Model parameters such as nest protection, predation rates, augmentation rates, survival, maturity, etc. using the modeling programs Vortex, Stella, Madonna and MatLab. (Quarter 4, 2007 and 2008; throughout 2009)
- Job 3. Population augmentation (15% of overall budget, requires MCCD contract (5% of budget) and staff time.)
- 3.1 Initiate contract with McHenry County Conservation District – Wildlife Resource Center (MCCD) to head-start turtles (Sign and renew contract annually in April)
  - 3.2 Collect eggs and deliver to MCCD (Quarter 4, 2007; throughout 2008 and 2009).
  - 3.3 Release and monitor released hatchlings (Quarters 2-4, 2008 and 2009)
- Job 4. SBNP Turtle Management Plan (20% of overall budget, requires staff time)
- 4.1 Utilizing the conclusions drawn from the study, design a long term management plan to continue the effort to stabilize the population (Throughout 2009 – Quarter 1, 2010).

- 4.2 Implement management plan by providing it to District staff and providing any training on specific techniques (trapping, monitoring, etc.) (Quarter 4, 2009, Quarter 1, 2010).

Job 5. Prepare final report (5% of overall budget, requires staff time)

- 5.1 Prepare final report per grant requirements (Quarter 4, 2009, Quarter 1, 2010).

EXPECTED RESULTS OR BENEFITS: The primary benefit of this project will be the stabilization of the existing *E. blandingii* population at SBNP. Because the population will not be stabilized with just two years of augmentation, another benefit to this project will be the use of an adaptive management plan for *E. blandingii* at SBNP, which can be followed in perpetuity as part of the overall management plan for SBNP. Other outcomes of this project will include a better understanding of the relationship between *E. blandingii* and their primary predators in urban and semi-urban areas of the Chicago region and methods that can be used to protect hatchlings and/or their nests from certain predators. For the long-term, another outcome of the project is the ultimate goal of re-introducing *E. blandingii* to other historic locations that still contain suitable, protected habitat; thus contributing to overall recovery of *E. blandingii* in northeastern Illinois.

APPROACH:

*Job 1: Measure rates of nest predation and determine the efficacy of nest protection.* Methods will include predator abundance surveys, nest predation rates using *in situ* motion triggered cameras, estimating clutch frequency, hatch rate, and efficacy of nest protection enclosures (Linhart and Knowlton 1975, Roughton and Sweeny 1982, Sargeant, et al. 1998). Since female *E. blandingii* lay only one clutch per year (Ernst et al 1994), clutch frequency can be estimated by determining the percentage of females captured prior to the nesting season that are gravid. Gravidity will be assessed using digital palpation of the inguinal pockets (Ewert 1989) and/or x-radiography. Initially, work will be done by INHS staff with District staff continuing the process of monitoring nesting sites and protecting nests. All procedures for animal handling have been reviewed and approved by the University of Illinois Animal Care and Use Committee protocol # 06129.

*Job 2: Model augmentation of head-started turtles into SBNP and other preserves.* INHS will be taking the lead on this project and modeling parameters such as nest protection, predation rates, augmentation rates, survival, maturity, etc. using the modeling programs Vortex, Stella, Madonna and MatLab.

*Job 3: Begin head-starting program.* District staff has completed preliminary negotiations with MCCD's Wildlife Resource Center to care for and rear eggs for head-starting. Eggs will be delivered to the Wildlife Resource Center immediately upon collection, hatched and reared by MCCD staff, then returned to SBNP the following year. District staff may also assist with collection of gravid females from SBNP by hoop trapping and monitoring nesting sites to bring females into captivity for egg deposition.

Should head-starting be determined to be a viable and necessary step in the recovery of *E. blandingii* at SBNP, District staff will work with staff at established regional head-starting facilities (The Wildlife Resource Center and the Willowbrook Wildlife Rehab Center of the Forest Preserve District of DuPage County) to create a long-term plan for cooperatively head-starting turtles.

*Job 4: Formulate a management plan for turtles at SBNP.* INHS staff is in a third year of compiling demographic data for the SBNP population of *E. blandingii*. Because the turtle is a long-lived species, collecting life history parameters necessary for a robust population viability analysis takes many years. Many important variables for formulating a management plan for the turtle population at SBNP remain unknown including: survival rates, a robust population estimate, clutch frequency, hatchling success, etc. This data will continue to be collected with the use of baited hoop traps, and visual encounter surveys of suitable habitat including nesting areas during the nesting season.

*Job 5: Prepare final report.* A final report will be prepared per grant requirements.

**LOCATION:** This three year project will be completed by researchers and graduate students from University of Illinois and by INHS staff in Champaign. The project will be executed at SBNP, located near Zion, Lake County, Illinois in Township 46 North, Range 12 East, Sections 3 and 10. The property is owned by the District. SBNP is a high quality natural area which makes up a portion of the “Illinois Beach-Chiwaukee Prairie” Conservation Opportunity Area, as identified in IWAP. It is also a dedicated Illinois Nature Preserve (dedication number 213) and is part of the “Illinois Dunes North” Illinois Natural Areas Inventory site.

**PROJECT SCHEDULE:**

The project schedule assumes a begin date of April 1, 2007 and an end date of March 31, 2010 for a total of 3 years. Each year, therefore, is organized into four quarters as follows:

Quarter 2 = April through June

Quarter 3 = July through September

Quarter 4 = October through December

Quarter 1 = January through March.

Because the project will begin in Quarter 2, each project year encompasses Quarter 2-4 of the current calendar year, and Quarter 1 of the following calendar year. E.g. “Year 1” begins April 1, 2007 and ends March 30, 2008.

Objectives	Year 1 (1 April 2007 – 31 March 2008)			
	Quarter 2	Quarter 3	Quarter 4	Quarter 1
Job 1. Evaluate nest predation and efficacy of nest protection				
1.1 Conduct predator abundance surveys	X	X	X	
1.2 Determine nest predation using cameras		X	X	
1.3 Monitor nests for predation, nest protection efficacy		X	X	
Job 2. Population modeling				
2.1 Continue data collection for PVA	X	X	X	
2.2 Model parameters with Vortex, Stella, etc.			X	X
Job 3. Population augmentation				
3.1 Initiate MCCD contract for head-starting	X			
3.2 Collect age and rear hatchlings for release			X	X
3.3 Release and monitor hatchlings				
Job 4. SBNP Turtle Management Plan				
4.1 Design long-term management plan				
4.2 Implement plan				
Job 5. Prepare final report				

Objectives	Year 2 (1 April 2008 – 31 March 2009)			
	Quarter 2	Quarter 3	Quarter 4	Quarter 1
Job 1. Evaluate nest predation and efficacy of nest protection				
1.1 Conduct predator abundance surveys	X	X	X	
1.2 Determine nest predation using cameras		X	X	
1.3 Monitor nests for predation, nest protection efficacy		X	X	
Job 2. Population modeling				
2.1 Continue data collection for PVA	X	X	X	
2.2 Model parameters with Vortex, Stella, etc.			X	X

Job 3. Population augmentation				
3.1 Renew MCCD contract	X			
3.2 Collect age and rear hatchlings for release	X	X	X	X
3.3 Release and monitor hatchlings	X	X	X	
Job 4. SBNP Turtle Management Plan				
4.1 Design long-term management plan				
4.2 Implement plan				
Job 5. Prepare final report				

Objectives	Year 3 (1 April 2009 – 31 March 2010)			
	Quarter 2	Quarter 3	Quarter 4	Quarter 1
Job 1. Evaluate nest predation and efficacy of nest protection				
1.1 Conduct predator abundance surveys				
1.2 Determine nest predation using cameras				
1.3 Monitor nests for predation, nest protection efficacy				
Job 2. Population modeling				
2.1 Continue data collection for PVA				
2.2 Model parameters with Vortex, Stella, etc.	X	X	X	X
Job 3. Population augmentation				
3.1 Renew MCCD contract	X			
3.2 Collect age and rear hatchlings for release	X	X	X	X
3.3 Release and monitor hatchlings	X	X	X	X
Job 4. SBNP Turtle Management Plan				
4.1 Design long-term management plan	X	X	X	X
4.2 Implement plan			X	X
Job 5. Prepare final report			X	X

PERSONNEL:

The following personnel from IDNR will manage this project:

Dr. Dan Ludwig  
Region 2 Office  
2050 W. Stearns Rd.  
Bartlett, IL 60103

Primary research staff will be:

Christopher A. Phillips  
Illinois Natural History Survey  
Division of Biodiversity and Ecological Entomology  
1816 S. Oak St.  
Champaign, IL 61820

The project manager and point of contact for the grant will be:

Jennifer Filipiak, Wildlife Biologist  
Lake County Forest Preserve District  
Planning, Conservation and Development Department  
32492 N. Almond Rd.  
Grayslake, IL 60030

Other District staff that may be involved in the project for turtle monitoring include members of the District's Operations staff and Natural Resources Crew, and ecologists in the Natural Resources Division.

The subcontractor for this project will be:

Sara Denham, Manager  
Wildlife Resource Center, McHenry County Conservation District  
6419 Giant Oaks Road  
Wonder Lake, IL 60097

Brad Woodson, Wildlife Biologist  
McHenry County Conservation District  
6512 Harts Road  
Ringwood, IL 60072

COMPLIANCE: This project is covered by categorical exclusion 1.4B(1) in 516 DM 6, Appendix 1 from NEPA because it consists only of research, inventory, and information collection activities directly related to the conservation of wildlife resources, and involves negligible animal mortality and no habitat destruction,

introduction of contaminants, or introduction of non-indigenous organisms. No federally listed species are involved.

Final reports resulting from the project, including the turtle management plan, grant reports and copies of Master's theses/Doctoral dissertations will be available through the District's Natural Resources Division. The District is committed to managing the *E. blandingii* population at SBNP in perpetuity, according to recommendations made in the turtle management plan.

#### BUDGET JUSTIFICATION:

*Personnel Services:* Funds are requested to fund two field assistants at 50% time who will participate in all aspects of this project. Salary and benefits for the Graduate Research Assistant (10 month appointment) are from a private foundation. Salary and benefits for Chris Phillips (2% time commitment) contribute to cost sharing, and are paid by Illinois Natural History Survey operating funds at no cost to the sponsor.

The salary of Jennifer Filipiak and of other ecologists within the Planning, Conservation and Development Department (specific details of % commitment to be determined) contribute to cost sharing, and are paid by Lake County Forest Preserve District at no cost to the sponsor.

*Fringe Benefits:* These funds are calculated as a percentage of the funding budgeted for personnel services above.

*Travel:* Travel funds are needed to reimburse staff for necessary travel occurring between the study site (SBNP) and the site of the head-starting facility in Wonder Lake, IL and travel to project-related meetings within Lake County and to and from Champaign-Urbana.

*Supplies:* Funding is needed for miscellaneous office supplies and expendable field supplies such as printer ink, sand/scent for scent stations, hoop traps, minnow traps, digital film cards, thermometers, bait for traps, batteries, water depth gauges, data loggers, blood collection tubes, and nets.

*Equipment:* Equipment funds are needed for digital, motion sensing cameras, radio transmitters, digital cameras, GPS units

*Contractual services:* These funds are requested to pay for head-starting facilities owned and operated by the MCCD's Wildlife Resource Center. They have agreed to head-start all hatchlings for \$4,000 per year.

*Cost sharing:* Chris Phillips is a full-time employee of the Illinois Natural History Survey whose time devoted to this project will contribute to the required 50% non-federal match. The amounts indicated represent approximately 2% of his salary and benefits over the duration of the project. Jennifer Filipiak and other LCFPD staff whose time will be devoted to this project will contribute to the required 50% non-federal match. The amounts indicated represent approximately 10% of the salary and benefits of one full-time staff over the duration of the project. The full salary and benefits for the Graduate Research Assistant also contribute to the required non-federal match.

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