

**Blanding's turtle (*Emydoidea blandingii*): An effort to
Restore and Protect a Threatened Species**

By: Alexandra Fodera

April 28, 2013



Table of Contents

Executive Summary.....	3
Natural History.....	4
• <i>Physical Description.....</i>	<i>4</i>
• <i>Distribution.....</i>	<i>5</i>
• <i>Habitat.....</i>	<i>6</i>
• <i>Reproduction.....</i>	<i>7</i>
Economic Benefits and Issues.....	8
Sociocultural Issues.....	9
Ecological Issues.....	10
Goal.....	11
Objectives, Course of Action and Assessment Protocol.....	11-15
Conclusion.....	15
Appendix I.....	16
Appendix II.....	17-18
Literature Cited.....	19-24

Executive Summary

The Blanding's turtle (*Emydoidea blandingii*) is a threatened species in New York State and is of conservation concern. Blanding's turtles can be found in isolated populations centered in the great lakes region in the United States and Canada but are rare throughout their range. There are currently 64 extant Blanding's turtle occurrences identified in four regions in New York; Dutchess, Saratoga, St. Lawrence, Jefferson, Niagara, and Erie counties (NHESP 2007). Many of these occurrences are threatened by habitat fragmentation from development and associated mortality from automobiles and predation. This species like many are frequently harmed when their habitats are not identified in advance of land development or road-building (Hartwig et al. 2009). The Blanding's turtle is currently listed as a threatened species in New York State, but is not listed federally. It is illegal to take, import, transport, possess, or sell an animal listed as Threatened, or its parts, in this state without a permit from NYSDEC (NHESP 2007). This species population was essentially stable and self-sustaining until 1994 without direct intervention (Congdon and Gibbons 1996). Although new populations have been identified in recent years, Blanding's turtle populations are believed to have been in decline for many decades (NHESP 2007). Due to the long lifespan of this species, it is difficult to assess long-term trends. Given that much their habitat in New York is at risk for development, an overall decline in these populations is likely. The goal of this plan is to support an overall increase of the Blanding's turtle (*Emydoidea blandingii*) population so it can hold a self-sustaining status and to prevent this species from going extinct in the future.

Natural History

Physical Description

Blanding's turtles (*Emydoidea blandingii*) are characterized by delayed sexual maturity, small clutch size, large home ranges, low reproductive success and long lived adults (Lang and Piepgras 1998). They are a medium-sized freshwater turtle largely confined to the Great Lakes Basin. The carapace is domed and elongated up to 25 cm (10 in) with yellow flecks on a dark background. These markings tend to get smaller and may fade altogether as the turtle ages (Herman 1993). They have hinged plastrons that range from a yellow center with dark patterns on the outer edges of each scute, to almost all dark (Congdon and Keinath. 2006). The most distinguishing characteristic of this turtle for both sexes is the bright yellow chin and throat. The sides of the neck and top of the head are variable in color, generally dark brown or black in males, but lighter in color and even mottled in females (Ernst et al.1994). In adults, there is no apparent sexual size dimorphism, but intersexual shape differences may result from differences in morphology of the plastron (Congdon and van Loben Sels 1991; Pappas et al. 2000). Males may have longer tails and heavier tail bases, and shell height in females may be taller and more domed (Congdon and Keinath. 2006). Hatchlings are essentially miniature adults, with a carapace length of 2.5 to 4 cm, except colors are generally brighter in younger individuals than in adults (Harding 1997; Conant and Collins 1998). They also are more circular in shape with longer tails in relation to their body size.

Distribution

The primary range of this species is centered around the Great Lakes, with a relatively uninterrupted distribution extending from southwestern Quebec and southern Ontario, south and west to central Nebraska, Wisconsin, Minnesota, Illinois, Indiana, Michigan, Iowa, Missouri, South Dakota, and Iowa (Ernst et al. 1994), and east to northern New York (Johnson and Wills 1997, Johnson and Crockett 2006), shown in Figure 1. Recent investigations in northern New York report the range of this turtle to be primarily in the vicinity of the Thousand Island region along the St. Lawrence River (NYSDEC), shown in Figure 2.

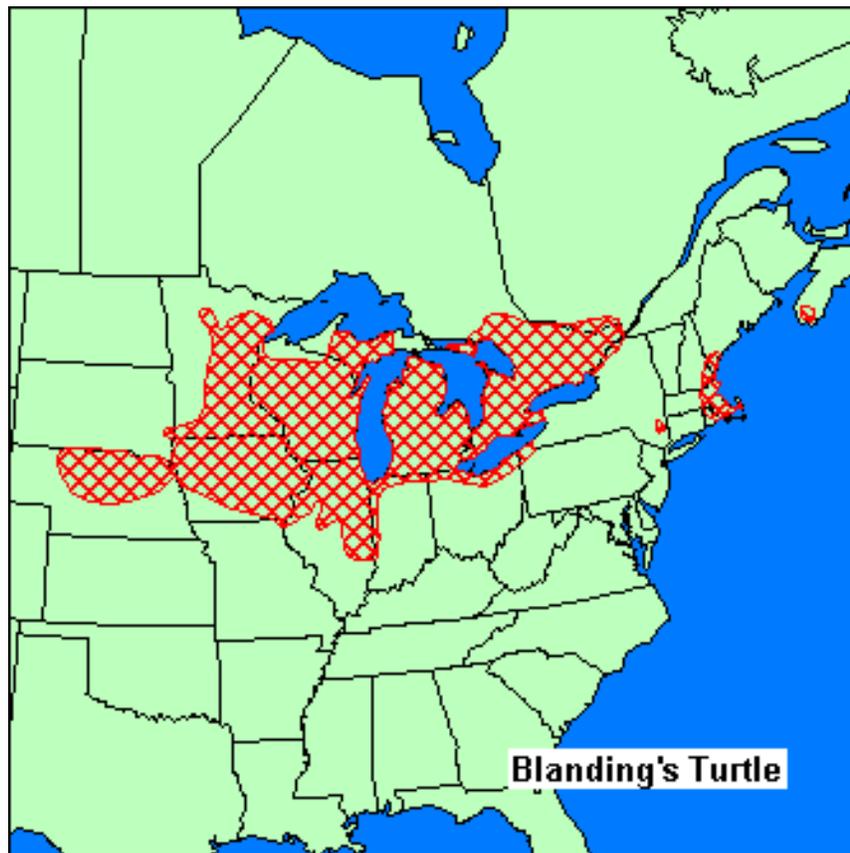


Figure 1. Distribution of (*Emydoidea blandingii*) in northern USA and Canada. Map courtesy of NYSDEC

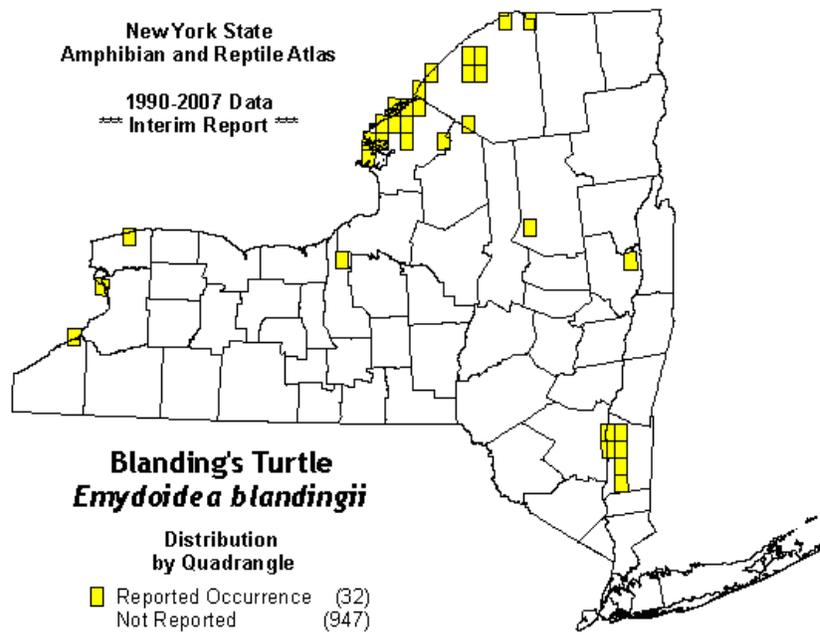


Figure 2.Reported occurrences of Blanding’s turtle population in New York. Map courtesy of NYSDEC

Habitat

In general, Blanding’s turtles occupy a variety of wetlands such as swamps, marshes, beaver dams, permanent and temporary ponds, and slow flowing streams (Kofron and Schreiber 1985).The Blanding’s turtle is a mobile species that inhabits a multiple wetland and upland habitats to meet its living needs. Blanding’s turtles make seasonal movements among aquatic areas that may be related to seasonally abundant resources or access to mates (Rhodin 2008). The Blanding’s turtle requires clean, shallow water with abundant aquatic vegetation, and appear to be sensitive to habitat alteration (Kofron and Schreiber 1985). Species feeds mainly on crayfish, insects, and other small animal prey, but also scavenges and consumes plant material and seeds (Kofron and Schreiber 1985; van Dijk and Rhodin 2011). The terrestrial component of their core

habitat is larger than that of many other aquatic turtle species, and both sexes use terrestrial corridors for movements among wetlands and for nesting migrations (Congdon and Keinath 2006). Blanding's Turtles overwinter from November to late March in a variety of wetland types using organic substrate in the deepest parts of ponds, marshes, creeks and occasionally vernal pools. They can be found in depths of mud substrate up to 3.7 - 8.3 inches (NHESP 2007)

Reproduction

Blanding's turtles can live up to 77 years in the wild (Brecke and Moriarty 1989), and reach sexual maturity between the ages 15 and 20. Given these life history traits, this species requires high annual survivorship of adults and juveniles to maintain stable populations (Congdon et al. 1993). During reproduction, internal fertilization takes place in the water (EOL 2013). Mating occurs between April and November but is focused during April and early May and nesting begins early June and lasts throughout the month (King 2009). Females will travel hundreds of feet to find appropriate nesting habitat. They prefer open canopies, which allow for sun exposure in well-drained but moist sandy soil, but when lacking preferred areas, lawns, gardens, or gravel road edges will be used (EOL 2013). Clutch size varies in every region. In New York clutch size range from 5-12 eggs with an average of 8 eggs (King 2009). Blanding's Turtles exhibits temperature sex determination, and eggs incubated at or below 28°C will produce males, while eggs incubated above 29°C will produce females (Herman et al. 1993). It takes approximately 84 days for hatchlings to develop and results in hatchlings emerging from late August through early October (Congdon et al. 1983; Pappas et al. 2000). Predation rates on turtle nests are generally high, variable, and unpredictable, but because almost all turtles are long-lived, stable populations do not require high nest survivorships to maintain population stability (Congdon and Gibbons 1996), seen in Figure 3.

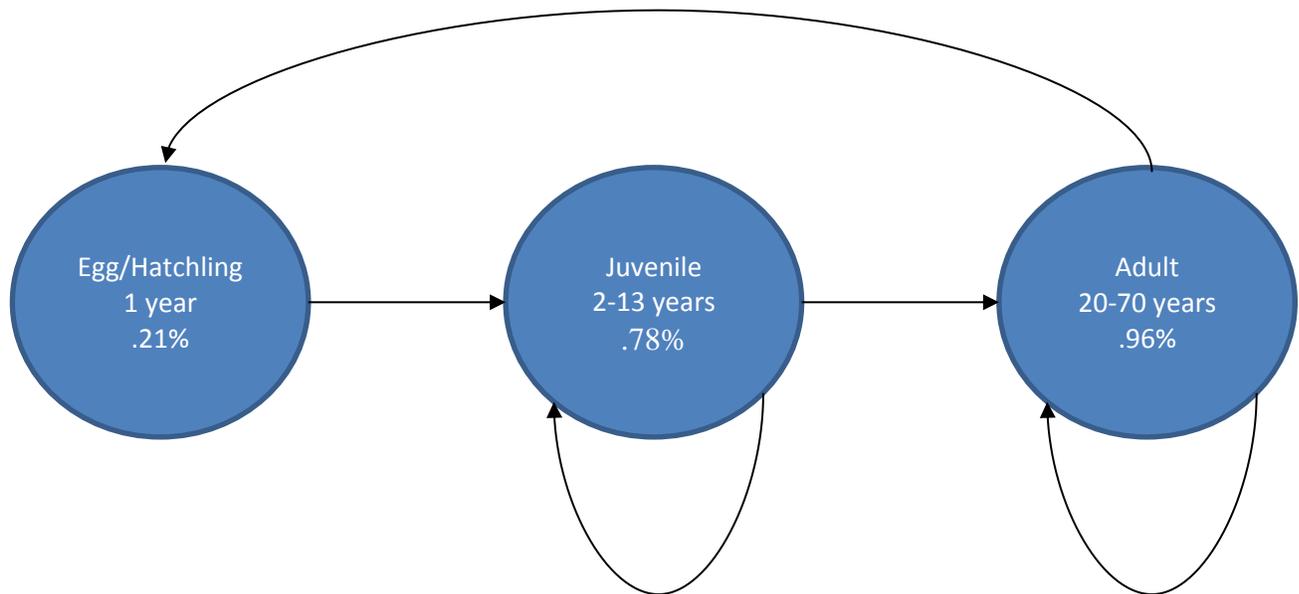


Figure 3. Life cycle graph for Blanding’s turtle. Life cycle has three age-based survival rates: 1st-year egg/hatchling ($P_i = .21\%$), Juvenile age-classes 2 through 13 ($P_i = .78\%$) and reproductive adult age’s ≥ 14 ($P_i = .96\%$).

Economic Benefits and Issues

Blanding’s Turtles are of biological significance because it is one of the longest lived freshwater turtles, with a lifespan exceeding 75 years (Congdon et al. 1993; Congdon et al. 2001; Ruben et al. 2001). Blanding’s Turtles exhibit all the characteristics of a long-lived species, in which they provide opportunities to study and create conservation strategies. This species has been used in studies to test competing hypotheses on why and how organisms age (Congdon et al. 2001, 2003). It is also the only living representative of the genus *Emydoidea* (Herman et al. 1993), which increases the importance of conservation for this species. Blanding’s turtles can be considered an “umbrella species.” As a result of its large home range and its use of a whole

complex of habitat, protection for Blanding's turtles protects many other species that co-occur in those habitats.

The growing interest of the pet trade for Blanding's Turtles presents a threat to survivorships of all ages (Levell 2000). Due to their long reproductive lives, collection of adults, juveniles, and hatchlings from small and isolated populations for the pet trade can result in severe reductions of populations (Herman et al. 1993). Females are usually collected on roads by motorists during nesting migrations (Congdon and Keinath 2006). This relatively high priced market makes it very appealing for individuals to risk fines and imprisonment, for the potential financial payout that the sale of a few individuals can bring (Herman et al. 1993).

Sociocultural Issues

Given their life history traits, this species is vulnerable to many threats including; loss and degradation of wetland and terrestrial habitats, road mortality and predation (Rhodin et al. 2008). Habitat destruction and fragmentation due to development and alterations of wetlands and uplands is the most significant threat to this species (Lang 2006). Habitat fragmentation and habitat destruction caused by road building and land conversion for human use reduces the quality of individual patch sizes available to the species and isolates populations. It can pose a significant threat since nest predation, primarily by raccoons, skunks, and opossums, was found to increase near habitat edges (Temple 1987). Loss or degradation of terrestrial movement corridors can increase the risks of injury and mortality. Fragmentation may also cause a reduction in genetic variation through drift and inbreeding (Congdon and Keinath 2006). Reduction in the amount or number of nesting areas through agriculture or development can result in increased risks to females during nesting migrations due to an extended search.

Ecological Issues

Fragmentation and reduction in available habitat areas increase the risk of adult road mortalities, forcing the species to travel across long distances to reach suitable habitats. In long-lived organisms with low fecundity, like Blanding's turtles, increased mortality of adults associated with roads is a very serious problem and one that impacts more females because of their extensive nesting migrations (Congdon and Keinath. 2006). A modeling study that investigated the effects of road density and traffic volumes on turtles found that for semi-terrestrial turtles such as the Blanding's Turtle, roads could contribute enough to annual adult mortality that positive population growth could not be maintained (NHESP 2007). Continued development in areas near Blanding's turtle populations will increase traffic volume and further the increase of road mortality of this species.

This species is very sensitive and is negatively affected when there are sudden environmental changes. Blanding's turtles inhabit productive, clean, shallow waters with abundant aquatic vegetation and soft muddy bottoms over firm substrates (Ernst et al. 1994). Practices that lead to loss or degradation to these wetland habitats may include; drainage or inundation of wetlands, river channelization, water impoundments, agricultural activities long edges of sloughs and ponds, herbicide and pesticide use, and development of upland nesting areas (Kofron and Schreiber 1985). Contamination of wetlands is detrimental to the health of this species. When Blanding's turtles ingest contaminated food, the contaminant will bio accumulate over a long period of time (Overmann and Krajicek 1995, deSolla et al. 1998).

Goal

The goal of this plan is to support an overall increase of the Blanding's turtle (*Emydoidea blandingii*) population so it can hold a self-sustaining status and to prevent this species from going extinct in the future.

Objectives, Course of action and Assessment protocol

Objective: Protect wetlands that are inhabited by the Blanding's turtle, in Dutchess, Saratoga, St. Lawrence, Jefferson, Niagara, and Erie counties, by establishing buffer zones around these wetlands within the first year of management.

Course of Action: Implement buffer zones around each wetland with identified Blanding's turtle populations in New York, to prevent development or surface-altering habitat modification surrounding wetlands. Limiting cultivation and modification of land to a minimum of 100 m from wetlands can be applied through public and land owner notice (Panella 2012). This will reduce runoff that may be contaminated with fertilizers, herbicides, and insecticides, or fecal material from cattle (Congdon and Keinath 2006). Use of off road vehicles within buffer zones should be avoided during periods of high terrestrial movement (March until late October) through public and land owner notice. Dumping of any materials that may change wetland hydrology, composition or pH within buffer zones should be eliminated.

No Action: Buffer Zones will not be implemented surrounding inhabited wetlands.

Assessment Protocol: If Buffer zones remain undisturbed after being created or established first, this action will be successful. The effectiveness of this action can be investigated by checking areas where buffer zones are implemented to see if there is an excessive amount of surface

disturbance. If the public does not abide by conservational requests of the Blanding's turtle within buffer zones, this action will not be successful. If this is the circumstance, additional signs may be posted around these areas as a reminder of the buffer zone implemented.

Objective: Preserve terrestrial upland landscape mosaics that surround inhabited wetlands beyond the 100 m buffer zones, in Dutchess, Saratoga, St. Lawrence, Jefferson, Niagara, and Erie counties, throughout the 10 year period of this management plan.

Course of Action: Implement specific time periods, when terrestrial activity of Blanding's turtles is least probable, to regulate short term degradation to potential Blanding's turtle habitat of adjacent upland areas. Annual notices can be sent to the public to minimize mowing and controlled burns to be conducted only when terrestrial activity of Blanding's turtles is least probable (late July through early May) through public and landowner notice (Congdon and Keinath 2006). Over grazing in riparian areas should be discouraged or eliminated through public and land owner notice (Lee 1999). Winter timber harvests are recommended to avoid crushing turtles and minimizing impacts to the forest floor habitat used by amphibian prey species (MDIFW). Use of off road vehicles should be discouraged when terrestrial activity of turtles is high (late may through early July) through public and land owner notice. This will prevent injury and mortality throughout their movements of individuals of all age stages.

No Action: Specific time periods to regulate short term degradation will not be implemented and the public will not be notified about precautions to take in preserving terrestrial upland habitats.

Assessment protocol: If no degradation is applied to potential turtle habitat of adjacent upland areas during implemented time periods, this action will be successful in protecting the

Blanding's turtle species. The effectiveness of this action can be investigated by inspecting areas surrounding wetland where Blanding's turtle occupy to see if there is an excessive amount of surface disturbance. If disturbances continue throughout time periods of high terrestrial activity, it will not be successful. To encourage implemented precautions we may provide incentives for stakeholders. Additional turtle crossing signs may be installed on a paved roads that run between Blanding's turtle nesting areas and wetlands to prompt management requests (Lang 2000).

Objective: Decrease mortality of adults due to Roads and traffic by 85%, in Dutchess, Saratoga, St. Lawrence, Jefferson, Niagara, and Erie counties, within a 10 year period.

Course of action: Implement roadway and traffic regulations annually during periods of increased Blanding's turtle terrestrial movements (late May through early July). Communicating with those in charge with city planning and building the goal and the importance of this species to incorporate mitigations into building plans would be necessary. All road projects should undergo thorough environmental review to avoid, minimize, and mitigate road mortality to endangered turtles (MDIFW). Consider installment of seasonal signage alerting motorists to highly sensitive turtle areas to encourage drivers to travel slower and more cautiously in select locations. High risk areas may also be equipped with turtle passageways of various designs including; culverts, or preferably underpasses within the first five years of management (Lang and Piepgras 1998). Fencing could be placed to encourage turtles to move through already existing passage ways.

No Action: Roadway and traffic regulations will not be implanted. Installments of seasonal signage and passageways will not be conducted.

Assessment Protocol: If these actions are executed they will be successful in preventing road mortality and disturbances of Blanding's turtle during periods of increased terrestrial movements. If these actions are not indorsed, road mortalities will still remain causing the population to ultimately decline as predicted, causing this plan to be unsuccessful. If builders do not permit permanent mitigations, temporary road blocks and detours can be placed in high areas of travel. If none of these actions are permitted, in order to reduce road mortalities we will notify the community of the areas of travel they need to be cautious about. This can be done through pamphlets, postings on town boards and door to door communication.

Objective: Improve public and private landowner awareness annually throughout 10 years, in Dutchess, Saratoga, St. Lawrence, Jefferson, Niagara, and Erie counties, about precautions that can be made to protect the Blanding's turtle.

Course of action: The general public should be informed that this species is protected, and should not be collected or harmed. Educational materials, including instructional video, slides, posters, leaflets, etc. can be posted and distributed annually through counties that occupy Blanding's turtle populations (Lang and Piepgras 1998), seen in Appendix II. Biologists knowledgeable about the concern of the Blanding's turtle can volunteer to speak at schools and town meetings to educate the public about the importance of the species and precautions that can be made to protect them. Direct communication with land owners whose land occupies or borders Blanding's turtle habitats is necessary. Landowners should be advised to follow implemented actions of management for this species including; maintaining good water quality, restricting herbicide and pesticide use in or near wetlands, implementing minimum development set-back distances, leaving buffer zones during timber harvest and limiting grazing and agricultural operations (Lee 1999).

No Action: No supplemental education will be provided to the public about the Blanding's turtle.

Assessment Protocol: If the public and landowners cooperate with our management requests this action will be a success in limiting human related threats to the Blanding's turtle. If the public and land owners do not cooperate with our requests, this action will fail. The public's understanding of this issue can be assessed through annually distributed survey, shown in Appendix I. If the public is not receiving our management notifications we will have to fall back on door to door notice when applicable and capable. If the public and landowners still refuse to abide to management requests, fines will be implemented to those who do not obey, if seen or suspected.

Conclusion

The purpose of this management plan was created to prevent future damage, and ensure that Blanding's turtles and their ecosystems are protected. The objectives that have been stated will help us reach our goal in supporting an overall increase in this population so they can hold a self- sustaining status and to prevent this species from going extinct in the future. Although land development has disturbed and fragmented many habitats, arranged land use and conservation planning can mitigate existing damages. To promote successful and stable management of Blanding's turtle, these actions listed should be implemented as soon as possible when funds permit. Efforts should be put forth to begin construction within the first 3 months of the project. It is important to communicate with stakeholders. Information will need to be provided and available in order for our actions to be successful. Stakeholder's opinions, views and concerns should be taken into consideration to allow for and keep a mutual understanding of

the situation that is being addressed. To provide corresponding data, population surveys will be distributed.

Appendix I - Survey to handout to New York residents, in Dutchess, Saratoga, St. Lawrence, Jefferson, Niagara, and Erie counties, that assesses management strategies being used.

Determine Public Awareness of Blanding's Turtle (*Emydoidea blandingii*) to Assess
Management Strategies in Use

1. County of residency (circle one)

 ▼

2. Age class (circle one)

 ▼

3. Would you be able to identify a Blanding's turtle if you saw one?

 ▼

4. Have you ever seen a Blanding's turtle in your county?

 ▼

5. Are you familiar with the status of the Blanding's turtle species?

 ▼

6. Are you familiar with the management that has been implemented for Blanding's turtle in your county?

 ▼

7. Have you been notified by your town of the threats that affects the Blanding's turtle and precautions that can be made to prevent these threats?

 ▼

8. Have you cooperated with the management requests?

 ▼

9. If yes, which management strategies have you abided by? (Those that apply)

 ▼

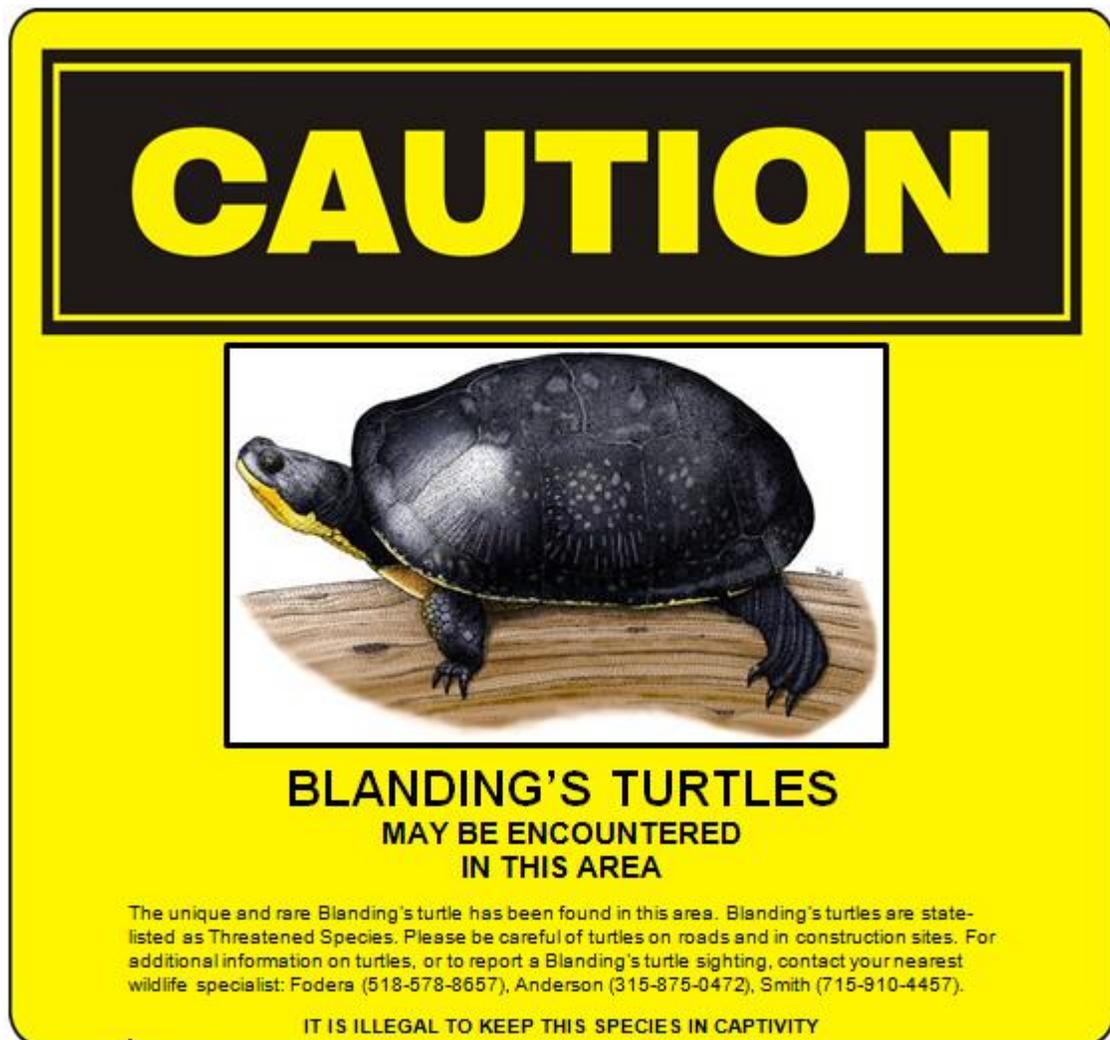
10. Do you feel that your community is cooperating with the management requests that have been implemented?

11. Do you think that our actions to notify the community about this issue are successful?

12. Would you like more information sent out to your community about the status of this species and further precautions that can be made to protect them?

Appendix II - Flyer distributed to inform the general public that the Blanding's turtle is protected, and should not be collected or harmed, along with recommendations to minimize impact on this species.

(Front of Flyer)



(Back of Flyer)

CAUTION

DESCRIPTION

The Blanding's turtle is a medium-sized freshwater turtle largely confined to the Great Lakes Basin. The carapace is domed and elongated up to 25 cm (10 in) with yellow flecks on a dark background. The head, legs, and tail are dark brown or blue-gray with small dots of light brown or yellow. The most distinguishing characteristic of this turtle for both sexes is the bright yellow chin and throat.

RECOMMENDATIONS FOR MINIMIZING IMPACTS TO BLANDING'S TURTLE POPULATIONS

- Turtles that are in imminent danger should be moved, by hand, out of harm's way. Turtles that are not in imminent danger should be left undisturbed to continue their travel among wetlands and/or nest sites.
- If a Blanding's turtle nests in your yard, do not disturb the nest and do not allow pets near the nest.
- All wetlands should be protected from pollution; use of fertilizers and pesticides should be avoided, and run-off from lawns and streets should be controlled. Erosion should be prevented to keep sediment from reaching wetlands and lakes.
- Mowing and controlled burns to be conducted only when terrestrial activity of Blanding's turtles is least probable (late July through early May)
- Use of off road vehicles should be discouraged when terrestrial activity of turtles is high (late May through early July)
- Drive slow and keep an eye for crossing turtles when passing wetlands.

Literature Cited

- Brecke, B., and J.J. Moriarty. 1989. *Emydoidea blandingii* (Blanding's turtle) Longevity. *Herpetological Review* 20:53.
- Conant, R., and J. T. Collins. 1998. *A Field Guide to Reptiles & Amphibians. Eastern and Central North America. Third Edition, Expanded.* Houghton Mifflin Company, Boston. 616 pp.
- Congdon, J.D. and D.A. Keinath. 2006. Blanding's Turtle (*Emydoidea blandingii*): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region.
- Congdon, Justin, Tinkle, Donald W., Breitenbach, Gary L. and van Loben Soils, Richard C 1983. Nesting ecology and hatchling success in the turtles *Emydoidea blandingii*. *Herpetological Review* 39:417-429.
- Congdon, J. D. and J. W. Gibbons. 1996. Structure and dynamics of a turtle community 160 over two decades. Pp. 137-159
- Congdon, Justin, and Van Loben Sels, Richard. 1991. Growth and body size in Blanding's turtles (*Emydoidea blandingii*): relationships to reproduction. *Canadian Journal of Zoology* 69:239-245.

Congdon, J.D., and R.C. van Loben Sels. 1993. Relationships of reproductive traits and body size with attainment of sexual maturity and age in Blanding's turtles (*Emydoidea blandingi*). *Journal of Evolutionary Biology* 6:547-557.

De Solla, S.R., Bishop, C.A., Van der Kraak, G., Brooks, R.J., 1998. Impact of organochlorine contamination on levels of sex hormones and external morphology of common snapping turtles (*Chelydra serpentina serpentina*) in Ontario, Canada. *Environ. Health. Perspect.* 106:253-260.

Encyclopedia of Life.2013. *Emydoidea blandingii*. Available from
<<http://eol.org/pages/1056352/overview/>>. Accessed 3 April 2013

Ernst, C. H., J. E. Lovich, and R. W. Barbour. 1994. *Turtles of the United States and Canada*. Smithsonian Institution Press, Washington and London. 578 pp.

Hartwig, T., G. Stevens., J. Sullivan, and E. Kiviat. 2009. Blanding's Turtle Habitats In Southern Dutchess County. Environmental Research and Education Science for Conservation. Pages 4-11, 43-53.

Harding, J.H. 1997. *Amphibians and reptiles of the Great Lakes region*. University of Michigan Press, Ann Arbor, Michigan, USA.

- Herman, T.B., T.D. Power and B.R. Eaton. 1993. COSEWIC status report on the Blanding's Turtle *Emydoidea blandingii* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. 32 pp
- Johnson, G. and T. Wills. 1997. Geographic distribution: *Emydoidea blandingii*. *Herpetological Review* 28:209.
- Johnson, G. and T. Crockett. 2006. Distribution, population structure, habitat relationships and nesting ecology of Blanding's turtle (*Emydoidea blandingii*) populations in northern New York: Final Report to Biodiversity Research Institute. 30 p
- King, J. C, Bifoss, J, Gale. and J, Napieralski. 2009. Central Michigan University. Management Plan for Wood Frog, Spring Peeper, Painted Turtle and Blanding's Turtle in Neithercut Woodland
- Kofron, C.P. and A.A. Schreiber. 1985. Ecology of two endangered aquatic turtles in Missouri: *Kinosternon flavescens* and *Emydoidea blandingii*. *J. Herpetological Review* 19:27-40
- Lang, J.W. 2006. Conservation of Blanding's turtles in Southwestern Minnesota. Final Report to the Minnesota DNR Nongame Program, Contract CFMS# A59353

Lang, J.W., Sajwaj, T. D. and S. A. Piegras. 1998. Blanding's Turtle (*Emydoidea blandingii*) at Camp Ripley: critical habitats, population status, management guidelines. University of North Dakota

Lee, Y. 1999. Special animal abstract for *Emys blandingii* (Blanding's turtle). Michigan Natural Features Inventory, Lansing, MI. 3 pp.

Levell, J.P. 2000. Commercial exploitation of Blanding's Turtle, *Emydoidea blandingii*, and the Wood Turtle, *Clemmys insculpta* for the live animal trade. *Chelonian Conservation and Biology* 3:665-674.

Maine Department of Inland Fisheries & Wildlife (MDIFW). 2003. Maine's endangered and threatened wildlife.

<http://www.maine.gov/ifw/wildlife/species/endangered_species/blandings_turtle/blandings_turtle.pdf>. Accessed 24 March 2013.

Natural Heritage and Endangered Species Program (NHESP). 2007. Massachusetts Forestry Conservation Management Practices for Blanding's Turtles. Draft (August 2007). Natural Heritage and Endangered Species Program, Massachusetts Division of Fisheries and Wildlife, Westborough, Massachusetts, USA.

New York Natural Heritage Program. 2011. Online Conservation Guide for *Emydoidea blandingii*. Available from: <http://www.acris.nynhp.org/guide.php?id=7508>. Accessed February 27th, 2013.

NYSDEC (2013) Blanding's turtle fact sheet.. New York State Department of Environmental Conservation. <http://www.dec.ny.gov/animals/7166.html>. Accessed 3 April 2013.

Overman, S.R., Krajicek, J.J. 1995. Snapping turtles (*Chelydra serpentina*) as biomonitors of lead contamination of the Big River in Missouri old lead belt. *Environ. Toxicol. Chem.* 14:689–695

Panella, M.J. 2012. Blanding's Turtle (*Emydoidea blandingii*) A Species Conservation Assessment For The Nebraska Natural Legacy Project. Nebraska Game and Parks Commission Wildlife Division.

Pappas, M.J., B.J. Brecke and J.D. Congdon. 2000. The Blanding's turtles (*Emydoidea blandingii*) of Weaver Dunes, Minnesota. *Chelonian Conservation and Biology* 3:557-568.

Rhodin, A.G.J., Pritchard, P.C.H., van Dijk, P.P., Saumure, R.A., Buhlmann, K.A., and Iverson, J.B. (Eds.).2008. 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

Rubin, C.S., Warner, R.E., and Ludwig, D.R. 2001. Habitat use and movements of radiotagged Blanding's turtles (*Emydoidea blandingii*) in a suburban landscape. *Chelonian Conservation and Biology* 4:136-141.

Temple, S. A. 1987. Predation on turtle nests increases near ecological edges. *Copeia* 1:250-252. American Society of Ichthyologists and Herpetologists

Van Dijk, P.P. & Rhodin, A.G.J. 2011. *Emydoidea blandingii*. In: IUCN 2011. IUCN Red List of Threatened Species. Version 2011.2. <www.iucnredlist.org>. Downloaded on 22 February 2012.