



Blanding's Turtle (*Emydoidea blandingii*)

Conservation Assessment Survey

A product of the Midwest Regional Working Group of
Partners in Amphibian & Reptile Conservation
(MWPARC)

October, 2010

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INTRODUCTION AND METHODS

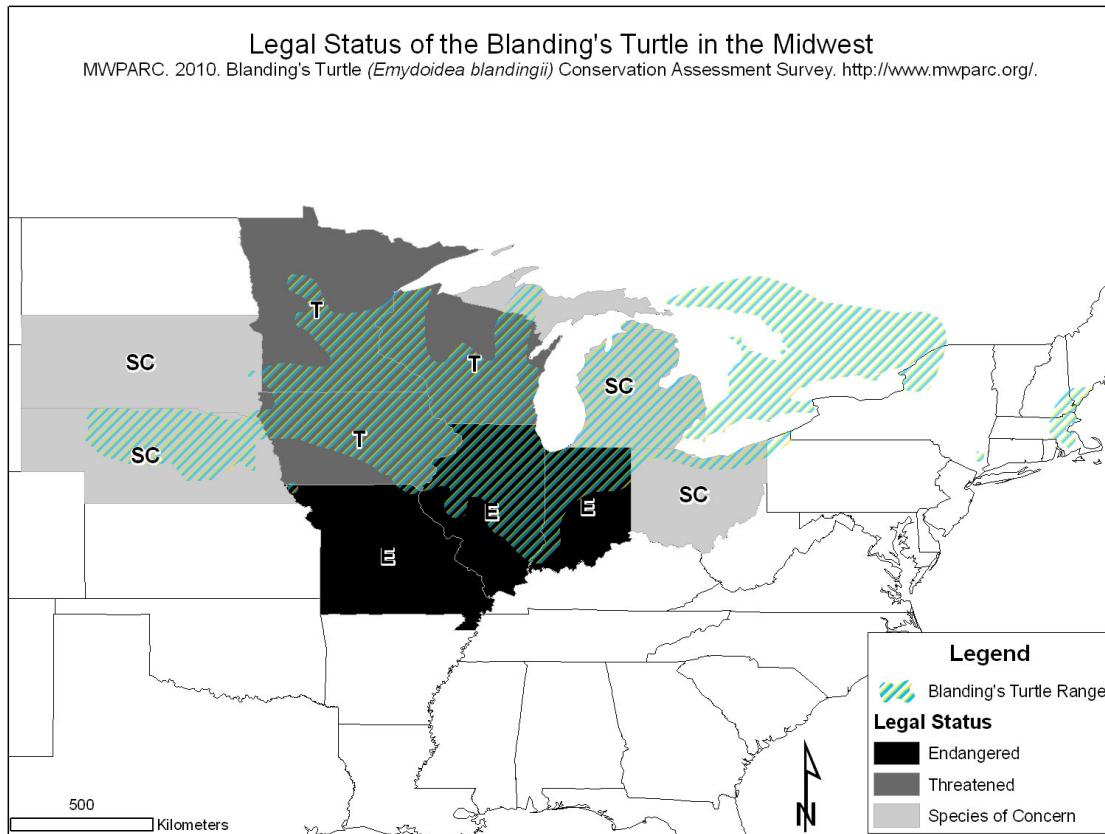
This document is a compilation of responses received from a survey to determine our current knowledge of the status of the Blanding's Turtle (*Emydoidea blandingii*) in the ten Midwestern states where the species is known to occur. The survey (Appendix I) was sent to representative(s) in each of the states in May 2010. (See Appendix II for a list of contributors.) The deadline for completion of the survey was June 2010 with results first presented at the annual meeting of the Midwest Regional Working Group of Partners in Amphibian & Reptile Conservation (MWPARC) in Oregon, Illinois (13-15 August 2010).

The results of the completed surveys are provided as a series of tables, most broken down by responses received from the individual states. For a few of the responses, maps portraying the data have been provided. I have attempted to edit the responses as little as possible. Readers are cautioned that many (if not most) responses are based on expert opinion, oftentimes derived from cursory data of populations occurring in the state, or extrapolated from one or more populations that have been the subject of research. There is also disparity among the states in how "populations" and "metapopulations" of Blanding's Turtles are defined. In many situations, comparing responses across states may result in an "apples and oranges" comparison.

Based on discussions at the 2010 MWPARC annual meeting, where these results were first presented, a number of tasks were identified to both improve this document and move forward with identified conservation actions. These "task teams" are provided in Appendix VIII.

If there is one common element among all of the state responses, it is that we know very little about the vast majority of Blanding's Turtle populations and in many cases do not even know the number of extant populations. With this in mind, the reader should be cautious not to confuse "the absence of evidence as evidence of absence," to paraphrase one respondent. Despite these shortcomings, however, let us not allow perfection to become the enemy of efforts to ensure the conservation of the Blanding's Turtle in the Midwest.

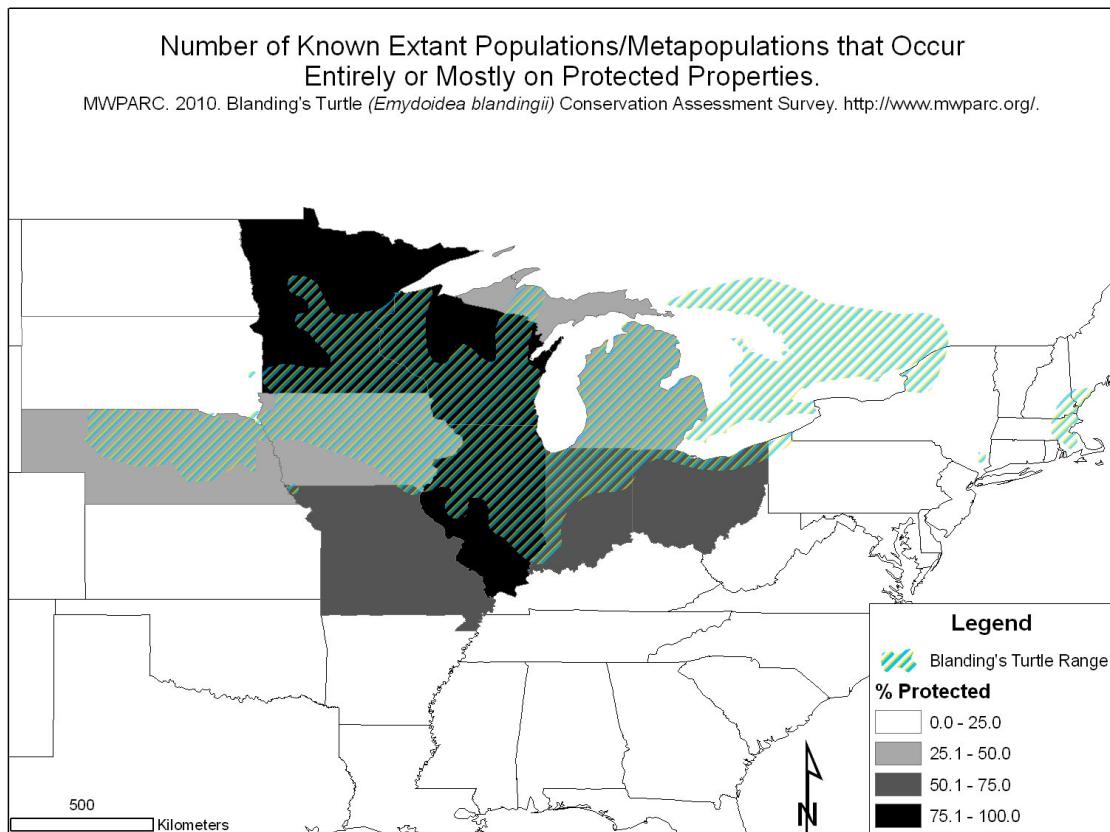
-- Gregory Lipps
October 2010



State	Legal Status
Illinois	Endangered
Indiana	Endangered
Iowa	Threatened
Michigan	Special Concern
Minnesota	Threatened
Missouri	Endangered
Nebraska	Species in Need of Conservation
Ohio	Species of Concern
South Dakota	Special Concern
Wisconsin	Threatened

State	Estimated number of historical populations/metapopulations in the state.	Number of known extant (occurrence records <10 years old) populations / metapopulations in the state.
Illinois	134, records from 27 counties.	72, records from 19 counties since 2000.
Indiana	79	17
Iowa	Records (some very old) from 45 counties. Dr. Janzen's work indicates 2-3 distinct genetic lines from 13 populations sampled using genetic markers.	IDNR has records from 26 counties from 1999-2009. Jeff LeClere has records for an additional 7 counties.
Michigan	Has been documented in 43 watersheds total in the state, based on MI's Natural Heritage Database and Herpetological Resource and Management, LLC Database. 243 element occurrence records based on records in the MI Natural Heritage Database. 68 counties total in the state.	40 watersheds with at least one known extant occurrence record. 144 known extant occurrence records of Blanding's Turtle based on records in the MI Natural Heritage Database and 185 known extant occurrence records from the Herpetological Resource and Management, LLC Database (i.e., last observed in 2000 or later). 68 counties with at least one known extant occurrence record (i.e., last observed 2000 or later).
Minnesota	Five large metapopulations, based primarily on watersheds. General locations: (1) Upper Mississippi River; (2) Lower Mississippi River; (3) Minnesota River; (4) Southwest MN; (5) Lake Superior Basin. Over 1000 records exist in the Heritage Database including records in 51 of MN's 87 counties.	5 metapopulations
Missouri	7	3
Nebraska	32+ counties	50-100+
Ohio	50 localities in 13 counties	19 localities in 9 counties
South Dakota	Unknown. Three records documented in SD Natural Heritage Database, one in each of three counties, 1963-1996.	None known.
Wisconsin	The Wisconsin Natural Heritage Inventory Database shows 324 element occurrences (EO's) of Blanding's turtle in the state. The Wisconsin Herp Atlas contains 1,183 records from 67 counties and 378 townships. There are at least 5 "metapopulations", by which we mean large geographic areas with frequent reports which probably function as	Of the 324 EO's, 173 are <10 year old. The Wisconsin Herp Atlas contains 117 records <10 years old for 49 townships in 29 counties. Note that no systematic inventory has been performed.

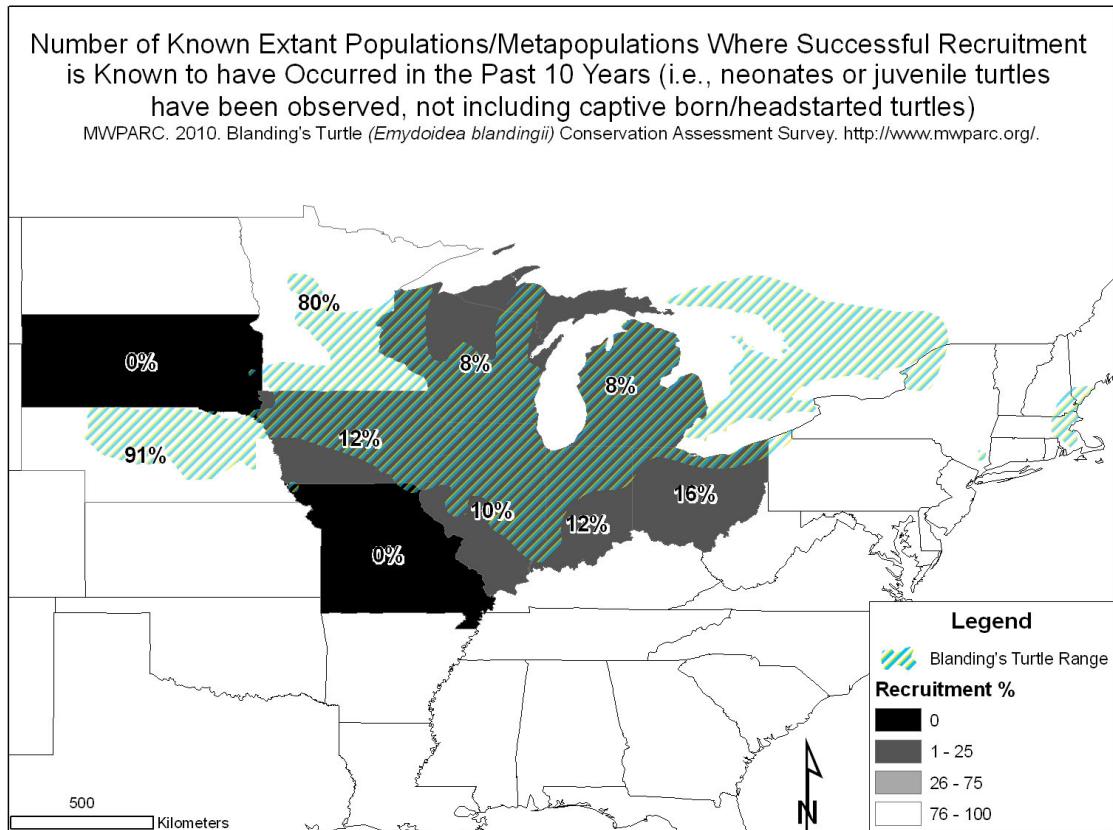
State	Estimated number of historical populations/metapopulations in the state.	Number of known extant (occurrence records <10 years old) populations / metapopulations in the state.
	metapopulations. However, there could be many more "metapopulations" depending on how the term is defined and how gene exchange is documented or inferred. Data are presence-only records; no absence analysis has been performed.	



State	Number of known extant populations/metapopulations that occur entirely or mostly on protected properties.
Illinois	Most, specifically in the northeastern Illinois counties.
Indiana	11
Iowa	15 counties have records from protected land.
Michigan	Of the 144 known occurrence records from the Michigan Natural Heritage Database, 59 occur on protected properties based on Michigan Natural Heritage Database and CARL data layer.
Minnesota	None, each of these populations cover several counties. Many localized concentrations are associated with protected properties in 4 of the 5 populations. In some cases significant tracts are protected.
Missouri	2 of 3
Nebraska	25-33%
Ohio	13 of 19
South Dakota	--
Wisconsin	Approximately 270 of the element occurrences (EOs) occur, at least partially, on public lands. However, without delineated site boundaries, it is difficult to determine

State	Number of known extant populations/metapopulations that occur entirely or mostly on protected properties.
	what % of a site is located on public lands. The 5 metapopulations occur primarily on public lands

State	Number of known extant populations/metapopulations with an estimated population size of:				
	<25	25-50	50-100	100-500	>500
Illinois	Most	at least 4	2	3	0
Indiana	--	--	--	--	--
Iowa	Probably most.	1	1	If 2 counties are considered to be a mixing population, then 2.	0
Michigan	--	--	--	--	--
Minnesota	0	1	0	2	2
Missouri	1	2	0	0	0
Nebraska	0	0	30	40	30
Ohio	2	1	--	--	--
South Dakota	0	0	0	0	0
Wisconsin	--	--	--	7	3



State	Number of known extant populations/metapopulations where successful recruitment is known to have occurred in the past 10 years (i.e., neonates or juvenile turtles have been observed, not including captive born/headstarted turtles)
Illinois	At least 7 sites. Most often low/very low levels are observed at best.
Indiana	2
Iowa	Sites in 4 counties.
Michigan	<10%
Minnesota	4
Missouri	0
Nebraska	>90%
Ohio	3
South Dakota	0
Wisconsin	It is probably safe to assume that most extant populations have some successful

State	Number of known extant populations/metapopulations where successful recruitment is known to have occurred in the past 10 years (i.e., neonates or juvenile turtles have been observed, not including captive born/headstarted turtles)
	recruitment, but whether or not it is enough to sustain a population over time is a harder question. Observations of juveniles have been made at several sites (at least 4) but the vast majority of extant populations do not have such observations - the "absence of evidence is not evidence of absence" caution applies here.

State	Number of known extant populations/metapopulations thought to be:				
	Declining	Stable	Increasing	Unknown	Viable
Illinois	Most	3	0		Perhaps our 3 largest, but most likely only 1 or 2 of them.
Indiana	--	--	--	--	Unknown. No population monitoring has been done at any locale.
	No population monitoring has been done at any locale.				
Iowa	--	Of the 13 examined with SSRs, 9 seem to be in Hardy-Weinberg Equilibrium			Few.
	Majority of opinions appear to be that most populations are declining.				
Michigan	50%	20%	10%	30%	<20%.
	Exact numbers are not available. Adults are often observed seldom more than 8-10 at any one time or place. These population estimates are based in part on observations of only a few populations across the state. Overall, there are very few sites where young are found.				
Minnesota	--	--	--	--	Unable to determine without population monitoring.
	Most populations are probably stable or declining. One population could be expanding because of recent addition/conversion of farmlands and surrounding habitat into a WMA complex in the early 60's (not sure of dates?) by DNR Resource Managers. Captures from this area seem younger and larger than the other areas (stunted growth from limited resources after inundation from dam creation in the 40's). Also, the recent 2006-07 drawdown in this area has created recruitment habitat for hatchlings from the few resident older females that still nest out of the Bottoms. Lastly, the work of TNC and DNR to maintain and re-create prairie habitat for nesting females is ongoing.				
Missouri	0	2	0	1	Likely none of the populations are viable for long-term.
	Based upon numbers of turtle captured in 1980's surveys, similar numbers are being captured at 2 of the sites. Therefore, we believe the populations are somewhat stable but consistently low. We have no historical data for the other site; therefore, population status is unknown at this time. We have not captured young or juvenile turtles in many years. Numbers included in this question are only reflection of the number of extant sites. Four additional sites are considered historical and extirpated.				

State	Number of known extant populations/metapopulations thought to be:				
	Declining	Stable	Increasing	Unknown	Viable
Nebraska	20	60	20		75% or more
Ohio	2	2	1	14	Insufficient data to determine the viability of any populations.
	The only increasing population is due to headstarting efforts.				
South Dakota	0	0	0	0	Likely none.
Wisconsin	Probably most	5	None-few		Unknown, but probably at least 10.
	<p>No population trend monitoring programs in place and have no hard data to assess trends. Suspect that few to no populations are increasing, and 5 are possibly stable (these include the 5 metapopulations that have vast acreages of protected land and limited or less traveled roads relative to the rest of the state). In general, most other populations are probably in decline, as almost all common turtle species are in decline with few exceptions. This opinion is based in part on testimony from old-time commercial fishermen who claim that turtle populations are a small fraction of what they were 60-80 years ago. On the other hand, where habitat restorations have been taking place, especially large scale wetland restorations, some populations could be increasing as the habitat carrying capacity increases.</p> <p>The decades long lag time for population extirpation makes viability assessment very difficult. We are aware of a few mark-recapture studies which might provide the demographic trend data necessary to evaluate this question but such analyses are not at hand. In addition to the 5 large metapopulations, there are at least 5 more somewhat smaller populations that are probably healthy, but we won't go so far as to say "viable" without evidence. There are many additional populations which are probably smaller and for which we have no data for assessing viability.</p>				

State	Present or threatened destruction, modification, or curtailment of Blanding's Turtle habitat or range.	
	Number of populations	Explanation
Illinois	--	Most in the Chicagoland area and rural areas. Increased urbanization and increased agricultural practices.
Indiana	--	
Iowa	At least 1	
Michigan	--	Threat occurring statewide, but can't provide number of populations.
Minnesota	5	River and stream channelization, roads, urbanization, agricultural practices (wetland drainage, nesting in row crops), nest predation; woody vegetation encroaching or being planted on nesting sites, invasive species on nesting sites; removal of beavers and beaver dams.
Missouri	2	2 of the 3 extant populations are threatened with wetland lost due to lowering of ground water (tile drainage of surrounding row crops), and sediment deposit. Most of the locations with Blanding's Turtles in Missouri are very small in area and only contain 1 or 2 small wetlands. Any loss of wetlands or changes in land management of these sites could be an issue for the species to persist in Missouri.
Nebraska	20-40	Ground water levels - loss of wetland habitat via draining, irrigation, etc.
Ohio	At least 4	
South Dakota	--	
Wisconsin	--	Given the dispersal abilities of this species, it is likely that the majority of populations are threatened with habitat destruction or modification. Habitat loss is ongoing as the state does not directly protect habitat (except through wetlands regulations) and development tends to disproportionately eliminate upland habitat. Habitat gains are also occurring through habitat restoration and habitat acquisition projects, as well as existing habitat protection through conservation easements, by both the State and NGOs. Net habitat changes are not comprehensively tracked or quantified.

State	Overutilization for commercial, recreational, scientific, or educational purposes.	
	Number of populations	Explanation
Illinois	Unknown	Collecting by hobbyist or visitors is a common concern of land managers.
Indiana	--	
Iowa	0	
Michigan	--	Don't know number of populations affected by this threat.
Minnesota	0	No evidence.
Missouri	0	This species is protected from take in Missouri. Missouri Department of Conservation does not allow the collecting for scientific or educational purposes due to low numbers. Currently, we are unaware of any illegal collection of the species, but this could be a threat.
Nebraska	0	N/A
Ohio	Unknown	With relatively high prices being paid for captive specimens, the potential certainly exists for illegal collection for the pet trade. Whether it is in spite of, or in ignorance of wildlife regulations, nesting females are the most likely individuals to be picked up (during overland migrations). Unfortunately, the persistence of adult females in any population is also among the most crucial elements for population sustainability. It is reasonable to assume that any population locality open to public usage is subject to some level of overutilization in this regard.
South Dakota	--	
Wisconsin	--	This is not perceived as a problem and is likely low since possession is banned under the state Endangered Species Law and no harvest is allowed.

State	Disease.	
	Number of populations	Explanation
Illinois	None documented.	
Indiana	--	
Iowa	--	No data available.
Michigan		Unknown if this threat is occurring in Michigan.
Minnesota	Unknown	No evidence.
Missouri	0	Unaware of any diseases associated with Blanding's Turtles at the 3 extant sites.
Nebraska	0	N/A
Ohio	0	No evidence.
South Dakota	--	
Wisconsin	--	Unknown, but rarely reported. The impacts of disease has not been directly assessed.

State	Predation, including depredation of nests.	
	Number of populations	Explanation
Illinois	12	Most likely occurs in all populations. Observed at all monitored sites (12); assumed occurring at all others.
Indiana	--	
Iowa	Thought to affect every population.	
Michigan		Most definitely; many/most populations, likely. Lack of keystone predators to control populations of meso-predators/nest predators
Minnesota	5	Loss of nests to raccoons, skunk, and fox is assumed to occur throughout the species range in Minnesota. Coyote populations are increasing at one site, although we have yet to document adult predation or nest depredation.
Missouri	2	At 2 of the 3 extant sites, there is much depredation of nests by raccoons and skunks for all turtle species.
Nebraska	0	N/A
Ohio	19	Depredation of nests by predators is believed to be high within any population in any given year. The extended life-span of this species is an adaptation to deal with this reality. However, the increase in predator populations (particularly raccoons) in the presence of human activity represents a significant threat.
South Dakota	--	
Wisconsin	--	Commonly observed at communal nesting areas, and sometimes at non-communal sites, but assessments of how nest predation affects population status are not available and likely vary considerably among sites. The species is adapted for high juvenile mortality, but cannot long sustain losses of adults. Where nests are individual and not clustered predation rates can be very low (Casper pers. obs.). Predation rates probably are driven by energy dynamics of predators, where if predators can predict where nests or adults are likely to be and find them relatively easily high predation occurs, but where predators must invest large amounts of search time it doesn't pay off in energy obtained and predation is low.

State	Inadequacy of available nesting areas.	
	Number of populations	Explanation
Illinois	2	Most likely occurs at the majority of sites. Both sites where nesting areas are inadequate are insularized by urban development (e.g., subdivisions, railroads, roads, etc.).
Indiana	--	
Iowa	Unknown	Probably common.
Michigan		At some populations/sites. Also lack of nesting areas turtles can safely access without crossing road.
Minnesota	3	Available nesting habitat may be a limiting factor in the forested area of MN (NE MN). In the agricultural region cultivated fields are often used as nest sites. Throughout the state gravel roads are used as nesting sites and are likely death traps to females as well as hatchlings due to predation, road grading, mowing, and road mortality. Nest site temperatures, although not usually fatal, can lead to skewed sex ratios in favor of males from nesting in corn, soybean and sorghum fields (paper in preparation by Steve Freedberg from research with Snapping turtles). All three species of marsh turtles at one site use these agricultural fields in the spring to nest in. Also, when the hatchlings disperse from the nest into the fully mature crops, their orientation towards water is flawed because they visually cannot pick up the correct orientation cues (Pappas and Congdon, manuscript in preparation)
Missouri	2	At 2 of the 3 extant sites, the population is mainly existing on <400 acres of wetlands and upland habitat. These areas are mostly surrounded by row cropping and adjacent highways. Although some nesting areas occur on these small land units, additional nesting areas is likely needed to sustain population and disperse nesting areas. It appears that predators are focused on the few suitable nesting areas.
Nebraska	0	N/A
Ohio	Unknown	Populations adjacent to agricultural lands could be subjected to these areas acting as population sinks. Agricultural activity appears to alter soil characteristics ultimately rendering them less suitable for nesting (i.e., soil compaction). Moreover, while open tilled fields may appear attractive during spring nesting activities, rapidly growing crops can eventually shade nests and significantly impact fitness of hatchlings and alter sex ratios. Furthermore, the effect of pesticides on developing embryos is uncertain and represents another potential impact on reproductive success in agricultural fields. The strong presence of agricultural activity in the northwest corner of the state coincides with the center for the heaviest present and historic population density of the Blanding's Turtle in Ohio. Additionally, Blanding's Turtle females make some of the most extensive overland nesting migrations of any of Ohio's

State	Inadequacy of available nesting areas.	
	Number of populations	Explanation
		native aquatic chelonians. This puts them at an increased risk of exposure to automobile traffic.
South Dakota	--	
Wisconsin	--	A seeming problem for some populations but no assessment is available as to the extent that lack of nesting sites is a limiting factor for populations. Agricultural activities sometimes create "nesting sinks" where turtles are attracted to unsuitable soils for nesting where embryonic development fails due to low oxygen levels (Casper unpublished data). On the other hand, widespread no till practices fit nicely with the nesting cycle (Casper unpublished data) and allow for successful nests in many agricultural fields, which conceivably could have allowed some populations to rebound that were affected by earlier tilling methods that routinely plowed up nests. So while tilling may have had a large negative impact in the past, current no till practices may result in a net increase in nest site availability, especially in more forested areas.

State	Incompatible land management practices.	
	Number of populations	Explanation
Illinois	Unknown	We have no knowledge of how burning and other habitat enhancing practices affect them. Many/most land managers consider amphibian and reptile activity patterns and season when scheduling management activities.
Indiana	--	
Iowa	Unknown	Believed to be extremely high. Agriculture, residential housing, urban sprawl, water manipulation/drawdown.
Michigan		At some sites. For example, mowing fields during nesting season; burning; road construction; filling critical wetland habitat.
Minnesota	5	<p>Planting trees in open upland habitats (nesting sites), prescribed burning (particularly burns associated with overwintering wetlands), wetland drawdowns, agricultural practices such as discing, chemical application, run-off (reducing water quality). Comments regarding prescribed burning: Tracked turtles were found spending more time on land during early spring than previously thought, and not just at the water's edge. Burning should take into consideration the type of fire, timing, configuration, and having a slower burn near refugia if possible. Haying should be considered as an alternative management practice if prescribed burning conflicts with turtle's active season.</p> <p>Hatchlings orient and disperse from nest sites in non-random fashion based on visual cues (Pappas, et al, 2009). In some situations, interference with these cues from introduced non-native trees/plantations, large crop fields and forest succession may increase risks faced by hatchlings dispersing from nests by reducing their ability to find wetlands.</p> <p>Food plots for deer, birds, etc. planted near wetlands appear as ideal nesting habitat for female turtles in the spring, but the results can be the same as mentioned above (skewed nest temps. and flawed hatchling dispersal). We have also found that silviculture (tree farms, wind breaks) and large ag. fields in general interfere with hatchling Blanding's turtle orientation and dispersal to water (Pappas, et al, 2009)</p>
Missouri	0	Of the 3 extant populations, land management practices are considering Blanding's Turtle needs. However, most of our extant sites are small in area and are surrounded by row cropping that limits upland habitat and lowers the ground water due to tile systems. Indirectly, 2 of the 3 sites are likely impacted by surrounding land practices due to the wide-ranging habitat needs of this species.
Nebraska	--	Wetland habitat loss and upland development is creating barriers to movement.

State	Incompatible land management practices.	
	Number of populations	Explanation
Ohio	Unknown	<p>The artificial manipulation of water levels within wetland habitats occupied by Blanding's represents a potential impact on present populations. Specifically, evidence has shown that the draw-down of wetlands during fall months can negatively impact adult animals. The purposeful flooding of wetlands during late fall and winter months may also have detrimental impacts that are currently uncertain. Moreover, the observed flooding of upland fields during the waterfowl hunting season has the potential to overlap with the emergence of hatchlings from nests in the fall. Hatchlings that fail to emerge from nests before intentional flooding takes place are likely subject to drowning.</p> <p>Additional land management practices impacting populations may be linked to agriculture in adjacent upland habitats. In addition to management practices occurring directly in the wetland habitat utilized by turtles, the previously mentioned agricultural practices in adjacent upland habitat can negatively impact reproductive success in any population in proximity to farmed lands.</p>
South Dakota	--	
Wisconsin	--	<p>Certainly an issue with transportation, agriculture and urban development, but not quantified or assessed statewide. On state owned lands current policy is to manage habitat to benefit protected species, including Blanding's Turtles, but conflicts may arise with multiple species and community management objectives. Given the dispersal abilities of this species, there are likely many individuals/populations encountering incompatible land management practices.</p>

State	Inadequacy of existing regulatory mechanisms.	
	Number of populations	Explanation
Illinois	All populations previously, currently inadequate for some populations.	Most remaining populations are on protected land and that is why the populations remain extant, however the urbanization and fragmentation damage has already been done.
Indiana	--	
Iowa	All populations are protected.	Unknown how well laws are enforced or how much poaching may be occurring.
Michigan		Current state regs don't protect habitat, and don't have good mechanisms in the state for dealing with locally common species that are becoming globally rare - i.e., too common to be listed but not common enough or still vulnerable without protection.
Minnesota	5	Habitat is not protected.
Missouri	0	Currently, 2 of the 3 extant sites are protected on public lands, and the Wildlife Code of Missouri prohibits the species from being collected.
Nebraska	--	No additional regulation needed, but education and environmental awareness programs needed.
Ohio	--	No requirement for protection of upland habitat surrounding wetlands.
South Dakota	--	
Wisconsin		State regulations adequately protect individual Blanding's Turtles; however, habitat protection would benefit this species. The primary problem is the absence of protections for critical habitat (DNR attorneys have recently concluded that destroying habitat does not constitute a "Take" and therefore cannot be regulated, regardless of how many turtles may die as a result). The possession ban prevents any significant pet trade. Required wetland buffers are also woefully inadequate to protect wetland quality and the associated wildlife.

State	Increased mortality due to attempted road crossings.	
	Number of populations	Explanation
Illinois	All, except one.	All sites are either partially or fully surrounded, or bisected by roads and rail lines
Indiana	--	
Iowa	Most, probably every, population.	
Michigan		Significant annual mortality of females during nesting season. Early spring migration mortality evident for both sexes.
Minnesota	5	Presumed to be a major threat in all populations due to abundance of roads and increased traffic levels. Roads continue to get wider and faster, particularly near metropolitan areas.
Missouri	1	1 of the 3 populations is affected by an adjacent heavily traveled highway. A few road mortality Blanding's Turtles have been found on this highway over the years. A barrier fence was installed in 2002 to prevent turtles from crossing.
Nebraska	<10-15%	"Guestimate" - no data available.
Ohio	--	Female Blanding's Turtles make some of the most extensive overland migrations of any of Ohio's native aquatic chelonians. This puts them at an increased risk of exposure to automobile traffic, which can and often does result in mortality. With adult females representing a premium in any population the loss of each individual represents a significant impact on sustainability of the entire population.
South Dakota	--	
Wisconsin	--	Often reported and undoubtedly a problem in certain areas, but no statewide survey of the extent of the problem has been made.

Factor	Other natural or manmade factors affecting the continued existence of Blanding's Turtle populations.	
	State	Explanation
Hydrologic alterations.	Illinois	Hydrologic alteration due to development.
	Missouri	Lowering of ground water and sedimentation. Wetlands at 2 of the 3 extant populations are decreasing in volume and area due to lowering of the ground water (tile systems) and runoff (increase sedimentation within the wetlands) from adjacent row cropping.
	Nebraska	Water management affecting groundwater, wetland extent, and river/stream flow. Affecting <25% of populations.
Urban sprawl; inadequate land use planning.	Iowa	Urban sprawl.
	Michigan	Poor residential design/ poor, lack of, or limited land use planning
	Wisconsin	The major threats facing Blanding's Turtles in the state are more acute in more developed landscapes such as southeast WI.
Road construction	Iowa	Road construction.
Fragmentation	Minnesota	Buildings, fences, curbs, railroad tracks, etc. create barriers that prevent turtles from accessing essential habitats.
Climate change	Wisconsin	An assessment of the anticipated effects of ongoing climate change on Blanding's turtle habitat and survival has not been performed, but this is expected to complicate conservation success, and could potentially allow for turtles to expand their range northward into the Lake Superior drainage.
Exotic/invasive species	Wisconsin	The potential impact of exotic plants on critical habitat for Blanding's Turtles is a concern. For example turtles may avoid nesting in sandy soils where spotted knapweed is prevalent (this is an allelopathic plant that modifies soils). Dense monotypic stands of reed canary grass, purple loosestrife, cattail and <i>Phragmites</i> are reducing carrying capacity by shortening hydroperiods through increasing evapotranspiration, and we expect that high stem densities and homogenous structure also physically deter use of these areas by Blanding's Turtles and their invertebrate food base (especially crayfishes).

State	How many populations are being monitored? At what frequency/intensity?	
	Number of populations	Explanation
Illinois	12	Annually
Indiana	0	22 trap nights in June 2010 at a site identified in the 1990s as perhaps one of the state's largest (~100s) resulted in 0 captures.
Iowa		13 properties were sampled for genetic analysis (once). MSIM gets Blanding's Turtles on occasion; most sites will be visited once every 5 years.
Michigan		Surveys to document presence of this species at new sites and to reconfirm continued presence of this species at select known sites are conducted regularly (annually probably) as part of various inventory, monitoring, and research projects throughout the state. However, intensive, targeted, regular population monitoring (e.g., mark-recapture study, annual surveys/monitoring) for this species has been conducted at only a small number of sites (maybe less than 10). Monitoring occurs annually for number of years to every 5-10 yrs with exception of E.S. George Reserve study.
Minnesota		None are being monitoring at the population level, however, some subpopulations are being monitored through radio-telemetry which provides information on the reproductive status of radio-tagged females and can be useful in assessing nest success. One park district has 19 years of telemetry and nest searches, and additional telemetry and nest searching at another park. Telemetry started in summer of 2005 through spring 2008 in a WMA. Another WMA started telemetry in spring 2009, anticipating continuing through 2011. Tracking focuses on spring/summer locations, but some fall/winter readings are taken.
Missouri	2	Currently, there is no systemic trapping at these sites. Sites are typically randomly surveyed every 6 to 8 years unless we have some focused research projects occurring.
Nebraska	0	None at present.
Ohio	4	Two are subjected to annual/intense monitoring; 1 medium; and 1 low.
South Dakota	0	
Wisconsin	18+	Frequency/intensity varies from one visit/season to multiple visits/season. Casper: two populations for nesting success and activity range, one for use of ecopassages. These studies are not designed to track population trends. At least 2 other studies have been monitoring sites with radio telemetry for 5-6 years, and at least one more started up this year. A more comprehensive listing of projects and study objectives would be useful.

Research	What research has occurred and are there plans to continue these projects or for new research projects?	
	State	Explanation
Natural history; ecology	Illinois	Demography, population ecology, spatial ecology, reproductive ecology, foraging ecology, community ecology, natural history, life history.
	Iowa	Dr. Tamplin has a few Blandings with transmitters on them at the moment.
	Michigan	Blanding's Turtle research at E. S. George Reserve, Justin Congdon - wrapped up but potential to continue if someone willing to take over. Rouge River study - David Mifsud - continuing intermittently.
	Minnesota	Telemetry Research to gain detailed knowledge of habitat use within local populations. Telemetry at one WMA to continue through 2011, in part to see if any changes occur in individual travel patterns, and also to get better information on geographic extent of local population. Heavy focus this year will be on nesting females. Five years of trapping/telemetry at one park 1999-2004 and several research projects.
	Missouri	A telemetry study examining habitat use and spatial ecology of Blanding's Turtle occurred on a National Wildlife Refuge in 2001-2003.
	Ohio	Diet, habitat use, and reproductive research occurred at one population from 2003-2007. Radiotracking of Oak-Savanna populations in NW Ohio in recent past; 2010 using GPS pods to track movements and identify nesting areas.
	Wisconsin	Casper - nesting success, activity range and habitat use, ongoing at two sites.
Surveys; distribution	Illinois	Surveys
	Indiana	Status and distribution surveys were conducted at various locations in the past.
	Minnesota	Surveys for new localities continue to obtain new records.
	Missouri	Most of the research has focused in surveying the species at known and historical sites and attempting to obtain population estimates at 2 sites.
	Ohio	Mark-recapture surveys at three locations.
	South Dakota	An M.S. student at South Dakota State University conducted a statewide turtle survey for all species, with special emphasis on

Research	What research has occurred and are there plans to continue these projects or for new research projects?	
	State	Explanation
		attempting to document Blanding's Turtle - with no sightings or captures; various other professional and amateur herpetologists have looked for this species without success. We suspect that we have very few individuals in residence or possibly animals occasionally move into the state from Minnesota.
	Wisconsin	Herp Atlas and NHI database - presence only occurrence databases, ongoing.
Disease	Illinois	Disease
Genetics	Illinois	Population genetics
	Iowa	Dr. Janzen's lab has sampled microsatellites on 13 populations, finding 2 to 3 distinct genetic lines.
	Wisconsin	A genetics research study is currently underway.

Activity	Past and current activities undertaken for the benefit of Blanding's Turtles or their habitat and the results of these activities.	
	State	Explanation
Population manipulation	Illinois	Headstarting; nest protection
	Michigan	Protection of nests at Shiawassee National Wildlife Refuge, limited success and time consuming. Private individual in Alcona Co. put milk crate with heavy stones over nest, protected eggs from predation, but didn't hatch until nests were dug up. Head-start program at Shiawasee National Wildlife Refuge.
	Ohio	Headstarting program initiated by Cleveland Metroparks in 2000. This program is currently not rearing any additional animals and is limited to the monitoring of previously released individuals. While survivorship of released animals is encouraging, attributes of long-life and late-maturity mean that it will be some time before the overall effectiveness of such an effort can be measured.
Invasive/exotic species removal	Illinois	Invasive/exotic species removal.
Habitat management/restoration	Illinois	Wetland management.
	Iowa	In the process of doing a widespread shallow lake restoration program which should benefit Blanding's Turtles in the long run. The NRCS WRP program has almost certainly benefited Blandings turtles as well.
	Michigan	Restoration of fen and sedge meadow habitat and wetland restoration for Copper-bellied Watersnakes through MI DNRE Landowner Incentive Program and USFWS Private Lands Program.
	Minnesota	MNDNR nongame staff work with private landowners directly and via DNR private lands specialists and wildlife managers, SWCDs, NRCS, and USFWS for conservation management, easements, and acquisitions. Staff also provide guidance regarding plantings, seedlings, prescribed burns, locations of easements and acquisitions, etc. Also, Nongame staff frequently provide informal technical guidance/consultation with wildlife managers, private land specialists and other resource professionals. Results: educate landowners and resource managers, improve habitat for Blanding's Turtles. Controlled wetland drawdowns enhanced recruitment habitat for hatchlings/juveniles along the shores of one site adjacent to the nesting dunes in 2006-2007.
	Missouri	Main site with Blanding's Turtle was purchased by Missouri Department of Conservation in 1983 to protect Blanding's Turtles, Illinois Mud Turtles, and Western Foxsnakes. Unfortunately, the area only consist of 379 acres total (~100 acres are wetlands) and remaining is sand prairies. At this

Activity	Past and current activities undertaken for the benefit of Blanding's Turtles or their habitat and the results of these activities.	
	State	Explanation
		<p>site, the existing permanent wetland is filling in due to agriculture practices surrounding the areas and major flooding. Three small, temporary wetlands were constructed in summer 2000 to provide foraging sites for Blanding's Turtles and breeding sites for many amphibians. In summer 2005, a larger, permanent wetland was constructed on the area for Blanding's Turtles. This new permanent wetland was constructed to off-set the loss of the existing permanent wetland that is decreasing in volume and area (i.e., filling in). Other actions conducted at this site for Blanding's Turtles were to 1) periodically break up sod and open the soil surface in selective areas (believe that grasses and sods are becoming too thick in egg laying sites), 2) construct a few travel lanes through thick, river bulrush to allow easier access between the wetland and adjacent sand ridges, 3) conduct well-timed burns to ensure maintenance of sand prairie community.</p> <p>At (presumed) extirpated site invasive woody tree species are being removed between the wetland and sand ridge to allow access to nest laying site.</p>
	South Dakota	Blanding's Turtle is a species of greatest conservation need in South Dakota's Wildlife Action Plan; efforts to identify, protect and restore aquatic ecosystems through the Wildlife Action Plan will benefit this species, if it exists in South Dakota.
	Wisconsin	<p>There are numerous local conservation and management projects being conducted throughout the state by DNR biologists or independent researchers.</p> <p>Many state lands have altered management and restoration efforts to accommodate Blanding's Turtles.</p>
Land acquisition	Minnesota	Wetland/upland acquisition for habitat protection.
	Wisconsin	A landfill has preserved upland habitat to allow movement between isolated wetlands.
Predator control/exclusion	Michigan	Predator control at Ed Lowe Foundation property, may have been successful. Predator exclusion at Tollgate.
	Ohio	Raccoon removal at one nesting beach appears to have had some success.
Reducing road mortality	Michigan	Turtle fence along road or highway to prevent or minimize turtle road mortality - e.g., turtle fence along US-31 along the Muskegon River, appears to have reduced turtle mortality.
	Minnesota	Maintain turtle crossing signs to educate public and reduce road mortality. Promote awareness of turtle crossing activities (via news releases, etc) results: unknown, hopefully reduces road mortality.
	Nebraska	Fencing of roadways to limit road injury/mortality.

Activity	Past and current activities undertaken for the benefit of Blanding's Turtles or their habitat and the results of these activities.	
	State	Explanation
	Wisconsin	Wisconsin DOT has been responding with turtle fencing and ecopassages to reduce traffic mortality and preserve habitat connections across highways where it can be justified, but many politicians oppose these efforts due to cost.
Legal/regulatory actions	Minnesota	Listed as threatened species in 1983. Environmental Review Process (ongoing), results: no analysis available, known to be very beneficial in at least some cases. For known Blanding's Turtle sites, Nongame staff have provided more intensive guidance regarding various development of projects, involved detailed and ongoing technical guidance, site visits, training for project staff, etc. Collect and manage reports in Heritage Database/Biotics for environmental review.
	Nebraska	Uplisting to regulate/control/prohibit collecting, recreational and commercial activities possibly detrimental to the species.
	Wisconsin	All DNR reviewed, approved or funded projects are assessed for impacts to rare species, including the Blanding's Turtle. Take of the species is not allowed per state law (s. 29.604, Wis. Stats.). For projects that can avoid take, additional conservation and management actions are strongly recommended.
Planning	Minnesota	Identified high priority sites for protection in Minnesota (these sites were identified in the mid-1990's and need to be reevaluated based on more current information). Collect and manage reports in Heritage Database/Biotics for analysis of important conservation areas. MNDNR Nongame staff include Blanding's Turtle conservation considerations in large scale conservation planning within regions of the state. Results: improved connectivity among Blanding's Turtle populations. MNDNR Nongame staff have worked closely with MNDOT in the development of the Waters General Permit Guidance, including guidance that better accommodates Blanding's Turtles and other herpetofauna. Developed fact sheets as handouts for developers to encourage use of "turtle-friendly" curbs, adequate size culverts, and adjust timing of activities to reduce impact on turtle populations.
Education and outreach	Minnesota	Blandings Turtle Workshop, 1998. Educational forum to share knowledge and discuss issues related to Blanding's Turtles in the Midwest.
	Missouri	Working with private owner of wetland having the state's second best population of Blanding's Turtles.

Activity	Future activities that are thought to be needed to benefit Blanding's Turtles or their habitat and the expected results of these activities.	
	State	Explanation
Planning	Illinois	<p>Illinois will be completing the IDNR's recovery planning tool. The document will be presented to IDNR and the IL Endangered and Threatened Species Board for approval. If approved, a statewide recovery plan will be drafted by a small group of biologists and the plan implemented under the direction of IDNR and the Board.</p>
	Minnesota	<p>Develop management guidelines that address ways to reduce impacts to turtles when conducting prescribed burning, planting trees, and planning wetland drawdowns.</p> <p>Continue working to incorporate improved guidance in Waters General Permit Best Practices document (used by MNDOT and county highway depts. Work to amend county ditch laws.</p> <p>Develop guidelines for acquisition, restoration, and management of upland habitats, especially nesting habitats and travel corridors between wetlands.</p> <p>The importance of recruitment habitat being located near nesting areas with the appropriate sight-lines for hatchlings to access them should be included in land acquisition planning.</p>
	Wisconsin	<p>NGOs, especially land trusts, are effective at protecting critical habitat where they can raise sufficient funds to purchase land, or arrange for conservation easements. However, NGOs are handicapped by a lack of critical habitat mapping in regional planning documents, upon which they rely for their land protection planning efforts.</p> <p>Some sort of Blanding's Turtle conservation guide that explains landscape level conservation needs would be extremely useful to NGOs for their land protection planning, and to regional planning teams (usually counties and municipalities) for planning development and transportation in communities in a manner which can retain viable Blanding's Turtle populations.</p>
Habitat management/restoration	Iowa	Restoration of shallow lakes across Iowa. We also feel that restoration of upland sites, nesting sites, and corridors to connect all these sites would benefit this species.
	Michigan	Create nesting habitat at sites that need it.
	Minnesota	River and wetland restoration at sites with known Blanding's Turtle populations to include: restoration

Activity	Future activities that are thought to be needed to benefit Blanding's Turtles or their habitat and the expected results of these activities.	
	State	Explanation
		<p>of meanders and oxbows in channalized rivers/streams; developing buffer strips along rivers and wetlands to improve water quality; and, restoration of drained wetlands along rivers and streams to enhance connectivity of site.</p> <p>Explore opportunities to dove-tail management of Blanding's turtle nesting areas via Farm Bill Programs, Clean Water Legacy Programs and other conservation programs (e.g. benefits to a State Threatened Species may increase the probability of funding for a given site such as buffers along riparian corridor.)</p> <p>Encourage the use of the best seed mixture for restoration sites known to be, or with potential to be, Blanding's Turtle nest sites.</p> <p>Develop protection strategies that focus on habitat (not just the turtle).</p> <p>Explore reducing beaver/dam removal in areas with known Blanding's Turtle populations.</p> <p>Develop guidelines that include the habitat types needed for all life stages of Blanding's (including juveniles) and how to best manage and maintain these habitats. Currently, the staging wetlands at one site are becoming overgrown with willow, reducing the amount of open water. What can be done to control this? Excavation and chemical treatment options are not preferred techniques in this area of high turtle use.</p> <p>Develop guidelines on how to create or restore wetlands or wetland complexes that include habitat types for all life stages (including juveniles) and seasonal needs (including overwintering habitats).</p> <p>In metropolitan areas, develop guidelines to enhance aquatic and upland habitats and landscape connectivity. Guidelines could address reducing stream degradation (from channelization, poor culvert design/placement, use of riprap), and maintianing connectivity between streams, oxbows, wetlands, and nesting habitat.</p> <p>Investigate ways to enhance habitat for hatchlings/juveniles.</p>
	Missouri	<p>Renovate an existing permanent wetland that is filling in at main site.</p> <p>At second site and the (presumed) extirpated site, likely will need to investigate ways to renovate the wetland from sediment deposition or consider installing a well to pump water into the wetland.</p>

Activity	Future activities that are thought to be needed to benefit Blanding's Turtles or their habitat and the expected results of these activities.	
	State	Explanation
	Ohio	Minimization of impacts related to the suitability of nesting and wetland habitat.
	Wisconsin	Habitat management guidelines need further research and refinement, especially as regards burning and nesting habitat, and effective mechanisms for protecting critical habitat (especially uplands).
Road underpasses	Iowa	Road underpasses.
	Michigan	More culverts and wildlife corridors.
	Minnesota	Establish turtle tunnels and/or barriers associated with high traffic volume roads and sites with significant Blanding's Turtle populations. Work with DOT at a federal level to get funding that will integrate wildlife crossings into road projects.
Predator control/exclusion	Michigan	Predator control at more sites.
	Missouri	Consider trapping and removal of predators at 2 of 3 sites.
	Ohio	Control of nest predator populations within areas of known nesting to encourage the reproductive success of known populations.
Surveys and monitoring	Michigan	More inventory and monitoring - using volunteers likely - to help inform management decisions.
	Minnesota	Assess viability of Blanding's populations in highly fragmented metropolitan areas .
	Missouri	At third site, need to conduct a survey of the area to better determine the population status. Likely will be labor intensive due to the size of the area and the numerous wetland types.
	Ohio	Survey work aimed at determining presence and absence of historical and suspected populations within the state, and wherever possible to estimate population sizes and trends. This information is critical to determining the most appropriate protective status of this species within the state, and for monitoring its status into the future. Secondary research should focus on determining the availability of suitable nesting habitat and nest success at known population localities. Determining this will ultimately provide insight into population trends expected into the future.

Activity	Future activities that are thought to be needed to benefit Blanding's Turtles or their habitat and the expected results of these activities.	
	State	Explanation
		The potential for continuation of head-start programs should be investigated where appropriate.
	Wisconsin	Additional long-term monitoring could provide useful population and possibly trend data. A statewide status evaluation is needed including quantification and ranking of existing records, habitat availability and population viability. Priority needs are monitoring programs, identification of existing critical habitats, identification of existing healthiest populations, and individual population viability assessments.
Rehabilitation	Minnesota	Develop guidelines for repatriating displaced turtles. Develop guidelines to treat or euthanize turtles injured by vehicles or farm machinery.
Legal/regulatory actions	Minnesota	Develop a clearing house of all turtles marked in MN and associated locations and photos (including Blanding's) and prepare a similar database for PIT tagging efforts.
	Ohio	Restriction of access through corridors to, and on, known nesting habitat during the peak nesting period
Genetics	Minnesota	Determine if population of noticeably smaller individuals is genetically different from other populations.
Land acquisition	Missouri	Need to purchase additional lands adjacent to main population to support all life history needs of this species. Currently, we do not believe 379 acres will maintain a long-term persistent population. Need to purchase area (wetland and adjacent terrestrial habitat) of second population if landowner is willing to sell. At the (presumed) extirpated site, need to purchase lands to the west and south to acquire more terrestrial habitat and better maintain the existing wetland.
	Nebraska	Wetland/habitat conservation and protection.
Small population	Nebraska	Targeted protection/threat reduction in remaining

Activity	Future activities that are thought to be needed to benefit Blanding's Turtles or their habitat and the expected results of these activities.	
	State	Explanation
management		(extant) smallest, most vulnerable populations.
Population manipulation	Ohio	The potential for continuation of headstarting programs should be investigated where appropriate.

APPENDIX I. SURVEY



5 May 2010

Dear Wildlife Professional:

We are writing to request your assistance in the compilation of a conservation assessment for the Blanding's Turtle (*Emydoidea blandingii*). Attached you will find a survey that we hope to have completed for each state within the range of the Blanding's Turtle. Results of this survey will be compiled and presented at the upcoming ***Blanding's Turtle Biology, Conservation, and Management Conference***, 13-15 August 2010 at the Lorado Taft Field Campus of Northern Illinois University. (Additional information about the conference is available at: <http://mwparc.org/meetings/2010/>).

The Midwest Regional Working Group of Partners in Amphibian and Reptile Conservation (MWPARC) recently completed a species ranking exercise, examining the regional concern and regional responsibility of all amphibian and reptile species occurring in the Midwest (<http://mwparc.org/species/>). This exercise identified the Blanding's Turtle as one of the highest ranked species in the region. We expect that a compilation of our current knowledge of the species' distribution and status, threats to populations, and ongoing and needed conservation and management actions will be an important tool for ensuring the Blanding's Turtles' continued persistence. We hope that you will aid us in this endeavor by completing and returning the attached survey by **30 June 2010**.

We understand that information for answering all of the survey questions may be incomplete or unknown, but ask that you complete the survey as fully and accurately as possible, while keeping answers as short as possible. While the conference will include several presentations providing the results of research projects involving Blanding's Turtles, the purpose of this survey is to examine the current status of the species at the statewide level. Note that any specific locality information that you may provide will not be made public.

Please send completed surveys or questions to Greg Lipps (GregLipps@aol.com; 419-376-3411). Thank you in advance for your participation in this survey.

Sincerely,

Co-chairs and Advisory Board
MWPARC

Blanding's Turtle (*Emydoidea blandingii*) Conservation Assessment Survey

E-mail: info@mathworks.com Phone: +44 1234 567890

Historic and Current Status

- 1) Current protective status in state (endangered, threatened, special concern, etc.)?
 - 2) Estimated number of historical populations/metapopulations in the state. If unknown, this could be the number of townships, counties, or other administrative or natural units with historical records of occurrence.
 - 3) Number of known extant (occurrence records <10 years old) populations / metapopulations in the state.
 - 4) How many of the sites identified in #3 occur entirely or mostly on protected properties?
 - 5) How many of the sites identified in #3 have an estimated population size of:
<25: 25-50: 50-100: 100-500: >500:
 - 6) At how many of the sites identified in #3 has successful recruitment known to have occurred in the past 10 years (i.e., neonates or juvenile turtles have been observed, not including captive born/headstarted turtles)?
 - 7) How many populations are thought to be:
Declining: Stable: Increasing: Unknown:
Further explanation:
 - 8) Given what is known about the populations in your state, how many populations are thought to be viable (self-sustaining) in their current condition?

Threats - For each of the following, indicate how many populations are thought to be affected by the listed threat and any evidence leading to that conclusion.

- 9) Present or threatened destruction, modification, or curtailment of Blanding's Turtle habitat or range.
Number of populations:
Explanation:

10) Overutilization for commercial, recreational, scientific, or educational purposes.
Number of populations:
Explanation:

11) Disease.
Number of populations:

Explanation:

- 12) Predation, including depredation of nests.

Number of populations:

Explanation:

- 13) Inadequacy of available nesting areas.

Number of populations:

Explanation:

- 14) Incompatible land management practices.

Number of populations:

Explanation:

- 15) Inadequacy of existing regulatory mechanisms.

Number of populations:

Explanation:

- 16) Increased mortality due to attempted road crossings.

Number of populations:

Explanation:

- 17) Other natural or manmade factors affecting the continued existence of Blanding's Turtle populations.

Number of populations:

Explanations:

Population Monitoring & Research

- 18) How many populations are being monitored?

At what frequency/intensity?

- 19) What research has occurred and are there plans to continue these projects or for new research projects?
-

Conservation and Management

- 20) Conservation and Management Actions - Past and Current. Describe any activities undertaken for the benefit of the species or its habitat and the results of these activities.

- 21) Conservation and Management Actions - Future. Describe any future activities that are thought to be needed to benefit the species or its habitat and the expected results of these activities.

Please return completed surveys by 30 June 2010 to GregLipps@aol.com
Thank you!

APPENDIX II. CONTRIBUTORS TO THE SURVEY**Illinois**

Dan R. Ludwig
Mike J. Dreslik

Indiana

Sarabeth Klueh
Bruce Kingsbury
Mark A. Jordan

Iowa

Karen Kinkead
Fredric Janzen
Terry VanDeWalle
Jeff LeClare

Michigan

Yu Man Lee
David Mifsud
Rebecca Rogers
Lori Sargent
Christopher Hoving
Jim Harding

Minnesota

Carol Hall
Jeff LeClere
Krista Larson
Rich Baker
Lisa Gelvin-Innvaer
Liz Harper
Madeleine Linck
John Moriarty
Mike Niziolek
Margaret Edwards

Missouri

Jeff Briggler

Nebraska

Jeff Lang
Alan Bartels

Ohio

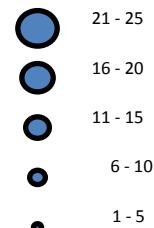
Carolyn Caldwell
Jim Spetz
Kent Bekker
Gregory Lipps

South Dakota

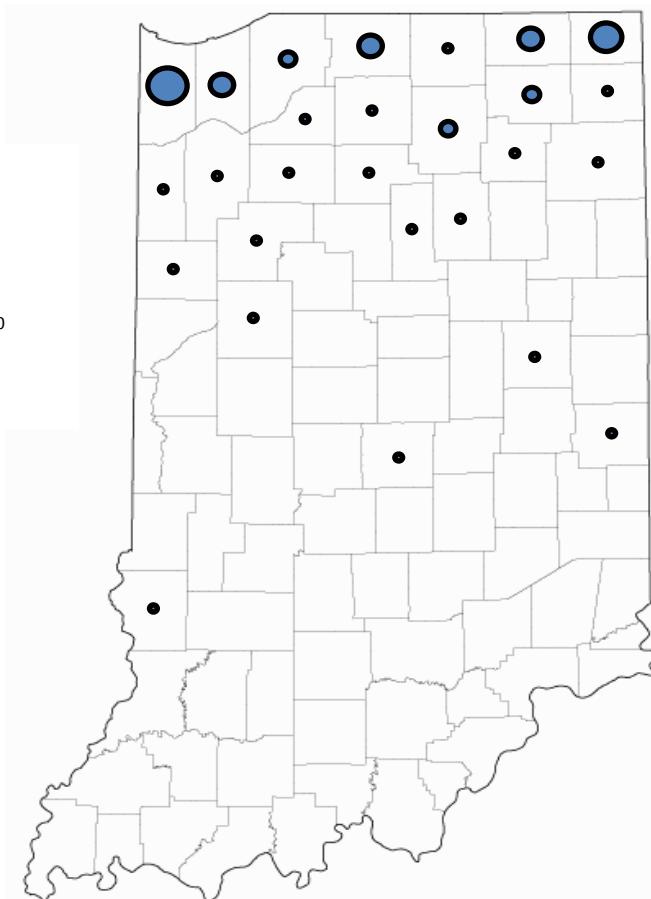
Eileen Dowd Stukel

Wisconsin

Rori Paloski
Tara Bergeson
Gary Casper
Bob Hay

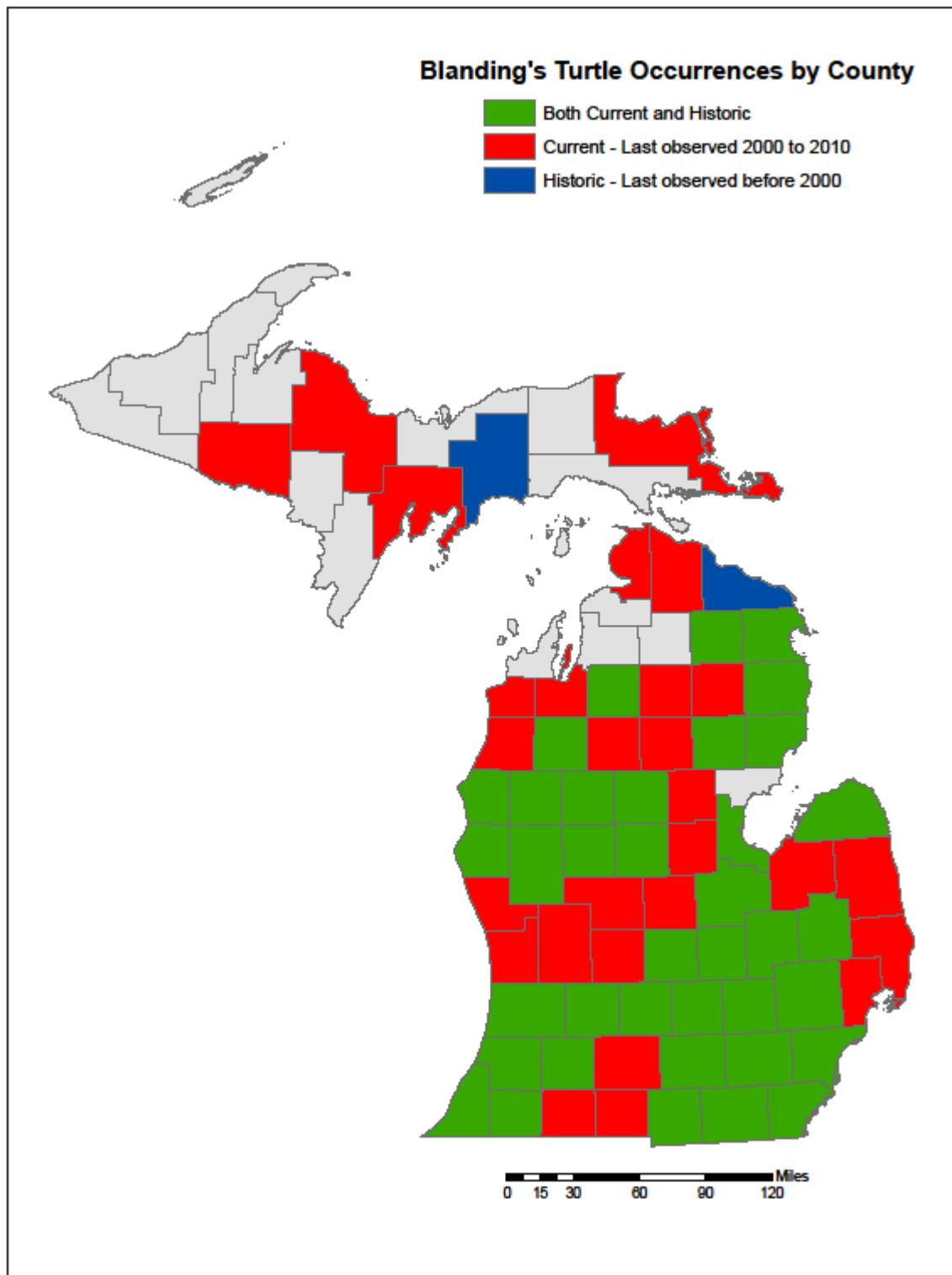
APPENDIX III. INDIANA MAP**Blanding's turtle distribution in Indiana**

The map combines museum records with data from the Indiana Natural Heritage Data Center

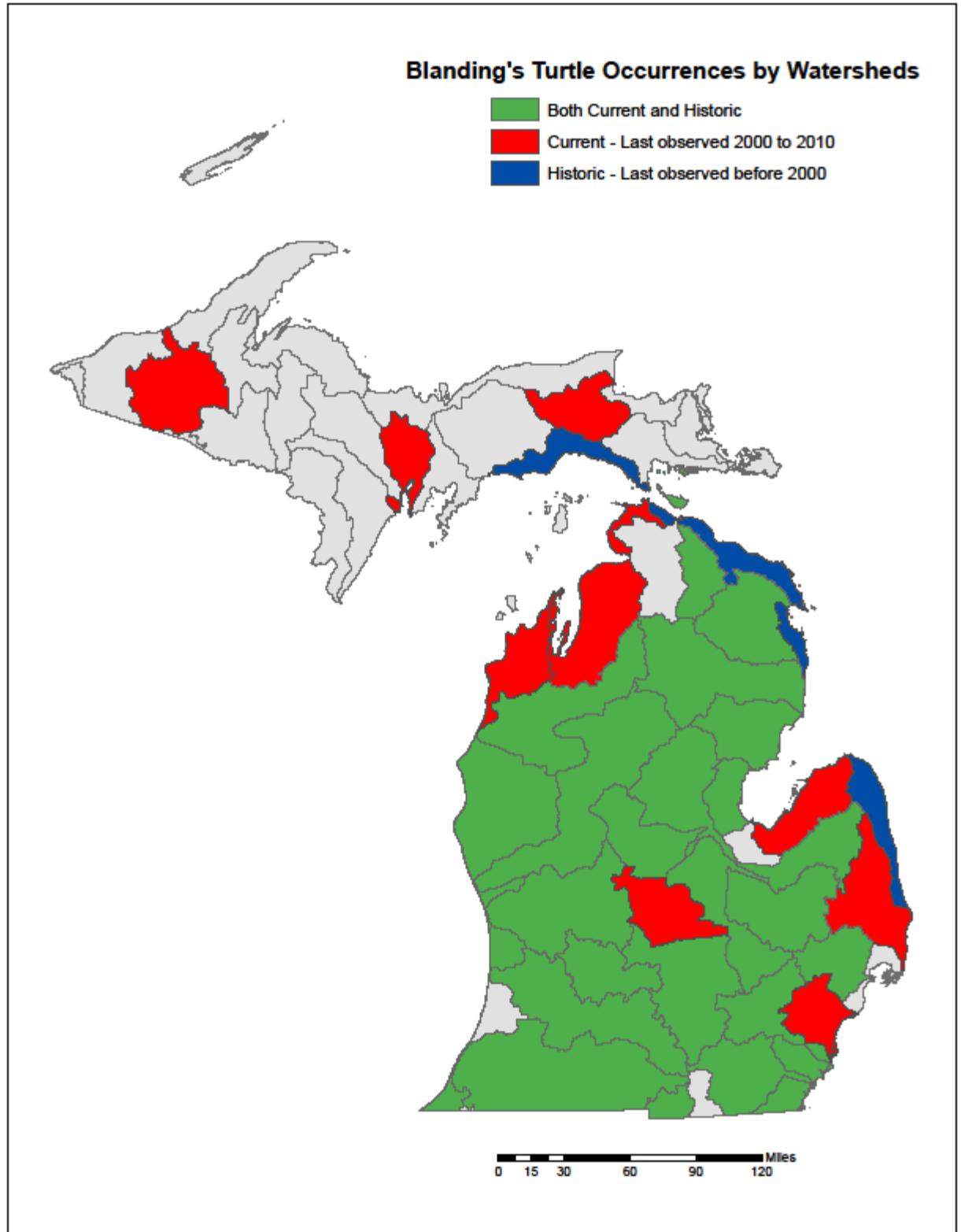


Number of occurrences of Blanding's turtle (*E. blandingsii*) by Indiana county, 1903-2009. (Figure provided by Mark A. Jordan.)

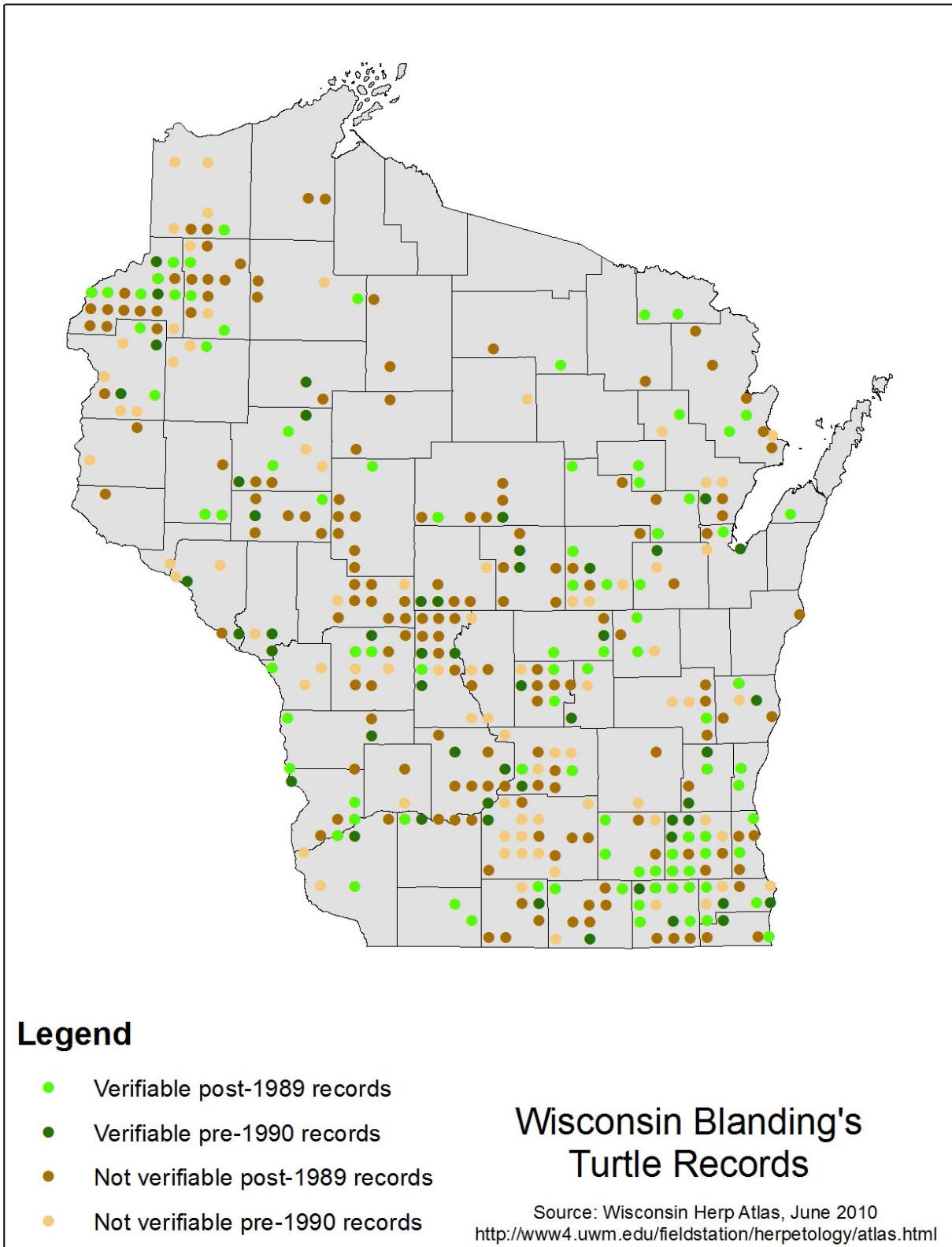
APPENDIX IV. MICHIGAN MAPS



Blanding's Turtle occurrences by county in Michigan. (Map provided by Rebecca Rogers, Michigan Natural Features Inventory.)



Blanding's Turtle occurrences by watershed in Michigan. (Map provided by Rebecca Rogers, Michigan Natural Features Inventory.)

APPENDIX V. WISCONSIN MAP

APPENDIX VI. MINNESOTA LITERATURE

List of Past Blanding's Turtle Research Reports:

- Blanding's turtle workshop 1998. Abstracts of presentations at workshop held May 7 and 8, 1998, J.F. Bell Museum of Natural History, Minneapolis, Minnesota. Unpaged
- Brecke, B. and J. J. Moriarty. 1989. Natural history note. Longevity. *Emydoidea blandingii*. Herpetological Review 20:53.
- Dee, J. Multiple years. Blanding's Turtle research: Summary Reports from 2000-2009. Submitted to the Minnesota Department of Natural Resources.
- Dorff, C. J. 1995. Conservation of Blanding's turtles (*Emydoidea blandingii*) in east-central Minnesota: impacts of urban habitat fragmentation and wetland drawdowns. M.Sc. Thesis. University of Minnesota, Minneapolis, 98 pp.
- Hall, C. D., and F. J. Cuthbert. 2000. Impact of a controlled wetland drawdown on Blanding's Turtles in Minnesota. Chelonian Conservation and Biology 3(4):643-648.
- Hamernick, M.G. 2000. Home ranges and habitat selection of Blanding's turtles (*Emydoidea blandingii*) at the Weaver Dunes, Minnesota. Final report submitted to the Nongame Wildlife Program, Minnesota DNR. 18 pp.
- Jessen, T. 2003. A search for Blanding's turtles in Blue Earth, Le Sueur, and Watonwan counties in Minnesota. Report submitted to the Nongame Wildlife Program, Minnesota Department of Natural Resources. 4 pp.
- Jessen, T. 1995. 1995 Blanding's turtle survey, SW MN conclusion. Report submitted to the Nongame Wildlife Program, Minnesota Department of Natural Resources. Unpaged.
- Lang, J.W. Multiple years. Blanding's turtle studies in southwestern Minnesota. Annual reports submitted to the Nongame Wildlife Program, Minnesota Department of Natural Resources.
- July 2002 - June 2003
 - July 2002 - March 2003
 - April 2002 - June 2002 Report
- Lang, J.W. Multiple years. Blanding's turtle research at Weaver's Dunes. Annual reports submitted to the Nongame Wildlife Program, Minnesota Department of Natural Resources.
- 2001 - Preliminary field report, April-June 2001
 - 2000 - Blandings turtles, roads, & culverts at Weaver Dunes
 - 1999 - DRAFT - Blanding's turtle research at Weaver Dunes - An overview of fieldwork in 1999
- Linck, M. H., and J. J. Moriarty. 1998. The effects of habitat fragmentation on Blanding's Turtles in Minnesota. Pages 30-37 in J. J. Moriarty, and D. Jones, editors. Minnesota's amphibians and reptiles, their conservation and status: proceedings of a symposium. Serpent's Tale Natural History Book Distributors, Lanesboro, Minnesota.

- Linck, M.H. 1988. *Emydoidea blandingii* survey within Ramsey Co., MN. Final report submitted to the Minnesota Department of Natural Resources. 6 pp.
- Linck, M.H. 1987. Blanding's turtle study at Kellogg-Weaver Dunes. Final report submitted to the Minnesota Department of Natural Resources. Unpaged.
- Moriarty, J.J. 1988. 1988 Blanding's turtle volunteer survey summary and results. Final report submitted to the Minnesota Department of Natural Resources. Unpaged.
- Niziolek, M. 2002. Meadowvale turtle project. Elk River Area High School, Elk River, Minnesota. <<http://blandingsturtles.tripod.com/main/content.html>>. Accessed 17 March 2005.
- Pappas, M.J., Congdon, J.D., Brecke, B. J., and Capps, J. D. 2009. Orientation and dispersal of hatchling Blanding's turtles (*Emydoidea blandingii*) from experimental nests. Canadian Journal of Zoology 87:755-766.
- Pappas, M.J. and J.D. Congdon. 2003. Weaver Bottoms 2001-2002 Turtle Survey: Management and Conservation Concerns. Final Report submitted to Nongame Wildlife Program, Minnesota Department of Natural Resources. 35 pp.
- Pappas, M.J., J. Congdon, and A. Pappas. 2001. Weaver Bottoms 2001 turtle survey; management and conservation concerns. Report submitted to the Nongame Wildlife Program, Minnesota Department of Natural Resources. 28 pp.
- 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(4):557-568.
- Pappas, M.J. and B.J. Brecke. 1992. Habitat selection of juvenile Blanding's turtles (*Emydoidea blandingii*). J. Herpetol. 26:233-234.
- Piepgras, S., T. Sajwaj, M. Hamernick, and J.W. Lang. 1998. Blanding's turtle (*Emydoidea blandingii*) in the Brainerd/Baxter region: population status, distribution & management recommendations. Final report submitted to the Nongame Wildlife Program, Minnesota Department of Natural Resources. 89+ pp.
- Refsnider, J. 2003. Population ecology and conservation genetics of Blanding's Turtles (*Emydoidea blandingii*) in Minnesota. Progress report submitted to the Natural Heritage and Nongame Wildlife Program, Minnesota Department of Natural Resources. 5 pp. + illustrations. Special permit 11605.
- Refsnider, J. M. 2005 Reproductive Ecology of Blanding's Turtles (*Emydoidea blandingii*) in east-central Minnesota. MS Thesis, University of Minnesota, St. Paul, Minnesota.
- Sajwaj, T.D., S.A. Piepgras, and J.W. Lang. 1998. Blanding's turtle, (*Emydoidea blandingii*) at Camp Ripley:critical habitats, population status and management guidelines. Report submitted to the Nongame Wildlife Program, Minnesota Department of Natural Resources. 185 pp.

APPENDIX VII. WISCONSIN LITERATURE

A non-comprehensive list of publications involving Wisconsin Blanding's turtles.

- Brewster, K. N. 1982. Life history notes: *Emydoidea blandingi*. Reproduction. SSAR Herpetological Review 13(2):48.
- Casper, G.S., J.M. Kapfer, and T. Muehlfeld. 2007. Geographic distribution. *Emydoidea blandingii* (Blanding's turtle). Herpetological Review 38(1):99-100.
- Cochran, P.A. and J.R. Hodgson. 1985. Geographic distribution: *Emydoidea blandingii*. Herpetological Review 16(4):116. (Oconto Co.)
- Cochran, P.A. and R.M. Korb. 1987. Recent sightings of the Blanding's turtle, *Emydoidea blandingii*, a threatened species, in Wisconsin. Bull. Chic. Herpetol. Soc. 22:145-147 (Note errata 22:201).
- Korb, R.M.. 1988. Geographic distribution: *Emydoidea blandingii*. Herpetological Review 19(1):21. (Shawano Co.)
- Ross, D.A. 1985. Habitat use and movements of a Blanding's turtle population in central Wisconsin. Unpubl. M.S. thesis. Univ. Wisconsin-Stevens Point. 51 pp.
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APPENDIX VIII. TASK TEAMS

At the Blanding's Turtle Biology, Conservation, and Management Conference (13-15 August 2010), four MWPARC task teams were initiated. The goal of these task teams is to address issues brought forward during the meeting, and their principle output will be products that will add significantly to this document. Readers are encouraged to check the MWPARC website (mwparc.org) for future updates.

The task teams are:

- 1) **Blanding's Turtle Distribution Mapping:** Develop current distribution maps for the Midwest with township-level distribution.
- 2) **Best Blanding's Turtle Populations:** Identify what each state considers their "best" population.
- 3) **Blanding's Turtle Core Areas:** Develop a white paper, based on the best available data, on the core areas used by Blanding's Turtles throughout their range.
- 4) **Habitat Management, Surveying, and Monitoring for Blanding's Turtles:** Develop a document with recommendations for land-managers and those tasked with surveying and monitoring populations.