

Interim Report to Mn DNR Nongame, Region 4, 261 Hwy 15 S, New Ulm, MN 56073

Title: Blanding's Turtle Studies in Southwestern Minnesota in 2002-03

Location: SW Mn, Lincoln, Lyon, Pipestone, Murray, Rock, and Nobles Counties

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Introduction

This project is a pilot study initiated by J.W. Lang as a follow-up to a WCRP proposal developed in collaboration with Lisa Gelvin-Innvaer, Nongame Wildlife Program (NWP), Mn DNR. The pilot study is designed to provide critical information on specific life history features of Blanding's turtles inhabiting remnant prairie wetlands in SW Mn. Productive region wide surveys of present-day turtle distribution and abundance depend initially on the identification of key habitat features associated with surviving turtle populations. This study provides important new information needed to identify these key features, and is the necessary first step in developing:

- (1) a region wide assessment of Blanding's turtles, and
- (2) a comprehensive plan for their conservation in SW Mn.

The Mn DNR NWP and the Nongame Research and Natural Area Program both have identified the Blanding's turtle as among priority species "in greatest conservation" need in SW Mn. Specific outcomes of this pilot study include:

- 1) addressing this need, as determined by the Minnesota State Legislature,
- 2) facilitating environmental review as well as broad landscape-level efforts to conserve and restore wetlands and adjacent wetlands within the region,
- 3) developing a state wide conservation plan for the species in Minnesota, and
- 4) contributing to strategies and long term goals of the Mn DNR (Directions 2000).

A specific example of the necessity for pertinent information with respect to environmental review (outcome 2, above) was evident recently. There was a recent request for "comment" on the potential impact of a proposed wind power facility located adjacent to known localities for the Blanding's turtle, based on the few records available in Rare Features database. In response to a request for input from the Regional Nongame Specialist for use in an agency response, I provided an initial assessment based on preliminary data from the present study.

Background

The Blanding's turtle, *Emydoidea blandingii*, is listed as a Species of Concern/ Species at Risk by the USFWS. Essentially a north temperate species, it prefers shallow marshes and swamps throughout eastern and central North America. Most populations are small and fragmented, and consequently considered to be either threatened or endangered. At several localities in the northeastern states, artificial wetlands and constructed nesting sites have been designed specifically for populations threatened with habitat loss, and these have been surprisingly effective. However, within its range, specific features of Blanding's turtle biology vary considerably from region to region, e.g., movement patterns, overwintering behaviors, and reproductive ecologies.

Consequently, studies elsewhere are of limited value in formulating long-term management strategies for a specific area, and detailed information from a particular locality is needed in order to conserve and manage Blanding's turtle populations.

In Minnesota, Blanding's turtle is listed as "threatened" and its statewide distribution is spotty. In the southeast, an exceptionally large population, estimated at more than 5000 turtles, inhabits Weaver Dunes and surrounding wetlands. In central Minnesota, a stable, low-density population persists in and around Camp Ripley. Recent, multi-year field studies at both localities highlight many significant differences. At Ripley, the turtles are larger (by 10-15%) and produce more eggs (30-40% more), but have much smaller activity areas, use fewer kinds of habitats, and range less widely (only 10% as far), in comparison with the turtles living at Weaver. Other localities where Blanding's turtles occur in Minnesota include various sites in and around the Twin Cities as well as additional populations in southeast Minnesota. Little is known about the species' current distribution and abundance in southwest Minnesota, though there are records from wetlands in the Missouri River drainage. A comprehensive plan for conservation and management that is applicable statewide will necessarily depend on an inventory and assessment of the species' status in southwest Minnesota.

Several key features of the species' natural history make it a sensitive ecological indicator, but also contribute to its vulnerability. Individual turtles are long-lived, have delayed reproduction, and move extensively during a lifetime between wetlands and uplands, typically over long distances. Natural mortality is very low, but human-induced mortality via roads and/or habitat loss jeopardizes the continued survival of many populations. Knowledge about the current status of particular populations is essential, including potential sources of mortality as well as levels of recruitment. At present, such information is not available for Blanding's turtles in the southwest.

In southwestern Minnesota, this state-listed "threatened" turtle occurs in shallow wetlands, particularly in prairie potholes and small ephemeral wetlands. Overland movements probably occur regularly, but turtles also likely depend on rivers, streams, channels, and ditches as movement corridors, as well as seasonal aquatic refugia. Connectivity among aquatic habitats may be critical, but identification and delineation of wetland habitats and how turtles use these habitats are necessary first steps in wetland as well as turtle conservation. In addition, daily activity and seasonal movements may very well be habitat-specific, as indicated by comparative studies of other Minnesota populations of Blanding's turtles. Unlike other regions in the state, few if any County Biological Surveys have been conducted in the southwest.

Objectives

The specific study objectives are:

- (1) to locate a study population in SW Mn representative of extant turtle populations, by (a) examining previous records, and (b) conducting field surveys
- (2) to identify critical habitats for all age/sex classes of the population; including hatchlings, juveniles, adult males, and adult females,
- (3) to delineate the spatial and temporal patterns of usage throughout the annual cycle for each group, including spring emergence, nesting, summer and fall feeding periods, and overwintering, including winter movements,
- (4) to assess parameters associated with the long-term viability of the population, particularly aspects of reproduction, survival, and growth
- (5) to formulate management recommendations based on 1-4 above, judged critical for the continued survival and conservation of this population and others in SW Mn.

Study Area and Methodology

WMA is a 109 acre state-owned property surrounded by agricultural cropland and dairy pasture. Wet meadow/fen vegetation, primarily calcareous seepage fen of the SW prairie subtype, occupies approximately 70 acres and is drained by a tributary creek flowing from the northeast in a southwest direction into the Rock River 0.5 miles

WMA. Upland dry terraces comprising about 40 acres border the low-lying wetland to the northwest and southeast. The creek has a constant flow of water year-round, and is typically 0.25-0.5 m deep and 0.5-1.0 m wide. It flows in meandering channels through the 70 acre wetland, entering the property in the northeast corner and exiting on the southwest corner (see Figures 5-9).

Examination of air photos from 1962 and 1968 indicate that a series of "ponds" were excavated in the wetland area between these dates. These ponds are named with respect to the position of each within the WMA and are shown in Figure 9. At present, these ponds contain some open water surrounded by cattails or persist as cattail marshes with standing water. The current WMA wetland and upland acreage is little changed on air photos dating from 1938 to present. These air photos indicate that agricultural activities have surrounded this WMA during this entire period, more than 60 years, and likely have persisted without major changes in surrounding landscape. Gravel roads surround the WMA, but were not more extensive in the past years.

Captured turtles were measured and marked using a standard protocol. The markings on each turtle consisted of drilling holes (with 5 mm dia. bit=3/16") in particular marginal scutes as illustrated in Figure 4. The codes used for turtles marked at _____ in 2002 are shown in Figures 4 & 5. Recaptured turtles with existing file marks were drilled with an additional code; existing file marks were not altered. Representative turtles were outfitted with radio transmitters and temperature data loggers. Measurement and telemetry methodologies as well as other study methods followed standard protocols described in detail previously in reports on earlier studies on Blanding's turtles in Minnesota at Camp Ripley and at Weaver Dunes.

During July 2002 through February 2003, I spent a total of 18 days conducting field surveys and fieldwork on this project. I made 7 trips to _____, and spent an average of 8 hours in the field per trip (8 hrs/day X 8 days=64 hrs. in the field). Driving time was 10 hrs per trip (5 hrs each way from MSP, Nebraska, North Dakota). The dates of my visits to _____ were: 24-25 August; 5-7 September; 14 October; 8-9 November 2002, 7 January, 22-23 February 2003. Telemetry dates are shown in Table 2.

Blanding's Turtles at _____ WMA

2002 Captures

During November 2002, 2 additional turtles were captured and marked at _____. These were hand caught in the water (2). For the total of 21 turtles captured in 2002, individual measurements and characteristics are presented in Table 1. In addition, one previously marked turtle was hand-captured at an overwintering site, and outfitted with a radio transmitter. A malfunctioning transmitter (74) was removed from an adult male. The total number of telemetered turtles followed during this period was 15; ten were adult females, and five were adult males

February, these turtles remained in the same locations where they were located in the fall of 2002.

Population Parameters

The Blanding's turtles at _____ appear to exhibit a suite of life history characteristics that distinguish this population from the Weaver Dunes population in southeastern Minnesota, and from populations of the species studied elsewhere, e.g., Nebraska. With respect to overall body size, the _____ turtles are large in comparison with all other populations except those at Camp Ripley in north central Minnesota.

Adult body sizes, as well as younger body sizes, are shown for _____ turtles measured in 2002 and in 1995-1996 (Table 3). Carapace lengths (mm) range from 223 to 267 for adult males, 222 to 243 for adult females, 184 to 215 for subadult males, 178 to 203 for subadult females, and 140-141 for juveniles. These values are only marginally smaller (<5%) than turtles measured at Camp Ripley, a population documented to be 15-20% larger in body size than Blanding's turtles at Weaver Dunes. So, _____ turtles measure 10-15% larger than those from all other populations (except the population at Camp Ripley).

In other populations (including the population at Camp Ripley), large body size is associated with rapid growth, accelerated maturation, large egg size, and increased clutch size. Whether these two latter features are characteristic of the _____ turtles is not yet known. However, the available measurements of the 30 turtles marked to date and growth increments from recaptured turtles provide limited data on growth and maturation. For example, a juvenile (BBX) aged at 6 years by T. Jessen showed a carapace length increase of 55 mm during the intervening 6 years, and measured 195 mm at 12 years of age in 2002. Evidence of equivalent or increased growth is evident among the subadults of comparable ages (Table 3).

Consequently, the _____ turtles are large at a given age, relative to their counterparts in other regions, and may mature at a larger size but the same age or at a larger size and younger age. Reproductive females observed making nesting movements or observed nesting ranged in size from 222 to 240 mm, carapace length. It is likely that the youngest of these, 222-229 mm carapace length, were at least 15 years of age. This is the minimum age of reproduction reported for the species, based on populations from other regions.

Conclusions to date

- (1) Reconnaissance in late April and early May 2002 resulted in the selection of WMA as a suitable study site for Blanding's turtles in southwestern Minnesota
- (2) A population was sampled, and 21 turtles were captured and marked. Turtles(15) have been outfitted with radios and data loggers, and are monitored periodically.
- (3) Turtles were concentrated in shallow ponds in late May and dispersed into adjacent wetlands by late June. Most of these were located on the WMA, but some were not.
- (4) Reproductive females nested during the third week of June in adjacent uplands utilized for croplands. All of documented nests are located on private lands.

- (5) Recaptured turtles, including 3 adult females, a subadult male, and a juvenile, marked in 1995-1996 were relocated in 2002 near their original capture locations.
- (6) The number of turtles at _____ is estimated to be 67-70 (59-80), based on 1995-1996 and 2002 mark-recapture record.
- (7) The total number of marked turtles at _____ is 32, if all turtles marked in 1995-1996 and 2002 have survived to date.
- (8) Preliminary density estimate is 1 turtle/acre or 2.5 turtles/ha, using 70 acres as potential wetland habitat. Smaller wetland acreage yields higher turtle densities.
- (9) Seasonal usage of wetlands within the boundaries of _____ is evident in late May and June. At least several telemetered turtles moved off the WMA by end of June.
- (10) Seasonal usage of stream habitats, including the tributary and main channel of the Rock River to the _____ WMA, was documented in the majority of turtles telemetered during August and September. By mid October and early November, all of the turtles located outside the WMA had returned to the wetlands within WMA boundaries.
- (11) All of the overwintering turtles were located in similar underwater habitats, primarily deep pools concentrated in two sections of the stream within the WMA.
- (12) Overwintering turtles remained stationary during the dormancy period, from November through February. No movements were detected by telemetered turtles.
- (13) _____ turtles are 10-15% larger in body size than other turtles, e.g. Weaver Dunes.
- (14) Additional life history features unique to _____ turtles, as well as other populations living in SW Mn, may be rapid growth and/or accelerated maturation.
- (15) Reproduction occurs in females as small as 229 mm carapace length, at least 16 years of age. Reproductive features may include large egg size and/or large clutch number, suggested by large body size, are not yet documented in these turtles.

Future Studies

Fieldwork to be conducted during the spring and summer of 2003 will focus on (1) continued tracking of radioed turtles, and (2) additional efforts to trap and capture turtles within the _____ WMA. Capture efforts throughout the remainder 2003 will further establish the validity of turtle abundance and density estimates for this population. Little is known about the habitats utilized by juveniles and subadults turtles at _____, and further information on this feature is needed for effective management. Nesting may be dependent on movement onto private lands in all directions, not just to the fields south of the WMA. Additional information is needed to identify nesting habitats. Reproductive features are not described, and likely differ from populations elsewhere.

Interim Management Recommendations

Based on our prior studies in Minnesota, Blanding's turtles require three habitats:

- 1) **activity season wetlands**, encompassing a variety of wetland types and sizes that are typically occupied for various periods during the spring, summer, and fall
- 2) **overwintering wetlands**, comprising specific wetlands that provide refuge from lethal winter temperatures and protection from predators during inactivity
- 3) **nesting uplands**, characterized by exposed, well-drained soils, utilized largely during the reproductive season by reproductive females and emerging hatchlings.

Currently, on the basis of available data, the activity season wetland utilized by the turtle population is located at least in part in the wetlands and associated water surrounding the creek tributary flowing through the _____ WMA. **The mid and late summer locations, that make up the remainder of the activity season wetlands have now been determined for these turtles.** Circumstantial evidence, based on movements of some turtles off the WMA, suggests that at least some of the turtles move either up or down the creek during the activity season. At present, the extent of these movements and their prevalence are not yet determined for the majority of _____ turtles. **Similarly, the overwintering wetland habitats required by these turtles have now been determined, and include stream habitats inside the WMA.** The known nesting habitats are not located on the WMA, but are located on private cropland and pasture south of the WMA boundary. **Additional nesting habitats may be located outside the WMA.** Habitat requirements of juveniles and subadults are yet to be determined.

Wetland Threats: At _____, the Blanding's turtles rely on wetland habitats associated with the creek tributary that flows through the WMA _____. Loss or alteration of wetlands on private property could severely impact turtles _____. In addition, road construction and water level regulation that affects water flow in the watershed could pose lesser threats to the turtle wetlands area-wide.

Strategies: Concerted efforts must be made to protect and preserve any wetlands in the watershed, regardless of size or type. In particular, water levels or drainage patterns should not be altered. Wetlands should be protected from road or lawn chemical run-off, and other forms of pollution. Roads should be not be upgraded or constructed in ways that affect water flow or existing wetlands.

Upland Threats: At _____, distances from existing roadways is certainly a key element in the survival of the turtle population to date. The major threat in uplands is that existing or additional roads will be upgraded or constructed in the region, within 1-3 miles of the _____ WMA. For example, the development of windmill installations in the area would increase traffic during construction, and probably result in roadwork in the area. This activity could have disastrous effects on the existing turtle population. For specific comments in this regard, see comments included here as Appendix A.

Strategies: Concerted efforts must be made to limit and restrict road access in the immediate vicinity of the _____ WMA. Any fieldwork or cropping within the existing WMA should be re-evaluated in light of the likelihood that these areas are potentially sites where females lay eggs, eggs incubate for several months, and hatchlings utilize when moving from nest sites to surrounding wetland habitats. Fieldwork within the WMA, such as weed control, should be scheduled and located to have minimal impacts on the existing turtle population.

Blandings Turtles 2002-03

code	age	sex	wt	gms	cl	mm	pl	mm	wd	mm	ht	mm	gr	gs	annuli	day	date	loc	cap	rcp	radio	nest	1995-96
BBK	J	F	381		141	137	94	56	Y	Y	5	148	28may	CPE	HT								
BBJ	SA	F	981		195	192	131	75	Y	Y	11	148	28may	CPE	HT						12		
BBX	SA	F	1026		195	190	134	77	Y	Y	11	149	29may	NWP	CT					R			TJ2009
BBN	SA	M	1199		215	196	137	78	Y	Y	13	160	9june	NWP	HT								
BBCG	A	F	1748		226	213	146	94	Y	Y	16+	311	7nov	CK.NNE	HC						29		TJ2002
BBY	A	F	1575		228	221	140	91	Y	Y	16+	149	29may	NWP	CT					R	46	nest	
BBC	A	F	1684		230	220	145	94	n	n	20	143	23may	NWP	HC					R	16A		
BBL	A	F	1707		230	218	149	93	Y	Y	18	149	29may	CPW	HC						48		
BBW	A	F	1707		230	225	152	91	n	n	20+	149	29may	NWP	CT					R	4A	nest	TJ2003
CCI	A	F	1902		232	225	153	94	n	n	20+	148	28may	CPE	HC						9A	nest	TJ2001
CCJ	A	F	1843		233	224	145	89	n	n	20+	165	14june	NWP	CT						12R	?n	
BBP	A	F	1930		236	234	155	97	n	n	20+	153	2june	NWP	CT					R	50		
BBQ	A	F	1852		243	224	145	96	Y	Y	17	153	2june	NWP	CT					R	40		
BBI	A	M	1466		223	199	140	86	Y	Y	20	148	28may	NWP	HT						(74)		
BBU	A	M	1326		223	197	141	82	Y	Y	20	153	2june	NWP	HT					R			TJ2005
BBV	A	M	1612		231	219	151	90	Y	Y	17+	149	29may	NWP	CT								
BBH	A	M	1780		241	232	148	94	n	n	20+	148	28may	NWP	CT					R	58		
BBCH	A	M	1675		244	212	146	84	Y	Y	18+	311	7nov	CK.SW	HC						10		
BBO	A	M	1934		249	223	148	89	Y	Y	18+	155	4june	NWP	CT						24		
BBG	A	M	1870		250	223	158	92	n	n	20+	148	28may	NWP	CT					R	60		
BBD	A	M	2179		264	235	159	96	n	n	20+	148	28may	NWP	CT						53		

Table 1. Summary of individual details for 21 Blanding's turtles collected at WMA in 2002. Turtles were marked with an individual code, identified as a juvenile (J), subadult (SA), or adult (A), sexed (F=female; M=male), weighed (in grams), measured (cl=carapace length; pl=plastron length; wd=width, at bridge; ht=height), aged (gr=growth rings visible on carapace; gs=growth seam visible along plastral midline; annuli=counted on individual plastral scutes). The day (Julian date) and date of capture, and location recorded is included, as well as method of capture (HC=hand capture; HT=hoop trap; CT=crab trap) and whether recaptured (R=recapture during 2002). Radio channel noted for turtles with radios, and nesting noted for females. Five turtles captured in 2002 were recaptures marked by T. Jessen in 1995-1996, noted with "TJ" identification code.

**Table 2 removed from document:
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BT
age-size comparison

code	age	sex	wt gms	cl mm	annuli +1=age	gro	nest	marked
2009	J	F		140*	6	+		BBX
BBK	J	F	381	141	6	+		
2002	SA	F		178*				BBY
BBJ	SA	F	981	195	12	+		
BBX	SA	F	1026	195	12	+		2009
2017	SA	F		203*	11			
2005	SA	M		184*				BBU
BBN	SA	M	1199	215	14	+		
2006	A	F		222*			nest	
BBCG	A	F		226	17+	+		
BBY	A	F	1575	228	16+	+		2002
2001	A	F		229*	20+			CCI
2003	A	F		229*			nest?	BBW
2011	A	F		229*				
BBC	A	F	1684	230	21	N	nest	
BBL	A	F	1707	230	19	+		
BBW	A	F	1707	230	20+	N	nest	2003
CCI	A	F	1902	232	20+	N	nest	2001
CCJ	A	F	1843	233	20+	N	nest?	
2012	A	F		235*				
2014	A	F		235*				
BBP	A	F	1930	236	20+	N		
2004	A	F		240*			nest	
BBQ	A	F	1852	243	18	+		
BBI	A	M	1466	223	21	+		
BBU	A	M	1326	223	21	+		2005
BBV	A	M	1612	231	17+	+		
2007	A	M		235*				
BBH	A	M	1780	241	20+	N		
2013	A	M		241*				
BBCH	A	M	1675	244	19+			
BBO	A	M	1934	249	18+	+		
BBG	A	M	1870	250	20+	N		
2008	A	M		254*				
BBD	A	M	2179	264	20+	N		
2010	A	M		264*	25			
2018	A	M		267*				

*=estimated carapace length

Table 3. Size-age features for 21 Blanding's turtles from WMA, measured in 2002 and in 1995-1996. Turtle code, age, sex, weight, as noted in legend in Table 1. Carapace length (mm) was measured directly in 2002, and indirectly estimated for 1995-1996 based on curved measurements, taken by T. Jessen in inches. Age based on readable annuli on plastral scutes; growth indicated by growth rings on carapace and/or presence of growth seam (+=growth; N=no growth evident). Certain females were observed nesting. Measurements of turtles recaptured in 2002 are tabled with earlier measurements taken in 1995-1996.

BT capture summary marked turtles									
season	N	juvenile	subadult females	subadult males	adult females	adult males	recapture 1995	recapture 1996	
1995	7		1	1	4	1	2		
1996	9	1	1		3	4	1	1	
95-96	16	1	2	1	7	5	3	1	
2002-03	21	1	2	1	9	8	4	1	
total marked	32	1	2	1	14	14			
32	=total marked based on 02-03 plus 1995-96 ?extant								
Lincoln Index	Jessen	1/10=7/N	N=70	estimated pop size					
	TJ+03	5/21=16/N	N=67	(59-80) est pop size					
	2003	?/10=30/70	recaps=43%	of total captures					

Table 4. Summary of Blanding's turtles marked at WMA in 1995-1996 and in 2002. Recaptures are noted (right columns), as well as the total number of marked turtles extant (bottom row). Lincoln Index calculations are shown for population estimates, based on the proportion of marked turtles recorded in subsequent recaptures.

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they contain location information.**



Figure 4. (top) View of female Blanding's turtle BBC showing general appearance, temporary paint markings, and permanent marginal coding (visible as drill holes in marginals). (bottom) The radio transmitter with antenna and "Tidbit" data logger are affixed to rear of carapace with 5-minute epoxy (Devcon epoxy), and remain attached for 6-15 months.



Figure 5. (top) View of WMA from overlook in late August 2002, showing multiple vehicle tracks across wetlands fringing the stream. Herbicide spraying is conducted annually to eradicate weeds by DNR staff as part of WMA management plan. (bottom) Blanding's turtle, BBL, on land in dairy pasture adjacent to WMA in late August 2002. During late summer and early fall, Blanding's turtles spend increasing amounts of time on land foraging in wet meadows.



Figure 6. (top) View of _____ of WMA in August 2002, looking NE, showing fence line, stream aspect, and vegetation in WMA (far side of fence) and adjacent pasture (foreground). (bottom) View of stream (_____), looking SSW from same location (shown above), across pasture (foreground) and alfalfa field (in distance, beyond fenceline).



Figure 7. (top) View of stream pool () at overwintering site of BBW, BBCH, and CCI. Turtles were located in this pool in early November 2002 and remained at the same locations through late February 2003. This photo was taken 7 January 2003; note partial ice block in pool and lack of snowcover in midwinter). (bottom) View of next pool downstream from above locality (to the west of pool shown in above photo) where two turtles, CCJ and BBY overwintered in 2002-03. Turtles were positioned underwater in deeper sections of pool, up against the streambank (visible in foreground).



Figure 8. (top) View of elongate pool located 50-100 m. downstream from pools shown in Fig. 7. (bottom) In January, 2003, turtle BBQ was stationary on the bottom substrate, in 1m of water, with carapace lettering visible (center of photo). Note lack of ice and/or snow in region.



Figure 9. (top) View of ice-covered pool in stream (), same location as in Fig. 7, overwintering site of BBW, BBCH, and CCI, in late February 2003. In distance (at center; stake and figure), stakes mark other pools downstream that were used by other turtles for overwintering (see Fig. 8). (bottom) View looking north from ; showing wetlands surrounding stream as it enters WMA . Five telemetered turtles overwintered in this section of the WMA in 2002-03.



Figure 10. (top) View of
in May 2002.

(CPE) looking NNE from the south perimeter of pond

(bottom) View of
and surrounding cattail marsh in May 2002.

(CPW) from northern perimeter, looking south across pond