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Conservation Biology Research Grants Program
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**SURVEY OF TIMBER RATTLESNAKE
(*Crotalus horridus*)
PERIPHERAL RANGE ON SOUTHERN MINNESOTA STATE
LANDS (1998)**

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ABSTRACT

Field surveys of suitable timber rattlesnake habitat were made on state lands in the counties of Goodhue, Olmsted, and Wabasha from May 9 through September 18, 1998. The primary goal of the study was to determine the status of possible timber rattlesnake populations in this peripheral-range region. Survey areas ranged from the Cannon River in the north to the northern tip of the White Water Management Area in the south, and from Pleasant Grove Township, Olmsted County in the west to the Mississippi river in the east.

A total of 143 field man-hours of survey time resulted in the finding of only three specimens of *Crotalus horridus*. Two specimens, a male and gravid female, were observed on different dates at a single site on state forestland in Olmsted County. This site was historically known as "xxxxxxx". The third specimen was evidenced by the sounding of its rattle deep in a talus crevice on a bluff prairie above the Zumbro River in the xxxxxx.

Despite the existence of what would be considered good to optimal timber rattlesnake habitat at nearly all survey sites there was no evidence (i.e. shed skins, snake tracks, or broken rattles) to confirm the presence of timber rattlesnakes at any site other than those at which *Crotalus horridus* were actually observed. Interestingly, landowners adjacent to many of the survey sites in Goodhue and Wabasha counties reported that they had not seen timber rattlesnakes for nearly three decades.

In addition to timber rattlesnakes, 7 other species of snakes, one species of lizard, and 5 species of amphibians were observed during field surveys. However, large numbers of any species were not observed at any site and a total of only 47 herpetological specimens were observed for all sites collectively over the entire season.

In conclusion, based on the results of the current survey, both the range and the numbers of timber rattlesnakes in Goodhue, Olmsted, and Wabasha counties appear to be substantially reduced, or the species extirpated in several areas, which historically supported viable timber rattlesnake populations. These findings strongly demonstrate the need for continued and enhanced habitat protection, population monitoring, and timber rattlesnake protection in Fillmore, Houston, and Winona counties where viable populations still exist.

INTRODUCTION

Southeastern Minnesota geographically represents the extreme northwestern range of *Crotalus horridus* and this region also exhibits the most severe climatic conditions at which the species can survive. Thus, the less than optimally favorable conditions for supporting these large-bodied rattlesnakes make the sustaining of timber rattlesnake habitat in the Upper Mississippi River Valley critical for the species survival in this portion of its distributional range.

Surveys of southeastern Minnesota state lands focusing on Houston, Fillmore, and Winona counties by Keyler and Oldfield during the 1990-91 seasons, and County Biological Surveys in 1993 clearly confirmed the existence of viable timber rattlesnake populations in these counties. However, little fieldwork was done at sites north of these counties. The timber rattlesnake was once much more prominent in Goodhue, Olmsted, and Wabasha counties as old newspaper articles, personal accounts, and private records suggest. These counties have been the sites of increased land development for agricultural, nonagricultural, highway expansion, and recreational uses in recent decades making most former timber rattlesnake colony sites incapable of sustaining viable populations. Over time the snakes territory has declined and consequently their numbers as well.

The limited amount of information regarding timber rattlesnake distribution in these peripheral-range counties suggested the need for a more current evaluation of their population status in the region. Surveys on state lands of the peripheral range to document the presence or the absence of *Crotalus horridus*, suitable habitat, and factors contributing to declines in timber rattlesnake populations can provide valuable information useful for optimizing conservation strategies for the species. Information concerning state land timber rattlesnake sites will also be useful for determining how the species and its habitat might be managed on private lands immediately adjacent to state lands. More importantly, the current study may point to the need for intense efforts to protect timber rattlesnake habitat and timber rattlesnake populations on state lands in Fillmore, Houston, and Winona counties where reasonable numbers of snakes comprising viable den colonies still exist.

MATERIALS & METHODS

Surveys and Sites Survey localities and sites were selected based on knowledge acquired from DNR records and staff, topography as determined from USGS Quadrangle maps,

and information provided by owners of land which was immediately adjacent to state lands. In general sites were selected which possessed a combination of the following: 1) a southeastern to southwestern exposure, 2) open bluff prairie with sun exposure, 3) talus structure, 4) relatively steep slopes, and 5) oak forest around the bluff prairie. Surveys were made during daylight hours and when temperatures ranged from 68⁰-85⁰F. Sites determined to have favorable timber rattlesnake habitat following an initial survey were resurveyed 2-3 times during the field season. All surveys were made on foot and hours in the field were calculated as: #persons in field x #hours in field = # field man-hours. Travel time in a vehicle was not used as a parameter to quantify fieldwork time.

Habitat Documentation Each site surveyed was briefly described with particular focus given to characterizing habitat features essential for timber rattlesnake inhabitation. Vegetation types, extent and type of rock structure, openness of bluff prairie (i.e. not covered by forest canopy), direction of sun exposure, and remoteness of site from major roads were documented. Some climatologic data were gathered during field surveys to validate appropriate temperatures and general climatic conditions at the time of survey of a given site.

Biological Processing No snakes were directly handled during the season other than a male timber rattlesnake, which was moved up a hill from a driveway. Sex and reproductive status were determined based on the investigators experience (i.e. vent to base of rattle length for gender determination and body girth in the lower 1/3 of the body for gravid status). Estimates of body length were made and morphological traits (i.e. mid-dorsal striping, post-ocular bars, background body color, no. of rattle segments, and any unusual markings) were documented based on direct observation.

RESULTS (Goodhue, Olmsted and Wabasha combined)

Collectively, 3200 miles were traveled to afford 143 field man hours which encompassed 26 surveys of 9 major sites (12 sites actual as 3 sites each had two bluff areas surveyed) from May 9 through September 18, 1998, in Goodhue, Olmsted and Wabasha counties on Richard Dorer Memorial Hardwood State Forest land, and resulted in the finding of only 3 *Crotalus horridus*. Two timber rattlesnakes were observed, a male (14 June) and a gravid female (30 May) in Olmsted county on state forest land in xxxxxx Township, and a single specimen was heard sounding its rattle (13 June) in the xxxxxx of Wabasha county. Despite the presence of good timber rattlesnake habitat at many of the other sites no specimens were observed, even with secondary or tertiary survey efforts. Although several other species of snakes, lizards, and amphibians were observed, none of the species were observed in large numbers, and their presence at some sites was unexpected (i.e. *Heterodon nasicus* in the xxxxxx). ~~See Table I for summary accounting of species by locality and site. See Appendix I for complete chronology of surveys, field hours, mileage, sites and coordinates, and biological data.~~

RESULTS BY COUNTY & LOCALITY

Goodhue County

xxxxxx1 - Three sites were surveyed (14 field man hours) in this locality, all being on the north side of the river with no timber rattlesnakes observed, but four other herpetological species were found. These sites were not directly on state land, but were properties immediately adjacent to state land where rattlesnakes likely traverse, and localities where timber rattlesnakes have been observed in the past by landowners. Since this area represents the northern limit of distribution for *C. horridus* in Minnesota, evaluation of habitat on land which might be considered for future purchase by the state was surveyed.

Two sites, which possessed good timber rattlesnake habitat, and were sites where landowners had reported seeing rattlesnakes in years past were carefully surveyed. One site was a bluff area on the south-southeast area of the xxxxxx farm. This area had good light exposure to the rock structure, but also had many rock areas and small bluff prairie areas fairly choked-out by extensive forest growth. The landowners told us that they used to see rattlesnakes all the time in the area we surveyed, but that they hadn't seen any in 20 years or so! We talked with the family, which lives below the xxxxxx farm bluff, to see if they had seen any timber rattlesnakes in recent years. They did say they had seen a small rattlesnake on the gravel road during the early fall of 1997, but had not seen any others. They did know their snake species, as they explained how they found fox and milk snakes quite frequently on their land. During our surveys of the area we also found fox, milk, and garter snakes (**Table I**).

The third site was above and across from the xxxxxx. The site had very good habitat for timber rattlesnakes with multiple rock outcrops which were multi-tiered and interspersed amongst bluff prairie. The area did have a huge power line passing directly through it. Our survey of the site resulted in the finding of two ring-necked snakes, but no other species were found (**Table I**).

Although no timber rattlesnakes were found during our survey work it is believed, based on landowner observations, that a few timber rattlesnakes still remain in the region. It is unlikely that whatever few snakes remain, they will be able to sustain viable, future timber rattlesnake populations. Continued monitoring of the xxxxxx region and its landowners will be crucial to determining the timber rattlesnakes present-day status in the region.

xxxxxx2 - This area currently contains no real expanse of good timber rattlesnake habitat. Our survey (4 field man hours) suggested possible sites in the area have been choked-out by forest canopy affording no essential sun exposure to the few rock structures present. A small area at the south end of the unit did possess some low, open bluff prairie with some rock and scattered oak; however, no species of any kind were observed. The xxxxxx2 area supposedly had timber rattlesnakes as inhabitants in years past, but the current survey findings strongly suggest that habitat to sustain a viable population of timber rattlesnakes is lacking.

xxxxxx3 - Three bluff prairies were surveyed at this site (19 field man hours) with no timber rattlesnakes observed. A single garter snake was observed (**Table I**). This site was previously surveyed by Keyler and Oldfield in 1990-91 and timber rattlesnakes were observed at that time. The bluff prairies on the northwest end of the ridge have favorable habitat with rock outcrops of sandstone/limestone, covered by wild grape, having southern and western exposures, open grass areas, and oak forest boarders. The farm immediately below this area was owned by a xxxxxx (now deceased), who had told Barney Oldfield and me that there used to be a lot of timber rattlesnakes taken off the bluff years ago and that he used to commonly see rattlesnakes in his yard. This 1998 season is the first year since 1986, when I began surveying the bluff, that I have not observed timber rattlesnakes on xxxxxx3. Whether timber rattlesnakes are still present is difficult to assess. There is no doubt that some of the bluff prairie areas on the north end of the bluff have become more enclosed by the forest canopy. However, it is important to note that we never found large numbers of rattlesnakes at the site (usually only 2-3). Thus, it is possible that the snakes are still present and the timing of our surveys was not in synchronization with timber rattlesnake activity.

Olmsted County

xxxxxx4 - This is a very interesting site, both historically, and due to the problems of land development which has encroached on what little timber rattlesnake remains. A total of 20 field man-hours were spent surveying this site, and three herpetological species were observed (**Table I**). As we learned from talking with some of the older landowners (i.e. the xxxxxx family) the area used to have considerable numbers of timber rattlesnakes. There is an area of underground hot springs with much loose shale on the surface at the west end of a ridge which is bordered by oak forest. We were told many snakes would lie around these springs years ago and that in the 1920's and 30's rattlesnakes crossed the road through the valley so frequently that the area became known as "xxxxxx4". Now, unfortunately, a number of homes and hobby farms have been built around the peninsula of xxxxxx whose tip touches highway XX (see **Appendix I**, 5/30 for exact locality). We talked with several landowners, and all had seen rattlesnakes within the past year. xxxxxx, who lives at the south-side base of the xxxxxx ridge, had found and killed several timber rattlesnakes in his dog run. He also has small children and is concerned for their safety, but willing to try and help with conservation of the timber rattlesnake by not killing snakes. He did find a large timber rattlesnake in his dog run about midnight during the week of May 18, 1998. He had pictures of timber rattlesnakes on his property from previous years. Above the ridge on the north side a family by the name of xxxxxx lives, and they have had timber rattlesnakes in their garage during the summer of 1997. More homes have been built around the xxxxxx peninsula and what little timber rattlesnake habitat remains will probably not be capable of sustaining a viable timber rattlesnake population without considerable understanding and protection by private landowners in the area. We also talked with landowners, who were original farmers in the region, just further south of the ridge, and they reported not seeing any rattlesnakes for a long time (i.e. greater than 10 years).

Our survey of the ridge resulted in the observing of a gravid female timber rattlesnake on May 30 (see ~~Appendix I~~). The snake was opaque (premolt condition), approximately 3 ft in length, had 6 incomplete rattle segments, and was not captured for biological data processing as we did not want to damage the developing skin or stress the animal. The snake was basking not more than 50 feet from Hwy XX at the west end of the ridge where there is rock outcropping with minimal bluff prairie. The air temperature was approximately 70⁰ F, there was slight drizzle and it was overcast. The bluff prairie is mostly choked-out with sumac, and it is possible that eliminating some of the thick sumac growth may enhance the habitat for timber rattlesnakes. Further in from the west end of the ridge we did find three ring-necked snakes, one of which was gravid. We also found an American toad at this site.

On June 14, a 3 - 3.5 ft., yellow color morph, male timber rattlesnake was found in the driveway of Mr. xxxxxx. He corralled the snake into a rubber tub and called for assistance to help move the snake back up the bluff. The air temperature was 80⁰F at 1900 hours and the sky sunny. Kimberly Fuller responded to the call and successfully relocated the snake back up on the bluff, which is immediately adjacent to his property (see ~~Appendix I~~).

This site on xxxxxx4 deserves continued monitoring and education of landowners in the area. Even though both of these snakes were adults and potential reproduction appeared evident, multiple visits to the site during the Minnesota timber rattlesnake birthing season (mid-July through early September) did not provide observation of newborn litters or juveniles (~~Appendix I~~). Even sustained conservation efforts to ensure their presence may not guarantee timber rattlesnakes will survive in this historically interesting and valuable locality. It is possible that other sites with viable populations exist on private lands, or even further in on state forestlands, which are expansive enough to not be impacted by peripheral land development. If such sites still do exist they are in a precarious environment and the timber rattlesnakes continued presence is uncertain in this county.

Wabasha County

xxxxxx5 - This site was surveyed on two occasions totaling 4.5 field man hours (~~Appendix I~~) with two herpetological species observed (~~Table I~~). Old bounty hunters like “xxxxxx”, whom I had spoken with in previous years (1990-91), told me that rattlesnakes had been taken from the Ridge. Thus, it seemed like a logical site to survey. The ridge faces south to southwest and has two areas of boulder scree and rock outcrops with oak forest periphery, and although these areas are not large they did appear to be reasonable timber rattlesnake habitat. The air temperatures during the time of surveys were from 77⁰- 83⁰ F, the sky was clear and sunny, and the humidity low. Overall conditions were on the dry side. It may be that timber rattlesnakes are transient on the ridge, but it is definitely not likely to have full-time inhabitants.

xxxxxx6 - Two sites were surveyed for a total of 9 field man-hours and neither yielded observations of timber rattlesnakes nor were there any indicators of their current presence, however six other herpetological species were observed (~~Table I~~). These two xxxxxx6 sites (see ~~Appendix I~~) are immediately above private farmland owned by the

xxxxxx families. Neither family reported seeing rattlesnakes in the past 20 - 30 years. In fact, Mr. xxxxxx thought long and hard about the last time he had actually seen a timber rattlesnake at one of the sites - his reply was, 1964! Both farm families said snakes had been bountied out of the sites, which are on xxxxxx above their properties. Surveys of the sites showed them both to have excellent timber rattlesnake habitat. Expanses of bluff prairie with good tier structured sandstone subtly covered by wild grape vines; juniper and cedar were mixed throughout the prairie with oak forest at the periphery. Weather conditions during both survey times were optimal with clear sunny skies, air temperatures between 78⁰ - 85⁰ F, and low wind. It was truly surprising to hunt these sites, scanning the large amount of good habitat, and not find rattlesnakes! Surprising were the presence of blue racers and western hognose snakes. Another interesting observation was that of a garter snake coiled and resting out at the end of a cedar limb about 4 feet off the ground. If ever there were timber rattlesnake reintroduction sites to be considered, these would be prime possibilities as not only is the habitat of high quality, but there are no major land developments in the immediate proximity.

xxxxxx7 - This site was surveyed a single time for a total of 6 field man-hours and no herpetological species were observed (~~Appendix I~~). Although this state forestland site has a small southwest facing knoll at its southern tip there is little habitat which is suitable for timber rattlesnakes. Weather at the time of the survey consisted of clear sunny skies, air temperature of 75⁰ F, and low humidity. It was difficult to know from reviewing topographical maps just what the habitat would be like without a survey. Most of the effort to survey this site was spent hiking back into and out of it. There were no real talus outcrops or loose rock and it is likely timber rattlesnakes were never present at the site.

xxxxxx8 - This site was surveyed on two occasions with a total of 19 field man-hours of survey invested (~~Appendix I~~). The only herpetological species observed were six-lined raceruners and an American toad (~~Table 1~~). Weather conditions during the initial survey of two bluffs were marginal as the air temp was approximately 68⁰ F and the sky overcast with thunderstorms approaching. These south to southwestern exposure bluffs possessed ample sandstone rock structure, multiple crevices with wild grape cover, open prairies, and peripheral oak forest. Birch, cedar and juniper were also interspersed with the prairie. These sites too, used to be regularly hunted by bounty hunters, and more recently an individual was reported to have timber rattlesnakes in the trunk of his car, which came from xxxxxx8 (personal communication, DE Keyler 1995). The second survey of these sites was made during optimal weather conditions of clear sunny skies, air temperature approximately 80⁰ F, high humidity, and low wind. These sites are north of the area known as, "xxxxxx". Despite optimal habitat and weather no timber rattlesnakes were observed or was there any evidence of their recent presence. Keyler and Oldfield observed two adult *Crotalus horridus* during the summer of 1995 at the "xxxxxx" site (see ~~Appendix I~~). This area will require more intense monitoring to determine if any timber rattlesnakes remain, as it is possible that the observations made in 1995 may have reflected the precariousness of the snake's existence at the site in that they were only remnants of waning population.

xxxxxx9 - Two separate surveys totaling 30 field man hours were made to two different bluff prairie sites in this locality (~~Appendix I~~). Eight herpetological species were observed including *Crotalus horridus* (~~Table I~~). Habitat differed between the two sites surveyed, however, both sites possessed habitat features favorable for timber rattlesnakes. This xxxxxx9 area is south and east of a large coulee known as, “xxxxxx”. The first site consisted of rock outcrops which were scattered across prairie on a south to southwest facing slope with grassy shelves, bittersweet, and wild grape cover. There was oak forest below the site and farm fields above and the elevation was not that of the typical high bluff prairie and the slope was modest. No timber rattlesnakes were seen at this site, but it does possess substantial crevices in some of the rock structure which could serve (or does serve) as timber rattlesnake hibernacula. It also may be a transiently visited site by snakes during the active season. Only further monitoring might provide for determining timber rattlesnake presence. We did talk with horseback riders on the trails who reported having seen a timber rattlesnake the previous summer in an area that was chosen as the second survey site. The second site possessed ideal timber rattlesnake habitat composed of a large expanse of multi-tiered south to southwest facing sandstone rock structure interlaced with prairie, juniper, cedar and birch. Six-lined racerunners were observed along with several amphibian species (~~Table I~~). Approximately in the middle tier of rock at the easternmost end of the bluff prairie is a large crevice surrounded by bittersweet vine. A single continued rattling was heard retreating deeper into the crevice as we approached. The snake was not visualized and documentation is based on the “sounding”. This site was surveyed twice with no timber rattlesnake observation during the second visit even with the optimal weather. At 1130 hrs the air temperature was 75⁰ F and the substrate temperature was 81⁰ F with a high-overcast sky, by 1530 hrs the air temperature had increased to 79⁰ and substrate to 83⁰ F - ideal conditions for timber rattlesnake observation. It is likely this site was hunted for timber rattlesnakes in the past which may be the reason for the absence of multiple timber rattlesnake sightings. As a comparison a similar site at xxxxxx would be expected to provide observation of 2-3 timber rattlesnakes per survey (Keyler and Oldfield 1992). If this site could be surveyed at a time of peak emergence a more realistic assessment might be possible. Regardless, based on our surveys and the limited sightings by horseback riders who frequently cover the trails around these sites, there is not likely to be a large number of timber rattlesnakes present.

DISCUSSION - CONCLUSIONS

The overall findings from this current study of timber rattlesnake distribution and presence on state land in the counties of Goodhue, Olmsted, and Wabasha are profoundly discouraging. There is no doubt that timber rattlesnakes were once more prominent and a significant component in the biodiversity of the bluff prairie ecosystem in these counties. Now most of the sites exhibiting good timber rattlesnake habitat, stand with only the silent absence of this rattlesnake, which most likely inhabited these areas for hundreds to thousands of years. It is perhaps a combination of factors which has lead to the current

circumstances. Land development, increased highways intersecting habitat, agricultural chemicals affecting timber rattlesnake prey populations, and bountying have all collectively taken their toll. Although the exact number of timber rattlesnakes necessary to maintain a viable population, or necessary to allow recovery of a depleted population is difficult to know exactly, there is evidence for estimating based on “sound biological intuition”. It is estimated that the minimum population size required for recovery is represented by 30-40 snakes with an even age distribution and at least 4-5 mature females (Brown 1993). It is also speculated that if such a small population were to be totally protected, recovery in numbers to 60-100 rattlesnakes with appropriate age distribution might be anticipated over a 20-30 year period. Given the information presented in this report, it seems apparent that the species has been extirpated or near extinction at almost all state land localities in Goodhue, Olmsted, and Wabasha counties.

The south facing bluffs along the north side of xxxxxx1 in northern Goodhue county harbored timber rattlesnake populations more extensively in years past, but land development, highways, and increased bicycle and four-wheeler recreational use have rapidly encroached on these areas. Studies by Reinert (1991) and Zappalorti (1988) in the eastern United States suggest a healthy timber rattlesnake population (50 adults) needs a radial distance of 1.5 miles of undisturbed land from a den site for adequate protection and population survival. Thus, with the rapid development in the xxxxxx1 area makes the active seasonal movement of rattlesnakes increasingly life-costing.

Surveys of xxxxxx3 in southern Goodhue County during the current study period produced no evidence of timber rattlesnakes. Keyler and Oldfield, during the 1990 season, reported the species at the site. The site had been surveyed several times and snakes were observed, but where the snakes were found on the Bluff is a very dangerous area to survey due to the steep drop-off. This fact, in conjunction with the necessity of optimal seasonal timing, make xxxxxx3 a difficult area to monitor, but it is probable a few timber rattlesnakes are still present. Previous surveys by the author never confirmed a large population, but suggested more of a minimally sustained den colony. Thus, the overall status of *Crotalus horridus* in Goodhue County suggests the species is nearly nonexistent and that the presence of any viable population is at best questionable.

Olmsted County has been lacking the documented sighting of timber rattlesnakes in the Minnesota National Heritage database since 1900. However, there is a history, which is not well recorded for the area, but survives in the stories of local residents. The verbal legend is rich with historical interest and the informal naming of the area as, “xxxxxx4” still lingers. Importantly, even with this current documentation of *Crotalus horridus* in Olmsted County, and the observation of a gravid female, there was no confirmation of successful birthing. The fact that several adult timber rattlesnakes had been killed at this site in immediately previous years (i.e. 1996-97) by landowners living above and below the bluff, obviously, has negatively impacted their reproductive potential. This area is under increasing stress for reasons similar to those seen at the xxxxxx1 and is an extremely important site to monitor, protect, enhance habitat, and for educating landowners on how to live with rattlesnakes.

While some good timber rattlesnake habitat still exists in Goodhue and Olmsted counties there is a much greater area of good to optimal habitat on state land located in Wabasha County. Following careful surveys of xxxxxx6 and xxxxxx9 one is hard-pressed to explain the absence of the timber rattlesnake at sites in these localities. The habitat contains all the right components (good multi-tiered rock structure, open prairies, intermittent juniper and cedar, wild grape and bittersweet crevice-cover all surrounded by oak forest) for supporting viable timber rattlesnake populations and there are reasonably large expanses of land not intersected by roads or traversed by vehicles. However, discussions with landowners in these areas implied that rattlesnake bounty hunters had frequented the region in years past. Both sites did provide observation of a variety of species of reptiles. Xxxxxx6 in particular was unique in that several blue racers (*Coluber constrictor*) and two specimens of western hognose were observed (*Heterodon nasicus*). The Wabasha county xxxxxx are important areas to keep as large undeveloped and protected land tracts which will be minimally disturbed by any source. As A.R. Breisch, Senior Wildlife Biologist of New York State's Endangered Species Unit has been quoted, "Long term integrity of a den can't be assured if only a few hundred acres are protected" (Brown 1993).

Although the findings of the present study have grim ramifications some positive concluding thoughts are warranted. The lack of timber rattlesnakes observed during the 1998 field season and the contributing factors should spur a significant direction for future timber rattlesnake conservation in Minnesota. Indeed, if it were not for Minnesota's public lands (i.e. state parks, state forests, scientific & natural areas) much of the timber rattlesnake habitat remaining would have been ravished. Timber rattlesnakes unfortunate enough to live on developing private properties are quite vulnerable. This makes the acquisition of more land in prime timber rattlesnake habitat in counties such as Fillmore, Houston and Winona by state agencies increasingly important for species conservation and preservation. To achieve this goal will require significant economic resources. Equally, if not more important, is the absolute and sustained effort to protect state lands where viable timber rattlesnake populations are known to exist. This means protecting not only the snakes but protecting their habitat by providing for minimal to no disturbance of den colony areas (i.e. not even eco-tours to sites). Some monitoring of sites will be necessary to assess population status over time, but this should be done with the least impact to the timber rattlesnake environment. Minnesota is fortunate to still have the timber rattlesnake as a key constituent in the wildlife of the Upper Mississippi River Valley and associated river corridors. Its uniqueness and importance as a contributor to the fragile balance within this ecosystem cannot be over stressed. If appropriate measures are not continued and enhanced for protecting both the timber rattlesnake and its habitat, the timber rattlesnake will become a species which can only talked about in the future.

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