

THE MANAGEMENT OF A 4.04 HECTARE FIELD FOR *Sistrurus catenatus catenatus*, THE MASSASAUGA RATTLESNAKE, AT CEDAR BOG, CHAMPAIGN COUNTY, OHIO

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INTRODUCTION

Cedar Bog Nature Preserve is located in southern Champaign County, central Ohio, at 40° 03' N latitude and 83° 47' W longitude. Underground water systems from the north and east flow through dolomitic gravel and surface in the preserve, creating a calcareous fen (Forsyth, 1974).

The State of Ohio acquired the preserve in 1942, by which time an estimated 2,830 hectares of wetland had been reduced to approximately 20 hectares of fen and swamp forest (Collins, 1977). The preserve today is 173 hectares (427.66 acres). The first written record of rattlesnakes in the preserve was a reminiscence of living by Cedar Bog in 1914 (Fleming, 1986). She alleges that in the year her family arrived there, fifty swamp rattlers were killed. Franks (1931) did not observe the Massasauga during the eight years he studied the vertebrate fauna of Cedar Bog, but he did record that several were killed each year by farmers (Lovich and Jaworski, 1988). Dr. Frederick informed the author that during the course of her Masters and Ph.D. work (1962-1968) she did not encounter any Massasaugas (Frederick, pers. comm., 1985). However, a local photographer's film of Cedar Swamp done in the 1940's has a Massasauga in it (Oaks, 1939).

On the west side of the preserve, north of Woodburn Road which bisects Cedar Bog on an east-west axis, lies a 4.04 hectare field (ten acres) (Quadrants G, H, I, -8) (King and Frederick, 1974). This was part of the Nature Conservancy purchase of 1969.

In the spring and summer of 1972 two studies were done on this field by the personnel from Wittenberg University, and reported for Cedar Bog Symposium I. The Meadow Succession study (deLanglade and Hyland, 1974) concluded that "within ten years drastic changes in the appearance of the community will occur" (p. 51). The Preliminary Massasauga Study (Laux and Gregory, 1974) concluded that the snake "was experiencing a localized population increase" (p. 53) in this meadow. In 1975 casual observation of this field indicated that the predicted succession was underway. Because our management goal at that time was to maintain open field, hand cutting of woody plants was started. No tractor existed on the site, and herbicides were rejected due to the wet nature of this field. The culvert that drained this field was partially plugged in an effort to make the edaphic conditions for woody plants unfavourable (Glotzhober and Jaworski, 1985).

In 1978 the management plan for the preserve called for this area to be artificially maintained as a grassland by periodic removal of trees and shrubs. "The area will not be mowed because it is a prime habitat for the massasauga rattlesnakes..." (Schultz and Jaworski, 1978).

In 1978, the entire ten acres of this field were cleared of woody plants, with the exception of certain map markers. The slash was hauled away.

By 1981, it was obvious that the job had to be done again. Observation of this field revealed that much invasion was occurring from *Solidago* spp. and *Eupatorium* spp. Under the dense clumps of *Solidago* the grass was nonvigorous. Where the dense goldenrods had been for some time, numerous small shrubs were invading. Clearly, even with the woody plants removed, the grass that was so important to the mice, and in turn to the snakes, was disappearing.

Observations of this area revealed that while the eastern and western two-thirds were sparsely populated by woody plants, the central third had become very dense over the preceding three years. The grass in this central portion can be described as dead, nonexistent, or at best, nonvigorous. Were this condition allowed to continue for a considerable period of time, it is quite possible that a natural barrier to massasauga migration could develop. This would in effect trap the snakes in only the eastern one-third of the field.

In 1984 a crew was put to work in this field. Their efforts only succeeded in clearing the eastern portion of the field. Man-hour assessment revealed that at least one-and-a-half years of work with this type of crew using hand tools would be required to clear the area.

SUMMARY

The management goal for the fescue meadow north of Woodburn Road for the past ten years has been the maintenance of the “open space” by the hand removal of woody species. Persistent work by the Cedar Bog staff and others has only kept a small portion consistently open. The goal of keeping the entire field open has been accomplished once, and the result of that effort lasted less than three years.

It is clear that the use of a single management technique has been inadequate to maintain an open grassy meadow and keep woody invaders out. We therefore needed to expand our management solution (Glotzhober & Jaworski, 1986).

OUR REVISED PLAN

The massasauga rattlesnake, (*Sistrurus catenatus catenatus*) is a valuable member of the Cedar Bog fauna, and is considered “Potentially Threatened” by the Ohio Department of Natural Resources, Division of Natural Areas and Preserves. To maintain this species at Cedar Bog, an area on the north side of Woodburn Road, just west of the West Branch of Cedar Run, will be managed for their benefit.

Recent research in other locations (Reinert & Kodrich, 1982) indicates that open, low-lying habitats are preferred, with crayfish burrows being used for hibernacula, and forested areas of only marginal value. Research on massasaugas at Cedar Bog has been limited to several brief undergraduate surveys by students from Wittenberg University, and Urbana College (now Urbana University). These limited studies, plus staff observations over many years, indicate that the field referred to above has been a highly favourable habitat for the massasauga at Cedar Bog.

Based on this information, our management goal is to maintain this area for massasaugas. To accomplish this end we will use a wide spectrum of habitat management techniques that will maintain the grass and the woody plants. The decision to use any technique or combination of techniques at a particular time will be based on staff evaluation of past efforts, the current status of vegetation, weather conditions, and available manpower and equipment. In each case, extreme caution will be used to avoid damage to the massasauga or other rare elements of Cedar Bog.

MANAGEMENT TECHNIQUES

A. Hand Cutting

1. Advantage: Affects only targeted woody species with no damage to remainder of habitat or to any fauna.
2. Limitations: Requires intensive manpower, which is not always available - while volunteers are an option here, large numbers are not available at consistent intervals when critically needed. Some woody plants maintain live root systems after cutting, which resprout quickly.
3. Application: Hand removal will be used when large numbers of volunteers and tools are available, or as localized spot treatment between control periods.

B. Mowing

1. Advantages: Control of woody plants by mowing can be accomplished by one person with the proper equipment. Because of this, it is easy to fit this control into a schedule at a time when conditions are most favourable. The kill rate for woody plants that are bush hogged is more than two to one. The Soil and Water Conservation Service recommends mowing of Kentucky Fescue 31 at least every two years to prevent clumping and weed infestation. Mowing would then invigorate the grass, and maintain other herbaceous growth.

Mowing can be done at temperatures that minimize destruction of the snakes.

Mowing can windrow the grass debris, thereby recreating some of the lost mouse habitat.

2. Limitations: If snakes are basking or moving about, there is a danger that they may be caught in the mower and killed.

In hibernacula areas (crayfish burrows in Linwood muck), mowing could cause collapse of crayfish burrows, trapping snakes. (Reinert, pers. comm. 1986)

Some woody plants will survive.

3. Application: Mowing will not be done in the area of the Linwood muck, nor in other soils where there are known hibernacula. In the remainder of the area it will be used as needed if weather conditions do not threaten the massasaugas. Indications are that snakes are not active when air and soil conditions are at or below 48° F, and are only rarely active between this temperature and 60° F. Mowing will be done only at or below 48° F, which is more highly restricted than the plan suggested for mowing to protect eastern plains garter snakes, an endangered species (Dalrymple & Reichenbach, 1984).

C. Burning

1. Advantages: Snakes are reported to retreat from fire into burrows so there are few deaths (Reinert, pers. comm. 1986).

Once woody plants are successfully killed, fire every two (2) years usually prevents major re-invasion of woody plants.

Burning has been successfully used for fifteen years at the Jennings Nature Preserve in Butler County, PA, with a stable population of massasaugas.

Burning can be employed under strict air and soil temperature conditions to minimize damage to snakes.

2. Limitations: A moderate number of staff is needed to control fires. Numbers of trained people may not always be available.

Fire may not always kill firmly established woody plants, especially in the first year of use.

A small portion of the area contains Linwood muck soils, which if dry, are subject to peat fires.

3. Application: Burning will be used when we can obtain sufficient numbers of people to effectively manage a burn, and when wind conditions are such that danger of spreading is minimum. In addition, timing should be in early spring preferably before air and soil temperatures reach 48° F (see Reinhert, 1978). The segment of this field in the far southeast corner which maintains Linwood muck will not be burned.

D. Localized Herbicide Application

1. Advantage: Such treatment can kill individual hardy woody plants which have persistently regrown after other control measures.

2. Limitations: Extreme care must be used to avoid getting the herbicide on other than individual targeted woody plants.

Extreme care must be used to prevent run-off of herbicide into aquatic habitats.

3. Application: This will be used only as a last resort control and only on individual plants which have not been successfully controlled by other approaches.

Herbicides will not be sprayed, but will be painted, dripped or rubbed onto the plant to be controlled. (Glotzhober and Jaworski, 1985)

CONCLUSION

For more than fifteen years, the staff at Cedar Bog Nature Preserve has endeavoured to maintain the conditions in a field that appeared favourable to the Massasauga Rattlesnake.

The hybrid grass of this field (Kentucky fescue #31) requires periodic mowing to maintain dominance over most successional invaders. This farming practice was done for three years until the acreage was purchased for the Preserve in 1969.

Since 1978, the management team at the Preserve (Terry Jaworski, Bob Glotzhober and Bill Schultz, with advice and consent from the Ohio Natural Areas Council) has determined that hand cutting; mowing, with limitations; burning and tightly controlled herbicide application have a place in the management of successional invasion.

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