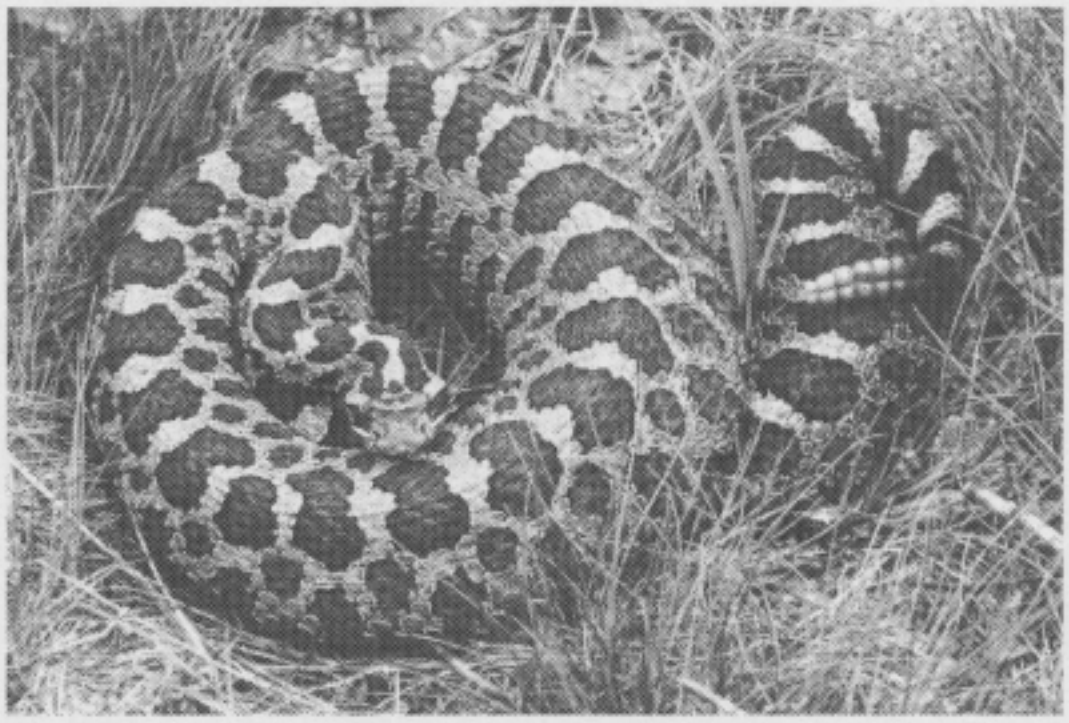
Snakes in Bog and Wetland Ecosystems



SNAKES IN BOGS AND WETLAND ECOSYSTEMS

Moderated by Shelly Dunn

DISCUSSION SUMMARY

Glenn Johnson and Bruce Kingsbury, through their presentations, drew attention to the "people connections" and some of the partnerships that are both possible and necessary to effectively generate the information that is needed to make wise management decisions in wetland ecosystems. Prevalent through the theory and application of resource management, however, was an underlying intuitive recognition that none of us is as powerful as Mother Nature, and that the 'do nothing' approach presents opportunities that we, as managers, might never foresee.

WETLAND MANAGEMENT ISSUES

The following sections summarize key issues that were discussed and relevant information that was provided in relation to snakes in bogs and other wetland ecosystems. Much of the discussion involved reference to the Wainfleet Bog Conservation Area, the site of one of the isolated remnant populations of eastern massasauga rattlesnakes (*Sistrurus catenatus catenatus*) in Southern Ontario.

WATER MANAGEMENT

Drawdown Management Regimes

Fluctuating water levels have been implicated in influencing the survival and demise of eastern massasauga rattlesnakes and other herpetofauna populations throughout their range. A reduction in water levels, notably through intentional management drawdowns, has been identified as a factor leading to the decline of massasaugas in affected areas. What seems to be critical to the survival of the snakes is the timing of the drawdown. In an example given during discussions, a drawdown regime being used to manage for waterfowl habitat is having little negative impact on an eastern massasauga rattlesnake population, simply based on the fortuitous timing of the drawdown regime. The de-watering phase is taking place during the summer months. Water levels are then increased and the marsh is flooded in autumn. Water levels remain high during the winter months when the snakes are hibernating. However, a change in this operating practice that would involve carrying the de-watered phase throughout the fall and winter months has been discussed. A resource management decision to do this without recognition and regard for the impacts it will have on the wildlife that are dependent on the affected system might have devastating effects, especially as it relates to species that are already under pressure as a result of limited suitable habitat. Consequently it was stressed that resource managers and research academics must communicate their respective objectives and discuss options for resource management decisions in order to ensure and maximize the mutually beneficial outcomes on managed sites. An experience in Wisconsin demonstrated that such communication can be critical to the survival or demise of a threatened species - the site in question was de-watered after the massasaugas had gone into hibernation. In over ten years since this occurrence, there has been no record of massasaugas on this site.

Water Level Increases

Water level increases, especially in degraded wetland ecosystems, are predicted to have positive impacts on populations of eastern massasauga rattlesnakes provided a restrained approach to the rate at which the water levels are increased is taken. In cases where water level increases are being considered as a management tool to enhance an ecosystem, the rate and time of year during which the water levels are increased becomes an important factor. Since little is known about the critical habitat relationships for massasaugas, we cannot accurately predict the length of time it will take for this species to respond to changes within their environment. Increasing water levels too quickly or at the wrong time of year could render some aspect of limited habitat unavailable to the snakes, possibly at a

critical life stage, thereby stressing an already compromised situation. Consequently, it was suggested that rewetting a degraded wetland site should be seen as a long-term objective, achieved through small incremental increases using the scale of a number of years, rather than seasons, as a primary objective. The degree to which the water levels are changed, both within the vertical profile of the substrate, and across the bog landscape also must be moderated. This type of gradual approach will help allow massasaugas and other species within the ecosystem greater opportunity to adapt and respond to the changes around them.

Recognizing that the life stage during which massasaugas are most vulnerable to water level change is when they are relatively stationary (hibernation phase) it was recommended that active management to increase water levels should be focused during the springtime with all efforts being curtailed by the end of summer.

Drainage Ditches in Wetland Ecosystems

Within Wainfleet Bog there are a number of drainage ditches, both large perimeter municipal ditches and an internal network that was established to facilitate former peat mining activities. This drainage system has been identified as a factor that is contributing to the dehydrated state of the bog. Consequently one of the objectives to help rehabilitate this site involves blocking outflow from these ditches, especially the internal network. Although no data is available at this time, it is proposed that these ditches are probable locations for hibernating massasaugas. The drains are known to serve this purpose for other herpetofauna within the bog. Consequently, discussions to infill entire ditches should be discounted in favour of an approach to block outflow along the ditches through use of earthen 'plugs' at regular intervals.

RESOURCE MANAGEMENT

Recognizing Opportunities for Non-game Management

Discussions pointed to the fact that it is possible to provide opportunities for non-game (e.g. massasaugas) while managing for game species (e.g. waterfowl). It was noted, however, that it is important to identify those management activities that have been designed for target game species which are having a detrimental effect on non-game species within the same habitat. To accomplish this, it is critical for research academics to work with resource managers. Additionally, resource management must help focus the interests and energies of user groups (e.g. waterfowl hunters) to help achieve common goals. Through a reciprocal education process, opportunities within game management operating regimes that would allow management for multiple species could be identified. Working together in this manner should help all groups recognize the changes that can be made within normal management practices that might effect greater overall wildlife benefits within a given habitat.

Clearly, however, management for multiple species can lead to conflicting issues (i.e. what one does for a given species may be detrimental or of lesser value to another). These are real and difficult issues to resolve. A focus on the ecosystem is needed in order to determine the best management approach for each situation. Recognizing that there are no easy answers it would be prudent to see fair consideration given to all organisms that utilize a habitat, including non-game, with a goal of maintaining biodiversity as a key factor.

In a related discussion, the need for academics to become involved in the process of policy development was stressed in order to ensure that the laws written to protect a given species are all encompassing. An example of a State law was quoted wherein it protects the animal, but not the animal's habitat. Without clear directive to protect the very needs that sustains an animal, its' habitat, such oversights create ambiguities for resource managers and may leave species at risk.

Mowing in Wetland Ecosystems

Mowing is a management issue that has been revisited often with respect to its effects on massasaugas. Examples were given on two extreme ends of the spectrum. On one site, a no-mowing policy was instituted after it was determined that mowing was responsible for the death of a massasauga. Conversely, mowing has been conducted regularly for nearly 20 years on another site, without ever having produced a massasauga casualty.

In the latter case mowing is actually used as a management tool to reduce the height of vegetation which facilitates easier sighting of massasaugas by researchers. In this situation, mowing is undertaken using a slow-moving riding mower that is equipped with a side mounted cutting arm set to trim vegetation to a height of 15-20 centimetres (6-8 inches). The cutting arm never makes contact with the ground.

Timing of this cutting operation may also be a critical factor in its effectiveness. In the area where it has been implemented successfully for almost 20 years, mowing takes place frequently from late May through early June, during the time when plant growth is most robust. It is repeated as necessary throughout the summer growing season to facilitate snake sightings.

Invasive Tree Species Management

Within the Wainfleet Bog, one of the issues facing managers is how to best control the invasion of European white birch trees (*Betula pendula*). Approximately 40 to 90 percent of the canopy is comprised of birch in disturbed (mined) areas of the bog. To what extent the birch trees are serving a habitat function in the bog remains unanswered at this point simply because the movement of the massasaugas has not yet been thoroughly researched. Existing research from other locations, however, has demonstrated a need for between 25-40% canopy cover for the massasaugas (Pers. Comm. Parent 1998, G.Johnson, 1998). Unconfirmed sightings of the snake have occurred, however, in areas of high birch density. Consequently, it can be assumed that birch trees may be serving some type of habitat function and that clear-cutting the birch may have detrimental effects on the snakes and other species that utilize them. In fact, discussion pointed to the fact that the future of formerly mined areas, which are currently regenerating largely into European white birch communities, may be optimistic. Research (Johnson-Ninniss and Middleton, 1991) has revealed that vegetation species lists for mined sites in the Wainfleet Bog, after 25 years of regeneration, were 50% similar to those sites that had been spontaneously regenerating for the same period of time.

Perhaps the former peat-mining disturbance needs to be seen to our advantage. Former mining activity has 'artificially' simulated hummock and swale effects, the areas between mined fields representing the hummocks. It is believed that the current hydrologic conditions on site, however, are limiting the success of these hummock areas as massasauga habitat. There may be better opportunities to manage mined areas to meet the specific needs (such as open basking areas) of massasaugas and other species within the bog ecosystem. There is great opportunity for experimental work at Wainfleet Bog. What appears to be a very disturbed site has great potential!

Fire Management in Degraded Bog Ecosystems

An unresolved management issue revolves around whether or not fire should be suppressed within the Wainfleet Bog. Recognizing the vulnerable state of the population of massasaugas in the bog, and the degraded hydrologic conditions of the site, it was stated that fire may represent a real threat to the bog ecosystem and the life forms it supports. Under the current hydrologic conditions, resource managers were strongly urged to suppress fire should it occur in the bog. It was recognized, however, that in the long term as the management plan is more fully implemented and the hydrologic conditions of the site are returned to a more hydric state, there may be zones where fire will be of minimal concern. In these areas fire might be allowed to burn naturally within the confines of wetter perimeter zones.

CRITICAL HABITAT CHARACTERISTICS

The Wainfleet Bog was the focus for discussions on critical habitat characteristics, since little is known at the present time about where the snakes are and what habitat features are critical to the massasaugas in this area. Discussions focussed on generating information that would help direct management of the site. The following questions were posed: Are there any unique or distinguishable habitat characteristics or features associated with hibernacula, rookeries or mating sites? Are there triggers within the surrounding habitat that determine these sites or are seasonal characteristics providing a trigger?

Hibernacula

In Cicero Swamp, sub-surface features characterized hibernacula - they were places that retained water so that massasauga rattlesnakes did not freeze, with enough space so that the snakes could fit into them. Water levels at these sites were at, or within a few centimetres of the surface at the time the snakes entered the hibernacula (Johnson & Breisch 1992).

In Kingsbury's management area, a marsh situation, the snakes hibernated in areas that would never flood but that always remained saturated. A small stream was located immediately adjacent to the hibernation site.

Humidity within hibernacula is considered a critical factor for snake survival. Dehydration resulting from low humidity over winter has been identified as a factor leading to mortality in captive snakes. What level of humidity is desirable or critical would appear to be variable.

A number of individuals sited experiences in which snakes were overtopped or 'flooded out' by water for weeks, up to an entire winter season, once they had gone into hibernation. In all reported cases, the monitored snakes emerged in spring with no apparent ill effects. In fact, the potential for hibernating snakes to be flooded by gradual increases in water levels appeared to be considered a much lower risk to survival than decreasing water levels would be. It was noted that the physiology of these snakes under cold conditions allows them to tolerate a lack of air for quite some time. Consequently, eastern massasauga rattlesnakes appear to be able to withstand complete inundation under water during hibernation for an extended period of time.

Soil temperature may be used to predict emergence from hibernacula. First emergence usually occurs early to mid-April as soil temperatures reach between 10-13 degrees Celsius (50-55 degrees Fahrenheit).

Rookery Sites

Less information was noted about rookery sites in wetland situations that might be applied to Wainfleet Bog. In the Cicero Swamp situation, however, Johnson characterized rookery sites as low, open sites with some low shrub cover nearby, especially leatherleaf (*Chamaedaphe calyculata*) and other similar plant species that provide a dense, spreading cover.

DRAWING CONNECTIONS BETWEEN PEOPLE AND THE RESOURCE

People often fear what they do not understand, and what they do not understand, they cannot respect. To ensure the continued existence of many species, including eastern massasauga rattlesnakes, people must be involved. Conservation is a people issue and education is critical to conservation. It is incumbent on wetland managers who are endeavoring to enhance and restore massasauga populations to involve and educate those individuals who are closest to the resource and to use local connections to manage the resource as much as possible. We need to rely on these people becoming stewards of the resource through understanding it and respecting its right to coexist amongst them. To achieve this education is critical!

Coupled with this need for understanding and education is a need to generate data to help determine the most appropriate management approaches. These two needs present an opportunity for volunteers. Use of volunteers was suggested as a means to help generate data and to magnify the efforts of resource managers and researchers. Two divergent opinions arose regarding whether discretion needs to be exercised involving the use of volunteers. One view strongly cautioned about the indiscriminate use of volunteers, especially as it relates to recruitment for snake surveys and determining critical habitat areas. For distributing pamphlets and giving talks on natural history, it was generally agreed that one could count on the sincerity of volunteers. But for determining critical habitat areas, it was suggested that more caution would be prudent.

An opposing view, however, stressed the educational value of the experience of volunteering and that once people are involved and become knowledgeable they can become passionate. Once they are passionate they can help promote greater respect and conservation of the species, especially in their 'own backyards' (see Bob Johnson, this Volume).

LITERATURE CITED

G. Johnson, A. Breisch. 1993. The Eastern Massasauga Rattlesnake in New York: Occurrence and Habitat Management. IN: "International Symposium and Workshop on the Conservation of the Eastern Massasauga Rattlesnake". (B. Johnson and V. Menzies, editors.) pp. 48-54.

Johnson-Ninniss & Middleton. Effect of Peat Extraction on the Vegetation of Wainfleet Bog, Ontario. Canadian Field Naturalist. Vol.105, pg. 1-12. 1991