Conservation of the Wood Turtle in the Shawinigan River Watershed

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Abstract: Since 1996, the wood turtle (*Glyptemys insculpta*) has been listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as a species of Special Concern. In North America, the species has disappeared from most of its former range because of illegal collecting and trade, destruction and fragmentation of its habitat, and disturbance caused by recreational activities. The discovery of an important nesting site close to La Mauricie National Park in the Shawinigan River watershed generated interest among managers and biologists in conserving the population.

To ensure the long-term conservation of the Shawinigan River wood turtle population and its habitat, several projects were initiated to (1) collect data on habitat use, reproduction, population characteristics, abundance, and genetics, and (2) better document the parameters governing this population. Results of these studies suggest that this population is one of the most important in the species' overall range. A thorough landscape analysis was also carried out within this population's range. It provided an in-depth understanding of this species' habitat requirements and allowed potential sites where recovery could occur to be identified.

Current management actions include establishing a monitoring program to detect long-term population trends in the Shawinigan River wood turtle population, and designing forestry practices that are appropriate for maintaining quality habitats for this population. A local nongovernment organization also initiated stewardship activities in 2001 that are aimed mainly at minimizing wood turtle disturbance and raising awareness among riverside property owners. The main nesting site was bought by another group to ensure its long-term protection. A restoration program for the population within the national park limits is being considered, and a local recovery plan involving different government agencies is currently being initiated.

Key Words: wood turtle, *Glyptemys insculpta*, demography, reproduction, habitat, home range, genetics, conservation, La Mauricie National Park, Quebec

Introduction

In North America, the wood turtle (*Glyptemys insculpta*) has disappeared from a large part of its range due mainly to illegal collecting and trade, destruction and fragmentation of its habitat,

and disturbance caused by recreational activities. Since 1996, the wood turtle has been listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as a species of Special Concern (COSEWIC 2004).

Several rivers in the Mauricie region of Quebec support wood turtle populations. The discovery of an important breeding site near La Mauricie National Park in the Shawinigan River watershed, however, generated interest among managers and biologists regarding the conservation of this population. La Mauricie National Park, Faune Québec, Université du Québec à Trois-Rivières, and McGill University have conducted studies on this population since 1996 as a means of gathering data to develop appropriate protection measures for this species and its habitat. Mark-recapture studies of the population have been conducted, and a survey program at the main nesting site has been implemented. The studies have focused on the population's ecology (habitat selection, movements, home range), morphological and reproduction characteristics, and genetic composition. The results of these studies have revealed the importance of the Shawinigan River wood turtle population in the Mauricie region and throughout the wood turtle's distribution range. This paper provides an overview of the studies that have been conducted on this population of wood turtles.

Population Trends

Walde (1998) and Walde et al. (2003) studied the size and characteristics of the Shawinigan River wood turtle population in 1996 and 1997. The number of wood turtles in the study area was estimated at about 238, with a density of 0.44/ha, one of the highest known densities of wood turtles in Canada. Additionally, the population was composed of 31% juveniles (0–13 years) in 1997. With a recruitment that appeared sustainable and an adult sex ratio that was close to 1:1, the population seemed in good demographic condition compared to other small isolated populations in the Mauricie region and in the province of Quebec.

Studies conducted from 1996 to 2002 indicated that population density of the Shawinigan River wood turtle population may actually be higher than that reported by Walde (1998) and Walde et al. (2003), as the number of marked turtles during this period was greater than 300. However, there is no indication that the population is increasing. Although the proportion of juveniles (33%) in 2002 seemed stable, and the sex ratio favoured females (i.e., 20 males: 36 females) (D. Masse, pers. obs.), mortality rates and threats to the species' habitat have increased since 1996 (see below).

Reproduction and Nest Site Fidelity

Walde (1998) and Walde et al. (2003) studied all aspects of reproduction and nesting in the Shawinigan River wood turtle population in 1996 and 1997. During that time, 44% of marked adult females (38 individuals) nested at the same location—in a gravel pit (Walde et al. 2003).

Other less important nesting sites were located using radiotelemetry. Nesting has continued to be monitored since 1998 as a means of determining the number of nests present as well as nesting success (number of eggs hatched/number laid), productivity (number of hatchlings produced/number of eggs laid), and recruitment[1]. From 1996 to 1998 and 2000 to 2004, an average of 33 (range 17–40) nests was found annually at the gravel pit nesting site, and average annual nesting success was 83% (range 65–98%). To determine productivity levels, hatchlings were counted each year and nests were unearthed after the nesting season to assess the number of unhatched eggs and dead embryos. Productivity has been stable, but recruitment seems to be limited by weather conditions.

Females travel up to 3 km to reach the gravel pit, and fidelity to this main nesting site has been very high; in 1998, 96% of nesting females (n = 40) at this site had already used it in the two previous years. From 2000 to 2004, an average of 82% of females was recaptured at the site; however, few unmarked females were found there.

Morphological Characteristics

The size of adult wood turtles in the Shawinigan River population is among the largest observed anywhere in the species' range. On average, males grow to a carapace length of 215 mm and weigh 1.2 kg (Walde et al. 2003). Frequency of tail and limb amputations due to predators, a common phenomenon among wood turtles, appears normal compared to other populations.

Threats to the Population

Habitat loss

Wood turtles throughout the Mauricie region have experienced habitat loss, and threats to the species are increasing in number and intensity. Recreational tourism (cottages, campgrounds, etc.) has reduced habitat availability, and residential and agricultural land use south of the Shawinigan River is increasing.

Predation and Poaching

Predation is the main cause of mortality in the Shawinigan River wood turtle population. It is observed primarily in the southern area of La Mauricie National Park and on the outskirts of the Shawinigan River, including the main nesting site, which is used by a high proportion of females. Although all nests at this site have been located annually since 1996 (except for 1999) and have been protected by wire netting, turtle density is high and females roam the site for three to four

[1]Data from 1999 were not included in these results because complete surveys of the main nesting area were not made that year.

days during nesting; consequently, turtles in the area of the main nesting site are highly vulnerable to predators.

No mortality was observed among the 20 adults monitored from 1996 to 1997 (Walde et al. 2003), but in a 2004 study, 2 of 12 radio-tracked juvenile turtles were predated by raccoons (*Procyon lotor*) and/or mink (*Mustela vison*). Another three unmarked adult turtles were found dead. Additionally, 36 unmarked females were seen during surveys of the main nesting site in 2004; however, 9 of them were killed by raccoons during egg laying and nest construction. The level of predation recorded in the 2004 study may have been responsible for the low number of nests found (n = 17) and one of the lowest numbers of hatchlings (n = 136) produced since 1996 (from 1996 to 1998 and 2000 to 2004, hatchling numbers ranged from 158 to 360). Several years ago, local residents exerted pressure on the racoon population by catching raccoons and releasing them in other areas. The recent high mortality rate among wood turtles is probably due to the fact that local residents have stopped the relocation of raccoons.

Turtles in the area of the main nesting site may also be vulnerable to poaching. Although poaching incidences have not been confirmed, we know that several turtles have been captured, kept as house pets, and later released.

Nesting site availability

The presence of only one major nesting site where up to 40 females concentrate during the nesting season is a concern because it may indicate that other good nesting sites are unavailable in the area. If the main site was altered, pressure on the population would increase. Also, only part of the gravel pit is protected. Females arriving from the road (as opposed to females coming from the river) are vulnerable to road kill in the unprotected part of the gravel pit. Human activities around the protected nesting site are not controlled, and some of them (e.g., waste dumping) could affect the site's integrity.

Home Range Size and Movements

Arvisais et al. (2002) studied the home ranges and seasonal movements of 20 wood turtles in the Shawinigan River area in 1996 and 1997. The authors recorded average home range areas of 28.3 ha. Wood turtles also showed site fidelity; there was an average overlap of 60.7% in their home ranges, and 88.8% of home range centroids were not significantly different for the duration of the study (two years). Home range sizes were larger than those reported from studies in more southerly locations, which has lead to the hypothesis that the size of wood turtle home ranges increases with increasing latitude. Arvisais et al.'s (2002) analyses indicate that turtle movements can be grouped into four distinct activity periods: prenesting, nesting, postnesting, and prehibernation.

Habitat Selection

Arvisais et al. (2004) characterized the chronology of habitat use by wood turtles in the Shawinigan River area. The authors also determined if the species used habitats according to availability within a home range and identified habitat features that influenced habitat selection. Habitats were characterized for 20 wood turtles that were followed weekly by telemetry during the active season of 1997. The turtles used a diversity of terrestrial and aquatic habitats. Terrestrial habitat types included mixed, coniferous, and deciduous forest stands; aquatic habitat types included streams, brooks, marshes, swamps, wet meadows, and beaver ponds. All turtle sightings were made within 300 m of the Shawinigan River, a slow-moving, meandering stream, and habitat use varied according to activity period. Wood turtles used aquatic habitats and alder stands during prenesting and prehibernation activity periods, whereas all habitat types were used during nesting and postnesting activity periods. Wood turtles did not use habitats randomly within their home ranges, suggesting that they selected for specific habitats. Wood turtles selected mixed forest stands that were relatively young (16 years) and short statured (1–4 m), and which had low arborescent cover (25%), moderate cover of the upper shrub layer (35%), and low total canopy closure (0–50%). This information will be helpful in establishing conservation measures for this species. Additionally, based on the importance of riparian habitat for the species, we have suggested that protected buffer strips be established along streams used by wood turtles.

Genetic Characterization of the Population

A genetic characterization study was conducted by Tessier and Lapointe (2002) and Tessier et al. (In press). It involved most populations in Quebec, such as those found in the Missisquoi, Tomifobia, Sutton, du Chêne, and de l'Aigle Rivers. The study showed that the Shawinigan River population is isolated and that its genetic diversity is unique among Quebec populations. This information supports the drive to protect this population and should be considered in conservation plans.

Ecological Reference Framework

The Ministère de l'Environnement du Québec has produced an ecological reference framework of the Shawinigan River watershed (Côté 2003) to describe and map its terrestrial and aquatic ecosystems. This tool uses geology, physiography, hydrography, and soil texture to define the perimeters of wood turtle habitat in the watershed.

Conservation Measures

The wood turtle studies conducted to date have lead local Parks Canada and provincial government managers to initiate several conservation measures, including the following:

- Instructions aimed at minimizing wood turtle disturbance were sent out to groups that organize outdoor activities in areas frequented by the species.
- Concerns related to the protection of wood turtles were addressed in the management plans of the regional county municipalities.
- A local stewardship program spearheaded by the Mouvement Vert Mauricie was initiated in 2001 as a means of raising awareness of riverside property owners and educating the general public about wood turtle conservation.
- Personnel have been hired to maintain surveillance at the nesting site each spring as females are laying eggs. This involves providing protection to nests and hatchlings.
- The nesting site (a 2.3-ha area) has been protected since 1996. In 1999, it was acquired by the Fondation de la Faune du Québec.
- Long-term conservation of the wood turtle in La Mauricie National Park depends on preserving the population outside the park boundaries; thus, the park encourages maintaining a movement corridor between the park's Lake Wapizagonke and the Shawinigan River.
- Under a provincial administrative agreement, quality habitat for wood turtles is maintained on public land that is being logged by using appropriate forestry practices.

Planned future conservation actions for the Shawinigan River wood turtle population include:

- establishing a management plan (Tessier and Lapointe 2004) at the watershed scale and creating a local recovery team to implement the management plan and ensure its follow-up;
- initiating an aquatic restoration program in the national park to restore shoreline habitat and the turtle population in accordance with the park's conservation plan;
- initiating a population restoration program, which could include releasing juveniles in the park (a feasibility study has been underway since 2001);
- establishing a management plan to reduce predation by mammals;
- establishing measures to decrease road kills; and
- gathering information on juvenile ecology to help protect wood turtle habitat. A study on juvenile ecology (home range, habitat use, survival) will be conducted in 2005. There currently are no data available on juvenile ecology in this population or in the scientific literature, in general. The study will be a starting point for the restoration program in La Mauricie National Park, and will help in developing a complete conservation plan and demographic viability model.

Conclusions: Lessons from the Field

The initial research projects and conservation measures were developed with little formal planning, large amounts of enthusiasm, good science, and increasing regional and provincial interest in the wood turtle's conservation. The apparent success of this approach can be linked to (1) having an informal recovery committee with no single lead by any one individual or organization, and (2) being supported through intergovernmental collaboration. This type of working approach was fine for a while, but more serious planning quickly became necessary. As activities such as coordinating the different recovery actions, conducting field research, and raising funds became more complex, the need for a conservation (or recovery) plan became apparent. This plan (as of late 2004) is now in its final stage of acceptance. We hope it will enable us to maintain a certain harmonization of wood turtle conservation efforts in the area.

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