

# Effectiveness of crab nets to survey for freshwater turtles in eastern Ontario, Canada

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**Abstract.** Crawfish nets have been successfully used to capture a variety of aquatic turtle species in the southern USA, and they proved to be particularly successful at catching Eastern Musk Turtles (*Sternotherus odoratus*). Using similar crab nets, this technique was tested at four sites in eastern Ontario, Canada, known or suspected to have Eastern Musk Turtles, a species at risk in Canada. Although no Eastern Musk Turtles were caught during two days of surveys at each site, the nets successfully attracted Painted Turtles (*Chrysemys picta*), one Snapping Turtle (*Chelydra serpentina*) and one Blanding's Turtle (*Emydoidea blandingii*), a species not previously caught using this technique. There was poor consistency in the number of species caught from one survey to the next, suggesting that multiple surveys are required to determine what species are present at a site.

**Key words.** methods, trapping, *Sternotherus odoratus*, *Emydoidea blandingii*

## Introduction

A variety of techniques have been successfully used to survey for turtles (Plummer, 1979; McDiarmid et al., 2012). Hoop nets (Legler, 1960) are one of the most common trapping techniques for turtles, although they may not be suitable for all situations. Tests of other techniques are important to determine which methods work in different environments. Crawfish nets have been successfully used to capture aquatic turtles in Louisiana and Tennessee, USA (Glorioso and Niemiller, 2006; Glorioso and Cobb, 2012). The technique successfully captured seven different species of turtles: Spiny Softshell (*Apalone spinifera*), Eastern Mud Turtle (*Kinosternon subrubrum*), Eastern Musk Turtle (*Sternotherus odoratus*), Snapping Turtle (*Chelydra serpentina*), Pond Slider (*Trachemys scripta*), Northern Map Turtle (*Graptemys geographica*) and Painted Turtle (*Chrysemys picta*; Glorioso and Niemiller, 2006). The nets caught a wide range of sizes of turtles, from a 23 cm (plastron length) Snapping Turtle, to a hatchling Eastern Musk Turtle < 2 cm (plastron length). Crawfish nets proved particularly useful at capturing Eastern Musk Turtles, with 111 captured during 8 hours of surveying at a roadside slough in Tennessee (Glorioso and Niemiller, 2006).

The Eastern Musk Turtle was designated threatened in Canada by the Committee on the Status of Endangered Wildlife in Canada in 2002, but down-listed to special concern in 2012 (COSEWIC, 2012). In Canada the species is limited to two provinces: parts of southern Ontario and a few locations in southern Quebec. Unlike many freshwater turtle species, Eastern Musk Turtles rarely bask out of the water (Ernst and Lovich, 2009) so some form of trapping is usually required to survey for this species. Given the species' status in Canada, developing reliable and easy survey techniques to determine presence or absence in a wetland is important. The purpose of this study was to test the efficacy of crab nets (similar to crawfish nets) for surveying for Eastern Musk Turtles.

## Materials and Methods

### Study Area

Four sites in eastern Ontario with known or suspected populations of Eastern Musk Turtles were selected for the surveys. All sites are owned by the Nature Conservancy of Canada. Precise locations are not provided because of the known risk of illegal collecting of Eastern Musk Turtles in Canada. All sites were located in the area between the cities of Ottawa and Kingston. Site 1 was a small bay with marsh attributes along the shore of a river in Lanark County. Sites 2-4 were all located in Frontenac County. Site 2 included a creek flowing into a lake and the lake itself. Site 3 was a wide creek with abundant submerged vegetation and some emergent vegetation. Site 4 was a marshy area of a lake.

### Methods

Glorioso and Niemiller (2006) used custom made crawfish nets in their survey. The nets consisted of 16 mm mesh attached to a 50.8 cm diameter stainless steel ring. Three cords were attached to the ring and to a cork which would float at the surface of the water. The nets were baited with chicken and periodically checked, by quickly lifting the nets out of the water, catching any turtle in the net. Precise details are available in Glorioso and Niemiller (2006). Such nets are difficult to acquire. After consulting with Brad Glorioso, he suggested trying crab nets available commercially from Memphis Net and Twine ([memphisnet.net](http://memphisnet.net)) located in Memphis, Tennessee. The crab nets consist of approximately 30 mm mesh attached to two circular rings, the outermost being approximately 45 cm in diameter, similar in size to the nets used by Glorioso and Niemiller (2006). While the crab nets are similar in diameter, the larger mesh means that small turtles cannot be captured, although they can be seen if they are feeding on the bait.

Nets were baited with chicken and set in shallow water (<30 cm deep) close to shore. Nets were spaced 3-10 m apart depending upon the habitat. A total of 6 nets were set for each survey. Nets were checked every 30 minutes and each session lasted a mean of 4.3 hours (range: 3.5-5.0 hours), typically from mid-morning to mid-afternoon. Surveys were undertaken from 30 May to 29 June 2011. Each site was surveyed twice, with a mean of 11.8 days between surveys. The comparison of first day with second day survey results was made using a non-parametric Mann-Whitney test using Minitab 8.3.



**Figure 1.** Adult male Blanding's Turtle (*Emydoidea blandingii*), 20.5 cm plastron length, caught in crab net, 27 June 2011. Leeches were present on the carapace and plastron and there is chicken (bait) visible in the turtle's mouth.

### Results

The crab nets attracted three species: Painted Turtle, Snapping Turtle and Blanding's Turtle (*Emydoidea blandingii*, Figure 1). Painted Turtles were the only species observed more than once, being detected at three of the four sites. They were detected at up to three nets during a session and they were often detected at a net within two hours of setting out the baited nets. Up to two Painted Turtles were observed feeding on the bait at the same time. No Eastern Musk Turtles were caught at any of the four sites during the eight survey days (Table 1). Considering only the three sites where turtles were caught, turtles were consistently caught on the first survey day and rarely on the second day, although this difference was not statistically significant ( $W=14$ ,  $p=0.16$ ).

### Discussion

The crab nets proved reasonably successful at detecting Painted Turtles, but were unsuccessful in attracting Eastern Musk Turtles, the target species of the current project. The capture of a Blanding's Turtle using a crab net is, to my knowledge, the first record for this species using this technique. Blanding's Turtles do not occur in the area that Glorioso and Niemiller (2006) surveyed, but the capture of one in the current study suggests crawfish/crab nets could be a successful technique to survey for this species.

There was poor consistency of results from one survey to the next. Even Painted Turtles which quickly found the nets and fed at the bait were only detected on both survey days at one site. It is possible that all species were present at the sites in low numbers and therefore there was a low probability of turtles encountering the nets. Possibly the feeding of one turtle (movement, dispersion of food particles) may have attracted other turtles to the nets. It is also possible that turtles had become "trap shy" and this response has been observed elsewhere using crawfish nets (Glorioso, pers. comm.).

At site 4, on the first survey, a large Snapping Turtle robbed the bait from four nets, suggesting that bait robbing may be a significant risk in areas with Snapping Turtles. Despite this, the Blanding's Turtle was caught after the Snapping Turtle had robbed three of the nets.

At site 1, an adult male Eastern Musk Turtle was caught less than a month after the survey, within a few hundred meters of where the nets were set (van Sleeuwen, pers. comm.). The turtle was caught by actively wading through the marshy area hunting for turtles. Clearly the species was present at the site, but was not detected

**Table 1.** Species observed feeding at baited crab nets in eastern Ontario in 2011.

Site	First survey	Second survey
1	Painted Turtle	No turtles
2	No turtles	No turtles
3	Painted Turtle	Painted Turtle
4	Blanding's Turtle, Painted Turtle, Snapping Turtle	No turtles

by the nets. It is unclear why this technique was not successful in eastern Ontario. Eastern Musk Turtles almost certainly occur in much higher densities in the southern USA, compared to close to their northern limit in Ontario, and low density could have reduced the probability of capture. It is possible that Eastern Musk Turtles were not active during mid-day when the surveys occurred. While Eastern Musk Turtles have been caught in traps during the day (e.g. Smith and Iverson, 2002) detailed surveys suggest they are less active from late morning to mid-afternoon at least in the southern USA (Glorioso and Cobb, 2012). Eastern Musk Turtles from the southern USA may be inactive at mid-day to avoid high temperatures. At the northern limit of the species' range, in Ontario, where environmental temperatures are lower than the southern USA, Eastern Musk Turtles during June select the warmest waters throughout the day (Picard et al., 2011) suggesting they may also feed throughout the day. It is also possible that setting out more nets for longer periods of time would have increased capture success.

Given that crab nets need to be checked frequently to see if turtles are feeding, this is a labour intensive method. In contrast, traditional hoop nets can be set and then checked only once or twice a day. Nonetheless, there are disadvantages to hoop nets. Turtles can drown if hoop nets do not contain a suitable air space (e.g. Barko et al., 2004). Hoop nets are large and can be expensive. There is also a risk of vandalism or theft to hoop nets set out in public waterways. While crawfish nets or crab nets do not replace hoop nets, they can be of value under certain circumstances. It would be useful to test these nets at various times of day to determine the optimal survey time for Eastern Musk Turtles in Canadian waters.

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