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AN IMPROVED MARKING TECHNIQUE FOR HARD AND SOFTSHELL FRESHWATER TURTLES

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Abstract: A method of marking turtles is proposed that offers significant advantages over traditional techniques of carapace notching for short-term studies. Self-locking nylon ties are used as tags and are marked in a binary code. The tags are easily attached through a small hole drilled in the posterior margin of the carapace of both hard and softshell turtles. Reading tags from a template at the time of attachment or recapture is fast and accurate. Basking turtles can be surveyed from a distance for tags using binoculars or spotting scopes. Tag loss among hard-shell turtle is rare within the first field season but frequent within one year. Tag loss was not observed in softshell turtles.

INTODUCTION

There are many established techniques for marking freshwater and terrestrial turtles (Ernst, 1974; Kaplan, 1958; Pough, 1970). Cagle (1939) described a widely used technique of notching marginal carapace scutes. Marginal carapace scutes on the right and left sides are assigned numbers. A notch is filed into a scute, and the scute number then recorded. If it becomes necessary to use more than one notch for identification, scute numbers on the same side are separated by a comma, and numbers on the right and left sides are separated by a hyphen. Making multiple notches on large numbers of turtles is time consuming, and recording data in this system is cumbersome.

Ernst's (1974) numerical coding system provides for the consecutive numbering of individuals, making it superior to other systems for data storage and retrieval. Ernst proposed that marginal scutes be assigned numerical values. Different combinations of scutes are then notched, and the recorded number is simply the sum of the notched scutes. Again, making multiple notches on each turtle is time consuming, particularly when samples are large. Distinguishing a notch made by the investigator from one accidentally incurred by the turtle may be difficult, and notching large, ill-tempered turtles can be an exciting event for the investigator and turtle alike.

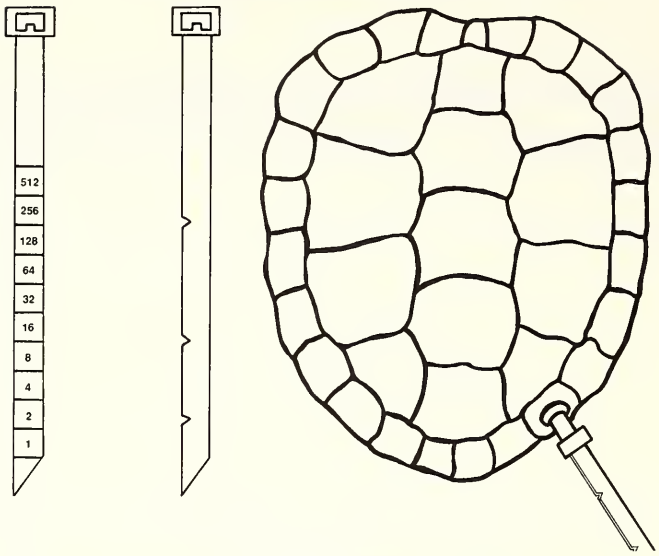

Figure 1. A coded tag and template. The tag is inserted through a hole drilled in the posterior margin of the carapace and locked.

MATERIALS AND METHODS

While conducting studies of multispecies turtle habitat use in 1988 and 1989, a more effective system of marking hard-shelled and spiny softshell turtles (*Trionyx spiniferus*) was developed. This system is an improvement over Ernst's (1974) system primarily in reducing the handling time for marking. Over 500 turtles were marked with coded tags attached through a small hole drilled in the posterior margin of the carapace (Figure 1). Tags consisted of 10 cm long, self-locking nylon cable ties, which are inexpensive to purchase in bulk at any department or hardware store. Each tag was divided into ten sections, which are marked and read using a template. Each section of a tag was assigned a binary value; e.g., sections 1, 2, 3, 4, and 5 represented numbers 1, 2, 4, 8, and 16 respectively. The tenth section was designated 512. An individual tag number was simply the sum of the marked sections. Using ten sections, 1023 turtles can be marked. If fewer turtles are marked, fewer tag sections (and a shorter tag) are required.

The time required to mark turtles was reduced by coding tags in the laboratory in advance of capture sessions. Tags were coded by melting a notch into one margin with a soldering iron. A cordless drill and a 0.48 cm (3/16 in) bit were used to punch a hole in the posterior margin of the carapace. A tag was then slipped through the hole and locked. Tags could be attached in a few seconds. When attached, tags extended approximately 7 cm behind the turtle and were often observed folded up over the carapace. The length of the tag did not appear to hinder even small turtles. Turtles as small as 6.4 cm in carapace length were tagged using this technique with no apparent loss of mobility and with no behavioral change.

Another advantage of this technique was that basking turtles could be visually surveyed for tags. The tags were often visible through 7-8X binoculars at up to 100 m and were easily seen with a spotting scope. Gross approximations of the percentage of the turtle population marked could be obtained without recapture sessions.

RESULTS

One significant drawback of this marking system is that many hard-shelled turtles lost their tags after the first field season, making this technique impractical for long-term studies of these species. While less than 1% tag loss occurred during the first field season, over 50% of the hard-shelled turtles marked in 1988 and recaptured in 1989 had lost their tags due to a deterioration of the bone between the drilled hole and the edge of the carapace. There was no evidence of bone breakage. By 1991, tag loss appeared to be 100% in these species. There was no apparent difference in tag loss as a function of turtle species, sex, or age. It may be possible to reduce this tag loss by drilling the hole farther from the edge of the carapace, widening the bridge of bone to which the tag is attached. No softshell turtle was observed to have lost its tag up to three years after application.

CONCLUSION

While apparently suitable for long-term studies of only softshell turtles, this technique holds several advantages over carapace notching of hard-shelled species. All coding work can be done in the laboratory, and the time required to mark each turtle is radically decreased. Large numbers of tags can be coded at one time and read with a template at time of attachment or recapture. Tags are extremely durable and do not support the algal growth often seen on the carapace. Even the largest snapping turtle (*Chelydra serpentina*) can be tagged safely and easily.

ACKNOWLEDGEMENTS

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