Where the Turtle Hits the Road: Preventing Nesting Diamondback Terrapin Mortalities

Abstract

During summer, the mating season for Northern Diamondback Terrapins (*Malaclemys terrapin terrapin*), thousands of females attempt to cross roads near marshes to feed, mate, and nest. To combat being injured or killed, many designs of terrapin fences have been tested. The original design was made of plastic webbing, and now corrugated piping is used; however, due to the flexibility of the piping and rough terrain, gaps can form under the pipes that females will use to get past. Additionally, certain females are large enough to go over the barriers. The goal of this experiment is to discover if there is a better type of fencing to use, also keeping in mind that aesthetics can be important for a community to accept fences. To test this, several female, preferably gravid, terrapins will be placed in a wooden box with an interchangeable wall to test the different fences. All fencing in the first trials will be six inches tall, and seven inches tall in the second. Overall, seven inch tall chicken wire had the best ability to contain females with 0 escapes. Other materials like the clear PVC were discarded as they proved ineffective.

Figure 1: A roadside sign warning drivers about terrapin crossing.

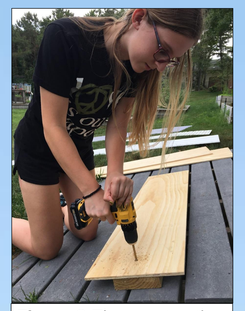

Figure 2: The construction of the main portion of the study.

Figure 3: The completed main portion of this study, made out of plywood.

Introduction

Often going unnoticed by drivers are various designs of terrapin fences along roadways. These barriers are in place to prevent the death of Northern Diamondback Terrapins (*Malaclemys terrapin terrapin*) so the species can thrive without the threat of being crushed by cars. Terrapins often attempt to cross roadways to reach a nesting site for them to lay their eggs every year ("Great Bay Terrapin Project"). Every year during nesting season, thousands of adult female terrapins attempt to cross roads to reach a nesting site to lay eggs. They may also do this to mate or find another source of food. Without barriers, most species of turtles are completely determined to cross the road, and will continue on their path even if moved away. During this time, several hundred terrapins can be killed in New Jersey alone, giving reason for terrapin fences to be constructed along roads that lay near marshes or other bodies of water ("A Guide for Building Terrapin").

One of the more common designs in use currently uses corrugated piping, wooden stakes, and zip ties, costing about $0.98 per foot ("A Guide for Building Terrapin"). One of the biggest flaws occurs when the stakes that hold down the barrier are too far apart, allowing the pipes to bend. If there is enough give, a terrapin is strong enough to push itself under and onto the road, and negates the purpose of the barrier. A more rigid material would be able to stop this from occurring. In testing done by the Wetlands Institute, "even the largest terrapin was unable to scale 6 inch tubing" ("A Guide for Building Terrapin"). It can be assumed that other fencing should be about six inches or taller. Another issue is damage to the fencing from roadside maintenance such as cutting back weeds, which, in some cases, can badly damage the tubing; also, damage from drivers is a key factor.

Hypothesis

Without factoring in stakes or nails, chicken wire costs about $0.07 per foot of wire. Chicken wire, when cut down, is also typically very unnoticeable and wouldn't stand out too much from the surrounding land. Thus, the chicken wire will likely be the best choice overall.

Methodology

- The main experiment will be done in a plywood box designed to have various fencing materials inserted to mimic fencing in the field. Three walls will be a foot tall, to ensure the remaining wall will be the only viable escape route.
- The materials (Lattice, Soffit, etc.) will be cut down to about 6 inches tall, or slightly more depending on material used. In the second trial, 7 inch materials will be used for comparison.
- For testing, each piece of fencing will be placed along the width off the plywood box, acting as a replaceable wall.
- Any terrapins involved will be measured before starting, and the same terrapins will be used. The largest gravid females will be chosen for this experiment.
- Terrapins will be placed on one side, with food and water accessible if necessary. They will be observed for an hour to determine if it is possible for them to scale the fence, using food to tempt them.
- After testing, the data between fences will be compared to each other, and then data will be compared to fences currently being used.
- General appearance/unobtrusiveness will be factored in to determine which type of fencing would be best.

Results

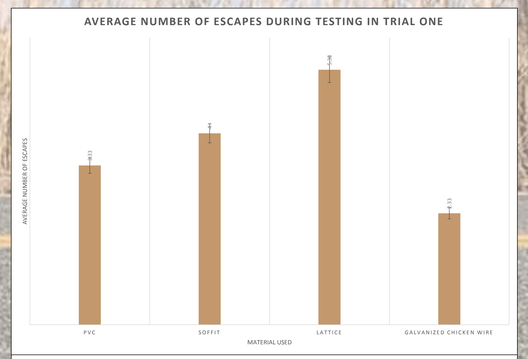

Figure 4: The average amount of escapes between three female gravid terrapins during Trial 1.

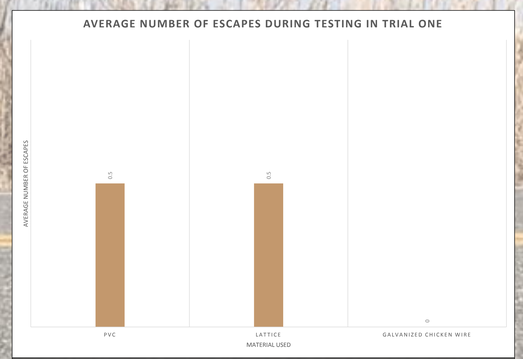

Figure 5: The average amount of escapes between two female gravid terrapins during Trial 2.

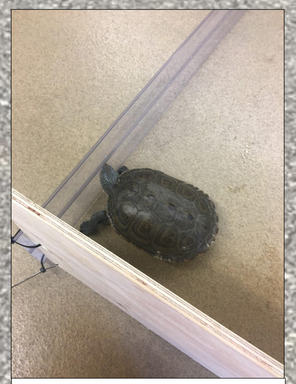

Figure 6: A grown female attempting escape over a clear PVC fence.

Figure 7: A grown female attempting escape over galvanized chicken wire.

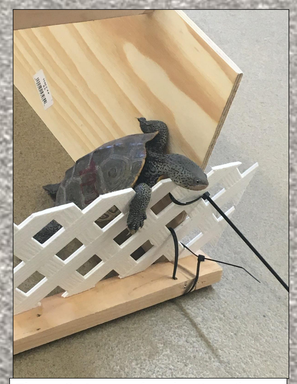

Figure 8: A grown female attempting escape over a lattice fence.

Discussion

- Corrugated Piping: $5174.40 per mile
- Galvanized Chicken Wire (6 inches): $378.05 per mile
- Galvanized Chicken Wire (7 inches): $453.66 per mile
- Lattice (6 inches): $2431.28 per mile
- Lattice (7 inches): $3241.70 per mile
- Clear PVC (6 inches): $3295.60 per mile
- Clear PVC (7 inches): $4394.13 per mile
- Soffit (6 inches): $3137.20 per mile
- Soffit (7 inches): $6274.40 per mile

In the initial round of testing with six inch high fences being used, the rate of escape was very high with every female escaping from 1 to 7 times with each type of fence. This number may be slightly inflated due to the design of the experiment. To form a safe area to test in, high wooden walls were used to enclose the terrapins, and they may have used this to enable their escapes. In actual use of fencing, these wooden walls would not be present.

In the second round of testing, the heights of each fence were raised to seven inches. The soffit was scrapped as well, due to its highly flexible nature. With fences this high, there was a max of 1 escape per fence type, and there were no escapes at all when chicken wire was being tested. Overall, this fence height proved to be far more useful as fencing than the six inch high variety.

Seven inch high soffit was the most expensive material, costing $6274.40 per mile of fencing, about 21% more expensive than the currently-used corrugated piping. Six inch high galvanized chicken wire had the lowest cost of $378.05 per mile of fencing, about 93% less expensive than corrugated piping.

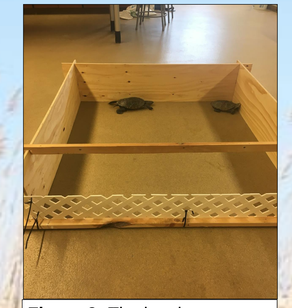

Figure 9: The box in use during Trial 2 with a stabilizing bar and lattice fencing.

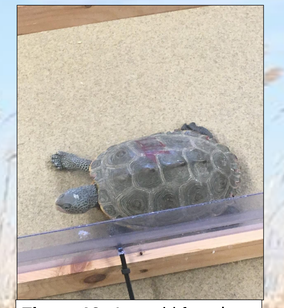

Figure 10: A gravid female terrapin searching for an escape in the PVC fence.

Conclusion

Based on total effectiveness and cost, seven inch high galvanized chicken wire fences would be the best replacement for the current corrugated piping fences. A mile of seven inch galvanized chicken wire costs $453.66 per mile of fencing, about 91% cheaper, and prevented all female terrapins from escaping. Therefore, this is far superior to current fencing, and should be considered a likely candidate for fencing. In the future, I aim to research fencing types more thoroughly by testing with more terrapins in order to procure more accurate results.

Acknowledgements

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References

"Great Bay Terrapin Project." *Conserve Wildlife Foundation of New Jersey*. Conserve Wildlife Foundation of New Jersey, 2017. Web. 12 June 2018.

"A Guide for Building Terrapin Barriers and Fences." *The Wetlands Institute*. The Wetlands Institute, 2018. Web.

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