The effect of head-starting on morphology and bite force in the Diamondback Terrapin (Malaclemys terrapin)

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Head-starting

Head-starting is the captive rearing and care of animals through their juvenile life stage, followed by release into their native habitats. The goal of head-starting programs is to avoid high mortality of hatchlings and thus increase overall population size.

Diamondback Terrapins

Malaclemys terrapin populations are declining throughout their range due to increased nest predation, road mortality, habitat loss, commercial harvest for food, and bycatch in crab pots. A M. terrapin head-starting program in Chesapeake Bay suggests that survival of accelerated animals is lower than wild animals.

Objectives

- Bite force, head, and body morphometrics were collected from M. terrapin across all ages on Poplar Island, MD.
- Bite forces were correlated to body and head size to determine their effect across ontogeny.

We aim to evaluate if bite force and morphometrics are different in head-started M. terrapin and therefore explain the reduced survivorship of released individuals.

Methods

- Measurements were taken from head-started juvenile diamondback terrapins (N = 155) and from recaptured head-start and wild diamondback terrapins of all ages (N = 291) on Poplar Island, MD.
  - Head height (left) and head width (right) measurements (Fig. 1)
  - HL = Head length
  - SL = Snout length
  - LLL = Lower jaw length (right; Fig. 2)
  - Bite force measurements taken with force transducer on small (left) and large (right) bite plates (Fig. 3)

Preliminary Results

The slopes of regression between carapace length and bite force are significantly different between head-started and wild diamondback terrapins of the same size (P = 0.023; Fig. 4)

The slopes of regression between head width and bite force are not significantly different between head-started and wild diamondback terrapins of the same size (P = 0.637; Fig. 6)

Discussion

- Head width and carapace length can predict maximum bite force in diamondback terrapins.
- Small head-started diamondback terrapins have larger bite force values for their body size.
- There is no significant difference in the relationship between head width and bite force for head-started and wild diamondback terrapins.

Future Research

1. Review historical morphometric data to predict bite force values of head-started and wild diamondback terrapins across ontogeny
2. Characterize a relationship between bite force and fitness in diamondback terrapins
3. Obtain prey items found in the Chesapeake Bay and corresponding crush force values
4. Determine if head-started individuals can forage at the time of release in native habitats

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References