

Notes on the Eastern Hognose Snake,
Heterodon platyrhinos Latreille (Squamata:
Colubridae), on a Virginia Barrier Island

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ABSTRACT.— An unusually high population density of the eastern hognose snake, *Heterodon platyrhinos* Latreille, is reported from a Virginia barrier island. The average snout-vent length of females in this population is significantly greater than the average SVL of males, but individuals of equal SVL do not differ in body mass. Females also differ from males in seasonal activity patterns, with males most active in early summer and females in late summer. The number of dorsal blotches of the island population differs significantly from that reported for a mainland population on the Delmarva Peninsula.

The eastern hognose snake, *Heterodon platyrhinos* Latreille, is found over much of the eastern United States (Conant 1975). Within this range it uses a great diversity of habitats, but like other members of the genus *Heterodon* it prefers dry, relatively open, sandy areas in which it can burrow easily (Corrington 1929, Lynn 1936, Duellman and Schwartz 1958, Platt 1969). This type of habitat is abundant on Tom's Cove Hook, a fast-growing recurved spit on the southern tip of Assateague Island, Virginia, and *H. platyrhinos* is especially conspicuous at this site.

Three factors may account for the apparently high density of hognose snakes. First, Assateague hosts a depauperate snake fauna, as do many Atlantic Coast barrier islands (Gibbons and Coker 1976). Only 6 species occur on the island (Lee 1972), compared to 17 on the adjacent Delmarva Peninsula (Martof 1980). The absence of other species may promote increased numbers of *H. platyrhinos*. Second, the sparsely vegetated dunes that form the interior of the spit provide ideal foraging habitat. Fowler's toads, *Bufo woodhousei fowleri*, breed in freshwater ponds between the dune lines and are abundant on the dunes. Hognose snakes were observed several times in the act of hunting and capturing toads buried in the sand. Third, it is possible that hognose snakes on Assateague are no more abundant than on the mainland, but are simply easier to census because of the open habitat. Given the apparent abundance of *H. platyrhinos*, the objective of this paper is to present information that is ordinarily difficult to obtain for a single population.

STUDY AREA AND METHODS

I observed active hognose snakes while on a preliminary visit to Assateague Island on 18 April 1981. The vegetation of Tom's Cove Hook consists of discrete zones of sand-dune, shrub, grassland, and salt-marsh habitats. Few snakes were observed in shrub and grassland areas during preliminary sampling, and none were seen in the salt marsh. Therefore, systematic sampling was confined to the sand-dune habitat on the inland dune ridges that form a nexus on the spit. These ridges were searched two or three times per week (22 days) from 11 June to 12 September 1981. The sequence in which the dunes were searched was varied. The first five searches lasted from 0800 to 1930. No snakes were observed during midafternoon hours, and subsequent sampling was confined to morning and late afternoon. On five occasions searches were conducted for a 3-hour period after sunset.

The following data were recorded for each capture: date, time of capture, exact location on the dune lines, temperature of the substrate (52 captures only), color of snake, snout-vent length (SVL) to the nearest 0.5 cm, body mass (g), number of dorsal blotches, and number of ventral and subcaudal scales. Each individual was marked with a unique identification code (ID) by clipping two subcaudal and three ventral scales. For recaptured individuals, the linear distance traveled between captures was estimated from an aerial photograph of the site. Sex (Fig. 1) was determined by an analysis of ventral and subcaudal scale counts (Edgren 1961). Five of the snakes that were classified as males according to scale count were noted to have everted hemipenes during handling, supporting the assumption that sex can be determined by scale count.

RESULTS AND DISCUSSION

A total of 66 individuals were captured, with 6 individuals (9.1%) recaptured an average of 17.5 days after initial capture. More males ($N = 38$) were captured than females ($N = 28$), but the ratio did not differ from 1:1 ($\chi^2 = 1.52$, $df = 1$, $p > 0.10$). Distance moved between captures ranged from 40 to 760 m ($x = 390$ m). The recapture data were not appropriate to derive an estimate of actual population density (White et al. 1982). However, there are approximately 13.6 ha of habitat suitable for hognose snakes (excluding salt marsh and aquatic sites) on the spit. Using only the 66 individuals captured, the absolute minimum population density of *H. platyrhinos* was 4.8 snakes/ha.

Two hatchlings were found dead on the road on 15 and 19 August, and were 18.5 and 19.0 cm SVL. No hatchlings were captured during the late summer, so their growth rate could not be determined. Two juvenile males (SVL < 36.0 cm) and one adult male (62.0 cm SVL) were recaptured more than a month after initial capture. These two size classes exhibited average summer growth rates of 2.2 and 1.0 cm/month, respectively. Platt (1969) observed higher growth rates in *H. platyrhinos* juveniles (3.4 cm/month) and lower rates in large males (0.8 cm/month). Growth rates for female size classes could not be determined.

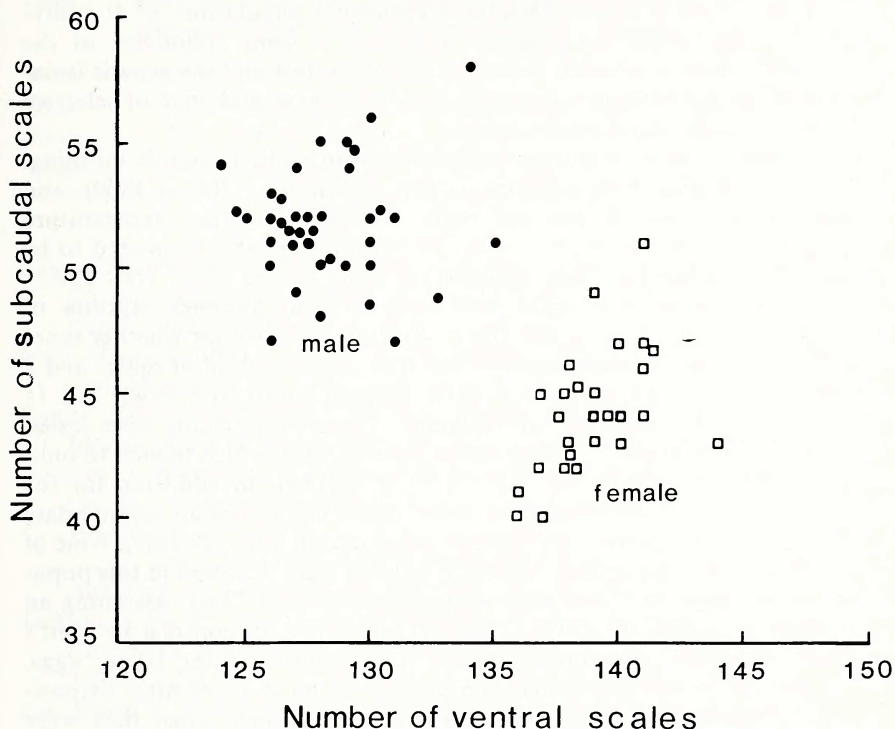


Fig. 1. Scale counts used to sex 66 *Heterodon platyrhinos* individuals found on Assateague Island, Virginia, June-September 1981.

Females were significantly longer ($t = 3.8$, $df = 64$, $p < 0.02$) and also exhibited greater body mass ($t = -2.74$, $df = 64$, $p < 0.01$) than males (Table 1). Covariance analysis was used to scale body mass for differences in snout-vent length, using SVL as the covariate. Female *H. platyrhinos* were no heavier than males of the same SVL ($F_{1,63} = 2.61$, $p > 0.10$). Sexual dimorphism in body length has been described in several populations of *Heterodon* (Edgren 1961, Platt 1969) and for other species (Fitch 1981, Gibbons 1972, Shine 1978). Platt (1969) attributed the sexual size dimorphism in *H. platyrhinos* to faster growth rates in females. Larger females of some species produce larger clutches, thereby possibly promoting selection for increased body size in females (Shine 1978, Semlitsch and Gibbons 1982).

Of the 66 individuals captured, 55 were judged to be normal in coloration, 3 were melanistic, and 8 were intermediate (very dark with some light markings). All melanistic snakes were adults. Observations on the number of dorsal blotches revealed that females have more blotches than males ($t = 4.22$, $df = 64$, $p < 0.001$; Table 1). Moreover, these means were also different (more than 2 SE) from values reported

by Edgren (1961) for the Delmarva Peninsula population of *H. platyrhinos*. This difference suggests a change in gene frequency of the "blotch" allele(s), possibly owing to founder effect and the genetic isolation of the island hognose population, or perhaps a change of selective pressures in an island environment.

Most of the 72 captures were made from early to middle morning. Only five snakes were captured in late afternoon (1700 to 1930), and none were found on the five night searches. Substrate temperature ranged from 24 °C to 39 °C for 52 captures. Snakes appeared to be most active when substrate temperature was 32 °C to 35 °C (N = 22).

The data were grouped into early and late summer captures of adults (males > 36.0 cm, females > 40.0 cm SVL) to test whether sexes differed in their summer activity patterns. Seventeen adult males and 8 adult females were captured in early summer (prior to 8 July), and 11 males and 14 females in late summer. These proportions were tested using a binomial test of proportions (Lewis 1966), which tended to indicate differences in activity ($U = 1.76$, $p < 0.08$). In addition, for the period 11 June to 12 September, adult males had a median capture date of 23 June. The median for females was a month later (23 July). Nine of the 10 largest females were captured after 22 July. Females in this population probably laid their eggs in late June or early July, assuming an incubation period of 45 to 55 days (Platt 1969). In contrast to Platt's study, in which few adult females were captured after laying eggs, females on Assateague Island appeared to be most active after oviposition. Females were less active early in the summer when they were gravid, as has been reported for other species (Jackson and Franz 1981, Shine 1979).

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Table 1. Body mass, snout-vent length (SVL), and dorsal blotch number in male and female hognose snakes, *Heterodon platyrhinos* ($\bar{x} \pm 1$ SE).

Sex	N	Body mass (g)	SVL (cm)	Dorsal blotches
Male	38	94.9 \pm 9.6	44.2 \pm 1.8	21.8 \pm 0.27
Female	28	140.6 \pm 14.5	54.4 \pm 2.7	23.7 \pm 0.37

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