

ISSN 1540-773X

# Collinsorum

THE JOURNAL OF KANSAS HERPETOLOGY

Volume 5, Number 1

June 2016



1974-2016



*Published by the Kansas Herpetological Society*  
<http://www.cnah.org/khs>

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## NOTES

### Adult Body Sizes and Clutch Characteristics of the Red-spotted Newt, *Notophthalmus viridescens viridescens* (Rafinesque, 1820), From a Complex of Vernal Pools in South-Central Pennsylvania

Despite a large geographic range (Powell et al., 2016), the Red-spotted Newt, *Notophthalmus viridescens viridescens* (Rafinesque, 1820), has received little attention with respect to its ecology (but see Healy, 1970, 1973, 1975), and less yet to clutch characteristics (Hunsinger and Lannoo, 2005). This species is widespread in Pennsylvania (Hulse et al., 2001; Meshaka and Collins, 2012), and for the state generally the average adult body sizes are similar between males (mean = 48.2 mm) and females (mean = 49.3 mm) (Hulse et al., 2001). Few studies have addressed its clutch characteristics (Bishop, 1941), and no clutch data have been published for Pennsylvania. In this paper, we provide adult body sizes and clutch characteristics for this species from a complex of adjacent vernal pools within a wooded area in south-central Pennsylvania.

Red-spotted Newts were collected during nighttime visits on 10, 14, and 17 March 2016 from a complex of closely associated natural and artificial vernal pools located near Boiling Springs on South Mountain, Cumberland County, Pennsylvania. All newts were fixed in formalin and later transferred to 70% ethyl alcohol for preservation. Specimens were deposited in the section of Zoology and Botany of the State Museum of Pennsylvania. Snout-vent lengths (SVL) were measured from the tip of the snout to the posterior end of the cloaca. Clutch size was estimated by direct count of all eggs in gravid females. Ten mature ova were randomly chosen from each gravid female and measured to the nearest 0.1 mm using an ocular microscope. All statistics were performed on Microsoft Excel (2010), and significance was recognized at a p value of at least 0.05.

From the 72 newts captured, a two-tailed t-test revealed no significant difference ( $p > 0.05$ ) in mean body sizes between males ( $43.3 \pm 1.9$  mm SVL; range = 38.9-46.7;  $n = 51$ ) and females ( $42.3 \pm 1.7$  mm SVL; range = 39.8-45.9;  $n = 21$ ). Twelve females (mean =  $43.1 \pm 1.8$  mm SVL; range = 40.4-45.9) were gravid. Clutch size ranged 55-125 eggs (mean =  $89.4 \pm 22.7$ ), and a regression revealed no significant relationship with female body size. Eggs were large (mean =  $1.4 \pm 0.2$  mm; range = 1.1-1.7), and a regression detected no significant relationship between mean egg size and either female body size or clutch size.

Newts at this site were smaller than those reported for Pennsylvania generally (Hulse et al., 2001) but similar to

those found elsewhere (Meshaka and Layne, 2015). Typical of the species, average body sizes of males and females at our site were similar to one another (Meshaka and Layne, 2015). Clutch characteristics are poorly known for this species (Hunsinger and Lannoo, 2005), and clutch sizes of our sample were smaller than the range 200-375 eggs reported from New York (Bishop, 1941). These data serve as baseline to test the range of plasticity in these life history traits, both in the physiographically complex state of Pennsylvania and elsewhere in eastern North America.

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## Eastern Racer (*Coluber constrictor*) Mortality as a Result of Early Emergence from a Man-made Structure Hibernaculum in South-central Nebraska

Global climate change has undoubtedly had an effect on the habitat ecology and phenology of many life forms (Bezzel and Jetz 1995, McCarty 2001, Walther et al. 2002). Being ectothermic, herpetofauna are thought to be exceptionally vulnerable to rapid climate change (Araújo et al. 2006, Bickford et al. 2010). Habitat selection and behavior is, in part, influenced by thermoregulation in snake species (Huey et al. 1989, Blouin-Demers and Weatherhead 2001, Blouin-Demers and Weatherhead 2002, Row and Blouin-Demers 2006). Some species of snake are adapted to survive certain temperature drops for limited lengths of time. For example, Common Garter Snakes (*Thamnophis sirtalis*) have demonstrated supercooling capacities for temperatures as low as  $-5.5^{\circ}\text{C}$  for a short period of time (Churchill and Storey 1992).

On 30 January 2016, three adult *Coluber constrictor* were found dead along the northwest corner of the Visitor Center building of the Crane Trust ( $40.796085^{\circ}\text{N}$ ,  $98.493181^{\circ}\text{W}$ ) in Hall County, Nebraska. The sexes and sizes of the snakes were not recorded. This building is located southwest of the Interstate-80 Alda, NE exit along the Platte River floodplain, approximately 0.5 km south of Interstate-80 and 0.5 km north of the Platte River's north channel. The building has a mowed, irrigated lawn and is surrounded by a three-foot band of one- to two-inch landscaping rock. North of the building is largely a concrete parking lot. To the south, a tree line of predominantly Eastern Cottonwoods (*Populus deltoides*) and White Mulberry (*Morus alba*) connects the property to the wooded riparian area on the north bank of the river channel. Two snakes were found lying on top of the rocks along the foundation and one in the mowed grass. There were no visible lacerations or markings on the two snakes found in the rocks (Figures 1 and 2) and postmortem wounds (Figure 3) likely from carrion feeding species on the third specimen found in the grass (Thirteen-lined ground squirrels, *Spermophilus tridecemlineatus*, and American Crows, *Corvus brachyrhynchos*, are frequently seen in this area). It is possible all three snakes died on top of the rocks along the foundation and the snake found in the grass was taken there by a scavenger.

All specimens showed little sign of decay, which is

evidence for deaths being recent occurrences. It is suspected that the mortalities are a result of freezing after an early emergence from the hibernaculum of loosened rocks along the foundation of the building. The building foundation and the surrounding landscaping rock are a documented snake hibernaculum. To prevent snake entry under the building, holes within the foundation's cement blocks were patched, which required moving and then repositioning the surrounding landscaping rocks before snake hibernation in the early fall of the previous year (14-16 September, 2015). It is possible that snakes previously hibernating under the building, now hibernating along the base of the foundation, were more subject to environmental conditions and variations than in past winters.

This January was unseasonably warm and surpassed January of 2007 as globally the warmest January in the 137-year record (NOAA 2016). The week before the mortalities were documented, temperatures reached as high as  $14.5^{\circ}\text{C}$  with a mean daily temperature of  $8.5^{\circ}\text{C}$ . Radiant heat from the foundation and sun exposure onto the bricks and rocks on the side of the building likely reached even higher temperatures. Night temperatures quickly dropped throughout the week, reaching as low as  $-8^{\circ}\text{C}$ . The nightly cold snap likely killed the snakes, before they were able to reenter the rocky hibernaculum. To our knowledge, this observation is the first documented report of snake mortality due to freezing after early hibernacula emergence in Nebraska. We predict that this mode of mortality has occurred throughout the state and elsewhere and may be especially prevalent near human structures that increase radiant heat to hibernacula.

Early emergence mortality in snake species is likely to become more common as global warming trends continue (Araújo et al. 2006). Warming trends also have implications for young *C. constrictor* behavior. Individuals incubated at a cooler temperature ( $28^{\circ}\text{C}$ ) outperform individuals incubated in warmer temperatures ( $32^{\circ}\text{C}$ ) in escape behavior, movement speed, and maneuverability (Burger 1990). These incubation temperature changes could prove detrimental for *C. constrictor* as they rely on their speed for prey capture and predator avoidance (Fitch 1963, Lillywhite 1987).

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Figure 1. Dead Eastern Racer (*Coluber constrictor*) found outside Crane Trust Visitor Center. Notice lack of visible lacerations.



Figure 2. A Second dead Eastern Racer from outside the Crane Trust Visitor Center.



Figure 3. A third dead Eastern Racer from outside the Crane Trust Visitor Center. This individual had obvious post-mortem wounds, likely from attempted scavenging of the carcass.

## Early Season Breeding Activity in Plains Leopard Frog (*Lithobates blairi*) in Kansas.

Youngmeyer Ranch is a 4,700 acre property located within the Flint Hills of Elk County, Kansas. The first warm spring rains for the area occurred on 8 March 2016. On 9 March 2016, between 20:00 – 22:30 h (air temperature = 10.9 °C, humidity = 72%, wind speed = 7 kph), we explored several vernal pools in search of Crawfish Frogs (*Lithobates areolatus*). While no Crawfish Frogs were found, we observed large gatherings and recorded the calls of Boreal Chorus Frogs (*Psuedacris maculata*) (Figure 1) and Plains Leopard Frogs (*Lithobates blairi*) (Figures 2 and 3). The calls of both species (especially *P. maculata*) were frequent and robust. While the Boreal Chorus Frogs allowed us to get relatively close, the Plains Leopard Frogs proved more cautious and often retreated underwater before we could get within a meter or so of their location. Plains Leopard Frogs also were frequently observed in amplexus (Figure 4). While Plains Leopard Frogs have been observed calling from early March to late August, they are not typically heard until late March (Kansas Herpetofaunal Atlas; pers. comm. Travis Taggart). In fact, out of 638 records of chorusing activity, the earliest date on record of this species calling in Kansas is 10 March, making this observation the earliest on record in Kansas. There are only three other records from mid-March: 14 March 2000, 14 March 2002, and 17 March 2001. These records of early calling by Plains Leopard Frogs should prove valuable, especially as annual global temperatures continue to increase and animal behaviors adapt to these changes.

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Figure 1. Boreal Chorus Frogs (*P. maculata*) observed calling on 9 March, 2016 in a vernal pool on Youngmeyer Ranch, Elk County, Kansas.



Figure 2. Plains Leopard Frog (*L. blairi*) observed on 9 March, 2016 in a vernal pool on Youngmeyer Ranch, Elk County, Kansas.



Figure 3. Plains Leopard Frog (*L. blairi*) observed on 9 March, 2016 in a vernal pool on Youngmeyer Ranch, Elk County, Kansas.

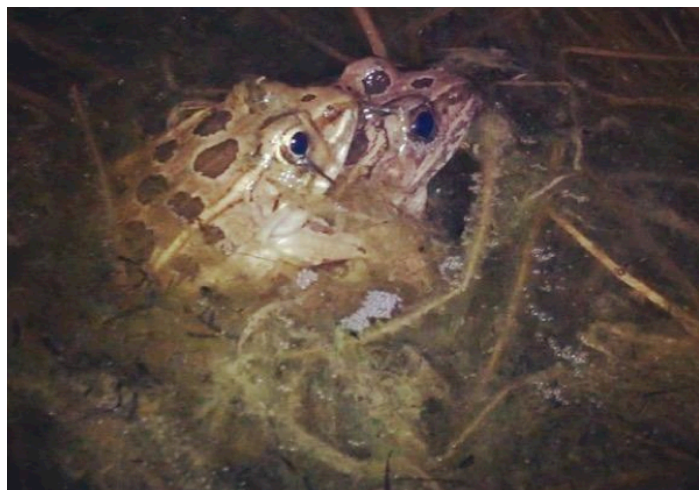


Figure 4. Plains Leopard Frogs (*L. blairi*) in amplexus observed on 9 March, 2016 in a vernal pool on Youngmeyer Ranch, Elk County, Kansas.



## **About the Kansas Herpetological Society**

The KHS is a non-profit organization established in 1974 and designed to encourage education and dissemination of scientific information through the facilities of the Society; to encourage conservation of wildlife in general and of the herpetofauna of Kansas in particular; and to achieve closer cooperation and understanding between herpetologists, so that they may work together in common cause. All interested persons are invited to become members of the Society. Membership dues per calendar year are \$15.00 (U.S., Regular), \$20.00 (outside North America, Regular), and \$20.00 (Contributing) payable to the KHS. Send all dues to: KHS Secretary, (address inside the front cover)

### *KHS Meetings*

The KHS holds an annual meeting in the fall of each year. The meeting is, minimally, a two day event with lectures and presentations by herpetologists. All interested individuals are invited to make presentations. The annual meeting is also the time of the Saturday night social and fund-raising auction.

### *Field Trips*

The KHS hosts three field trips each year, one each in the spring, summer, and fall. Field trips are an enjoyable educational experience for everyone, and also serve to broaden our collective understanding of the distribution and abundance of the amphibians, reptiles, and turtles in Kansas. All interested persons are invited to attend.

## **Editorial Policy**

*Collinsorum*, currently issued quarterly (March, June, September, and December), publishes all society business.

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As space allows, *Collinsorum* publishes all manner of news, notes, and articles. Priority of publishing is given to submissions of Kansas herpetological subjects and by KHS members; however all submissions are welcome. The ultimate decision concerning the publication of a manuscript is at the discretion of the Editor. Manuscripts should be submitted to the Editor in an electronic format whenever possible. Those manuscripts submitted in hard copy may be delayed in date of publication. Manuscripts should be submitted to the Editor no later than the 1st of the month prior to the month of issuance. All manuscripts become the sole possession of the Society, and will not be returned unless arrangements are made with the Editor.

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### *Bronze Salamander Award*

Established in 1987, this Award is presented to those individuals whose efforts and dedication to the Kansas Herpetological Society go far beyond the normal bounds. The recipients of this Award have given exemplary service to the KHS, and are presented with an elegant bronze sculpture of a Barred Tiger Salamander.

### *The Howard K. Gloyd - Edward H. Taylor Scholarship*

Established in 1993, The Gloyd-Taylor Scholarship is presented annually by the Kansas Herpetological Society to an outstanding herpetology student. The scholarship is a minimum of \$300.00 and is awarded on the basis of potential for contributing to the science of herpetology. Students from grade school through university are eligible.

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KHS members only are eligible to apply for The Alan H. Kamb Grant for Research on Kansas Snakes, which was established in 2001. The recipient of the grant will be selected by the KHS Awards Committee. A minimum award of \$300 is given annually.

### *The Henry S. Fitch - Dwight R. Platt Award for Excellence in Field Herpetology*

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### *The George Toland Award for Ecological Research on North American Herpetofauna*

This CNAH Award was established in 2008 in recognition of the scientific career of George Fredrick Toland, whose lifelong interest in herpetology was passed on to so many of his students. The recipient of this award will be selected by the KHS Awards Committee. A minimum award of \$200 is given annually at the end of the KHS meeting.

### *The Suzanne L. & Joseph T. Collins Award for Excellence in Kansas Herpetology*

This CNAH Award was established by Westar Energy in 1998 in recognition of the achievements of Suzanne L. Collins and Joseph T. Collins. In even years, the Award is bestowed upon an individual who, in the preceding two calendar years, had published a paper of academic excellence on native species of Kansas amphibians, reptiles, and/or turtles, and in odd years, the Award is given to an individual who, in a juried competition, took the best photograph of a Kansas amphibian, reptile, or turtle. The Collins Award is minimally \$1,000.00, and is neither a grant nor a scholarship. No nominations or applications can be made for it.