

# *Herpetological Review*

***BUFO BOREAS* (Western Toad). DAVIAN BEHAVIOR**

**JEFF A. ALVAREZ**, The Wildlife Project, P.O. Box 579805, Modesto, California 95357, USA; e-mail: [Jeff@thewildlifeproject.com](mailto:Jeff@thewildlifeproject.com).

**BUFO BOREAS (Western Toad). DAVIAN BEHAVIOR.** Misdirected copulation among amphibians has been noted in several species including *Rana boylei* (Bettaso et al. 2008. Herpetol. Rev. 39:462); *R. cascadae* (Garwood and Anderson 2010. Herpetol. Rev. 41:204); *Bufo bufo* (Ayres 2010. Herpetol. Rev. 41:192–193); *B. terrestris*, and *Osteopilus septentrionalis* (Meshaka 1996. Florida Sci. 59:74–75); and *B. marinus* (Lewis 1989. Cane Toads: An Unnatural History. Doubleday, New York. 98 pp.). Those authors alternately referred to Davian behavior as necrogamy. Ayres (2010, *op. cit.*) expanded the use of the term Davian behavior to include misdirected copulations with other species. Here I describe Davian behavior in the Western Toad (*B. boreas*) associated with the federally threatened California Red-legged Frog (*R. draytonii*).

While conducting monitoring surveys in February 2009 for California Red-legged Frogs in eastern Contra Costa Co.,



FIG. 1. Davian behavior by a Western Toad (*Bufo boreas*) attempting to amplex a California Red-legged Frog (*Rana draytonii*).



FIG. 2. Ventral (relative to the California Red-legged Frog, *Rana draytonii*) view of Western Toad (*Bufo boreas*) amplexing a California Red-legged Frog in a manner that has immobilized the frog.

California, USA, I encountered an adult Western Toad in pectoral amplexus with an adult female California Red-legged Frog. Both the toad and frog were on the terrestrial bank of a livestock pond (Fig. 1). The toad was clasped tightly to the frog's thoracic region, while the California Red-legged Frog appeared completely immobilized by the toad.

Davian behavior has been considered an ecological trap because, in this case, the toad was not capable of successfully reproducing (Ayres 2010, *op. cit.*). In this observation, however, neither animal was able to reproduce successfully since both were on land, and reproductively viable conspecifics were in aquatic breeding habitat and not accessible to either individual. Predation events may increase during reproductive activity in many species (Magnhagen 2003, *Trends Ecol. Evol.* 6:183–186). Here, both individuals were exposed to an increased predation potential due to their distance from water (ca. 1 m). The California Red-legged Frog may have also been subjected to an unanticipated physical stress that was brought on by the Western Toad's grasp (Fig. 2).

On other occasions, I have observed Western Toad males amplexing a root ball of *Juncus balticus*, a piece of cattle dung, and a dead conspecific individual. Arak (*In* Bateson 1983, *Mate Choice*. Cambridge Univ. Press. New York, New York. 462 pp.) suggested explosive breeding is the reason for necrogamy (Davian behavior). Among the objects reported by Arak (1983, *op. cit.*) were fish and floating debris. I integrate the hypothesis that temporally compressed breeding anurans comprise males that will attempt to amplex appropriately sized nearby objects as a result of breeding pressure from conspecifics. Although Ayres (2010, *op. cit.*) proposed that chemical factors might influence necrogamy in *B. bufo*, I offer that objects of the appropriate size are targets for Davian behavior, and that there is little regard for their composition. I further add that a heterospecific individual attempting to escape amplexus attempts would facilitate complete amplexal behavior by the Western Toad. Although Davian behavior may represent an evolutionary trap for individual Western Toads, it also represents confounding stresses on a threatened species, in this case, the California Red-legged Frog. This observation represents reduced opportunities for reproduction and increased predation risk in both species. Western Toads appear to engage in this behavior at an observable rate, which was observed by me over several years. If the target is a sympatric species, local populations of both the California Red-legged Frog and the Western Toad might be effected.

I thank Sarah M. Foster for her comments and assistance on the manuscript.

**JEFF A. ALVAREZ**, The Wildlife Project, P.O. Box 579805, Modesto, California 95357, USA; e-mail: Jeff@thewildlifeproject.com.