NATURAL HISTORY NOTE

Yosemite Toad (Anaxyrus canorus) Reaction to Passing Construction Equipment

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The Yosemite Toad (*Anaxyrus canorus*; Fig. 1) occurs at high elevations (1,950-3,445 m) in the central Sierra Nevada Mountains of California where it is known from Alpine County to Fresno County (Goldberg 2021). It is currently listed as "Threatened" by the U.S. Fish and Wildlife Service (USFWS 2014). Breeding in Fresno County occurs after snow melt in several high elevation meadows. At one large meadow (Fig. 2; location undisclosed to

protect the sensitive breeding population; elevation 2,803 m; Fresno County), toads of various ages cross a paved road to access upland habitat after breeding activities. The toads remain in the upland habitat for the rest of the year.

Roads impact amphibians in a variety of ways, including direct mortality, noise, and vibrations from passing vehicles (Eigenbrod et al. 2009, Jochimsen et al. 2004, Mazerolle et al. 2005). Very little is known about Yosemite Toad response to vehicle noise and vibration; herein we report our observations of a toad reacting to passing construction equipment.

On July 18, 2023, at 1000 h, we observed a juvenile Yosemite Toad (Fig. 1), approximately 2 years old, sitting still within the broken shade of pine trees approximately 10 m east of the center of the paved road. The upland habitat was characterized by lodgepole pines (Pinus contorta), granite outcrops, and various wildflowers. The snout-vent length was 45 mm and the general condition of the toad appeared healthy. The sex was not able to be visually determined. During our observation, the toad did not move or react to our presence. Various wheeled vehicles, such as sedans, SUVs, and trucks pulling trailers passed us on the road, but the toad did not react to traffic. Thirty minutes later a vehicle known as a Morooka Rubber Track Carrier (Morooka USA, Ashland, Virginia) passed us on the road, traveling at approximately 5-7 MPH. These rubber tracked vehicles can weight up to 11,213 kg (24,720 lbs) with a length of 5.6 m (18.5 ft; see https://www.morookacarriers.com for photos of various models-the model discussed here is similar to MST1500VD). As the Morooka was passing by, the toad quickly began walking and hopping upslope to the nearest cover, which was a fallen branch 1.8 m



Fig. 1. Juvenile Yosemite Toad (*Anaxyrus canorus*) resting in broken shade within upland habitat. Photo by Howard Clark. All photos taken with Nikon Coolpix S8100 12.1 MP CMOS digital camera.

away (branch diameter approx. 15 cm; Fig. 3). The toad remained under the branch for ~30 minutes then eventually moved back into the dappled shade of the pine trees close to where we found the toad originally. We checked on the toad throughout the day, and it cratered into the granite soil and appeared to be in good condition. The next day the toad was not found in the area.

It appears that the rubber tracked Morooka generated enough ground vibration to elicit a behavioral response from the toad. In comparison, truck and car traffic on the road did not seem to have any effect on the toad, and even with human observers standing within a meter, no reaction was noted. Only when someone leaned close to the toad did it hop a couple times upslope away from the person. More research is needed to determine the effects of traffic and vibrations on Yosemite Toads and other amphibians within high elevation breeding areas and migration corridors. For example, because the passing wheeled vehicles did not elicit an avoidance response, is there a higher road mortality impact, whereas heavier slower-moving equipment, with a high vibration signature, will lead to toads moving out of the way and avoiding vehicle strike? These research questions can lead to crafting vehicle-specific protection measures in areas with high road mortality.

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Fig. 2. General study site. Meadow is on the left and the single-lane paved road is on the right. Photo by Howard Clark.



Fig. 3. Juvenile Yosemite Toad (*Anaxyrus canorus*) under fallen branch. Photo by Howard Clark.

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