Bull. Southern California Acad. Sci.
123(2), 2024, pp. 96–100

Observation of a Novel Breeding Habitat for the California Red-Legged Frog (*Rana draytonii*) in San Benito County, California

Crecencia Sanchez,[1]* Rachel Perpignani,[1] Shawn Wagoner,[1] and Jeff A. Alvarez[2]

[1]*Burleson Consulting Inc., A Terracon Company, 1900 Garden Road Suite 210, Monterey, CA 93940*
[2]*The Wildlife Project, PO Box 188888, Sacramento, CA 95818*

The California red-legged frog *(Rana draytonii)* is a native ranid that ranges in California from Mendocino and Butte Counties in the north to San Diego County in the south; isolated populations also exist in Baja California (Thomson et al. 2016). This species has been classified as federally Threatened since 1996 (USFWS 2003). *Rana draytonii* is a biphasic amphibian that requires its eggs to be oviposited in perennial and ephemeral aquatic habitat features (Storer 1925; Alvarez et al. 2013a), and whose larvae then metamorphose to become largely terrestrial (Allaback 2010; Tatarian 2008). *Rana draytonii* typically oviposits during the winter in perennial and ephemeral creeks and ponds (Storer 1925; Alvarez et al. 2013a). Several studies exist on the aquatic habitat and microhabitat use by this species for oviposition (Reis 1999; Cook and Jennings 2007; Rathbun 2012; Alvarez et al. 2013a, 2013b; Wilcox et al. 2017; Alvarez and Wilcox 2022). *Rana draytonii* has been reported to reproduce in freshwater creeks and ponds—typically cattle stock ponds (Storer 1925; Fisher and Shaffer 1996; Alvarez et al. 2013a). It is also known to oviposit in brackish water lagoons, such as Abbott's Lagoon in Point Reyes National Seashore (J. Alvarez pers. obs.), and recent reports indicate widespread use of anthropogenic spring boxes, primarily as non-breeding sites, but occasionally for breeding as well (Alvarez and Wilcox 2022). *Rana draytonii* has been reported to be extirpated from the Central Valley of California, with excessive land disturbance and agricultural cultivation being the chief reasons for its extirpation (Jennings and Hayes 1994). This species is not believed to utilize areas of intense agricultural use (Jennings and Hayes 1994; Fisher and Shaffer 1996) and has not been reported to reproduce in areas such as agricultural ditches and canals. Here we detail the first published record of *R. draytonii* reproducing in an anthropogenic agricultural drainage ditch.

Our observations were made adjacent to an existing site which was immediately adjacent to the intersection of The Alameda Street and Mission Vineyard Road along State Route 156 (36.835861, -121.531646, elev. 71 m), in San Juan Bautista, San Benito County, California, in the South Coast Range. This site is within the known range of *R. draytonii* and was being mechanically denuded of vegetation ahead of anticipated ground disturbance for a State road widening project (Fig.1). The agricultural ditch, called East Ditch, was an open trapezoidal-shaped trench measuring between 2.5–3.0 m wide across the flat bottom, 4.5–6.0 m wide across the top, and was between 1.2–1.8 m deep along its entire length. The site was largely disturbed by long-term and historic agricultural uses and intermixed with relatively natural landscape components including coast redwood (*Sequoia sempervirens*), blue gum eucalyptus *(Eucalyptus globulus)*, watercress (*Nasturtium officinale*), poison hemlock (*Conium maculatum*), cattails (*Typha* sp.), fat hen *(Atriplex prostrata)*, field bindweed (*Convolvulus arvensis*),

* Corresponding author: cs@burlesonconsulting.com

Fig. 1. Habitat conditions associated with the drainage ditch in San Benito County, California, 27 February 2023. Photograph by Crecencia Sanchez and Rachel Perpignani.

rabbitfoot grass (*Polypogon monspelliensis*), alkali heliotrope (*Heliotropium curassavicum*), non-native slender oat (*Avena barbata*), and poison oak (*Toxicodendron diversilobum*). An agricultural drainage ditch also lay within the site, adjacent to an agricultural plot. This drainage ditch flowed in the direction of San Juan Creek on the westernmost side of the project site. Approximately 0.56 km of the agricultural drainage ditch lay in the project boundaries and was surveyed as part of an investigation to assess wildlife use of the site.

While surveying the drainage for nesting birds on 23 August 2022, we observed one *R. draytonii* larva (Fig. 2). The following evening, we conducted a nighttime survey using 400-lumen flashlights to evaluate *R. draytonii* occupancy on the site. During this survey, we identified two adult and 11 larval *R. draytonii.* Between this survey and 9 September 2022, we relocated approximately 33 larvae, 161 metamorphs, and 7 adults from the site as part of required biological compliance monitoring. On the morning of 27 February 2023, we discovered four spherical amphibian egg mass approximately 10-15 cm in diameter and with several visible larvae resting on its surface (Fig. 3). As we progressed along the drainage ditch, we photographed a total of four egg masses and collected GPS coordinates at each location. The egg masses were identified as that of *R. draytonii* based on their size, the time of year, color of the embryos, and a review of all known amphibians in the area. All four egg masses were attached to dead vegetation and resting near the surface of the water, which was approximately 10-20 cm deep (sensu Alvarez et al. 2013a). Following our observations in February 2023, a significant rain event (1.7 cm) occurred, which altered the conditions of the drainage ditch. Follow-up surveys resulted in no observation of *R. draytonii* eggs and

Fig. 2. Larval *Rana draytonii* in a drainage ditch in San Benito County, California, 23 August 2022. Photograph by Shawn Wagoner.

larvae, and we speculate that a pulse flow washed egg masses and larvae outside of the project area.

Our observations suggest that all life history stages of *R. draytonii* can successfully inhabit and oviposit within agricultural drainage ditches. We found *R. draytonii* over a two-year period in all aquatic and terrestrial life stages. We speculate that these life history stages may be supported, at this site, by ephemeral or nearly ephemeral water, relative disturbance free habitat (i.e., adjacent habitat is heavily disturbed but aquatic habitat is consistent), a lack of non-native fish species (i.e., aquatic predators), and other conditions not noted during our brief period of observation. Moreover, our observation of free-swimming larvae suggests that this novel habitat is suitable for development of egg masses and hatching of larvae. Agricultural drainage ditches are subject to sudden, dramatic changes in water flow rates and volume, and likely contain high concentrations of herbicides and pesticides. The potential

Fig. 3. One of four *Rana draytonii* egg masses, in situ, in a drainage ditch in San Benito County, California, 27 February 2023. Photograph by Crecencia Sanchez and Rachel Perpignani.

consequences of these variables should be investigated further, as should the extent to which *R. draytonii* utilize anthropogenic agricultural water features for breeding, and whether this native species shows a preference for natural versus anthropogenic habitats. Investigating these questions will be critical for addressing the conservation needs of *R. draytonii*. Based on these observations of adults, post-metamorphic frogs, larvae, and egg masses, we conclude that sufficient habitat, in the form of an agricultural drainage ditch, is present for *R. draytonii* at this site, and likely at similar sites elsewhere.

Although no accurate or precise data could be found to report the actual number of kilometers of agricultural ditches that occur within the range of *R. draytonii*, we contend that it is tens of thousands of kilometers. We suggest, that occurrence of *R. draytonii* in agricultural landscapes—a novel habitat for breeding, ovipositing, and hatching larvae—may have far reaching implications for the species management. Further, we suggest that agricultural areas in which *R. draytonii* are present extend hydroperiods of agricultural ditches to mid-summer, to the extent practicable. Additional measures may include investigations into modifications to agricultural ditches, such as the placement of small rock piles, willow trees, or portions of logs that do not hinder agricultural needs but create microhabitat in which egg masses and larvae may be sustained during flash flows.

Our observations suggest two distinct management implications: 1) this habitat type may vastly increase potential habitat used by the species for refuge, foraging, and breeding, and 2) surveys that are conducted to determine the demographic status (i.e., presence/lack of presence) should include agricultural ditches that are in the range of *R. draytonii*.

Acknowledgments

We thank the California Department of Transportation for site access. We are grateful to Burleson Consulting, a Terracon Company, and the team at the Monterey office for their support on this project. Thor Anderson offered constructive comments to this manuscript, which benefited its clarity and readability.

Literature Cited

Allaback, M.L., D.M. Laabs, D.S. Keegan, and J.D. Harwayne. 2010. *Rana draytonii* (California red-legged frog). Dispersal. Herpetol. Rev., 41:204.

Alvarez, J.A., D.G. Cook, J.L. Yee, M.G. Hattem, D.R. Fong, and R.N. Fisher. 2013a. Comparative microhabitat characteristics at oviposition sites of the California red-legged frog (*Rana draytonii*). Herpetol. Conserv. Biol., 8:539−551.

———, M.A. Shea, and S.M. Foster. 2013b. *Rana draytonii* (California red-legged frog). Association with Beaver. Herpetol. Rev., 44:127–128.

———, and J.T. Wilcox. 2022. Use of spring boxes by the threatened *Rana draytonii* Baird & Girard, 1852 in California, USA. Herpetol. Notes, 15:383–386.

Cook, D.G., M.R. Jennings. 2007. Microhabitat use of the California red-legged frog and introduced bullfrog in a seasonal marsh. Herpetologica, 63:430–440.

Fisher, R.N., and H.B. Shaffer. 1996. The decline of amphibians in California's Great Central Valley. Conserv. Biol., 10:1387–1397.

Jennings, M.R., and M.P. Hayes. 1994. Amphibian and reptile species of special concern in California. California Department of Fish and Game, iii+255 pp.

Rathbun, G.B. 2012. Water temperatures in a California red-legged frog breeding pond. Immed. Sci. Ecol., 1:7–11.

Reis, D.K. 1999. Habitat characteristics of California red-legged frogs (*Rana aurora draytonii*): ecological differences between eggs, tadpoles, and adults in coastal brackish and freshwater systems. MS Thesis, San Jose State University, San Jose, California, viii+58 pp.

Storer, T.I. 1925. A synopsis of the amphibia of California. Univ. Calif. Publ. Zool., 27:1–342.

Tatarian, P.J. 2008. Movement patterns of California red-legged frogs (*Rana draytonii*) in an inland California environment. Herpetol. Conserv. Biol., 3:155–169.

Thompson, R.C., A.N. Wright, and H.B. Shaffer. 2016. California amphibians and reptile species of special concern. University of California Press, xv+408 pp.

United States Fish and Wildlife Service. 2003. Recovery plan for the California red-legged frog (*Rana aurora draytonii*). United States Fish and Wildlife Service, Portland, Oregon, USA, viii+173 pp.

Wilcox, J.T., M.L. Davies, K.D. Wellstone, and M.F. Keller. 2017. Traditional surveys may underestimate *Rana draytonii* egg masses in perennial stock ponds. Calif. Fish Game, 103:66–71.

Accepted for publication 31 May 2024.