

California Red-legged Frog Response to Pond Restoration

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Abstract

The California Red-legged Frog (*Rana draytonii*) is a threatened species that is declining in its range. Pond restoration and enhancement efforts are tools that can reverse this trend by improving habitat conditions that support recovery goals for the California Red-legged Frog. By removing excess sediment and emergent vegetation at the Garin Newt Pond Wildlife Area the pond's hydroperiod improved, making it successful at supporting native amphibian breeding and larvae survival. Following restoration efforts in 2017, California Red-legged Frog egg masses and tadpoles increased by 99% and 97% respectively. Using a two-sample t-test, comparing the long-term monitoring totals of adult and larvae sampled pre-restoration (2008 to 2017) and post-restoration (2018 to 2019), showed a statistically significant increase in all life stages of California Red-legged Frog. This new site-specific information will inform recovery efforts designed to preserve and manage habitat for this threatened species.



Introduction

The California Red-legged Frog (*Rana draytonii*) was once abundant in central California, but is now considered a threatened species (USFWS 1996). After almost a decade of observing only the occasional presence of adult California Red-legged Frogs at the Garin Newt Pond Wildlife Area, and no evidence of any reproductive output, with the exception of the 2017 season, the East Bay Regional Park District embarked on an effort to improve the site's breeding and larvae survival conditions. This research reports on how the California Red-legged Frog responds to improved pond hydroperiod resulting from the removal of excess sediment and emergent vegetation.

Methods

The study was carried out at the Newt Pond Wildlife Area, which is part of Garin Regional Park, a wildlands area located in Hayward, California. Surveys were conducted for all life stages of the California Red-legged Frog from 2008 to 2019, during the months of January through August, using the U.S. Fish and Wildlife Service California Red-legged Frog habitat assessment and protocol-level survey guidelines (USFWS 2005). Data recorded included all life stages of the California Red-legged Frogs observed, number of individuals observed, and size classes.

The Pond restoration efforts which occurred in 2017 included the removal of 260 cubic yards of sediment and Cattails by use of a long-reach excavator, loader and dump truck (Figure 1. Pond restoration efforts using an excavator and loader). The action was taken to improve the pond's hydroperiod to allow for successful California Red-legged Frog breeding (Figure 2. California Red-legged Frog egg mass at Newt Pond Wildlife Area).

Results

Since restoration effort in the fall of 2017, the California Red-legged Frog population at the Newt Pond Wildlife Area has shown a statistically significant increase in the average number of egg masses ($t = -4.7, df = 10, P = 0.0004$) and the average number of larvae ($t = -5.6, df = 10, P = 0.0001$) (Figure 1). To compare the reproductive output (average number of egg masses and larvae) before (2008-2017) and after (2018-2019) restoration we used a two-sample t-test with $\alpha = 0.05$ for all tests.

Discussion

Excess emergent vegetation is recognized as creating detrimental habitat conditions for California Red-legged Frog reproductive output because it prevents the surface water from reaching suitable temperatures larvae development (Scott, Rathbun, and Tatarian 2013). It is also known that sediment removal actions can create greater seasonal pond depth, thus increasing a sites inundation period during the spring and early summer, and its potential for successful native amphibian development.

Prior to restoration, the Newt Wildlife Area pond was very shallow, choked with Cattails, and did not maintain water throughout the spring and supported a scarce number of adult California Red-legged Frogs (Figure 3). Results indicate the number of California Red-legged Frog egg masses and larvae showed a statistically significant increase two-years following this restorative action (Figure 3), suggesting that regular pond maintenance (sediment and emergent vegetation removal) can be an effective management tool that may benefit this threatened species.

Acknowledgments

Survey efforts and equipment were largely funded by the Regional Parks Foundation, Alameda County Fish and Wildlife Commission, and the California Department of Fish and Wildlife. We would also like to express our sincere gratitude to the following individuals' that helped make this work possible: P Alvarez, P Barale, K Barrington, N Beadle, D Bell, M Clark, J Dorcy, A Dwyer, J Geoghegan, S Gidre, T Groff, N Hector, C High, H High, S High, R Kaufmann, K Kenworthy, S Lockett, C Newell, T Noonan, M Marrow, M Orcutt, H Ormshaw, M Pearson, M Peixoto, B Pinomaki, M Riensche, S Riensche, D Riensche, N Riensche, R Riensche, B Singleton, R Smith, B Surges, M Tinoco, and B Wainwright. This work was conducted in accordance with the terms and conditions of U.S. Fish and Wildlife Service permit #TE-817400-12 and the California Department of Fish and Wildlife permit #SC-2298, California Regional Water Quality Control Board San Francisco Bay Region -CIWQS Reg. Meas. 406893 and CIWQS place ID 825468, USFWS BO Permit No. 08ESMF00-2016-F-2130, VLP Permit No. 2086-2012-001-03, and California Department of Fish and Wildlife-Final Lake or Streambed Alteration Agreement Notification No. 1600-2016-0188-R3.

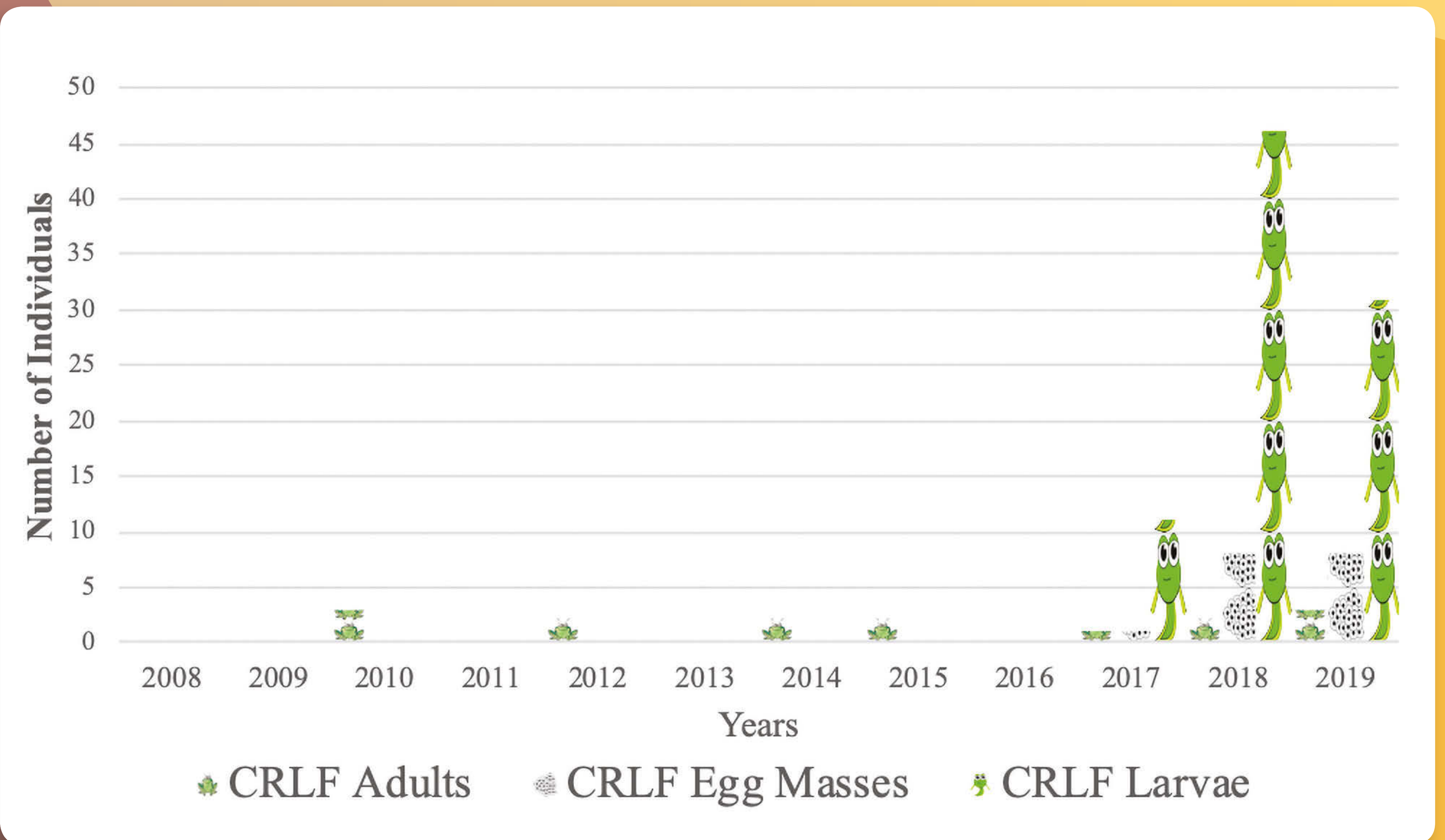


Figure 1. Status of California Red-legged Frog at Newt Pond Wildlife Area. California Red-legged Frog (CRLF) adults, egg masses and larvae at the Newt Pond Wildlife Area in the years following restoration.



California Red-legged Frog.
Photo: D.L. Riensche



Figure 2. Pond restoration efforts using an excavator and Loader. Photo: D. Riensche



Figure 3. California Red-legged Frog egg mass at Newt Pond Wildlife Area.
Photo: D. Riensche