

**San Diego Association of Governments
Ramona Grasslands Preserve Bullfrog Eradication Project
County of San Diego
Final Report
Reporting Period: December 4, 2018 – December 4, 2020
SANDAG Contract Number: 5005507**

Executive Summary

Adult and tadpole arroyo toad (ARTO) were observed within Santa Maria Creek west of Rangeland Road within Ramona Grasslands Preserve (Preserve) during monitoring surveys performed in 2016. Historically, this species is known to breed within Santa Maria Creek on the western areas within the Preserve. These sections of the creek contain high quality habitat; however, ARTO abundance in these areas is less than what has been reported in similar stream systems, and that is likely due to high abundance of bullfrogs. Threat surveys performed in 2016 confirmed bullfrog presence within Santa Maria Creek within the western areas. Also, an individual southwestern pond turtle was observed in 2016 in the western portion of the Preserve. The goal of the project was to enhance the existing ARTO population and increase the potential for a southwestern pond turtle population within Ramona Grasslands Preserve. The objective of the proposed project was to implement a bullfrog eradication program within the Preserve and the treatment ponds on the adjacent Ramona Municipal Water District (RMWD) property.

Prior to beginning the Bullfrog Eradication Program (BEP), a team of qualified herpetologists located bullfrogs and special status herptiles within the western portion of the Preserve and the adjacent RMWD property and added these observations to a Global Positioning System (GPS). Bullfrog eradication surveys began in late January 2019 and continued approximately twice a month through October 2020. The only exception was in the second quarter of 2020 when a stop work order issued by the County of San Diego Department of Parks and Recreation (DPR) on March 20, 2020 in response to Governor Newsom's updated list of essential workers in relation to COVID-19 suspended the field survey effort. The stop work order was lifted in April 2020 and eradication surveys resumed. Eradication efforts were performed in the Santa Maria Creek Pond, Santa Maria Creek, Ramona Grassland Preserve Pond, RMWD Vegetated Pond, and the RMWD Unvegetated Pond.

The BEP was implemented through two arroyo toad (ARTO) breeding seasons. In each year (2019 and 2020) adult ARTOs were observed calling from portions of the Santa Maria Creek. Also, in each year ARTO toadlets were observed within the creek. More than 1,500 bullfrogs were removed from the Santa Maria Creek Pond, Santa Maria Creek, Ramona Grassland Preserve Pond, RMWD Vegetated Pond, and the RMWD Unvegetated Pond. The removal of these potential predators has enhanced the overall viability of the ARTO and southwestern pond turtle habitat within the Preserve. Although it is still recommended that a modified BEP program be implemented on an annual basis within the Preserve and adjacent RMWD property, these additional bullfrog eradication measures will ensure that the Santa Maria Creek corridor will continue to support high quality ARTO breeding and aestivation habitat. Also, continued bullfrog eradication measures will increase the potential for a southwestern pond turtle population within the Preserve.

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Appendix A. Bullfrog Eradication Data by Quarter and Location

Project Background

Arroyo toad (ARTO), a federally endangered species, is found within Ramona Grasslands Preserve (Preserve). During 2016 monitoring surveys, adult, and tadpole ARTO were observed within Santa Maria Creek west of Rangeland Road within the western portions of the Preserve. In addition, an individual southwestern pond turtle was observed in 2016 in the western portion of the Preserve. Adult and juvenile bullfrogs have been observed in Santa Maria Creek west of Rangeland Road and in the treatment ponds on the adjacent Ramona Municipal Water District (RMWD) Property. Bullfrogs have been known to eat juvenile and adult ARTO and juvenile southwestern pond turtles. The presence of adult and juvenile bullfrogs reduces the chances of a viable population of ARTO and southwestern pond turtles within the Preserve.

The Bullfrog Eradication Project proposes to implement a bullfrog eradication program within the Preserve including Santa Maria Creek west of Rangeland Road and within the two treatment ponds on RMWD property in between the northwest and southwest portions of the Preserve (Figure 1). Arroyo toad is an SDMMMP (San Diego Management and Monitoring Program) Management and Monitoring Strategic Plan (MSP; SDMMMP 2017) category SO (Significant occurrence(s) at risk of loss from MSPA [Management Strategic Plan Area]) species and the purpose of the project was to increase the viability of the existing ARTO population within the Preserve. Also, southwestern pond turtle, an MSP category SL (Species at risk of loss from MSPA) species, has been observed in the Preserve and will also benefit from removal of bullfrogs.

Project Goals

The goal of the project was to enhance the existing ARTO population and increase the potential for a southwestern pond turtle population within Ramona Grasslands Preserve. The objective of the proposed project was to implement a bullfrog eradication program within the Preserve and the treatment ponds on the adjacent Ramona Municipal Water District (RMWD) property.

The expected result of the project was quantification of bullfrogs and special-status herptiles within the western portion of the Preserve and adjacent RMWD property before and after the bullfrog eradication efforts are completed to ascertain the effectiveness of the bullfrog removal efforts.

Work Performed by Task

Task 1- Pre-eradication Bullfrog and Special-Status Herptiles Survey

Budget: \$4,080.00

Spent: \$4,080.00

Match for Task: N/A

Prior to beginning the Bullfrog Eradication Program (BEP), a team of qualified herpetologists located bullfrogs and special status herptiles within the western portion of the Preserve and adjacent RMWD property and added these observations to a Global Positioning System (GPS) (Figure 2). The areas where special status herptiles were observed included portions of the Ramona Grasslands Preserve and the adjacent RMWD property. The focus of the pre-eradication surveys was to review historic bullfrog observations, to determine where potential habitat occurs within the western portion of the Preserve and adjacent RMWD property and to test eradication equipment tools. During these surveys when bullfrogs were observed, and easily accessible surveyors attempted to eradicate them, but this was not the primary purpose of these surveys. This task was completed during the second quarter of the project. Due to the timing of the pre-eradication surveys which was outside of the active breeding season for bullfrog and

arroyo toad it was not possible to determine baseline population number for both species. The focus of the pre-eradication surveys was to concentrate on overall habitat conditions and to determine where bullfrogs and ARTO were likely to occur within the creek corridor. However, the BEP was performed during two ARTO breeding seasons and on-site ARTO population size estimates were made at that time.

Task 2- Bullfrog Eradication Program

Budget: \$68,379.47

Spent: \$67,581.14

Match for Task: N/A

Bullfrog eradication surveys began in late January 2019 and continued approximately twice a month through October 2020 by qualified biologists. The only exception was in the second quarter of 2020 when a stop work order issued by the County of San Diego Department of Parks and Recreation (DPR) on March 20, 2020 in response to Governor Newsom's updated list of essential workers in relation to COVID-19 suspended field survey efforts. The stop work order was lifted in April 2020 and eradication surveys resumed. Surveys were conducted in the Santa Maria Creek Pond, Santa Maria Creek, Ramona Grasslands Preserve Pond, RMWD Vegetated Pond, and the RMWD Unvegetated Pond (Figure 3). In general nighttime surveys concentrated on the removal of adult bullfrogs and daytime surveys were conducted to remove juveniles/tadpoles.

Observations of bullfrog locations were taken using a GPS unit. Information collected during the surveys included species observed or heard, and in the case of bullfrogs, if the individuals were removed. The number of adult bullfrogs seen during the surveys and the number that were eradicated were recorded. Table 1 details the number of adult and juvenile/tadpole bullfrogs eradicated per quarter. The final quarter of the project only included one month of data (October 2020). Adult and juvenile/tadpole bullfrogs eradicated in each survey area within the Preserve and adjacent RMWD property is detailed in Appendix A.

Table 1. Bullfrogs Eradicated

	Adults Eradicated	Juvenile -Tadpoles Eradicated
2019		
Y1Q2	19	0
Y1Q3	27	0
Y1Q4	14	150
Y2Q1	3	190
2020		
Y2Q2	2	26
Y2Q3	16	71
Y2Q4	11	1,000
Y3Q1	8	16
Total	100	1,453



Photograph 1. Tadpole Eradication (September 2020)



Photograph 2. Juvenile Bullfrog Eradicated with Gig (November 2019)



Photograph 3. Small Swale in Santa Maria Creek Occupied by Bullfrog Tadpoles (September 2020)



Photograph 4. Bullfrog Eradicated (January 2019)



Photograph 5. Bullfrog Eradicated (February 2019)



Photograph 6. Adult Arroyo Toad (March 2019)

Task 3-Monitoring and Evaluation

Budget: \$4,576.96

Spent: \$5,230.29

Match for Task: N/A

The bullfrog eradication effort was performed through two ARTO breeding seasons. In each year (2019 and 2020) adult ARTOs were observed calling from portions of the Santa Maria Creek (Figure 4). Also, in each year, ARTO toadlets were observed within the creek. The Preserve ARTO population on a whole appeared to be stable from 2019 to 2020 during and after bullfrog eradication efforts. Calling in each year was observed in the same general locations (Figure 4). However, detection of toadlet concentrations was visually harder to assess in 2020 as overall vegetative cover was dense throughout the entire Santa Maria Creek corridor. It is assumed that 2020 ARTO reproduction was similar or possibly slightly lower than 2019. If it was lower, this was likely due to differences in hydrology as precipitation was higher in 2019 compared to 2020. The 2019 rainy season was unusual in that breeding conditions were supported in the creek from March through June. The observed breeding season in 2020 was from April through May.

As detailed in Table 2 more than 1,500 bullfrogs were removed from the Santa Maria Creek Pond, Santa Maria Creek, Ramona Grasslands Preserve Pond, and the adjacent RMWD treatment ponds. The Preserve adult ARTO population is approximately 40-50 individuals (Table 2). This estimate is based off direct observations of calling males in 2019 and 2020, detection of females during each breeding season, and observations of ARTO individuals within aestivation habitat adjacent to the on-site breeding habitat. Overall habitat suitability for ARTO throughout the Preserve portions of Santa Maria Creek are detailed in Figure 4. On site suitable habitat for ARTO is comprised of open sandy areas, where low flowing portions of the creek occur. Aestivation areas occur adjacent to the creek and include large, sandy area with low overall vegetative cover.

Table 2. Arroyo Toad Observations and Bullfrog Observation by Year

	Bullfrog Adults Eradicated	Bullfrog Juvenile - Tadpoles Eradicated	ARTO Observations	ARTO Toadlets Concentrations
2019				
	63	340	45*	5
2020				
	37	1,113	45*	3
Total	100	1,453	90	8
*= 45 is the mid-point for a range of 40-50 individuals. In 2019 and 2020 direct observations of ARTO likely included redundant direct observation of the same individuals during different surveys. These numbers are estimates of the total breeding population observed during the eradication surveys that were conducted during the ARTO breeding season.				

Task 4- Reporting (Year 1 Q2, Q3, and Q4 and Year 2 Q1, Q2, Q3 and Q4 and Final Report)

Budget: \$2,963.57

Spent: \$2,896.19

Match for Task: N/A

County of San Diego Department of Parks and Recreation consultant prepared progress reports on a quarterly basis to document pre-eradication surveys and bullfrog eradication efforts. A quarterly report was not submitted the first quarter of Year 1 of the project because there were no charges to the project. In June 2020 the grant was extended for an additional six months, so a total of seven quarterly reports were prepared during the grant term.

Conclusions

The bullfrog eradication effort in 2019 and 2020 was successful by removing more than 1,500 bullfrog adults, tadpoles, and juveniles from the Project Area (Santa Maria Creek Pond, Santa Maria Creek, Ramona Grasslands Preserve Pond, and RMWD treatment ponds). The project implemented monthly bullfrog eradication surveys starting in January 2019 and ending in October 2020. These surveys documented both bullfrogs and breeding ARTO within portions of the Santa Maria Creek. Based on the project goals, the project was successful because it has enhanced overall habitat quality for both ARTO and southwestern pond turtle by reducing the potential threat of predation by removing more than 1,500 bullfrogs. Although successful, implementation of a long-term bullfrog eradication program within both the Santa Maria Creek portion of the Preserve and the adjacent treatment ponds on RMWD property is recommended. Active adult bullfrog eradication surveys should be implemented in February and March annually prior to the ARTO breeding season. An additional tadpole removal survey is recommended to occur annually in October.

Overall, the Santa Maria Creek corridor contains high quality habitat for ARTO breeding and aestivation. Due to the proximity of the creek to the RMWD treatment ponds it is recommended that management of the Preserve ARTO habitat should include an annual bullfrog eradication component as discussed above. The removal of bullfrog adults, juveniles and tadpoles will ultimately reduce the threat of predation on the ARTO population within Santa Maria Creek and will ensure the Santa Maria Creek corridor maintains high quality breeding and aestivation habitat for ARTO. Also, continued bullfrog eradication measures will increase the potential for a southwestern pond turtle population within the Preserve.

References

ICF International Inc. 2016. CMP Resource-Specific Monitoring 2016 annual report. Prepared for: County of San Diego Department of Parks and Recreation.

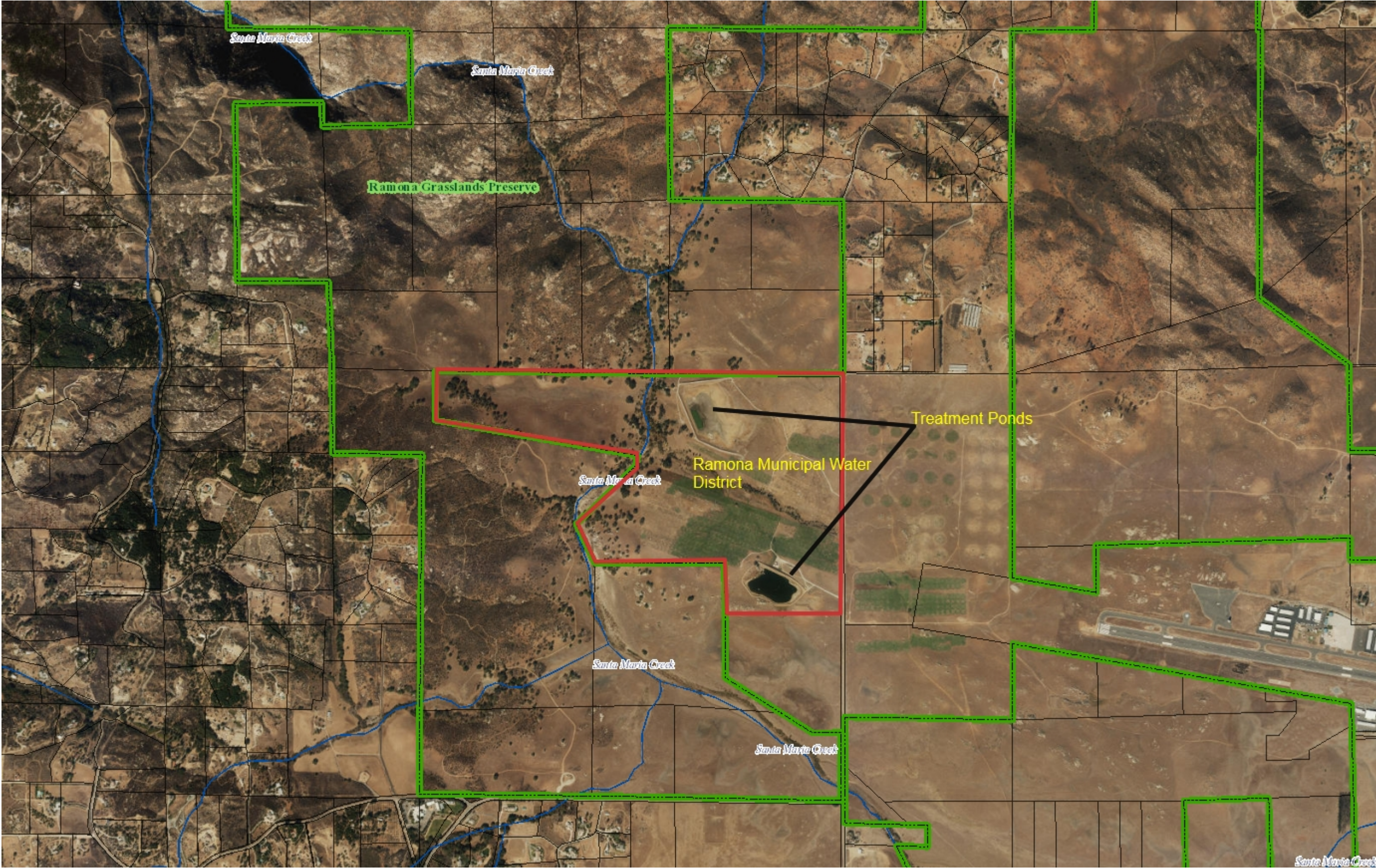
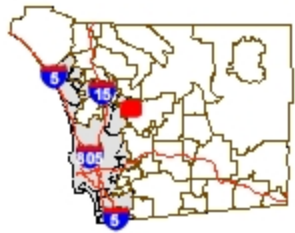
San Diego Management and Monitoring Program (SDMMP). 2017. Management and Monitoring Strategic Plan for Conserved Lands in Western San Diego County: *A Strategic Habitat Conservation Roadmap*. Prepared by: San Diego Management and Monitoring Program (SDMMP) and The Nature Conservancy.

Appendix A. Bullfrog Eradication Data by Quarter and Location

[illegible]

Total 2019 Juveniles =	340													
Total 2020 Adults =	37													
Total 2020 Juveniles =	1,113													

Figure1. Ramona Grasslands Preserve and Ramona Municipal Water District Property



- Legend**
- DPR Owned and Managed Lands
 - Blue Line Streams**
 - Stream/River
 - Connector
 - Artificial Path
 - Canal/Ditch
 - Pipeline
 - Parcels

1: 21,169



0.7 0 0.33 0.7 Miles

WGS_1984_Web_Mercator_Auxiliary_Sphere
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This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.
THIS MAP IS NOT TO BE USED FOR NAVIGATION

Notes

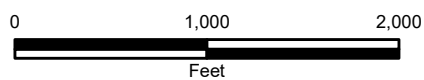
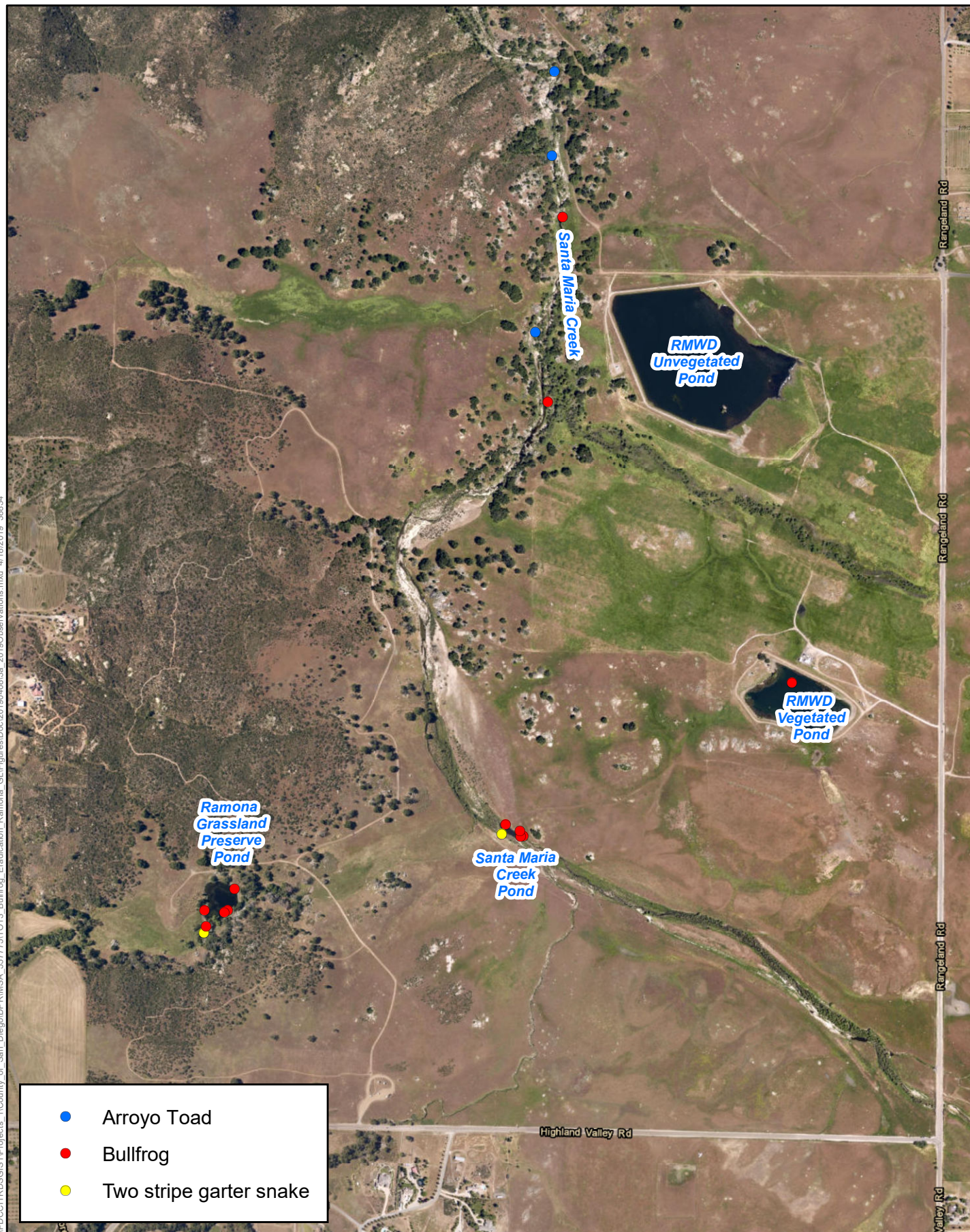


Figure 2
2019 Species Observations
Bullfrog Eradication Project

