

CALIFORNIA RED-LEGGED FROG SURVEY REPORT & RELOCATION PLAN

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1.0 INTRODUCTION

The Giant Reed (*Arundo donax*) Removal Project (Project) is one component of the larger Matilija Dam Ecosystem Restoration Project. During vegetation surveys for the Project in February of 2007, the federally threatened California red-legged frog (*Rana aurora draytonii*) was observed in Reaches 7A and 7B; two small sub-adults were seen in Reach 7A and two egg masses were observed in 7B. Prior to the start of this project the California red-legged frog had only been detected three times between 1999 and 2000 in the Matilija Creek drainage. This species was included in the U. S. Fish and Wildlife Service (USFWS) biological opinion issued for the Matilija Dam removal project (USFWS 2005a), however, take for the entire dam project is limited to ten individuals. Discussions with agency personnel Chris Dellith, from USFWS, and Pam Lindsey, from the Watershed Protection District, on March 23, 2007, resulted in the USFWS recommending additional nighttime surveys, as it appeared from preliminary daytime surveys that population estimates for this drainage had been underestimated. This information would then be used to determine the best protection measures for this species during the upcoming giant reed removal project which is currently scheduled to begin in September of this year.

1.1 Project Area

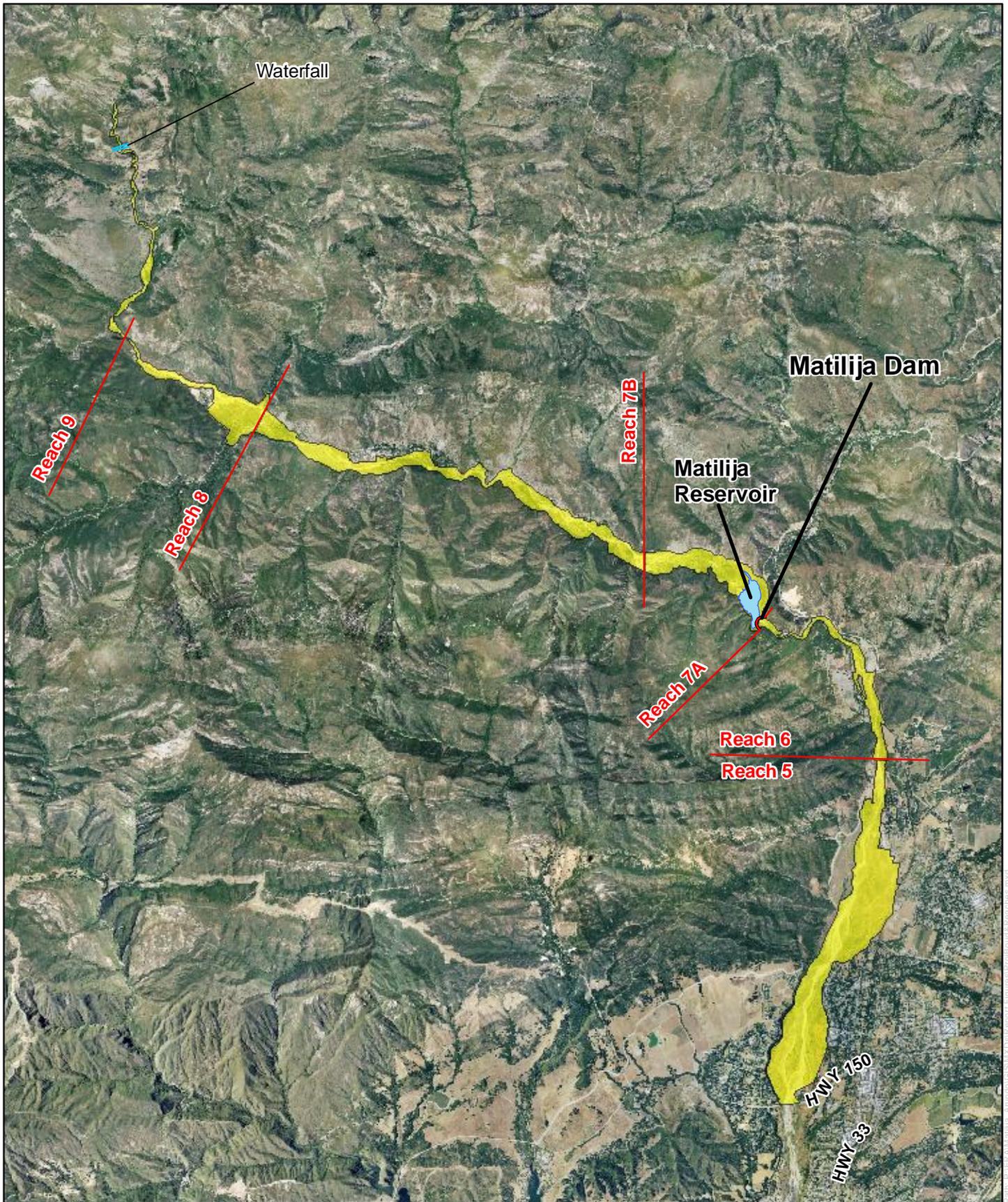
The project area includes the floodplain of Matilija Creek and the Ventura River. Matilija Creek and the Ventura River were divided into a series of reaches for the EIS/EIR for the Matilija Dam Ecosystem Restoration Project, with Reach 1 beginning at the Ventura River Estuary and Reach 9 extending into the upper Matilija Creek watershed. This Project's area includes Reaches 5 through 9 with Reach 7 split into two sections: Reaches 7A and 7B (Figure 1). The project area comprises approximately 1,274 acres and 14.9 river miles. The limits of the project area begin at Highway 150 and extend upstream approximately 15 miles ending approximately 2,000 feet past the falls.

The Project Reaches are defined as follows:

- Reach 5: Highway 150 Bridge to the upstream end of Robles Diversion Facilities, approximately 3.3 river miles.
- Reach 6: Robles Diversion to the Matilija Dam; approximately 2.1 river miles.
- Reach 7A: Matilija Reservoir from the dam upstream approximately 1.3 river miles.
- Reach 7B: Begins approximately 1.3 river miles from the Matilija Reservoir dam and extends approximately 4 river miles upstream.
- Reach 8: Begins approximately 5.3 river miles upstream of the Matilija Reservoir dam and continues approximately 1.6 river miles upstream to the confluence of Old Man Creek and Matilija Creek.
- Reach 9: Begins at the confluence of Old Man Creek and Matilija Creek and continues approximately 2.6 river miles upstream.

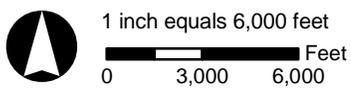
2.0 CALIFORNIA RED-LEGGED FROG SURVEYS

During vegetation surveys in February and March of 2007, habitat assessments for California red-legged frogs were completed. Suitable habitat for California red-legged frogs (Figures 2a, 2b, 2c, and 2d) was observed in all reaches except Reach 5, which is generally lower gradient, shallow, and was dry at the time of surveys. In order to minimize the potential of any impacts to California red-legged frogs during this project, surveys were conducted to locate California red-legged frogs, find appropriate sites for relocation, and to identify any other species of concern in the project area. Night surveys for California red-legged frogs were conducted in April and May of 2007, in Reaches 6, 7A, and 7B where the densest giant reed occurs and where impacts to the California red-legged frog, if any, are most likely to occur. Suitable habitat is also present in Reaches 8 and 9 but night surveys were not conducted. The concentration of giant reed is low in Reaches 8 and 9 and because most work in these two reaches would be completed by hand, any potential impacts to California red-legged frogs would be significantly minimized.



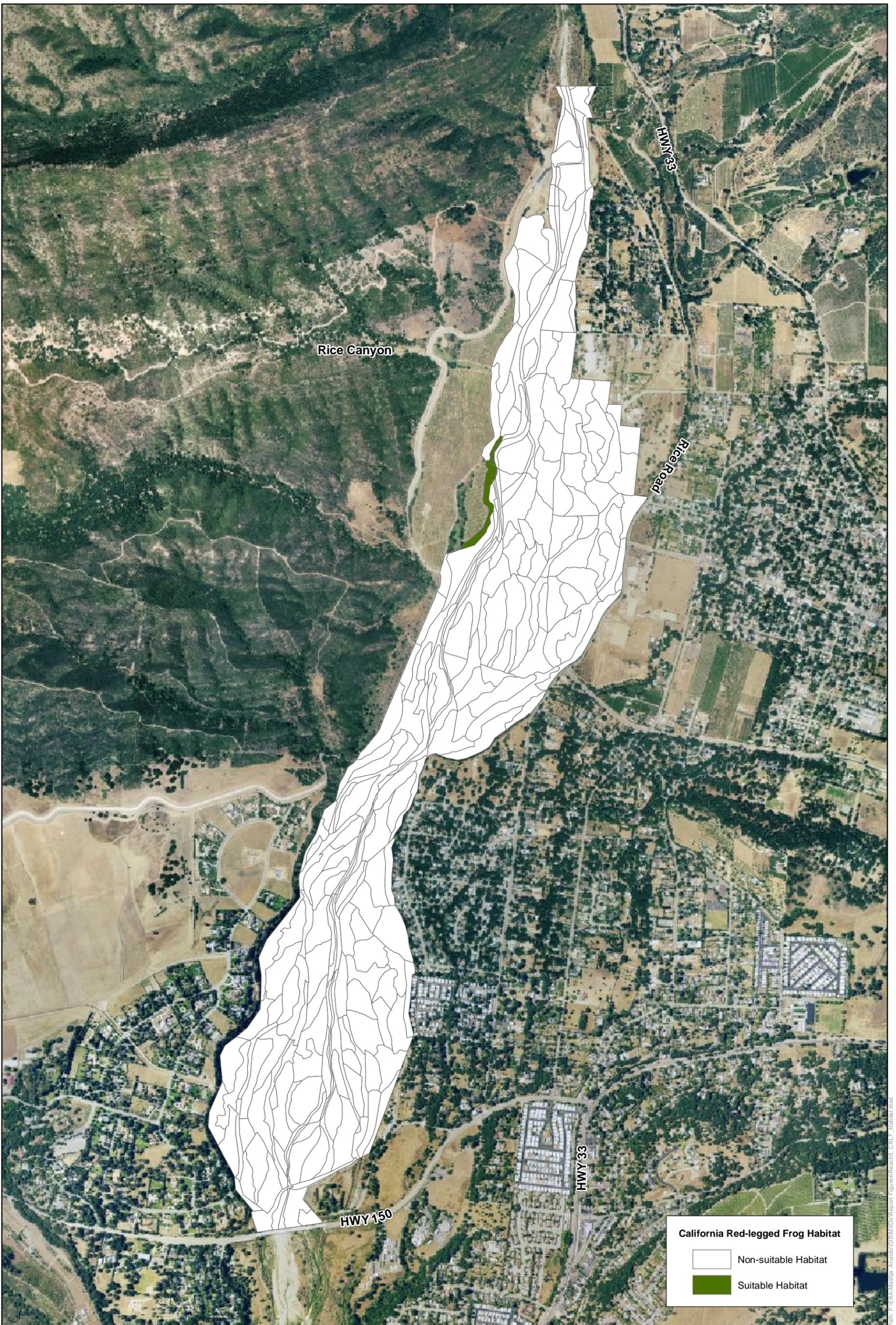
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Source: AirPhoto USA 2005



Project Boundary

Figure 1



Source: AirPhoto USA 2005

1 inch equals 1,200 feet

0 300 600 1,200 Feet

Reach 5 California Red-legged Frog Habitat Map



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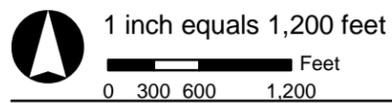
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1 inch equals 1,000 feet
 0 250 500 1,000 Feet

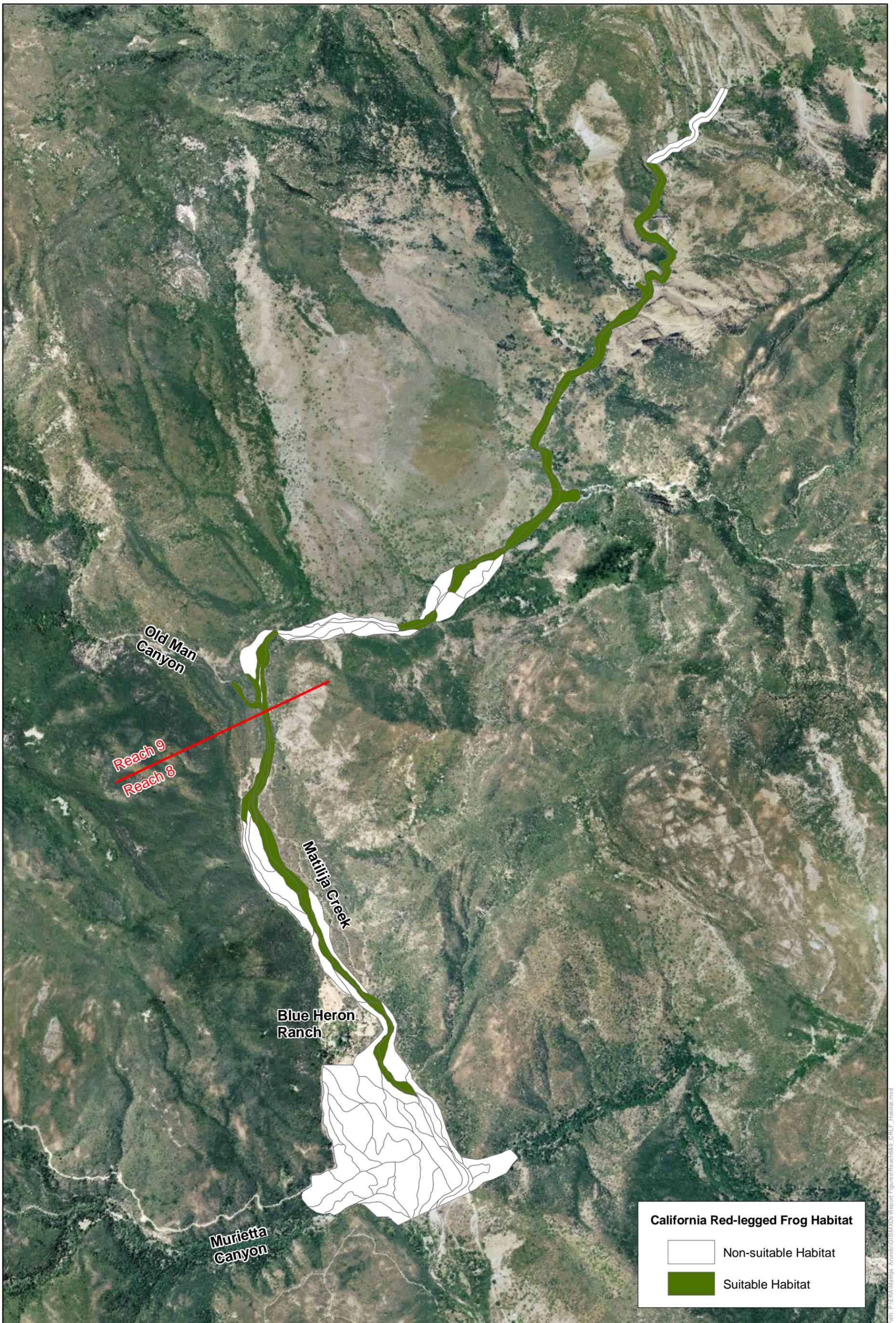
Reach 6 and 7A California Red-legged Frog Habitat Map



Source: AirPhoto USA 2005



Reach 7B California Red-legged Frog Habitat Map



Source: AirPhoto USA 2005

1 inch equals 1,200 feet

0 300 600 1,200 Feet

Reach 8 and 9 California Red-legged Frog Habitat Map

2.1 Methodology

Focused nighttime surveys to estimate the population and distribution of California red-legged frogs were conducted from approximately one half hour after sunset to midnight during the weeks of April 16, 2007, April 23, 2007, and May 7, 2007. Dipnets, flashlights, headlamps, and binoculars were used to identify amphibians while walking quietly through the stream and looking under banks, boulders, and vegetation as described in the survey methodology of the Revised Guidance On site Assessments and Field Surveys for the California Red-legged Frog (USFWS 2005b). Reaches 6, 7A, and 7B were carefully searched throughout these weeks. Reaches 6 and 7A were each surveyed twice. Most of 7B was surveyed once, but the upper portion of Reach 7B where the highest density of California red-legged frogs (the upper limit of our surveys) was observed, was surveyed twice to get an accurate population estimate.

The primary researcher conducting these surveys was Russell Smith in accordance with his current 10(a) 1(A) permit (TE- 99265-0) for California red-legged frog surveys in Southern California. Surveys were conducted by EcoSystems Restoration Associates biologists, Julie Niceswanger, Brian Woodward, Tito Marchant and Nicole Shorey. Two surveys were conducted without Mr. Smith, one in Reach 6 and one in Reach 7B. When Mr. Smith was not present only passive means of identification were used. Amphibians were identified by walking slowly up to an animal and identifying individuals to species by sight; without capture if the animal was sedentary or capturing by hand or with a net if necessary for identification. Larvae were also captured by hand or net to verify identification.

2.2 Results

Surveys detected a total of 100 California red-legged frogs upstream of the Matilija Reservoir in Reach 7B. California red-legged frog observations began approximately 1.14 miles upstream of the reservoir and continued along an approximately 2.8 mile stretch (Figures 3a and 3b). Reaches 6 and 7A were heavily infested with adult, sub-adult, and larval bullfrogs (*Rana catesbiana*) and red swamp crayfish (*Procambarus clarkii*) which likely preclude the presence of California red-legged frogs. Surveyors removed bullfrogs when they were encountered in each of these reaches. This likely had little impact on the bullfrog population in Reach 7A because of the high numbers associated with the reservoir. Fewer bullfrogs and red swamp crayfish were encountered as surveyors proceeded upstream of the reservoir. As surveyors continued upstream from 7A into 7B the removal of individual adult bullfrogs in isolated pools and pools that also contained California red-legged frogs was likely highly beneficial and important for protecting the California red-legged frog population. Table 1 summarizes the survey results and conditions.

Reach 6

Night surveys were conducted in this reach on April 17 and 24, 2007. Surveys began at the paved bridge on Camino Cielo Street (depicted in Figure 3a), continued past the confluence of Matilija Creek and the Ventura River, and ended near the private hotel close to the base of the dam. Surveys also included the large pond at the base of the reservoir where some of the largest adult bullfrogs were observed. Numerous red swamp crayfish and bullfrog larvae were observed in this reach as well as green sunfish (*Lepomis cyanellus*) and adult bullfrogs. No California red-legged frogs at any life stage were observed in this reach.

Reach 7A

Night surveys were conducted in this reach on April 16 and 25, 2007, and May 7, 2007. Surveys began near the drainage of Rattlesnake Creek where the giant reed forms a tunnel down to Matilija Creek (depicted in Figure 3a). Surveyors walked downstream to the reservoir and then backtracked and continued upstream past the tunnel. No California red-legged frogs were located in this section of Reach 7A during night surveys however, two, small sub-adult California red-legged frogs were observed during daytime vegetation surveys in February 2007 (depicted in Figure 3a). The area surveyed had numerous bullfrogs of all life stages. Red swap crayfish were also abundant in this reach. Pacific treefrogs (*Hyla regilla*) and California treefrogs (*Hyla cadaverina*) were observed.



Daytime Incidental Observations:
2 CRLF
Observed on: 2/6/2007

Giant Reed Tunnel
(not to scale)

Matilija Dam

Matilija Reservoir

Reach 7A
Reach 6

Ojai Quarry

Paved Bridge
(not to scale)

HWY 33

California Red-legged Frog Survey

- California Red-legged Frog
- Western Pond Turtle
- Project Boundary

1 inch equals 1,000 feet
0 250 500 1,000 Feet

Source: AirPhoto USA 2005

Reach 6 and 7A
California Red-legged Frog Survey Results



1 inch equals 1,200 feet
 0 300 600 1,200 Feet

Source: AirPhoto USA 2005

Reach 7B
 California Red-legged Frog Survey Results

Reach 7B

Night surveys were conducted on April 18, 26, and 27, 2007, and May 7, 8, and 9, 2007. One hundred California red-legged frogs were observed throughout this reach and occur in the highest density at the uppermost surveyed area. It is interesting to note that bullfrogs and red swamp crayfish decreased as surveyors progressed upstream from Reach 7A and both completely disappeared past the active hot springs. California red-legged frog eggs were observed in the upper portion of this reach in February 2007, and California red-legged frog larvae were observed during the current surveys in several areas along the reach. Fifteen western pond turtles (*Clemmys marmorata*) and three two-striped garter snakes (*Thamnopsis hammondi*) were observed in this reach.

Table 1 Survey Results Summarized by Reach

Reach	Survey Date	Personnel	Start/End Temps. (°F) and Weather	Distance Surveyed	CRLF Present	Other Sensitive Species	Non-native Species
6	4/17/07	R. Smith, J. Niceswanger, B. Woodward	56/50 Wind 1-3 mph 100% cloudy	Approx. 0.5 mile	none	none	Dense crayfish population +bullfrogs.
6	4/24/07	J. Niceswanger, T. Marchant	64/62 Calm Clear Sky	Approx. 0.4 mile	none	none	Dense crayfish population +bullfrogs.
7A	4/16/07	R. Smith, J. Niceswanger, B. Woodward	55/49 Calm Clear Sky	Approx 0.45 mile	no night observations; 2 incidental daytime observations	none	Bullfrogs, crayfish present.
7A	4/25/07	R. Smith, J. Niceswanger	70/65 Calm Clear Sky	Approx. 0.45 mile	none	none	Bullfrogs, crayfish present.
Upper 7A to lower 7B	5/7/07	R. Smith, J. Niceswanger	72/62 Calm Clear Sky	Approx. 0.9 mile	4 CRLF in lower 7b	4 western pond turtles	Bullfrogs, crayfish present.
7B	5/8/07	R. Smith, J. Niceswanger	75/65 Wind 1-3 mph Clear Sky	Approx. 1.0 mile	16 CRLF+ CRLF Larvae	8 western pond turtles, 1 two- striped garter snake	Fewer bullfrogs, crayfish.
7B	5/9/07	R. Smith, J. Niceswanger	70/68 Wind 1-3 Clear Sky	Approx. 0.5 mile	12 CRLF	3 western pond turtles	Bullfrogs, crayfish absent.
7B	4/18/07	J. Niceswanger, B. Woodward	54/48 Wind 1-8 mph Clear Sky	Approx. 0.4 mile	17 CRLF	none	Bullfrogs, crayfish absent.
7B	4/26/07	R. Smith, J. Niceswanger, N. Shorey	68/64 Calm Clear Sky	Approx. 0.22 mile	37 CRLF + CRLF Larvae	none	Bullfrogs, crayfish absent.
7B	4/27/07	R. Smith, J. Niceswanger	80/68 Calm Clear Sky	Approx. 0.33 mile	31 CRLF + CRLF Larvae	3 western pond turtles, 2 two- striped garter snakes	Bullfrogs, crayfish absent.

CRLF = California red-legged frog

3.0 PROPOSED MITIGATION MEASURES

The Giant Reed Removal Plan (EcoSystems Restoration Associates 2007) outlines specific protection measures in the Best Management Practices and Mitigation Measures section to prevent and reduce impacts to California red-legged frogs during the giant reed removal activities. The primary emphasis for the California red-legged frog population in Matilija Creek during project implementation should focus on protecting frogs *in situ* by making adjustments to the treatment modalities for the giant reed and other target invasive species near occupied pools. It is preferable to leave individual frogs in their natural habitat and moving any California red-legged frogs should be considered only as the last alternative. However, with our current information on the distribution of California red-legged frogs in the project area, it may be necessary to move individuals out of harms way where they are within high density areas of giant reed infestation particularly, within Reach 7A and the lower portion of Reach 7B. The following sections outline thresholds for defining when CRLF should be relocated and describe our recommended relocation method when all other protection measures have been exhausted.

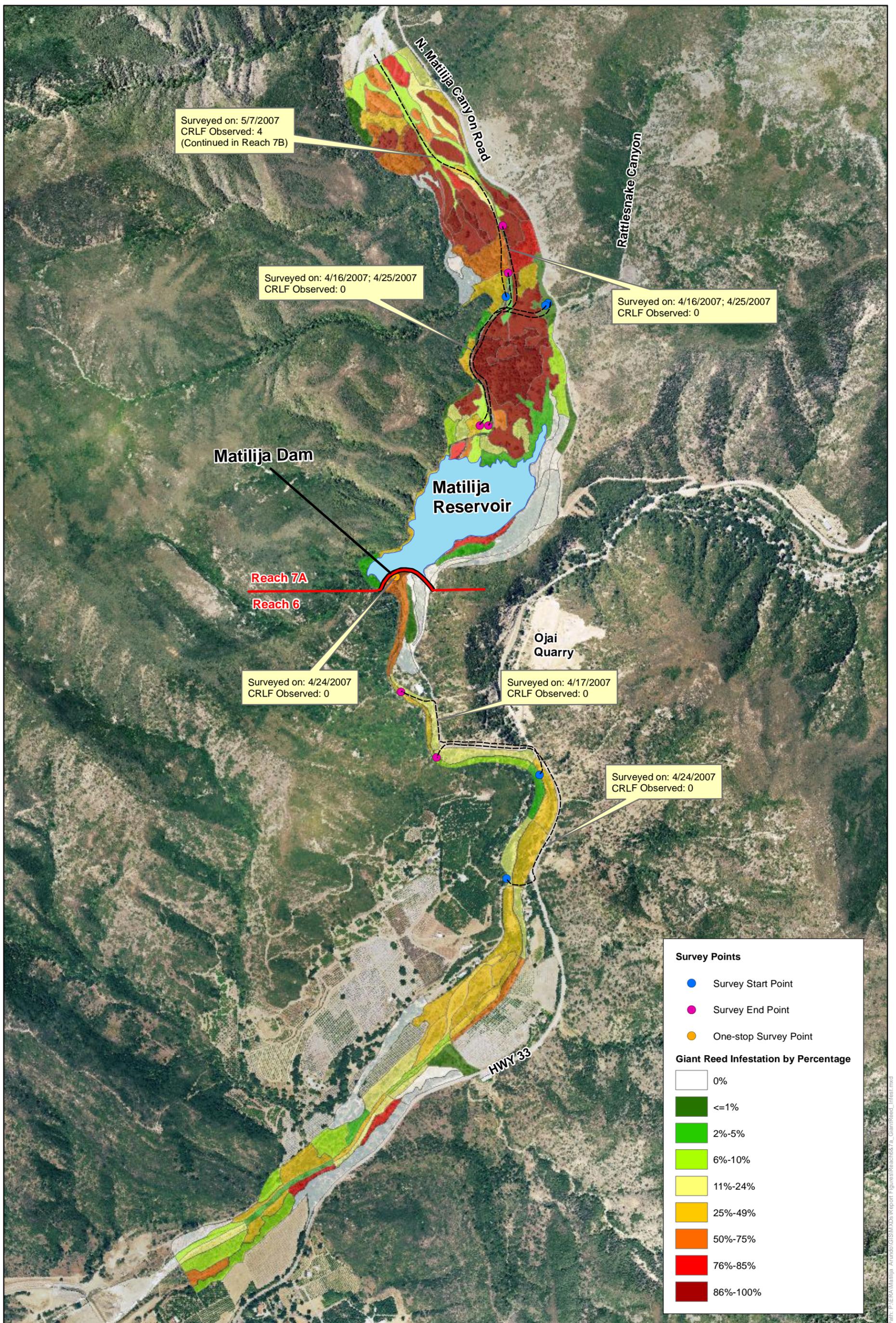
3.1 Threshold Approach for Evaluating Occupied Pools

The first step is to evaluate the level of infestation of the targeted invasive species relative to the known locations of occupied California red-legged frog pools. Occupied California red-legged frog pools in areas with giant reed infestation rates between 25 and 49 percent should be evaluated in the field to determine how close giant reed is to the occupied pools and what protection methods are possible during work activities. Figures 4a and 4b depict the giant reed infestation rates relative to the areas surveyed for California red-legged frogs. Based on this evaluation Reaches 7A and the lower portion of 7B have the highest densities of giant reed near occupied California red-legged frog pools.

It is important to protect the occupied pools and the immediate area around the pools to prevent impacts to California red-legged frogs during project activities. We know from previous studies that during dry periods California red-legged frogs tend to stay close to water (USFWS 2002). Research in Santa Cruz County found that most frogs within the study were non-migrating and always remained within 426 feet of their aquatic residence; and over half of these individuals always stayed within 82 feet of water (Bulger 2003). Additional research in San Luis Obispo County had similar observations finding that radio tracked California red-legged frogs stayed close to water and never strayed more than 85 feet into upland vegetation (Rathburn et al. 1993). In conversations with Russell Smith (personal communication 2007) about his study in East Las Virgenes Creek in Ventura County, he found that individual frogs remained relatively sedentary as well; and the furthest movement away from the stream was approximately 30 feet. Project activities are currently scheduled for September; typically a dry month in Central California. Based on observations from previous studies we should anticipate that California red-legged frogs in the Matilija Creek drainage are likely remaining close to water.

There are several issues regarding the treatment of giant reed within the occupied California red-legged frog habitat in Reach 7B. Giant reed occurs in densities reaching 100% coverage and requires intensive efforts to treat (spray with herbicide) or remove. In addition to the high density, its relative abundance around the immediate shoreline of occupied pools makes it difficult to avoid impacts to the pools. Of particular concern with this entire effort is the ability of giant reed to regenerate vegetatively, both from underground rhizomes and from broken stems. This makes it extremely important to treat all of the giant reed or the risk of re-infestation is very high. Because all of the giant reed must be treated, leaving a buffer area around pools to protect frogs during project activities is not an acceptable alternative as it would leave giant reed that would essentially re-infest the project site. Therefore we recommend relocating California red-legged frogs from occupied pools under the following circumstances:

- a) if giant reed grows up to the immediate edge of occupied California red-legged frog pools and would require ground disturbance within 30 feet of the pool edge,
- b) if any spray treatment methods could result in overspray into the water, or
- c) if heavy equipment or flail mower use is planned within 30 feet of occupied pools.



Source: AirPhoto USA 2005

1 inch equals 1,000 feet
0 250 500 1,000 Feet

Reach 6 and 7A
Giant Reed Infestation and CRLF Surveyed Areas

Figure 4a

3.2 California Red-Legged Frog Relocation Plan

If impacts to the immediate area around pools occupied by California red-legged frogs can be avoided during the giant reed removal process then the frogs should be left in their native pools. However, it may not be possible to avoid any potential impacts to the immediate areas around California red-legged frog pools in some areas because giant reed is contiguous with the edge of the pools and the intensity of effort, i.e. spraying herbicide, mowing, or heavy equipment use, may preclude protecting pools to a degree to prevent harm to California red-legged frogs. In areas where the giant reed is dense and continues down to the immediate shoreline California red-legged frogs could be impacted by removal activities and we recommend moving them to the nearest ecologically suitable habitat prior to project activities to avoid harm or injury. Relocation areas should be identified prior to the start of project activities to assure that only areas that are suitable and provide adequate cover are considered. Figure 3b depicts our two recommended relocation areas and a description is provided below.

The densest infestations of giant reed within areas occupied by California red-legged frogs are in Reaches 7A and the lower portion of 7B. Night surveys observed approximately 20 California red-legged frogs in the lower portion of Reach 7B (below the hot springs) where there is the highest potential for impacts to occupied pools from project activities. Two California red-legged frogs were seen during daytime surveys in Reach 7A. However, these individuals were not relocated during night surveys. Some of the pools in the lower portion of Reach 7B are isolated and are distant enough from the giant reed infestation and possibly from the removal activities to offer safe refuge for California red-legged frogs left in place. An assessment of the density of giant reed and the project activities associated with each occupied pool in the lower portion of Reach 7B should be conducted to determine if project activities can be modified to protect occupied pools or if relocation of individual frogs is necessary. Reach 7A should be surveyed prior to project activities to locate any California red-legged frogs that may have moved into the area. Currently, the USFWS take limit for impacts to California red-legged frogs caused by project activities is ten individuals. If additional precautions, which could include relocating frogs, are not implemented in the lower portions of Reach 7B the take limit would likely be exceeded.

Reach 7A area is heavily occupied by bullfrogs which are known to carry the Chytrid fungus. Several bullfrogs and one California red-legged frog were sampled by staff of the U.S. Geological Survey for Chytrid fungus in March of 2007. All samples tested negative. This result allows for California red-legged frogs captured within the drainage to be moved upstream without infecting the resident population. However, because the density of bullfrogs is substantial in Reach 7A extra precautions should be taken if any California red-legged frogs are found in this reach. Any California red-legged frogs that need to be removed from Reach 7A should be taken to a USFWS-approved quarantine site and tested for Chytrid fungus before being released.

3.2.1 Recommended Relocation Areas

The upper portion of Reach 7B has much lower densities of giant reed. Additionally, the giant reed typically occurs further from the shoreline and away from occupied California red-legged frog pools. Night surveys identified approximately 80 California red-legged frogs in pools within the upper portion of Reach 7B. Occupied pools in this portion of Reach 7B should be adequately protected if all the proposed best management practices and mitigation measures from the Matilija Dam Giant Reed Removal Plan are implemented during project activities.

We have identified an area in the upstream portion of Reach 7B as a potential relocation area. This segment of Reach 7B has adequate cover, adequate pools, currently supports California red-legged frogs, and is close to the potentially impacted area of the lower section of Reach 7B to be suitable for the relocation of individual frogs. Additional areas in a side channel of Reach 8 also appear to have adequate pools, cover, and prey resources to support the relocation of frogs however, night surveys were not conducted in Reach 8 to determine if it was currently occupied by California red-legged frogs. Figure 3b depicts the potential relocation areas in Reach 7B and Reach 8.

It is important to recognize that although California red-legged frogs tend to stay within localized areas, particularly in the dryer seasons, they have been documented traveling long distances. A study in Santa Cruz County documented overland travel up to 1.7 miles over a period of 2 months (Bulger 2003). A similar study in San Luis Obispo County documented movement of 1.7 miles between two ponds (Rathburn and Schneider 2001) over a period of 32 days. The only areas where these animals will be removed for this project are in areas where there is no other means of protection during project activities and if left in place they would likely be harmed. If California red-legged frogs are relocated too close to areas where impacts are likely to occur without adequate time to resurvey the area prior to project activities it is likely they will move back into the project area and be harmed or injured. The recommended relocation area in Reach 7B is approximately 0.7 mile upstream of the hot springs area. This is still relatively close considering the distance that California red-legged frogs are capable of traveling, but still provides a buffer so that frogs may not move immediately back into areas where project activities have been initiated.

3.2.2 Relocation Implementation

We recommend starting any relocation activities approximately 2 weeks prior to the start of project activities. U.S. Fish and Wildlife approved biologists should begin moving California red-legged frogs from areas where more intrusive techniques for giant reed control will occur to identified relocation areas approximately 2 weeks before the start of project activities. Surveys should combine a nighttime effort to locate adults and a daytime effort to locate metamorphs and sub-adults. As each frog is captured, a GPS position should be documented. Frogs should be transported carefully in special plastic buckets that have locking tops with drilled air holes. Each bucket should be lined with damp sphagnum moss that will keep the frogs moist and will prevent overexertion if frogs had to attempt to swim or stay afloat in a water medium. The closed bucket may also help interfere with any visual homing aides. Upon release, another GPS position should be recorded.

In addition to the GPS position for each frog captured and released, a marking system that allows individuals to be tracked throughout project activities should be considered. We recommend using a pit tag/transponder which would be inserted subcutaneously. Individuals could then be tracked over time to determine if and how quickly they return to the impact areas. Additionally, any frogs that are removed to a USFWS-approved holding facility could then be returned to the point of capture.

We recommend returning to the potentially impacted areas where frogs were moved, immediately prior to the start of project activities (one to three days) to resurvey the areas and determine if any of the moved frogs returned. If any individuals return to potentially impacted areas, they should be captured and taken to a USFWS-approved holding facility using the previously described buckets. Additionally, if any new individuals have moved into the area they should also be moved to the holding facility as it will be unclear if they will stay in the relocation areas or return to potentially impacted areas once project activities have been initiated.

During surveys, two species of concern in California were observed; Southwestern pond turtles and the two-striped garter snake. Both of these species were observed in Reach 7B. If either species is encountered in areas of dense giant reed infestation, a biologist should relocate the specimen into another area where there is suitable habitat outside of potentially harmful impacts.

In order to prevent the possible spread of disease or parasites in the California red-legged frog populations, this project will abide by the "Declining Amphibian Population Task Force Guidelines" during all work activities.

3.3 Non-native Predator Control Program

The removal of bullfrogs should be considered an important component of California red-legged frog protection measures during the implementation of the giant reed removal plan. Bullfrogs are extremely abundant in Reach 7A and are known predators to native amphibians and reptiles, including the

California red-legged frog, and baby western pond turtles. When bullfrogs are encountered, a biological monitor should humanely and permanently remove them from the project area to the maximum extent possible.

4.0 References

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