TECHNICAL MEMORANDUM 3-13

Special-Status Amphibians – Focused 2013 Foothill Yellow-Legged Frog Surveys

Yuba River Development Project
FERC Project No. 2246

October 2013

TECHNICAL MEMORANDUM 3-13

EXECUTIVE SUMMARY

Yuba County Water Agency (YCWA) performed visual encounter surveys (VES) for foothill yellow-legged frog (FYLF) (*Rana boylii*) at two sites affected by the Yuba River Development Project (Project). The study addressed remaining information needs identified by Relicensing Participants following the conclusion of YCWA's Study 3.4, *Special-status Amphibians – Foothill Yellow-legged Frog Surveys* (YCWA 2012), which included surveys of 10 sites, distributed throughout accessible parts of the Project-affected stream reaches and two sites upstream of the Project. Study 3.13 was included as a proposed new study in YCWA's Initial Study Report and approved in FERC's March 29, 2013 Study Plan Determination without additional comment.

The two survey sites were located at Yellowjacket Creek, a tributary to the Middle Yuba River more than 3.3 River Miles (RM) downstream of Oregon Creek, and on the Yuba River (site YR-2A) from River Mile 39.96 to the confluence of the North Yuba and Middle Yuba River, a distance of 191 meters (m). The Yellowjacket Creek site was about 146 m in length, beginning at the mouth and terminating where the creek became impassable. VES at Yellowjacket Creek were performed on April 30, May 20, and August 19, 2013. As stipulated in the study plan, two VES were performed at site YR-2A under summer low flow conditions; the surveys occurred on July 15 and August 5, 2013.

No FYLF of any life stage were detected during VES at either site. At Yellowjacket Creek, one adult Sierra newt (*Taricha sierrae*) was observed during the April survey, along with a one juvenile American bullfrog (*Lithobates catesbeianus*) on the same date and at least three juveniles on August 19, 2013. Yellowjacket Creek is a small stream (e.g., wetted width of only 1.5 m on the August survey) with pools likely too small to sustain FYLF breeding and rearing. At YR-2A, the only amphibians observed were 30-50 second-year American bullfrog tadpoles and more than 10 post-metamorphic American bullfrogs found on the July 15 survey.

Previously in 2012, YCWA surveyed an approximately 90-m section of YR-2A (i.e., site YR-2) three times, when no FYLF were found. Yellowjacket Creek had not been surveyed for FYLF previously; however, three surveys were performed in 2012 in the adjacent Middle Yuba River (site MYR-2 in Study 3.4) and no FYLF were found during those surveys. One adult FYLF had been observed previously in August 2012 on the Middle Yuba River adjacent to the mouth of Yellowjacket Creek. No young-of-year FYLF were observed incidentally in the vicinity of Yellowjacket Creek in August 2012 or during fish survey work in the area in September 2013. These results suggest that FYLF occasionally occur on the Middle Yuba River near Yellowjacket Creek, but provide no evidence of a breeding population this far downstream.

The study was conducted in conformance with the FERC-approved Study 3.13, *Special-Status Amphibians – Focused 2013 Foothill Yellow-legged Frog Surveys*; no variances occurred.

The study is complete.

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SPECIAL-STATUS AMPHIBIANS – FOCUSED 2013 FOOTHILL YELLOW-LEGGED FROG SURVEYS

Yuba County Water Agency's (YCWA) continued operation and maintenance of the Yuba River Development Project, Federal Energy Regulatory Commissions (FERC) Project No. 2246, has a potential to affect the special-status amphibian, foothill yellow-legged frog (FYLF) (*Rana boylii*), which is considered a Forest Sensitive Species by the United States Department of Agriculture Forest Service (Forest Service), and a Species of Concern by the California Department of Fish and Wildlife (CDFW).

1.0 Goals and Objectives

The goal of this focused study was to determine whether FYLF occurred at two specific locations - one of which was not addressed by YCWA's previous FYLF surveys in 2012 - and an expanded survey area at another site that was previously surveyed, with no detection of FYLF.

The objectives of this focused study were to:

- Perform surveys for FYLF at Yellowjacket Creek, a tributary to the Oregon Creek Reach of the Middle Yuba River
- Perform an expanded survey at site YR-2A, located on the Yuba River near the confluence of the North Yuba and Middle Yuba River, a site partially surveyed in 2012 as site YR-2 in Study 3.4
- Identify habitats in these areas potentially suitable for FYLF and evaluate the suitability of these habitats for the species
- Compile incidental observations during visual encounter surveys (VES) documenting other native amphibians, and non-native aquatic species that may affect the distribution of FYLF

2.0 Methods

2.1 Study Area

The study area (Figure 2.1-1) was limited to the following two survey sites:

- Yellowjacket Creek, a tributary of the Middle Yuba River more than 3.3 miles (mi) downstream of the confluence of Oregon Creek (i.e., Middle Yuba River, Oregon Creek Reach). The site extends from the Middle Yuba River confluence and terminates where the creek becomes impassable, a distance of approximately 146 meters (m)

- Site YR-2A, on the Yuba River, Middle/North Yuba Reach, 2.4 mi downstream of New Bullards Bar Dam. The site extends from River Mile 39.96 to the confluence of the North Yuba and Middle Yuba River, a distance of approximately 191 m.

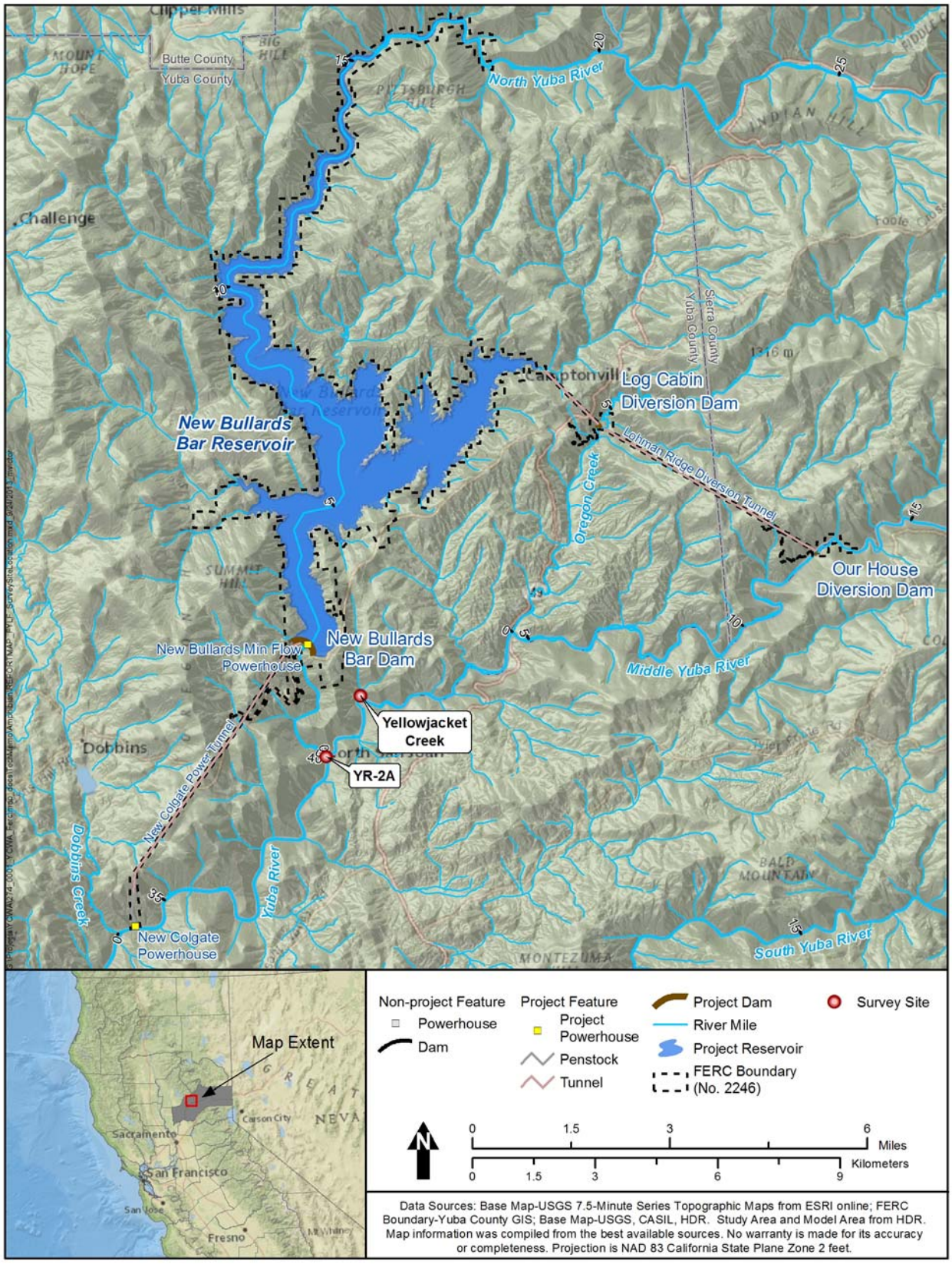

Figure 2.1-1. Survey sites for 2013 foothill yellow-legged frog visual encounter surveys.

2.2 Study Methods

Surveys for FYLF were performed according to the VES standard protocols developed by Pacific Gas & Electric Company (PG&E) for hydroelectric Project applications (PG&E and NID 2009), which were modified from Seltenrich and Pool (2002). Specifically, two surveyors working in tandem walked slowly and searched for FYLF along stream margins, back channel areas, and potential instream habitats, scanning the immediate area and ahead. To aid in the detection of eggs and larvae, surveyors used a transparent, floating tray ("view box") to look through the water column in shallow margin areas. No snorkeling was required because one site – the one on Yellowjacket Creek – is on a small, shallow stream, and activities at the other survey site (YR-2A) were focused on detection of larvae and post-metamorphic life stages that do not occupy deep-water habitats. The surveyors were prepared to record each FYLF detection by life stage and developmental stage (Gosner 1960), along with the associated habitat data based on procedures described in PG&E and NID (2009), including water temperature, depth, and substrate characteristics. Locations of significant amphibian detections were recorded by Map Grade Trimble Global Positioning System (GPS).

Consistent with the FERC-approved study, three FYLF VES visits were conducted at Yellowjacket Creek; two visits in spring/early summer 2013 for the detection of egg masses, and one in summer 2013 to detect tadpoles. Survey timing was based on considerations of seasonal water temperature and flows in the adjacent Middle Yuba River, requirements of the private landowner for advance notice of survey schedule, and discussions with Relicensing Participant, Amy Lind (Forest Service). The FERC-approved study required two summer surveys (i.e., July to August-early September 2013) at site YR-2A. Survey timing followed discussion with Ms. Lind.

A target list of species to be noted if observed included other native amphibians, American bullfrog (*Lithobates catesbeianus*), Sierra garter snake (*Thamnophis couchii*), and crayfish (e.g., signal crayfish [*Pacifastacus leniusculus*] or virile crayfish [*Orconectes virilis*]). When these species were observed, approximate numbers, life stage(s), and locations were recorded. Following the initial VES, surveyors completed a habitat characterization of both study locations, following standard operating procedures.

Prior to conducting field work, YCWA obtained necessary CDFW scientific collection permits and adhered to accepted decontamination guidelines to minimize the likelihood of transmitting diseases (USFWS 2005).

3.0 Results

3.1 Yellowjacket Creek

3.1.1 Habitat Characterization

Yellowjacket Creek is a small, perennial tributary to the Middle Yuba River, Oregon Creek Reach (i.e., downstream of Oregon Creek). Stream gradient was moderate and the survey site

mostly consisted of riffle, run, and cascade/pool, with occasional pools and step-pools. The average bankfull width was about 3.4 m. The wetted channel was about 3 m wide on the first survey and 1.5 m wide on the third survey. The survey site terminated where the stream became impassable. Within pools, the substrate was predominately sand and gravel, and coarser grained substrates were embedded (Table 3.1-1). The substrates in higher gradient habitats are dominated by sub-angular cobble, small boulders, and gravel. Overhanging vegetation of blackberry (*Rubus armeniacus*), willow (*Salix* sp.) and alder (*Alnus* sp.) becomes increasingly dense upstream. Pools at the time of surveys were generally less than 20 centimeters (cm) deep. The observed habitats suggest this small stream is insufficient to sustain FYLF breeding. However, the creek is evidently suitable as seasonal habitat for FYLF post-metamorphic life stages.

Table 3.1-1. Habitat description of the FYLF site at Yellowjacket Creek surveyed in 2013.

Site Code and Location/ Stream and Substrate Characteristics	Vegetation/Cover Characteristics	Other Comments
Moderate-gradient channel dominated by riffle (25%), run (25%), and cascade/pool (25%), with 15% pool and 10% step-pool. Substrate predominately gravel (40%) and cobble (30%), with sand (20%) and boulder (10%). Substrate embeddedness was moderate overall, but high within pools.	Moderate amount of margin vegetation consisting of grass, sedges (*Carex* spp.) and blackberry (*Rubus armeniacus*); no emergent, submerged, or aquatic vegetation. Overhanging vegetation highly dense willow (*Salix* sp.), blackberry, and alder (*Alnus* sp.). Riparian canopy was dense (95% cover) willow, alder, maple (*Acer* sp.), and oak.	The site is unlikely to ever be used as foothill yellow-legged frog breeding habitat because of the small size of the stream and shallow pools with fine grained substrate. However, conditions are suitable for post-metamorphic stages.

3.1.2 Survey Results

No FYLF of any life stage were found during the three surveys.

One small juvenile American bullfrog and one adult Sierra newt (*Taricha sierrae*) were found in a pool at the upstream end of the site during the first survey (Table 3.1-2, Figure 3.1-1). No amphibians were detected during the second survey. During the third survey, at least three juvenile American bullfrogs were noted jumping into the stream as the surveyors approached. Because of poor satellite reception for the handheld GPS, geographic coordinates for each of the American bullfrog detections were not obtained. Small salmonid fish were observed on each survey.

Table 3.1-2. Summary of FYLF VES results, at Yellowjacket Creek.

Survey Date	Water Temperature (°C)			FYLF	American Bullfrog	Sierra Newt	Comments
	Edge	Main	Pool				
04/30/13	13.5	13.5	13.5	None	J:1	A:1	Sierra newt (*Taricha sierrae*) and American bullfrog (*Lithobates catesbeianus*) occurred in same shallow pool at upstream end of site.
05/20/13	12	12	13	None	None	None	--
08/19/13	16	16	16	None	J:3	None	Juvenile American bullfrogs were heard or seen.

A = adult, J = juvenile.

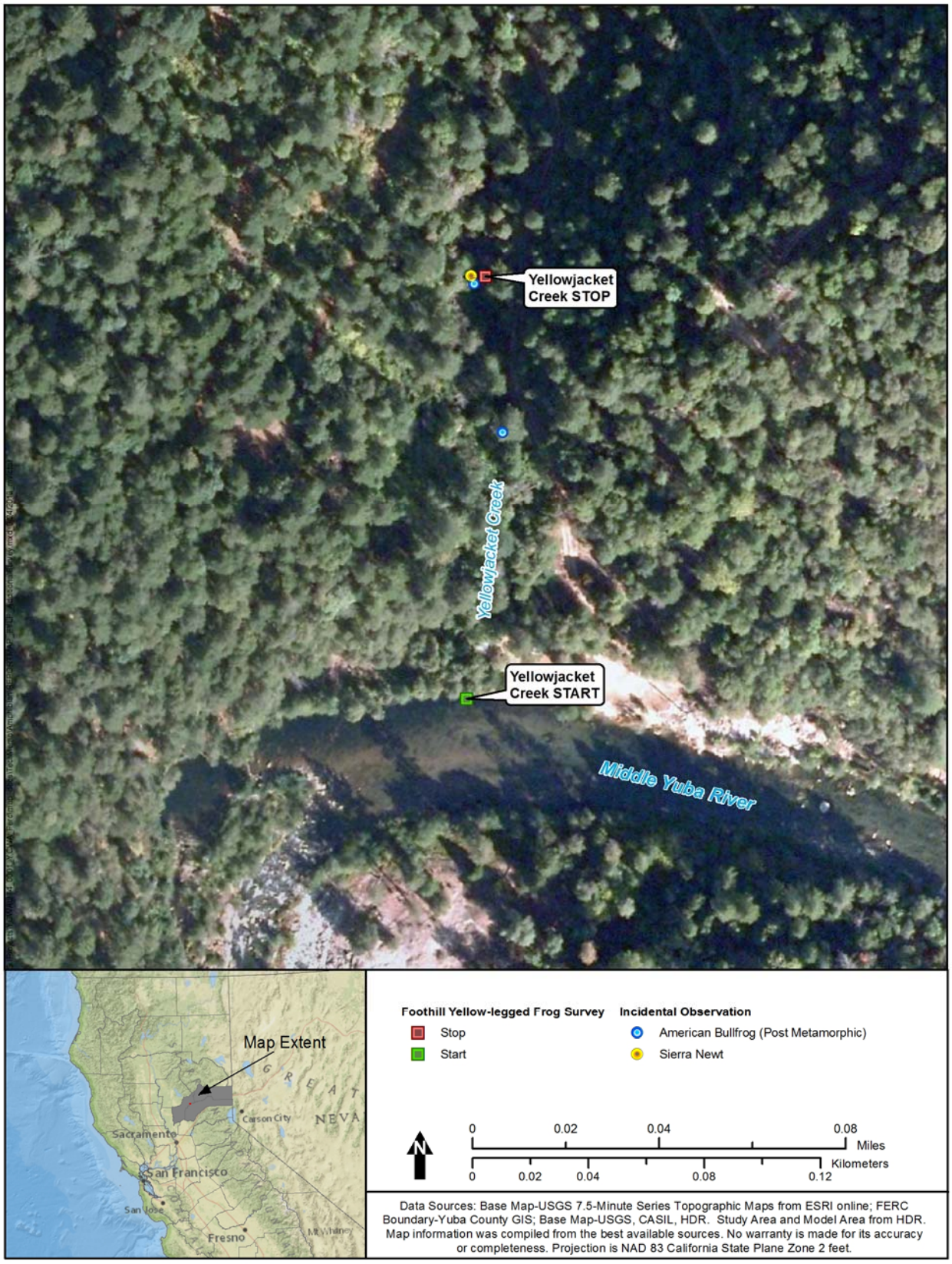

Figure 3.1-1. Yellowjacket Creek site survey area in 2013.

3.2 Yuba River (Site YR-2A)

3.2.1 Habitat Characterization

Site YR-2A is situated in the Yuba River 2.4 mi downstream of New Bullards Bar Dam. The upstream half of the site exhibits a low gradient and includes a large main-channel pool and tail-out (30% of the site), whereas the rest of the site was moderate gradient and predominantly cascade/pool (35% of site), run (20%) and riffle (10%); the remaining 5% of the site was step-pool. Potential FYLF habitat was associated with the pool and tail-out, but limited to edgewater in the downstream half of the site (Table 3.2-1). Downstream of the pool, the channel was divided. The left bank channel (facing downstream), was boulder-dominated, largely devoid of vegetation, and mostly cascade/pool. The right bank channel was riffle and run, with a substrate of cobbles and boulders, and the edges of the wetted channel were vegetated by willows. The deepest parts of the site, located at the confluence, were approximately 1.75 m deep. Patches of dense algae were present at the time of the second survey.

Table 3.2-1. Habitat description of FYLF survey site YR-2A on the Yuba River.

Site Code and Location/ Stream and Substrate Characteristics	Vegetation/Cover Characteristics	Other Comments
Overall low-gradient, but the downstream half of the site is moderate gradient. Includes a split channel with a large main channel pool and tail-out, and cascade/pool, run and riffle predominant in the rest of the site. Substrate comprised of boulder (50%) and cobble (30%), with some bedrock (15%) and gravel/pebble (5%). Substrate embeddedness was low.	Small amount of margin vegetation consisting of sedges (10%). No emergent or submerged vegetation. Overhanging vegetation limited to parts of the right bank split channel where willows occurred (10% of site). Moderately dense riparian canopy of oak (*Quercus* spp.) (50%).	Potential breeding and rearing habitat is present in the main channel pool, the pool tail-out, and edges cobble bars. Edgewater areas are present at the downstream end of the site. Smallmouth bass (*Micropterus dolomieu*) were observed at the site.

3.2.2 Survey Results

No FYLF of any life stage were found during the two surveys.

More than 30 second-year American bullfrog larvae were observed during the first survey, but no bullfrogs of any life stage were observed during the second survey (Table 3.2-2, Figure 3.2-1). An adult Sierra garter snake was also observed in the water on the first survey. Smallmouth bass (*Micropterus dolomieu*) were numerous throughout the site.

Table 3.2-2. Summary of FYLF VES results, at site YR-2A.

Survey Dates	Water Temperature (°C)			FYLF	American Bullfrog	Comments
	Edge	Main	Pool			
07/15/13	25	24	24	None	L: 30-50 S: 1 J: >10	American bullfrog larvae were all large, second-year tadpoles with small hind limbs. Smallmouth bass were numerous and a wide range of sizes were observed.
08/05/13	33	23	23	None	None	Smallmouth bass numerous.

Key: L = larvae, J: juvenile (small), S = sub-adult.

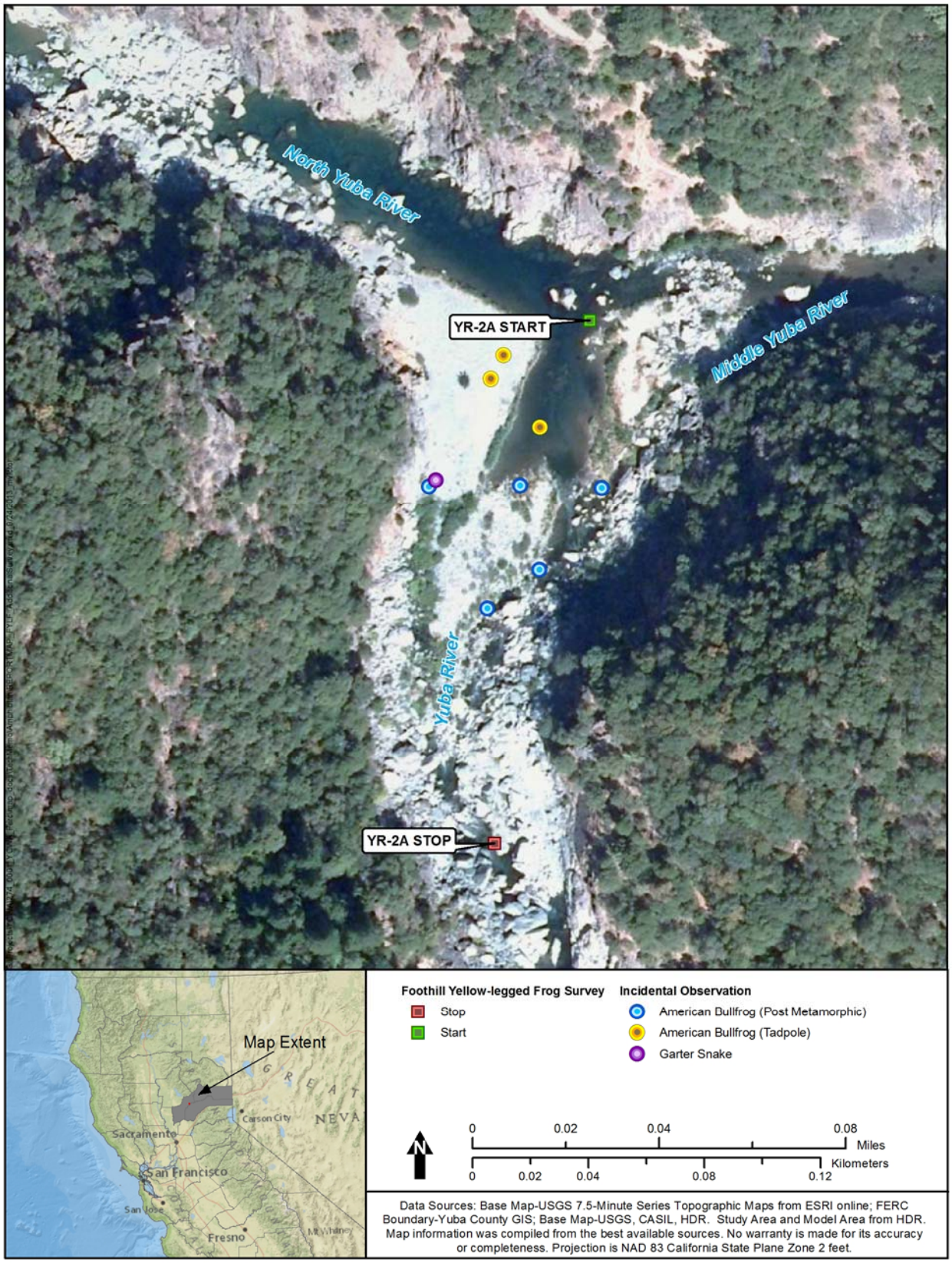

Figure 3.2-1. Yuba River YR-2A site survey area in 2013.

4.0 Discussion

The results of this study provide no evidence that FYLF occurs at either site and suggests that self-sustaining populations of this species do not occur.

Yellowjacket Creek is not potential FYLF breeding habitat, but suitable for post-metamorphic life stages. Because small tributary streams are often used by adult and juvenile FYLF before and after the breeding season, FYLF detections at Yellowjacket Creek would be anticipated if FYLF regularly occurred in the adjacent section of the Middle Yuba River. Previous surveys in 2012 at Site MYR-2, located on the Middle Yuba River and spanning the confluence of Yellowjacket Creek, also failed to detect FYLF. However, an adult FYLF was incidentally observed on the Middle Yuba River adjacent to Yellowjacket Creek on August 29, 2012. No young-of-year FYLF were observed incidentally in the vicinity of Yellowjacket Creek in August 2012 or during fish survey work in the area in September 2013. These results suggest that FYLF occasionally occur on the Middle Yuba River near Yellowjacket Creek, but provide no evidence of a breeding population this far downstream.

Results at site YR-2A on the Yuba River were consistent with the results of Study 3.4, in which no FYLF were detected in the Yuba River or in the North Yuba River downstream of New Bullards Bar Dam. Warm water in the Yuba River and the presence of centrarchid fish provide conditions highly suitable for American bullfrog, although only second-year American bullfrog tadpoles were observed, suggesting that breeding did not occur within the site in 2013 or occurred, but was not successful.

5.0 Study-Specific Consultation

The FERC-approved study required no study-specific collaboration/consultation. However, YCWA provided advance notice of survey schedules and adjusted the survey schedule at site YR-2A in response to a request from Relicensing Participant, Amy Lind (Forest Service).

6.0 Variances from FERC-Approved Study

This study was conducted in accordance with Study 3.13, *Special-Status Amphibians – Focused Foothill Yellow-Legged Frog Surveys*, and FERC's Study Determination, with no variances.

7.0 Attachments to This Technical Memorandum

There is one attachment to this Technical Memorandum:

Attachment 3-13A	Selected Field Photographs – Yuba River Development Project [1 Adobe pdf file: 15 MB; 20 pages formatted to print double sided on 8 ½ x 11 paper]

8.0 References Cited

Gosner, K.L. 1960. A simplified table for staging anuran embryos and larvae with notes on identification. Herpetologica 16:183-190.

Pacific Gas and Electric Company (PG&E) and Nevada Irrigation District (NID). 2009. Study 2.3.6. Foothill Yellow-Legged Frog Surveys Study. Revised Study Plan, Drum Spaulding Project and Yuba Bear Hydroelectric Project.

Seltenrich, C. P. and A. C. Pool. 2002. A standardized approach for habitat assessments and visual encounter surveys for the foothill yellow-legged frog (*Rana boylii*). Pacific Gas and Electric Company.

USFWS. 2005. Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog. Available online: http://www.fws.gov/sacramento/es/documents/crf_survey_guidance_aug2005.doc. Accessed November 2007.

Yuba County Water Agency (YCWA). 2012. Technical Memorandum 3-4. Special-status amphibians – foothill yellow-legged frog surveys. Yuba County Water Agency, Marysville, CA. Available online: <http://www.ycwa-relicensing.com>.

Technical Memorandum 3-13

Special-Status Amphibians –
Focused 2013 Foothill Yellow-Legged Frog Surveys

Attachment 3-13A

Selected Field Photographs

Yuba River Development Project
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ATTACHMENT 3-4A

SELECTED FIELD PHOTOGRAPHS

1.0 Yellowjacket Creek Survey Site

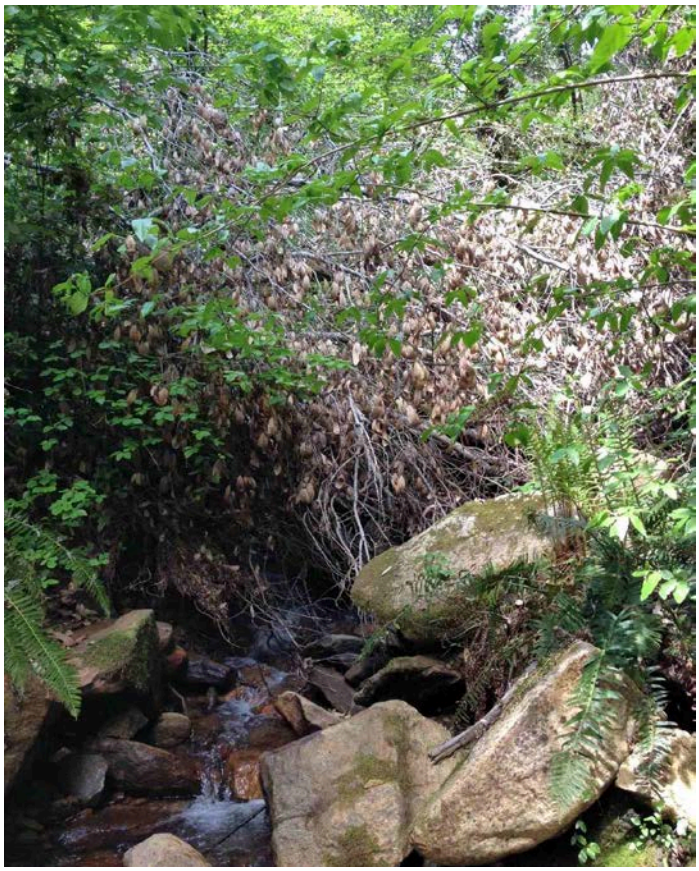

Figure 1.0-1. Yellowjacket Creek: The upstream boundary of the survey site occurred at this point where the stream became impassable. (April 30, 2013)

Figure 1.0-2. Yellowjacket Creek: An adult Sierra newt (*Taricha sierrae*) and a small, juvenile American bullfrog (*Lithobates catesbeianus*) (see Figure 1.0-3) were detected at the site during the first survey, both in this shallow pool at the upstream end of the site. (April 30, 2013)

Figure 1.0-3. Yellowjacket Creek: This juvenile American bullfrog was found at the location shown in Figure 1.0-2. (April 30, 2013)

Figure 1.0-4. Yellowjacket Creek: The lower end of the site exhibited a low gradient; view is looking upstream. (May 20, 2013)

Figure 1.0-5. Yellowjacket Creek: Steps occur at the mid-point of the site; view is looking upstream. (May 20, 2013)

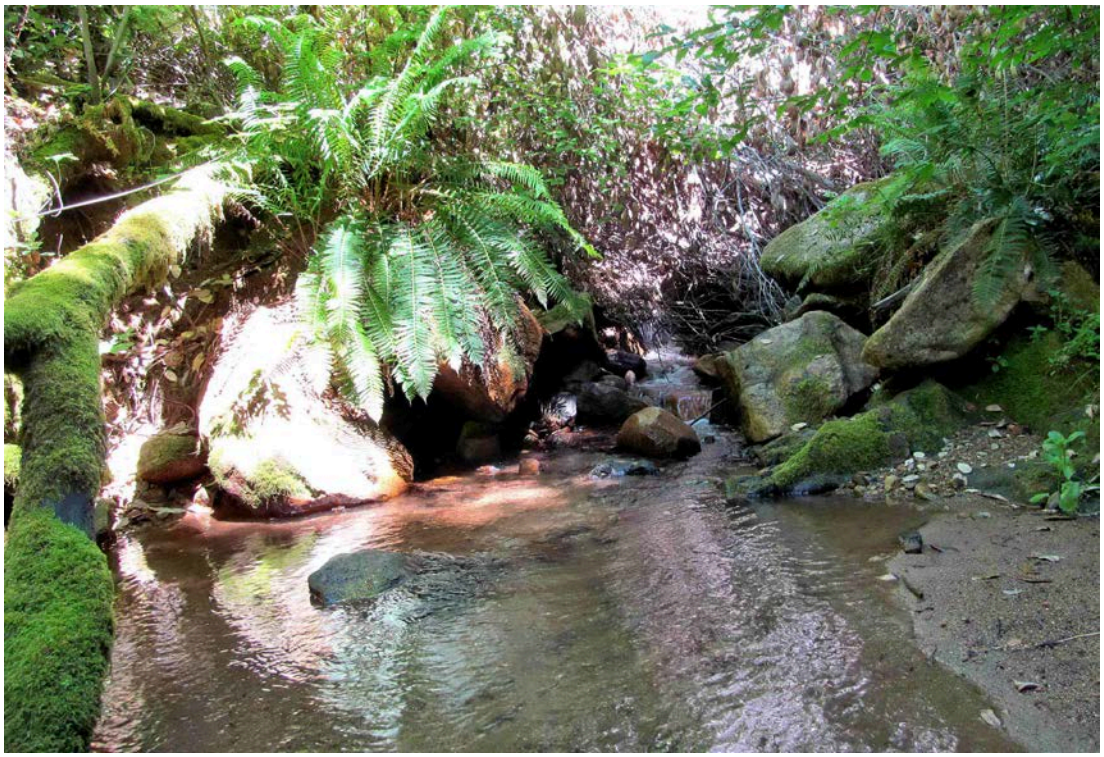

Figure 1.0-6. Yellowjacket Creek: Conditions at the upper end of site were were essentially unchanged compared to the first survey; view is looking upstream. No amphibians were detected on this survey. (May 20, 2013)

Figure 1.0-7. Yellowjacket Creek: This is the mouth of creek at the Middle Yuba River; view is looking upstream. (August 19, 2013)

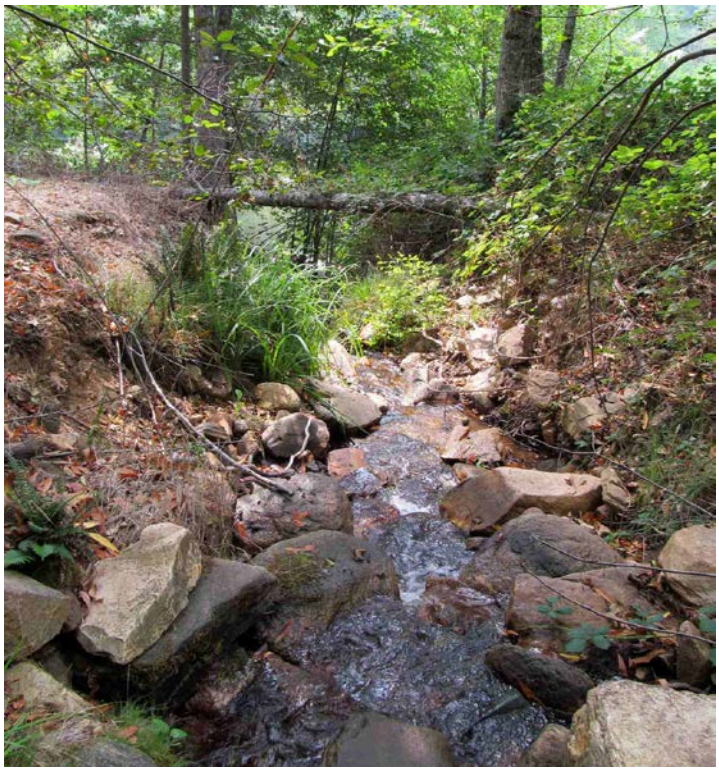

Figure 1.0-8. Yellowjacket Creek: Note the incised channel near the downstream end of site; view is looking downstream. (August 19, 2013)

Figure 1.0-9. Yellowjacket Creek: This is at the same location as Figure 1.0-8, but looking upstream. (August 19, 2013)

Figure 1.0-10. Yellowjacket Creek: This is the mid-point of the site, viewed looking upstream. (August 19, 2013)

Figure 1.0-11. Yellowjacket Creek: This is the mid-point of the site, viewed looking downstream. (August 19, 2013)

Figure 1.0-12. Yellowjacket Creek: A small pool occurred at the three-quarter point of the site; view is looking downstream. (August 19, 2013)

Figure 1.0-13. Yellowjacket Creek: This is the three-quarter point of the site, viewed looking upstream. (August 19, 2013)

Figure 1.0-14. Yellowjacket Creek: During the third survey, at least three juvenile American bullfrogs were detected. This is the upstream end of site, viewed looking downstream (August 19, 2013)

Figure 1.0-15. Yellowjacket Creek: This is the upstream end of site, viewed looking downstream. (August 19, 2013)

2.0 Site YR-2A (Yuba River – Middle/North Yuba River Reach)

Figure 2.0-1. Survey Site YR-2A: The upstream end of the survey site is at the confluence of Middle and North Yuba rivers, but the survey area did not include the confluence. This is the view looking across the confluence toward valley of North Yuba River. (August 5, 2013)

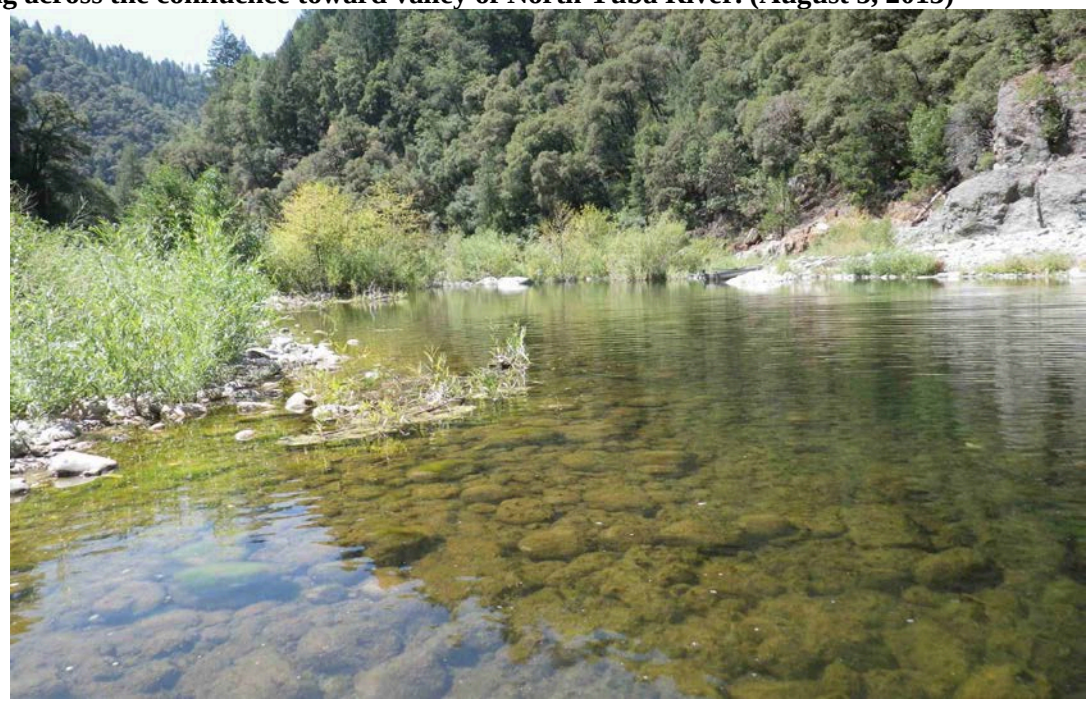

Figure 2.0-2. Survey Site YR-2A: This large pool in the upstream portion of the site is contiguous with the confluence pool, but is shallower and has a cobble substrate; view is looking downstream. (August 5, 2013)

Figure 2.0-3. Survey Site YR-2A: Large, second-year American bullfrog tadpoles occurred in the pool and several used this woody debris for hiding cover. (July 15, 2013)

Figure 2.0-4. Survey Site YR-2A: This second-year American bullfrog tadpole is representative of the size of tadpoles found at YR-2A. (July 15, 2013)

Figure 2.0-5. Survey Site YR-2A: This is the same tadpole as in Figure 2.0-4, viewed dorsally to illustrate the large size. (July 15, 2013)

Figure 2.0-6. Survey Site YR-2A: More than 10 juvenile American bullfrogs were also detected during the July survey. (July 15, 2013)

Figure 2.0-7. Survey Site YR-2A: Downstream of the pool, the channel splits. This is the upstream start of the right bank channel; view is looking upstream. (July 15, 2013)

Figure 2.0-8. Survey Site YR-2A: This is the right bank channel; view is looking upstream toward the pool. (August 5, 2013)

Figure 2.0-9. Survey Site YR-2A: This is the right bank channel, viewed looking downstream. (July 15, 2013)

Figure 2.0-10. Survey Site YR-2A: This is the right bank channel, viewed looking downstream. (August 5, 2013)

Figure 2.0-11. Survey Site YR-2A: This is the left bank channel; view is looking donstream. (August 5, 2013)

Figure 2.0-12. Survey Site YR-2A: This location is about 20 meters from the downstream end of the survey site; view is looking upstream. (August 5, 2013)

Figure 2.0-13. Survey Site YR-2A: This is the downstream end of the site; view is looking downstream. (July 15, 2013)

Figure 2.0-14. Survey Site YR-2A: This is the downstream end of the site; view is looking upstream. (July 15, 2013)

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