



TECHNICAL MEMORANDUM 3-14

Special-Status Turtles – Focused 2013 Western Pond Turtle Surveys

Yuba River Development Project FERC Project No. 2246

October 2013

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TECHNICAL MEMORANDUM 3-14

EXECUTIVE SUMMARY

Yuba County Water Agency (YCWA) performed a focused snorkeling survey in search of western pond turtle (WPT) (*Actinemys marmorata*), in 2013, beginning at the upstream end of Our House Diversion Dam Impoundment and in the next 10 pools upstream of the impoundment on the Middle Yuba River. WPT is considered a Forest Sensitive Species by the United States Department of Agriculture, Forest Service, and a Species of Special Concern by the California Department of Fish and Wildlife.

The study addressed information needs identified by Relicensing Participants following the conclusion of YCWA's Study 3.6, *Special-status Turtles – Western Pond Turtle*, which included surveys of sites on the Middle Yuba River and Yuba River, Our House Diversion Dam Impoundment, Log Cabin Diversion Dam Impoundment, and New Bullards Bar Reservoir (YCWA 2012).

Two WPT surveys were performed, one in late May 2013, when water from was being diverted from Our House Diversion Dam Impoundment into the Lohman Ridge Diversion Tunnel, and one in early August 2013, when the tunnel was not diverting water. No WPT were detected during either survey. Potential underwater hiding cover for WPT was generally scarce within the surveyed pools, where large boulders did not occur and gravel or sand were often predominant; submerged woody debris and aquatic vegetation beds were absent; and undercut banks occurred in only one pool.

The study results were consistent with previous investigations at Our House Diversion Dam Impoundment in 2012 (YCWA's Study 3.6) and 2010 (Yuba-Bear Hydroelectric Project [FERC No. 2266] Relicensing study, Nevada Irrigation District 2011), in which WPT was not detected. The nearest known observations of WPT are from 3.4 River Miles upstream of Our House Diversion Dam (PG&E and NID 2011).

The study is complete.

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SPECIAL-STATUS TURTLES – FOCUSED 2013

WESTERN POND TURTLE SURVEYS

Yuba County Water Agency's (YCWA) continued operation and maintenance of the Yuba River Development Project, Federal Energy Regulatory Commission Project Number 2246 may potentially have an adverse effect on western pond turtle (WPT) (*Actinemys* [formerly *Emys* or *Clemmys*] *marmorata*), which is considered a Forest Sensitive Species by the United States Department of Agriculture, Forest Service, and a Species of Special Concern by the Cal Fish and Wildlife.

1.0 Goals and Objectives

The goal of the study was to develop information concerning the presence or absence of WPT associated with the upstream end of Our House Diversion Dam Impoundment and pools immediately upstream of the impoundment on the Middle Yuba River. The study addressed information needs identified by Relicensing Participants following the conclusion of YCWA's Study 3.6, *Special-status Turtles – Western Pond Turtle*, which included surveys of sites on the Middle Yuba River and Yuba River, Our House Diversion Dam Impoundment, Log Cabin Diversion Dam Impoundment, and New Bullards Bar Reservoir (YCWA 2012).

Objectives of the study were to:

- Conduct snorkeling surveys to search for WPT, examining potential underwater hiding areas.
- Survey the upstream of the impoundment and at least two pools or as many as can be surveyed in one day, once in May or June, when YCWA is operating the diversion and the second survey under low flow conditions in July or August.
- Document any WPT found, following procedures described in Study 3.6 (YCWA 2012).

2.0 Methods

2.1 Study Area

The study area for the snorkeling and habitat assessment surveys was limited to the upstream portion of Our House Diversion Dam Impoundment and pools within approximately 0.5-mile upstream of the impoundment on the Middle Yuba River. Figure 2.1-1 shows the location of Our House Division Dam Impoundment and the 10 pools surveyed for WPT, including the start and stop points.

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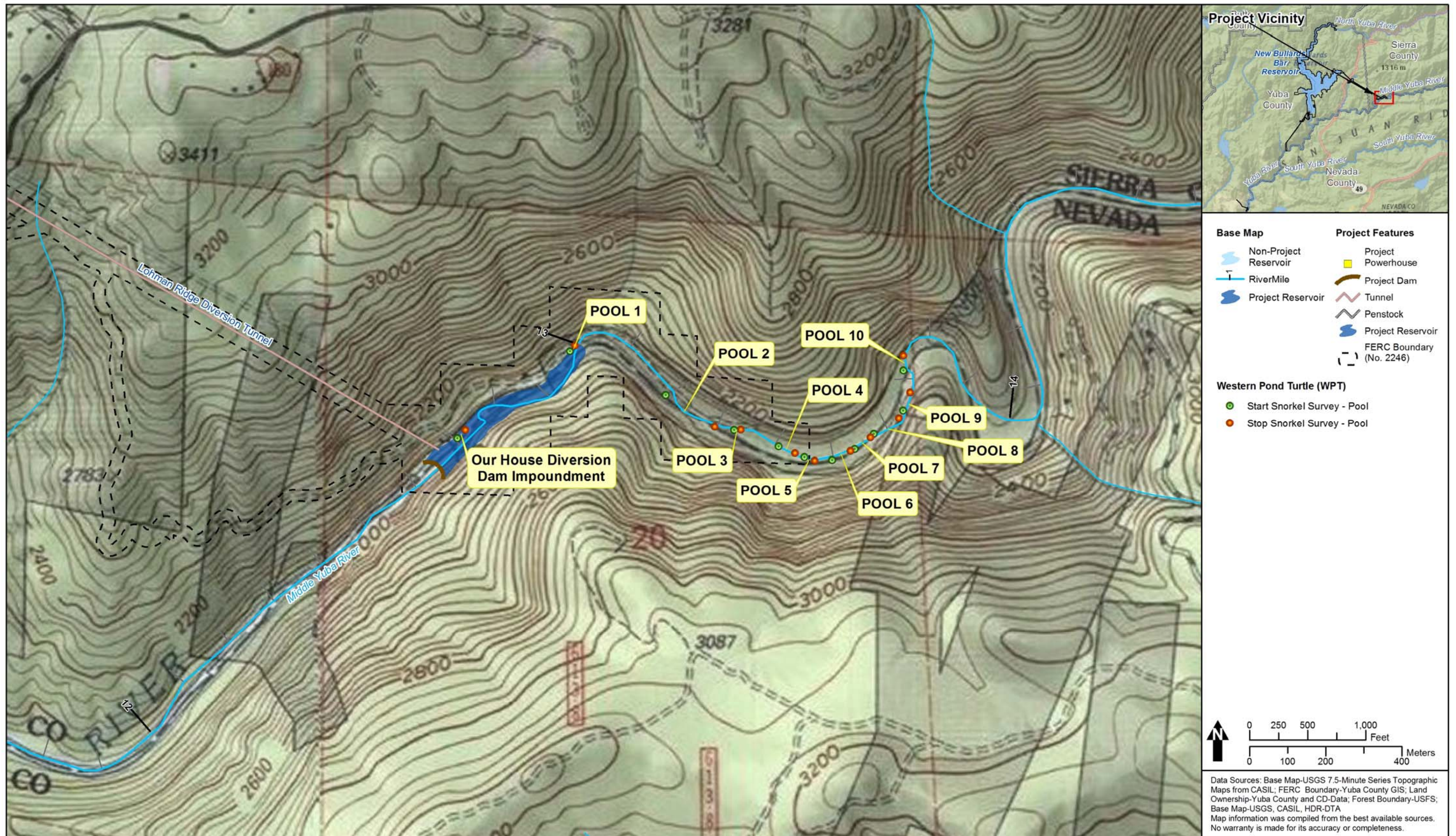


Figure 2.1-1. Study area for western pond turtle (*Actinemys marmorata*) snorkeling surveys in the Middle Yuba River in the upstream end of Our House Diversion Dam Impoundment and upstream pools.

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2.2 Study Methods

The upstream end of Our House Diversion Dam Impoundment and 10 pools upstream of the impoundment were identified and surveyed for WPT by snorkeling. A snorkeler systematically searched each pool for WPT that were swimming, on the pool bottom, in crevices, and in other potential underwater hiding areas along banks. The snorkeler and other team member were also alert for amphibians, snakes, and fish observed during the survey or incidentally. During the first survey period, descriptive data were collected at each pool, including pool length, maximum observed water depth, bank characteristics, substrate type and coverage, and the presence and type(s) of potential underwater hiding cover. Air and water temperature were recorded during both surveys and each site was photographed.

Two surveys were performed. The first survey occurred on May 16, 2013, when YCWA was operating the diversion at the Lohman Ridge Diversion Tunnel Intake. The second survey was performed on August 6, 2013, during lower flows when the Project was not diverting.

During the first survey period, a snorkeling survey of the upper end of Our House Diversion Dam Impoundment was unnecessary because of clear viewing conditions, relatively shallow depth (1-2 meters [m]), and absence of potential underwater hiding locations. During the second survey, the upper end of the impoundment was snorkeled to verify that no underwater structures exist. The remaining previously surveyed 10 pools were then snorkeled and assessed for a second time to evaluate changes in WPT habitat structure at lower flows.

3.0 Results

3.1 Habitat Descriptions

The study area is within a portion of the Middle Yuba River characterized by a low gradient and confinement within a deep canyon. Stream habitats in the reach are moderately long, mid-channel pools interspersed with low-gradient riffles/runs. Pools were either separated by slightly higher gradient habitats or were contiguous (Figure 2.1-1 and Attachment 3-14A). Representative photographs of survey sites are presented in Attachment 3-14B.

At Our House Diversion Dam Impoundment, potential underwater hiding areas were limited to the right bank, where dense riparian vegetation and exposed roots may be submerged when water surface elevation is high (Table 3.1-1). Upstream of the impoundment, substrates at the pools generally included a high percentage of sand and gravel, and no large boulders occurred. As such, underwater crevices for hiding were largely absent. Undercut banks occurred only at Pool 3, where less than 10 m of one bank was undercut. None of the pools had submerged woody debris, aquatic plant beds, or other underwater features that could be used for hiding. The depths of the pools varied from 1.1 m (Pool 7) to 2.7 m (Pool 4). Overhanging vegetation was prominent on at least one bank of all the pools surveyed. At five of the pools, one of the banks was entirely bedrock, and the banks were partly bedrock at two other pools.

Table 3.1-1. Description of WPT hiding and basking habitats at survey sites.

Location/ General Characteristics of the Sites ¹	Potential Western Pond Turtle (WPT) Habitat (1) Hiding Habitat (2) Basking Habitat
<p><u>Upstream End of Our House Diversion Dam Impoundment (River Mile [RM] 12.73):</u> The survey area included upper end of deep pool created by the impoundment of water behind the concrete arch dam. In the area that was snorkeled, maximum depth was less than 3 meter (m). Substrate was comprised of sand (90%), gravel (5%), and cobble (5%). A low-gradient riffle and a shallow connected left bank side pool were located at the upstream end of the survey area. Aquatic and emergent vegetation were absent. Overhanging riparian vegetation was located mainly on the right bank, with scattered patches present on the left bank towards the dam. Adjacent upland slopes were steep and vegetated by oak (<i>Quercus</i> spp.)-conifer forest.</p>	<p>(1) No potential underwater hiding areas occurred at current water level, but would be present at higher water. Potential above-water hiding cover on the right bank of the impoundment consisted of dense riparian vegetation, exposed roots and undercut banks. Potential above-water hiding cover along the left bank was limited to small patches of overhanging riparian vegetation.</p> <p>(2) At high water, overhanging branches may be accessible for basking.</p>
<p><u>Pool 1 (RM 12.99):</u> Pool was approximately 22 m long and maximum depth (at center) was 1.5 m. Substrate was predominantly a mixture of sand and gravel (together 85%), with cobble (5%), boulder (5%), and bedrock (5%). The left bank low (15°) gravel/cobble bar and right bank was steep bedrock (45-90°). Overhanging willows (<i>Salix</i> spp.) and alder (<i>Alnus</i> spp.) were scattered along the right bank. At the observed flows, there was no vegetation at the water edge along the left bank.</p>	<p>(1) No potential underwater hiding areas or undercut banks occurred. Potential above-water hiding cover limited to sparse riparian vegetation on the right bank that may be accessible at high water.</p> <p>(2) Bedrock on right bank may be too steep for potential basking substrate; however, at high water, overhanging branches may be accessible.</p>
<p><u>Pool 2 (RM 13.26):</u> Pool/run was approximately 220 m long and maximum depth was 1.4 m. Substrate was predominantly a mixture of sand, gravel, and silt (together 80%) and cobble (20%). Banks were not steep (less than 15°) and densely vegetated with overhanging alder and willow.</p>	<p>(1) No potential underwater hiding areas or undercut banks occurred. Potential above-water hiding cover consists of dense riparian vegetation.</p> <p>(2) At high water, overhanging branches may be accessible for basking.</p>
<p><u>Pool 3 (RM 13.33):</u> Pool/run was approximately 25 m long and maximum depth was 1.2 m. Substrate was mostly cobble (50%) and small boulder (10%), mixed with gravel and sand. Banks were not steep (less than 15°) and densely vegetated with overhanging alder and willow.</p>	<p>(1) Right bank has small area of undercut bank less than 10 m in length. No other potential underwater hiding areas present. Potential above-water hiding cover consists of dense riparian vegetation.</p> <p>(2) At high water, overhanging branches likely accessible for basking. A few lightly shaded boulders on the right bank are also suitable.</p>
<p><u>Pool 4 (RM 13.42):</u> Pool was approximately 60 m long and maximum depth was 2.7 m. Substrate was mostly cobble (50%) and small boulder (10%), mixed with gravel and sand. Left bank was moderately steep (30-60°) bedrock, with several ledges sloping to the water line, and sparsely vegetated. Right bank was a low cobble/gravel bar (15-30°) with sparse willow.</p>	<p>(1) No potential underwater hiding areas or undercut banks occurred. Potential above-water hiding cover is scarce.</p> <p>(2) Potential basking habitat associated with sloping bedrock ledges on left bank.</p>
<p><u>Pool 5 (RM 13.46):</u> Lateral scour pool was approximately 35 m long and maximum depth was 2.3 m. Substrate was cobble (30%), small boulder (20%), and sand (50%). Left bank was mostly steep (60-90°) bedrock, but with occasional ledges sloping to the water line, and sparsely vegetated, except for low forbs. Right bank was low (less than 20°) boulder/gravel and vegetated with willows, some of which was overhanging.</p>	<p>(1) No potential underwater hiding areas or undercut banks occurred. Almost no above-water hiding cover.</p> <p>(2) Bedrock on left bank likely too steep to be used as basking substrate.</p>
<p><u>Pool 6 (RM 13.52):</u> Pool is approximately 70 m long and maximum depth was 1.3 m. Substrate was cobble (50%) and small boulder (10%), mixed with gravel and sand. Overhanging vegetation consists of alder and willow. Left bank was low (less than 20°) cobble/boulder and moderately vegetated by willows, some of which were overhanging. Right bank was moderately steep (about 45°), and vegetation (willow and alder) occurred mostly in a narrow band near the toe of the slope, above which the slope was exposed by erosion.</p>	<p>(1) No potential underwater hiding areas or undercut banks occurred. Potential above-water hiding cover consists of riparian vegetation along right bank.</p> <p>(2) Potential basking habitat associated with partially submerged cobbles and small boulders, areas of exposed bank, and overhanging branches on right bank.</p>
<p><u>Pool 7 (RM 13.55):</u> Pool is approximately 65 m long and maximum depth was 1.1 m. Substrate was mostly gravel (70%) and sand (10%), with cobble (15%) and bedrock (5%). Left bank was low (less than 15°) cobble/small boulder, moderately vegetated with willows. Right bank was moderately steep (about 45°), with steeper bedrock along 15% of the bank. Vegetation on the right bank was patchy and consisted of alders (some of which was overhanging) and clumps of grass and rush.</p>	<p>(1) No potential underwater hiding areas or undercut banks occurred. Potential above-water hiding cover occurs within patches of riparian vegetation along right bank.</p> <p>(2) Potential basking habitat associated with low bedrock ledges and areas of exposed bank on right bank.</p>

Table 3.1-1. (continued)

Location/ General Characteristics of the Sites ¹	Potential WPT Habitat (1) Hiding Habitat (2) Basking Habitat
Pool 8 (RM 13.60): Pool was approximately 100 m long and maximum depth was 1.75 m. Substrate was almost entirely sand (50%) and gravel (35%), with the rest being cobble. Left bank was steep (80-90°) bedrock and mostly devoid of vegetation. Right bank was low (15-30°) cobble bar, vegetated with moderately dense alder and willow, some of which was overhanging.	(1) No potential underwater hiding areas or undercut banks occurred. No above-water hiding cover occurs on left bank. (2) Potential basking habitat associated with a few low bedrock ledges on the left bank. At high water, overhanging branches on right bank likely accessible for basking.
Pool 9 (RM 13.66): Pool was approximately 75 m long and maximum depth was 1.6 m. Substrate was cobble (60%), gravel (30%), and sand (10%). Left bank was steep (80-90°) bedrock, devoid of vegetation. Right bank was low (less than 15°) cobble bar, vegetated with moderately dense willow and alder, some of which was overhanging.	(1) No potential underwater hiding areas or undercut banks occurred. No above-water hiding cover occurs on left bank. (2) Bedrock on left bank likely too steep to be used as basking substrate.
Pool 10 (RM 13.73): Pool was approximately 50 m and maximum depth was 1.6 m. Substrate was sand (40%), gravel (25%), cobble (30%), and bedrock (5%). Right bank was mostly steep (60-90°) and about a third of the length was sparsely vegetated bedrock; however, the bank along the downstream end of the pool was gently sloped (less than 20°). Except for the bedrock area, the bank is moderately to densely vegetated with alder and willow, some of which was overhanging. Left bank slope was low cobble (less than 20°). At the observed flows, there was no vegetation at the water edge along the left bank, but dense willows occurred away from the edge.	(1) No potential underwater hiding areas or undercut banks occurred. Potential above-water hiding cover occurs within patches of riparian vegetation along right bank. (2) Potential basking habitat associated with a few partially submerged cobbles and small boulders, areas of exposed bank, and occasional overhanging branches on right bank.

¹RM location = approximate midpoint of survey sites on Middle Yuba River

3.2 Snorkeling Survey Results

No WPT were observed during either snorkeling survey (Table 3.2-1). Fish were observed throughout the survey area, particularly in the pools. Other observations during snorkeling included adult Sierra newts (*Taricha sierrae*). Foothill yellow-legged frogs (*Rana boylei*) were observed incidentally at pools and between sites, mostly in shallow, low gradient areas.

Table 3.2-1. Results of WPT snorkeling surveys.

Date	Air/Water Temp. (°C)	Survey Results
OUR HOUSE DIVERSION DAM IMPOUNDMENT		
08/06/13	39/24	> 20 large trout
POOL 1		
05/16/13	19/17	2 rainbow trout (<i>Oncorhynchus mykiss</i>), 1 Sacramento sucker (<i>Catostomus occidentalis</i>) and 1 adult Sierra newt (<i>Taricha sierrae</i>)
08/06/13	36/22	Approximately 50 young-of-year foothill yellow-legged frogs (FYLF, <i>Rana boylei</i>), several minnows of unknown species
POOL 2		
05/16/13	19/17	No incidental species observations
08/06/13	36/23	Several minnows
POOL 3		
05/16/13	19/17	1 adult Sierra newt
08/06/13	36/23	Numerous young-of-year FYLF
POOL 4		
05/16/13	20/17.5	1 rainbow trout observed
08/06/13	36/23	No incidental observations
POOL 5		
05/16/13	20/17.5	2 adult FYLF observed
08/06/13	36/23	No incidental observations

Table 3.2-1. (continued)

Date	Air/Water Temp. (°C)	Survey Results
POOL 6		
05/16/13	21/18	1 Sierra newt and 4 juvenile FYLF observed
08/06/13	36/23	1 young-of-year FYLF, 1 trout
POOL 7		
05/16/13	21/18	1 Sierra newt and 1 FYLF were observed
08/06/13	36/25	3 adult FYLF
POOL 8		
05/16/13	21/18	No incidental observations
08/06/13	36/24	1 adult FYLF
POOL 9		
05/16/13	22/18	3 trout, 1 FYLF and 1 Sierra newt observed
08/06/13	36/24	No incidental observations
POOL 10		
05/16/13	22/18	No incidental observations
08/06/13	33/23	Approximately 30 rainbow trout

4.0 Discussion

The results of the study were consistent with survey results at Our House Diversion Dam Impoundment in 2012, when no WPT were observed (YCWA 2012).

In 2010, no WPT were detected during surveys for the Yuba-Bear Hydroelectric Project Relicensing (FERC Project No. 2266) study performed for Nevada Irrigation District (PG&E and NID 2011). There are also no known reports of WPT at the impoundment or in the Middle Yuba River immediately upstream of the impoundment. The nearest known observations of WPT were 3.4 River Miles upstream of Our House Diversion Dam (PG&E and NID 2011).

5.0 Study-Specific Consultation

No study-specific consultation was required.

6.0 Variations from FERC-Approved Study

No variations to this study occurred.

7.0 Attachments to This Technical Memorandum

Attachment 3-14A Survey Site Maps [1 Adobe pdf file: 16 MB; 8 pages; formatted to print double sided on 11 by 17 paper]

Attachment 3-14B Selected Field Photographs [1 Adobe pdf file: 17 MB; 24 pages formatted to print double sided on 8 ½ by 11 paper]

8.0 References Cited

Pacific Gas and Electric Company (PG&E) and Nevada Irrigation District (NID). 2011. Technical Memorandum 3-14 – *Western Pond Turtle Basking*. Prepared for the Relicensings of NID’s Yuba-Bear Hydroelectric Project (FERC Project No. 2266) and PG&E’s Drum-Spaulding Project (FERC Project No. 2310).

Yuba County Water Agency. 2012. Technical Memorandum 3-6: *Special-Status Turtles – Western Pond Turtle*. Prepared for the Relicensing of the Yuba River Water Development (FERC Project No. 2246).

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Technical Memorandum 3-14
Special-Status Turtles –
2013 Focused Western Pond Turtle Surveys

Attachment 3-14A

Survey Site Maps

Yuba River Development Project
FERC Project No. 2246

October 2013

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Figure 1. Focused western pond turtle (*Actinemys marmorata*) survey site at upstream end of Our House Diversion Dam Impoundment.



Figure 2. Pool survey sites on Middle Yuba River upstream of Our House Diversion Dam Impoundment.

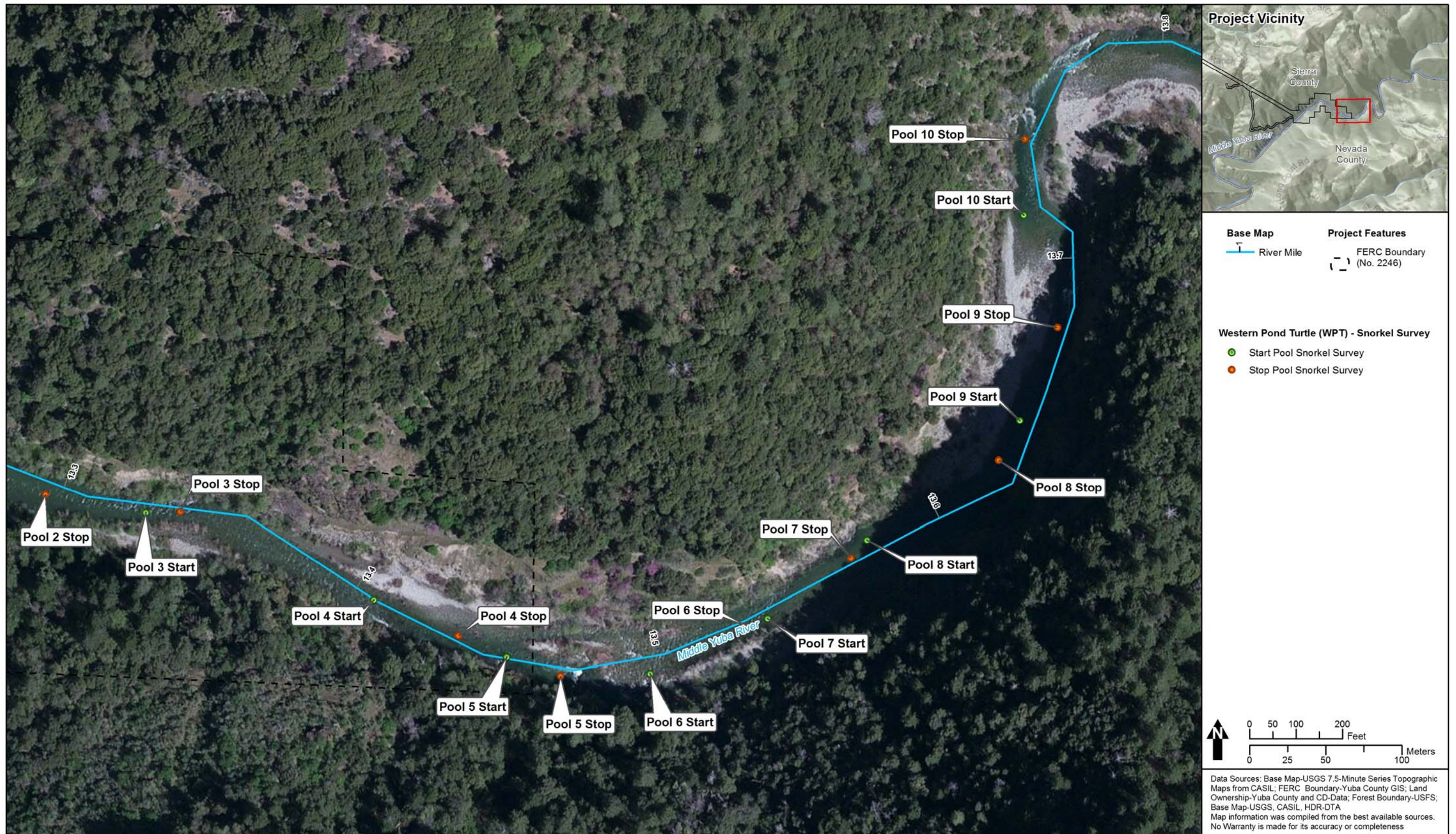


Figure 2. (continued)

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Selected Field Photographs

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ATTACHMENT 3-14B

SELECTED FIELD PHOTOGRAPHS



Figure 1. Our House Diversion Dam Impoundment: The survey area at the upper end of the impoundment was less than 3 meters deep and lacked underwater hiding areas at the observed water level; view is looking downstream (August 6, 2013).



Figure 2. Our House Diversion Dam Impoundment: Overhanging vegetation on the right bank is likely to be partly submerged at high water; view is from upstream of the impoundment pool (August 6, 2013).



Figure 3. Our House Diversion Dam Impoundment: A low-gradient riffle and shallow connected left bank side pool were located at the upstream end of the survey area; view is looking upstream from the impoundment (August 6, 2013).

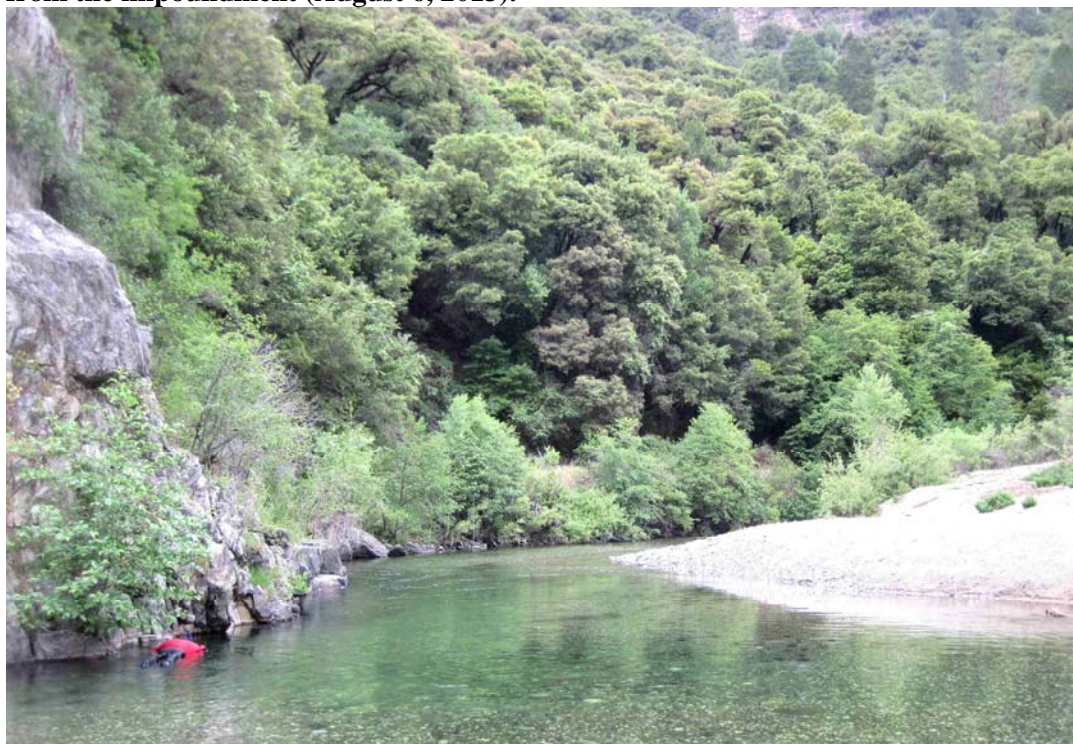


Figure 4. Pool 1: The right bank of pool 1 was steep bedrock, and the left bank was a gently sloping bar, neither of which was undercut; view is looking upstream (May 16, 2013).



Figure 5. Pool 1: No potential underwater hiding areas were observed at pool 1 (May 16, 2013).

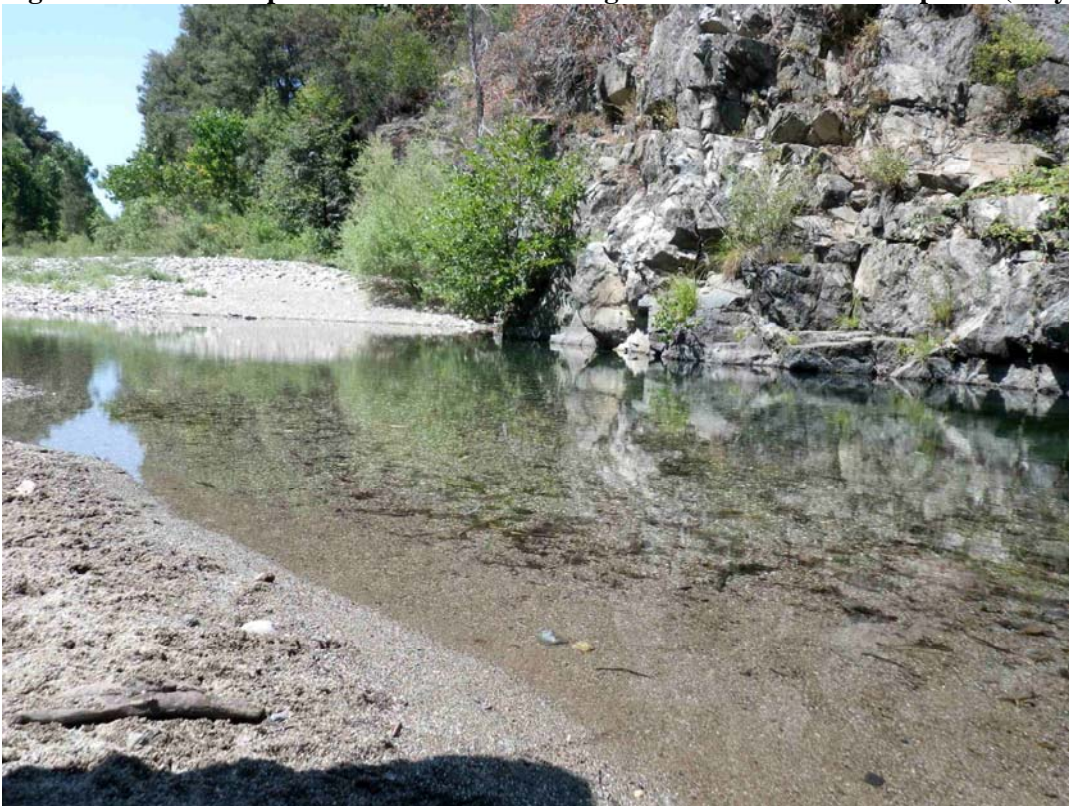


Figure 6. Pool 1: This is the view looking downstream from pool 1 (August 6, 2013).



Figure 7. Pool 1: This is the view looking upstream from the left bank (August 6, 2013).

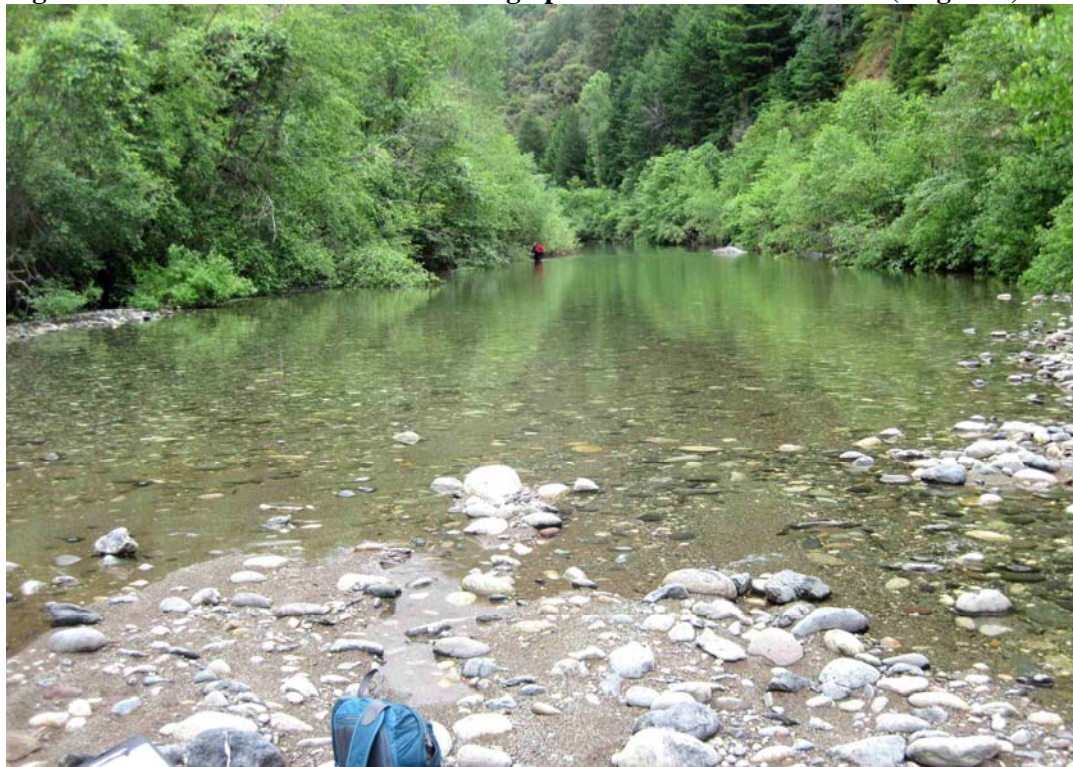


Figure 8. Pool 2: This long pool was characterized by densely vegetated banks, absence of undercut banks, and no potential underwater hiding areas; view is looking upstream (May 16, 2013).



Figure 9. Pool 2: This is a view of the left bank, showing dense, overhanging vegetation (May 16, 2013).



Figure 10. Pool 3: The banks of pool 3 were densely vegetated; view is looking upstream (May 16, 2013).

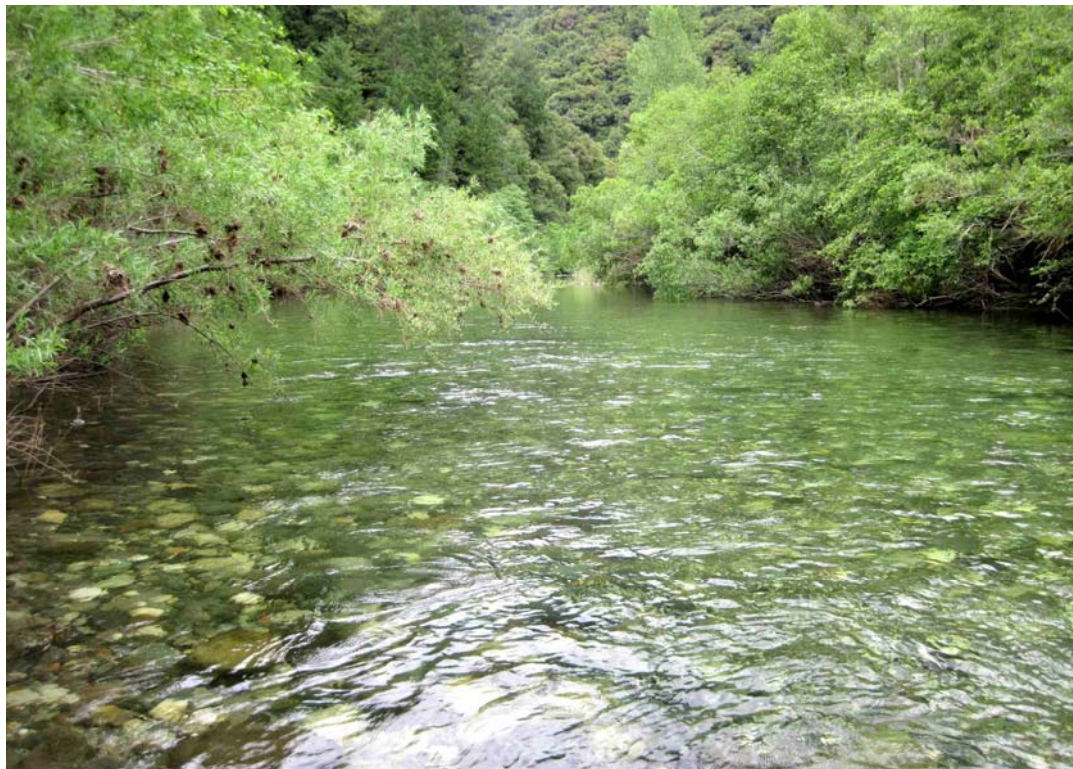


Figure 11. Pool 3: The substrate of this site included approximately 50% cobble and 10% small boulder; view is looking downstream (May 16, 2013).



Figure 12. Pool 3: This is a view of the left bank; view is looking upstream (May 16, 2013).



Figure 13. Pool 3: Pool 3 was the only survey site with an undercut bank, which was less than 10 meters in length along the right bank (May 16, 2013).



Figure 14. Pool 3: Much of pool 3 was 1 meter deep or less; and the deepest part of the site was 1.2 meters (August 6, 2013).



Figure 15. Pool 4: The left bank of pool 4 was moderately steep bedrock, and the right bank was a low bar; view is looking downstream (May 16, 2013).



Figure 16. Pool 4: A run occurred upstream of pool 4; view is looking upstream from right bank (May 16, 2013).



Figure 17. Pool 4: No potential underwater hiding areas were observed at pool 4 (May 16, 2013).



Figure 18. Pool 5: This survey site was a lateral scour pool, and the left bank was mostly steep bedrock (May 16, 2013).



Figure 19. Pool 5: This is the view looking downstream from pool 5 (May 16, 2013).



Figure 20. Pool 6: The right bank along pool 6 was moderately steep, with vegetation mostly confined to a narrow band; view is looking upstream (May 16, 2013).



Figure 21. Pool 6: Potential above-water hiding cover at pool 6 was associated with overhanging vegetation along the banks; view is looking downstream (May 16, 2013).



Figure 22. Pool 6: No potential underwater hiding areas or undercut banks were observed at pool 6 (August 19, 2013).



Figure 23. Pool 7: The right bank of pool 7 was moderately steep, with steeper bedrock along 15% of the bank (May 16, 2013).



Figure 24. Pool 7: No potential underwater hiding areas or undercut banks were observed at pool 7; view is looking downstream (May 16, 2013).



Figure 25. Pool 7: The left bank of pool 7 was a low bar; view is looking upstream (May 16, 2013).



Figure 26. Pool 8: The left bank of pool 8 was steep bedrock, and the deepest part of the site was 1.75 meters deep (May 16, 2013).



Figure 27. Pool 8: The substrate at pool 8 was mostly sand and gravel (together 85%), and no potential underwater hiding areas were observed; view is looking downstream (May 16, 2013).

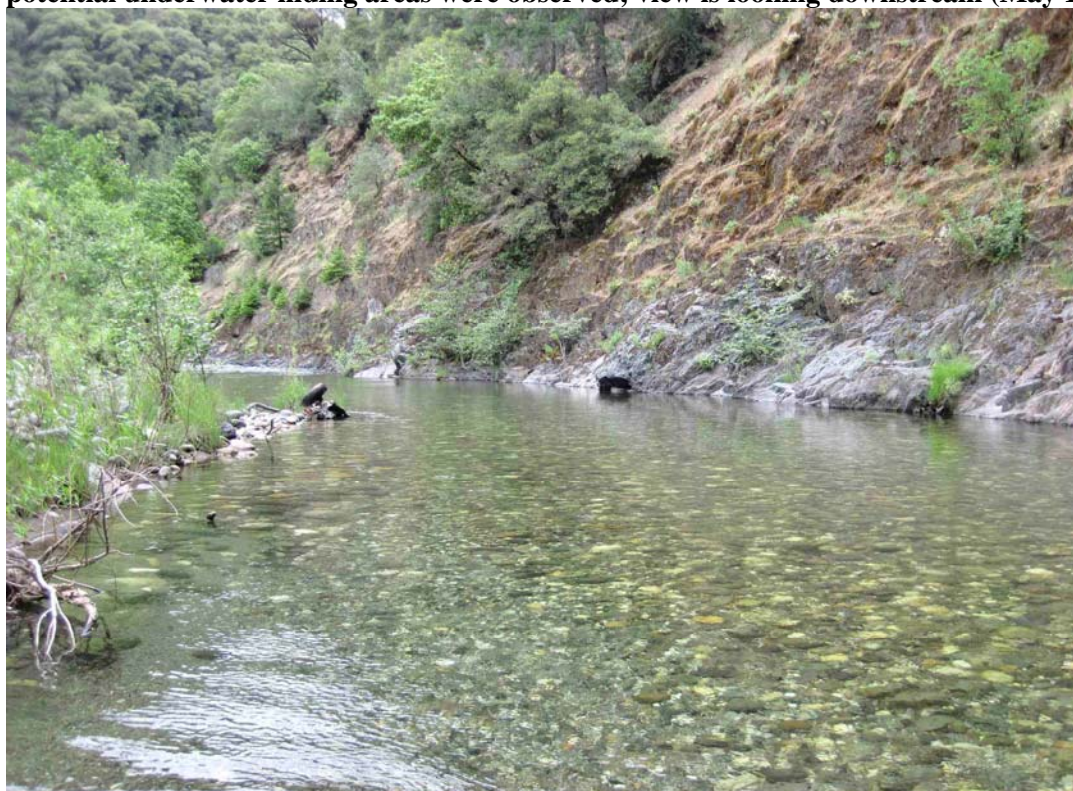


Figure 28. Pool 8: This is the view from pool 8 looking upstream from the right bank (May 16, 2013).



Figure 29. Pool 8: Underwater hiding cover may be present along the right bank of pool 8 at high water (May 16, 2013).



Figure 30. Pool 9: The left bank of pool 9 was steep bedrock and the deepest part of the site was 1.6 meters deep; view is looking upstream (May 16, 2013).



Figure 31. Pool 9: No potential underwater hiding areas were observed at pool 9; view is looking downstream (May 16, 2013).

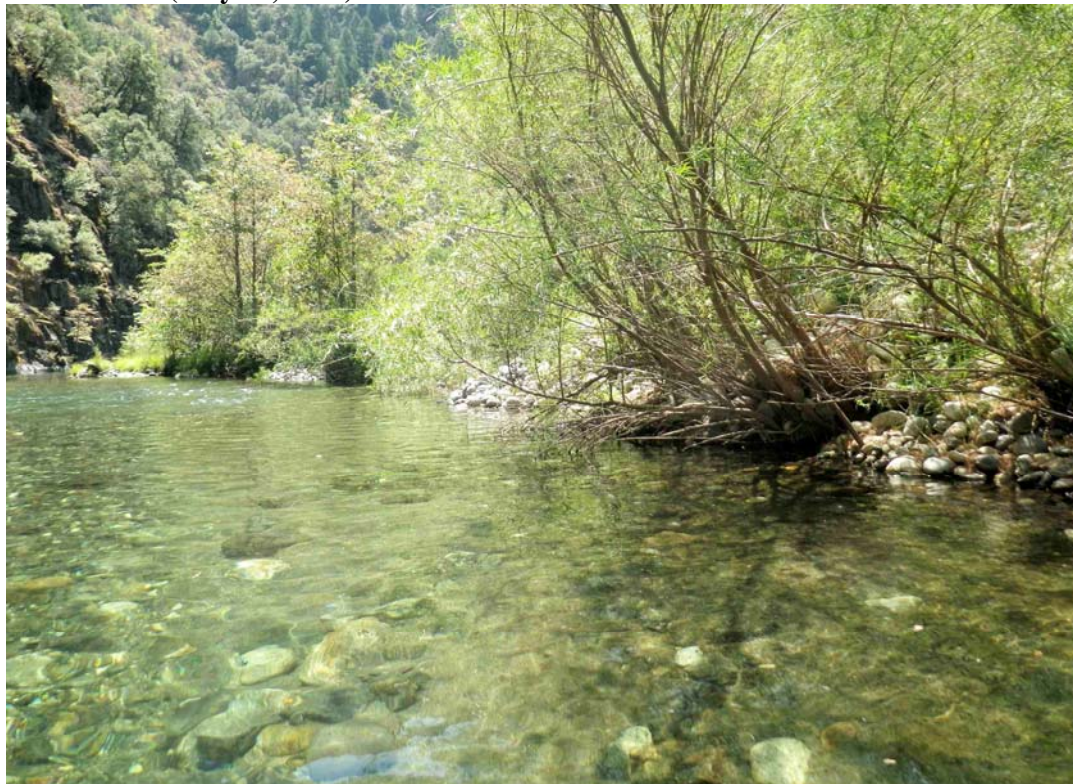


Figure 32. Pool 9: The right bank of pool 9 was a low cobble bar with moderately dense shrubs and small trees; view is looking downstream (August 6, 2013).



Figure 33. Pool 10: The right bank of pool 10 was mostly steep and included sparsely vegetated bedrock; the deepest part of the site was 1.6 meters deep; view is looking upstream (May 16, 2013).

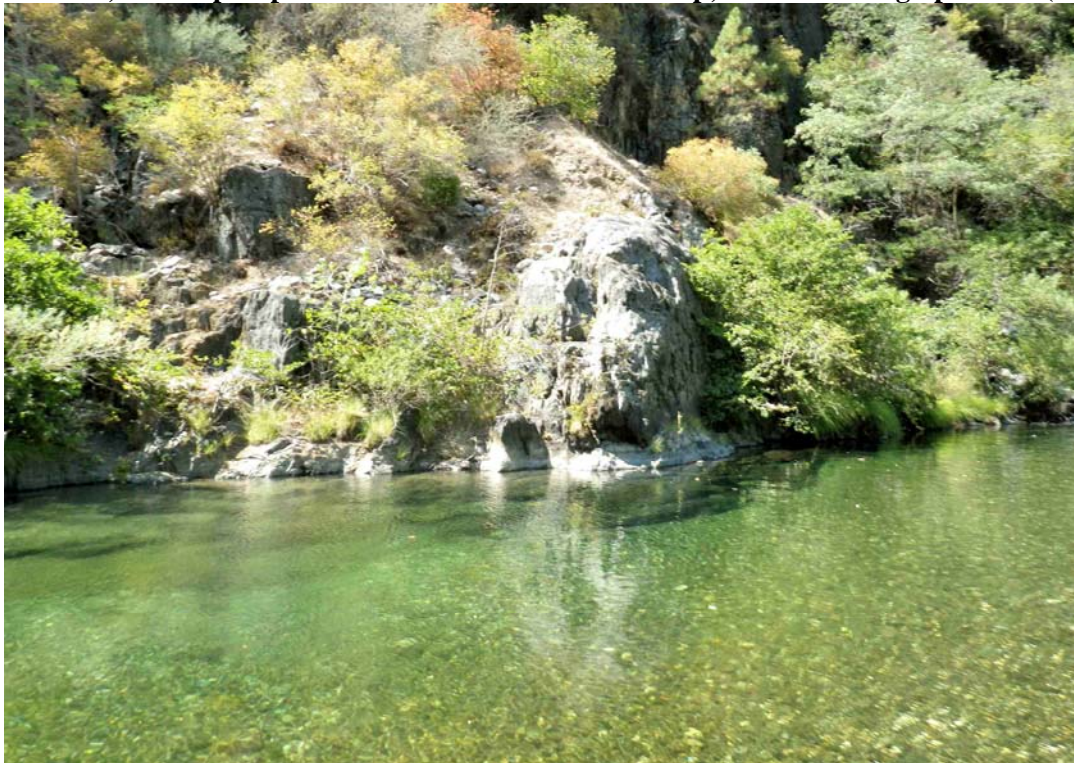


Figure 34. Pool 10: The substrate of pool 10 was mostly sand (40%), gravel (25%), and cobble (30%); no potential underwater hiding areas were observed (August 6, 2013).



Figure 35. Incidental observations during the surveys included juvenile and adult foothill yellow-legged frogs (*Rana boylii*) (August 6, 2013).