2.0 North Yuba River – New Bullards Bar Dam Reach

New Bullards Bar Dam Reach of the North Yuba River is 2.3 miles in length and extends from the confluence of the North Yuba River with the Middle Yuba River to New Bullards Bar Dam. Information used to evaluate conditions on this reach and investigate accessibility included a field reconnaissance on March 7 and 9, 2011. Additional information was collected in September and October 2009 as part of the Habitat Mapping Report (YCWA 2010).

Generally the potential effects of the Project in the reaches are associated with a reduction in flows compared to flows arriving at the diversion dams during runoff when the Project is diverting. Under Article 33 of the current license, YCWA is required to maintain minimum streamflow releases below New Bullards Bar Dam in wet and normal water years of 5 cfs, or natural flow, whichever is less. This article provides for reductions in these minimum streamflow requirements in critically dry water years. YCWA typically operates New Bullards Bar Reservoir by capturing winter and spring runoff from rain and snowmelt. The reservoir normally reaches its peak storage at the end of the spring runoff season, and then is drawn down until its lowest elevation in early to mid-winter. Storm runoff operations occur during the storm season, typically between October and May, and include operations to avoid or reduce uncontrolled flows. Flood operations and dam safety operations can occur in the December through May time frame and include small to large spills out of New Bullards Bar Reservoir. Review of the period of record (1966-2004) indicates that spills as late as May occurred in 8 of the 38 years (1969, 1971, 1982, 1983, 1995, 1996, 1998, and 2003); spills occurred as late as July in three of those years. Spills, which were sometimes prolonged or repeated in short intervals, closely corresponded with high flows on the North Yuba upstream of the reservoir.

Substrate along most of the reach is bedrock and house-sized boulders that separate large mid-channel pools. There are very short and infrequent areas of cobble-size deposits, but most of the substrate consist of large and immobile material. There is no apparent floodplain or terrace development. One seasonal tributary occurs along the reach (at about RM 0.8).

Based on channel classification and habitat mapping performed for the PAD (YCWA 2010), the New Bullards Bar Dam Reach of the North Yuba River is characterized as follows. The channel of the North Yuba River - New Bullards Bar Dam Reach is dominated by gradients below 3 percent (average gradient of 2 percent). In terms of channel morphology, presence of potential FYLF habitat, and accessibility, New Bullards Bar Dam Reach can be divided into three sections (Table 2.0-1). The first section (Section 1) at the downstream end of the reach is 1.1 mi in length and exhibits a gradient greater than 3 percent. Section 2 is short (0.15 mi) and has gradient greater than 5 percent. The rest of the reach is designated as Section 3, which is characterized by a lower gradient, particularly just above Section 2, where the gradient is less than 1 percent.

New Bullards Bar Dam Reach is very rugged with large boulders that often cover the channel, and large, deep pools bounded by bedrock. The middle steeper portion (~RM 0.5 to ~RM 1.5; includes parts of all 3 Sections) cannot be safely accessed by foot from upstream due to a deep bedrock gorge with vertical cliff walls blocking the way. The lower portion of Section 1 is a rugged path through very large boulders that cover pocket water and separate deep pools. The reach is accessible at two points, in the lower part of Section 1 and the uppermost part of Section

3. Access dowstream from New Bullards Bar Dam into Section 3 requires a boat to cross the spillway pool; about 0.8 mi of the reach downstream is accessible, though moderately difficult. Access upstream from the Middle Yuba River and North Yuba River confluence into Section 1 is limited and is a long and difficult walk. In Section 1, only 0.1 mi was accessible on March 9, 2011, during higher flows; about 0.5 mi was accessible in September 2009, during lower flows. The lowest 0.4 mi of the river is surrounded by private property.

Analysis of available stream habitat mapping data and the March 2011 reconnaissance indicates that suitable habitat for FYLF is not common nor contiguous in this reach. Potentially suitable habitat occurs at the confluence with the Middle Yuba River and at the confluence of the tributary at RM 0.8 (which is inaccessible by foot), and in other much smaller patches throughout the reach primarily associated with low gradient riffles and pool tail-outs with cobble-dominated substrates. These suitable areas are generally surrounded or separated by deep, mid-channel pools and areas of pocket water among massive boulders. A survey site of 800 m length could be situated (albeit with difficult access) at the downstream end of the reach in Section 1. A survey site of up to 1,000 m could be situated at the upstream end of the reach (1,300 m of accessible stream, includes weir and spillway pools), in Section 3, provided boat access is feasible; access in this section is moderately difficult. Section 2 is inaccessible. It may be possible to extend or shift the survey site in Section 1 to include the upstream portion of the Yuba River or the downstream portion of the Middle Yuba River. Habitat appears to be most suitable at the confluence of the rivers, and access is difficult in the upstream portion of Section 1. The potential effects of the Project on FYLF in the New Bullards Bar Dam Reach of the North Yuba River should be approximately the same throughout the reach. Accretion is unlikely to significantly increase flows through the reach.

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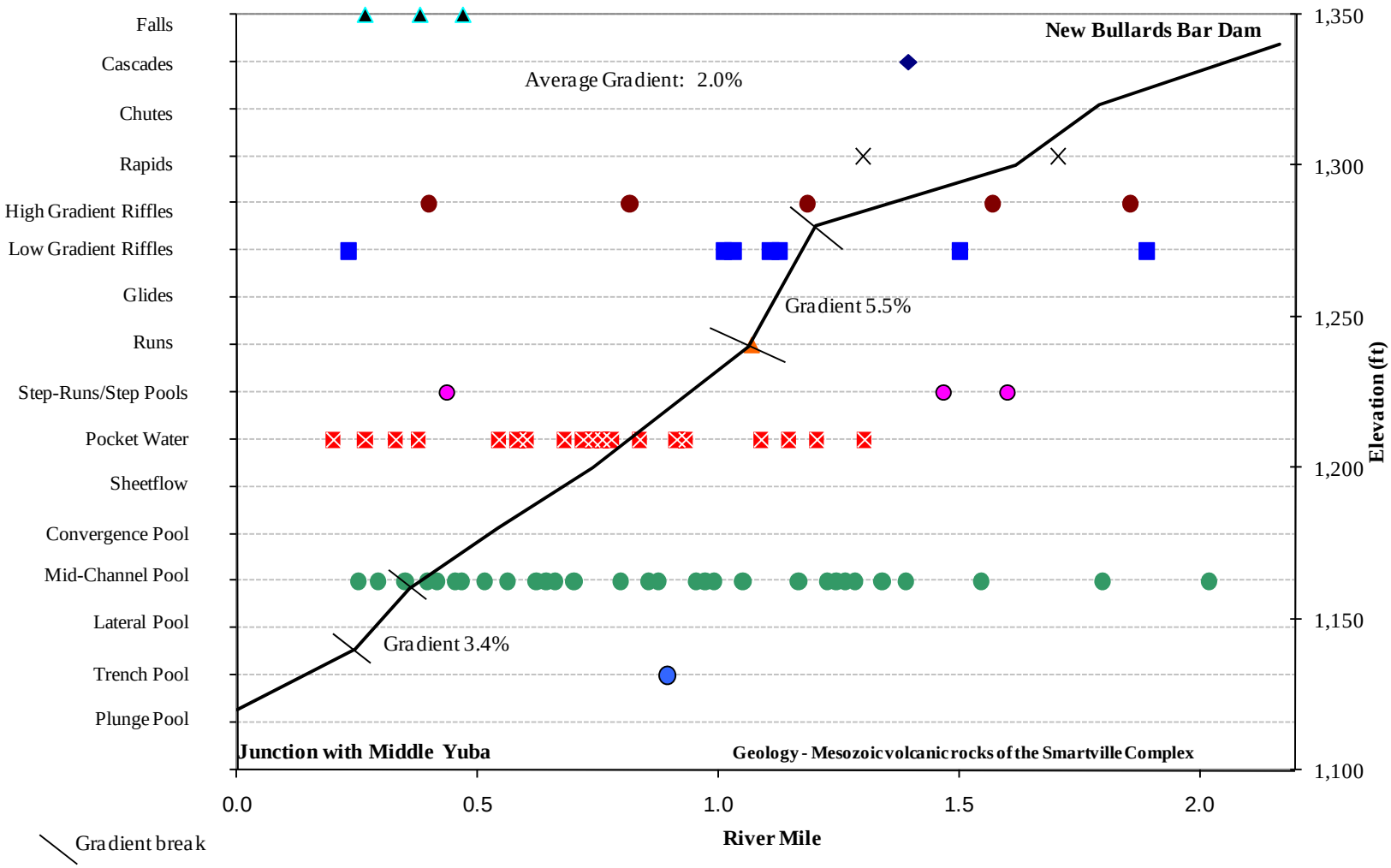

Figure 2.0-1. North Yuba River – New Bullards Bar Dam Reach longitudinal profile and habitat types from Stream Habitat Mapping Report (YCWA 2010).

Table 2.0-1. North Yuba River - New Bullards Bar Dam Reach section descriptions and access considerations

Section/ River Mile	Description of Section	Presence of potential FYLF breeding habitat	FYLF Records	Site Access
Section 1 RM 0.0 to 1.1	Predominant stream habitat types are mid-channel pool and pocket water. Bankfull width averages 21 m. Dominant substrate consists of boulders and bedrock. Margin and overhanging vegetation is rare and predominantly consists of deciduous shrubs. One tributary occurs at along this section around RM 0.8.	Potential breeding and rearing habitat is mostly limited to the confluence with the Middle Yuba River and at the tributary confluence at RM 0.8 where the substrate is more suitable (patches of cobble, less boulder/bedrock dominated). Few pool tail-outs occur with cobble/gravel dominant substrate.	• No FYLF records	• Accessible from confluence with Middle Yuba River up to RM 0.5 at lower flows (cross North Yuba River below junction and walk upstream through house-sized boulders and past deep pools), but difficult. At high flows, access is limited up to RM 0.1.
Section 2 RM 1.1 to 1.25	Predominantly low-gradient riffles, mid-channel pools, and pocket water. Bankfull width generally is less than 20 m. Dominant substrate consists of boulder and cobble, with bedrock. Margin and overhanging vegetation is low to moderately dense and comprised of deciduous shrubs. No tributaries occur along this section.	Gradient is highest in this section, however, potential breeding and rearing habitat is more prevalent (than in other sections), and primarily associated with cobble/boulder substrates in low gradient riffles.	• No FYLF records	• Cannot be safely accessed by foot from upstream due to a deep bedrock gorge with vertical cliff walls blocking the way. • The lower section is a rugged path through very large boulders that cover pocket water and separate deep pools.
Section 3 RM 1.25 to 2.3	Predominant stream habitat type is mid-channel pool; and to a lesser extent, low and high gradient riffles. Bankfull width averages 21 m. Boulders and bedrock are dominant substrates. Margin and overhanging vegetation is moderately dense and consists of deciduous shrubs. No tributaries occur along this section.	Potential breeding and rearing habitat is non-contiguous and patchy. Is primarily associated with cobble substrates in low gradient riffles and pool tail-outs.	• No FYLF records	• Access downstream of New Bullards Bar Dam requires a boat to cross the spillway pool, moderately difficult access. • Access is limited to 0.8 mi below dam (i.e., no access below ~RM 1.5)

Figure 2.0-2. North Yuba River – New Bullards Bar Dam Reach. The approximate extent of the March 2011 reconnaissance areas are demarcated by red dots (two short sections).

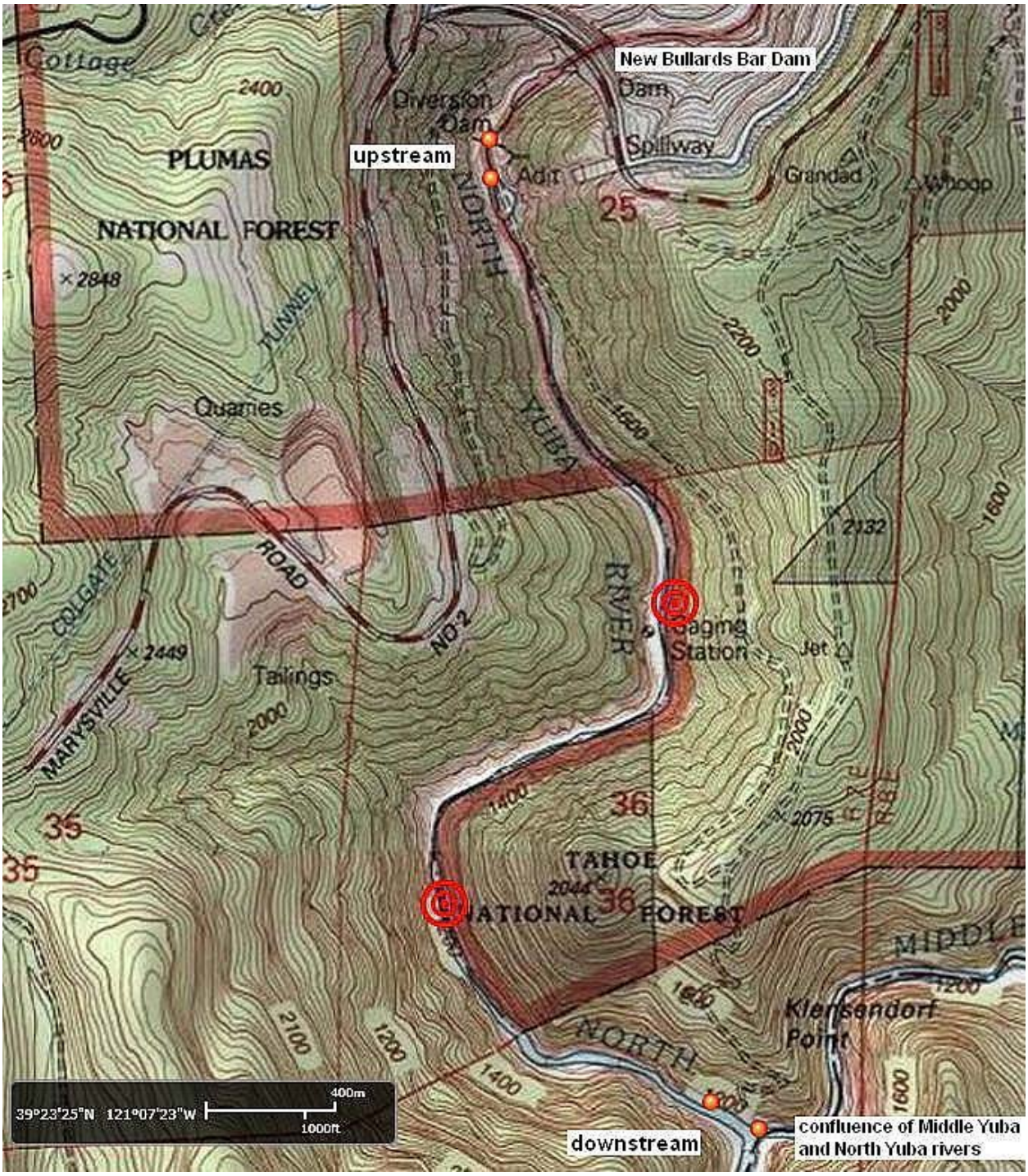

Figure 2.0-3. North Yuba River – New Bullards Bar Dam Reach: overview aerial image. The approximate extent of the March 2011 reconnaissance areas are demarcated by red dots (two short sections). Concentric red circles indicate approximate extent of inaccessible middle section of reach (with boat and at low flows).

Figure 2.0-4. North Yuba River – New Bullards Bar Dam Reach: aerial image of upstream section investigated in March 2011. The approximate extent of the March 2011 reconnaissance area is demarcated by red dots.

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Figure 2.0-5. North Yuba River – New Bullards Bar Dam Reach: aerial image of downstream section investigated in March 2011. The approximate extent of the March 2011 reconnaissance area is demarcated by red dots. Concentric red circles indicate approximate limit of accessible section of reach (at low flows).

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Aerial video captures: North Yuba River - New Bullards Bar Dam Reach (NBBDR)

Figure 2.0-6. North Yuba River NBBDR Section 1 at confluence with Middle Yuba River, looking upstream.

Figure 2.0-7. North Yuba River NBBDR, Section 1 at RM 0.1, looking upstream.

Figure 2.0-8. North Yuba River NBBDR, Section 1 at RM 0.5, looking upstream. From this point going upstream is inaccessible by foot.

Figure 2.0-9. North Yuba River NBBDR, Section 1 at RM 0.8, looking upstream. Tributary confluence is on left side.

Figure 2.0-10. North Yuba River NBBDR, Section 1 at RM 0.9, looking upstream.

Figure 2.0-11. North Yuba River NBBDR, Section 2 near RM 1.1, looking upstream.

Figure 2.0-12. North Yuba River NBBDR, Section 2 near RM 1.25, looking upstream.

Figure 2.0-13. North Yuba River NBBDR, Section 3 near RM 1.4, looking upstream.

Figure 2.0-14. North Yuba River NBBDR, Section 3 near RM 1.6, looking upstream. Below this section is inaccessible.

Figure 2.0-15. North Yuba River NBBDR, Section 3 near RM 1.7, looking upstream.

Figure 2.0-16. North Yuba River NBBDR, Section 3 near RM 1.8, looking upstream.

Figure 2.0-17. North Yuba River NBBDR, Section 3 near RM 2.0, looking upstream at New Bullards Bar Dam. Spillway pool requires boat to cross.

Ground photos: North Yuba River - New Bullards Bar Dam Reach (NBBDR)

Figure 2.0-18. North Yuba River NBBDR, Section 1 at RM 0.1, main channel pool just upstream of confluence with Middle Yuba River, looking downstream from right bank (LDS), September 14, 2009.

Figure 2.0-19. North Yuba River NBBDR, Section 1 at RM 0.1, mid-channel pool just upstream of confluence with Middle Yuba River, looking downstream from left bank (LDS), March 9, 2011.

Figure 2.0-20. North Yuba River NBBDR, Section 1 at RM 0.2, pocket water with bedrock-dominant substrate, looking downstream, September 14, 2009.

Figure 2.0-21. North Yuba River NBBDR, Section 1 at RM 0.3, pocket water with bedrock/boulder-dominant substrate and some cobble, looking upstream, September 14, 2009.

Figure 2.0-22. North Yuba River NBBDR, Section 1 at RM 0.3, mid-channel pool with boulder-dominant substrate, looking upstream, September 14, 2009.

Figure 2.0-23. North Yuba River NBBDR, Section 1 near RM 0.35, mid-channel pool with boulder/cobble substrates, looking upstream, September 14, 2009.

Figure 2.0-24. North Yuba River NBBDR, Section 1 at RM 0.4, mid-channel pool with boulder-dominant substrate, looking upstream, September 14, 2009.

Figure 2.0-25. North Yuba River NBBDR, Section 1 near RM 0.45, step-run/step-pool with boulder-dominant substrate, looking upstream, September 14, 2009.

Figure 2.0-26. North Yuba River NBBDR, Section 1 near RM 0.5, mid-channel pool with bedrock/boulder-dominant substrate and some cobble, looking upstream, September 14, 2009.

Figure 2.0-27. North Yuba River NBBDR, Section 3 near RM 1.5, rapids with boulder and bedrock dominant substrate, looking downstream October 17, 2009. Below this section is inaccessible.

Figure 2.0-28. North Yuba River NBBDR, Section 3 near RM 1.55, step-pool with boulder-dominant substrate, looking upstream October 17, 2009.

Figure 2.0-29. North Yuba River NBBDR, Section 3 near RM 1.6, low-gradient riffle with boulder-dominant substrate and vegetated banks, looking upstream October 17, 2009.

Figure 2.0-30. North Yuba River NBBDR, Section 3 near RM 1.7, mid-channel pool with boulder-dominant substrate, looking upstream October 17, 2009.

Figure 2.0-31. North Yuba River NBBDR, Section 3 near RM 1.8, high-gradient riffle with boulder-dominant substrate, looking downstream October 17, 2009.

Figure 2.0-32. North Yuba River NBBDR, Section 3 near RM 1.9, mid-channel pool with boulder-dominant substrate (bedrock mainly found on banks), looking upstream October 17, 2009. Spillway pool requires boat to cross.

3.0 Yuba River – Middle/North Yuba River Reach

Middle/North Yuba River Reach of the Yuba River is 5.8 mi in length and extends from the New Colgate Powerhouse to the confluence of the North Yuba River with the Middle Yuba River. Information used to evaluate conditions on this reach and investigate accessibility included a field reconnaissance on March 7 and 9, 2011. Additional information was collected in September 2009 as part of the Habitat Mapping Report (YCWA 2010).

Generally the potential effects of the Project in the reaches are associated with a reduction in flows compared to flows arriving at the diversion dams during runoff when the Project is diverting. Under Article 33 of the current license, YCWA is required to maintain minimum streamflow releases in wet and normal years during the periods from April 15 through June 15 and from June 16 through April 14 as follows: 50 cfs and 30 cfs, respectively, or the natural flow, whichever is less, below Our House Diversion Dam; and 5 cfs or the natural flow, whichever is less, in both periods below New Bullards Bar Dam. This article provides for reductions in these minimum streamflow requirements in critically dry water years. Licensee typically operates New Bullards Bar Reservoir by capturing winter and spring runoff from rain and snowmelt. The reservoir normally reaches its peak storage at the end of the spring runoff season, and then is drawn down until its lowest elevation in early to mid-winter. Storm runoff operations occur during the storm season, typically between October and May, and include operations to avoid or reduce uncontrolled flows. Flood operations and dam safety operations can occur in the December through May time frame and include small to large spills out of New Bullards Bar Reservoir. There are no existing gage records for Middle/North Yuba River Reach of the Yuba River; however, there are gage records for the North Yuba River below New Bullards Bar Dam. Review of the period of record (1966-2004) indicates that spills as late as May occurred in 8 of the 38 years (1969, 1971, 1982, 1983, 1995, 1996, 1998, and 2003); spills occurred as late as July in three of those years. Spills, which were sometimes prolonged or repeated in short intervals, closely corresponded with high flows on the North Yuba upstream of the reservoir.

Based on channel classification and habitat mapping performed for the PAD (YCWA 2010), the Middle/North Yuba River Reach of the Yuba River is characterized as follows. The reach is dominantly bedrock-controlled, with only very short boulder/cobble sections. The channel is laterally and vertically stable due to dominant bedrock control. Sinuosity is very low as there are no significant sections strongly influenced by alluvial deposition. Habitat is dominated by large and deep mid-channel pools that are separated by long sections of pocket water formed between large boulders (Figure 3.0-1). High gradient riffles dominate the gradient "steps," although according to the mapped gradient of 1.8 percent they are not overly steep. Finer sediment (cobble and finer) is not common and sediment transport capability likely exceeds sediment availability. Eleven tributaries occur along the reach, one of which, Sweetland Creek, is perennial and is located at RM 38.2.

This confined bedrock-dominated reach is largely inaccessible. The river flows through bedrock canyons with vertical walls inhibiting ground access. The only location that was accessed for stream habitat mapping was the area just above and below New Colgate Powerhouse (YCWA 2010). In terms of channel morphology, presence of potential FYLF habitat, and accessibility,

Middle/North Yuba River Reach can be divided into three sections (Table 3.0-1). Approximately 0.7 mi of the reach upstream of the New Colgate Powerhouse was accessible on March 7, 2011, during higher flows; about 1 mi of the reach was accessible in September 2009, during lower flows. The reach downstream of the Middle/North Yuba confluence was not accessible on March 9, 2011; access downstream during higher flows requires a boat to cross the deep pool at the river confluence. During lower flows, approximately 0.1 mi of the reach is accessible. The middle Section 2 (~RM 35 to ~RM 39.6) lacks public roads within reasonable proximity to the river, is bounded on either bank by steep bedrock cliffs, and cannot be safely accessed by foot from upstream or downstream access points due to vertical cliff walls that block the way.

Analysis of available stream habitat mapping data and the March 2011 reconnaissance indicates that areas of potentially suitable habitat exist upstream of New Colgate Powerhouse for approximately 0.7 mi; however, habitat becomes increasingly patchy going upstream through this section, with suitable habitat often separated by deep, bedrock-confined pools and boulder-dominated pocket water. Section 2 has numerous relatively short sections of potentially suitable habitat. Section 3 has suitable habitat mainly associated with the Middle/North Yuba confluence. A survey site of 1,000 m in length could be situated in Section 1, preferably starting just upstream of New Colgate Powerhouse. A survey site of about 150 m length could be situated at the upstream end of the reach, in Section 3, provided boat access is feasible. It may be possible to extend or shift the survey site in Section 3 to include the upstream portion of the Yuba River or the downstream portion of the Middle Yuba River. Section 2 is inaccessible. Habitat appears to be most suitable at the confluence of the rivers, and access becomes limited downstream of Section 3. Potential Project effects in the Middle/North Yuba River Reach of the Yuba River should be greatest near the Middle/North Yuba River confluence, but the magnitude of accretion along the reach is not precisely known.

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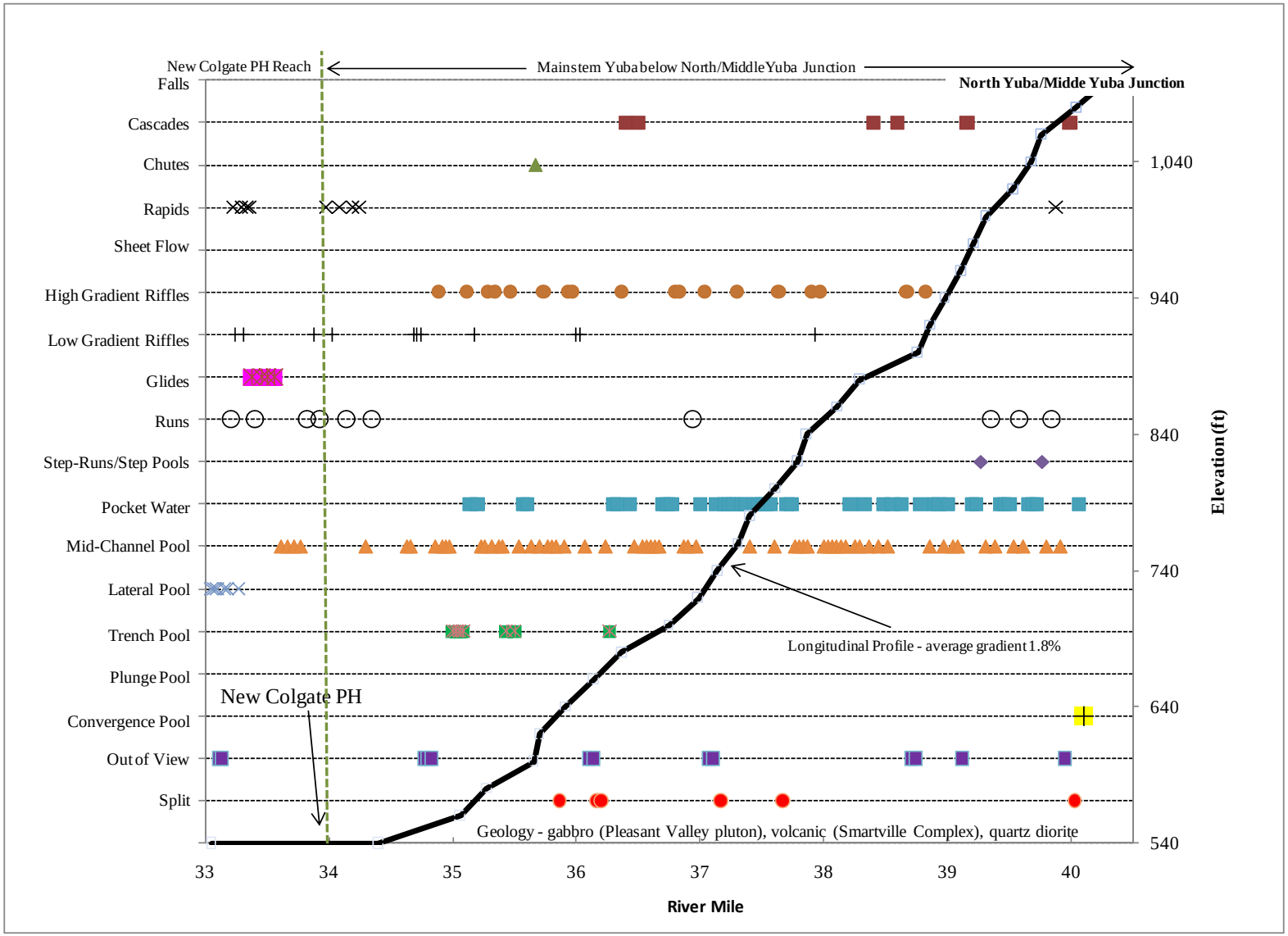

Figure 3.0-1. Yuba River – Middle/North Yuba River Reach longitudinal profile and Habitat Mapping Units using video-mapped data (YCWA 2010).

Table 3.0-1. New Bullards Bar Dam Reach section descriptions and access considerations

Section/ River Mile	Description of Section	Presence of potential FYLF breeding habitat	FYLF Records	Site Access
Section 1 RM 34 to 35	Predominant stream habitat types are mid-channel pools and high-gradient riffles. Bankfull width averages 25 m. Dominant substrate consists of boulders. Margin and overhanging vegetation is rare and predominantly consists of blackberry and scattered willows and alder saplings. One tributary is present at RM 34.2.	Potential breeding and rearing habitat mainly consists of mid-pools and some low-velocity edgewater with suitable boulder substrate. Suitable habitat is interspersed among bedrock-confined shoreline and higher velocity flows. Sufficient sun exposure on stream margins.	• No FYLF records	• Accessible from New Colgate Powerhouse up to RM 35 at lower flows. • At high flows, access is limited up to RM 34.8. • Portions of the stream shoreline consist of steep bedrock/ boulders, and thus are not wadeable.
Section 2 RM 35 to 39.6	Predominantly mid-channel pools, and pocket water, and high-gradient riffles. No ground data on bankfull width. Dominant substrate consists of boulder and bedrock. Margin and overhanging vegetation is sparse and mainly consists of deciduous shrubs. Five tributaries occur along this section.	Potential breeding and rearing habitat consits of pools and low-velocity edgewater and suitable boulder substrate. The habitat occurs in several relatively short sections throughout the reach. Boulder substrate is also common. Higher-gradient areas and bedrock-confined channel is interspersed throughout this section. Sufficient sun exposure on stream margins.	• No FYLF records	• Access to section is limited due to lack of roads near the river and steep bedrock terrain throughout section. • Cannot be safely accessed by foot from upstream or downstream access points due to presence of vertical cliffs.
Section 3 RM 39.6 to 39.7	Predominant stream habitat type is a convergence pool and split. No ground data on bankfull width. Boulders and cobbles are dominant substrate. Margin and overhanging vegetation is patchy and consists of moderately dense groups of deciduous shrubs. No tributaries occur along this section.	Confluence consists of low-velocity pools and edgewater with good interspersion of cobble/boulder substrate. Margin and overhanging vegetation does not preclude sun exposure along most of this section.	• No FYLF records	• Accessible from YCWA access road. Traversible from North Yuba/Middle Yuba River confluence downstream approximately 0.1 RM during low flows; vertical cliffs limit further access downstream. • Access during high flows would require a boat to cross the convergence pool at the Middle/North Yuba River confluence.

Figure 3.0-2. Yuba River – Middle/North Yuba River Reach: overview topography. The approximate extent of the March 2011 reconnaissance areas are demarcated by red dots (one section).

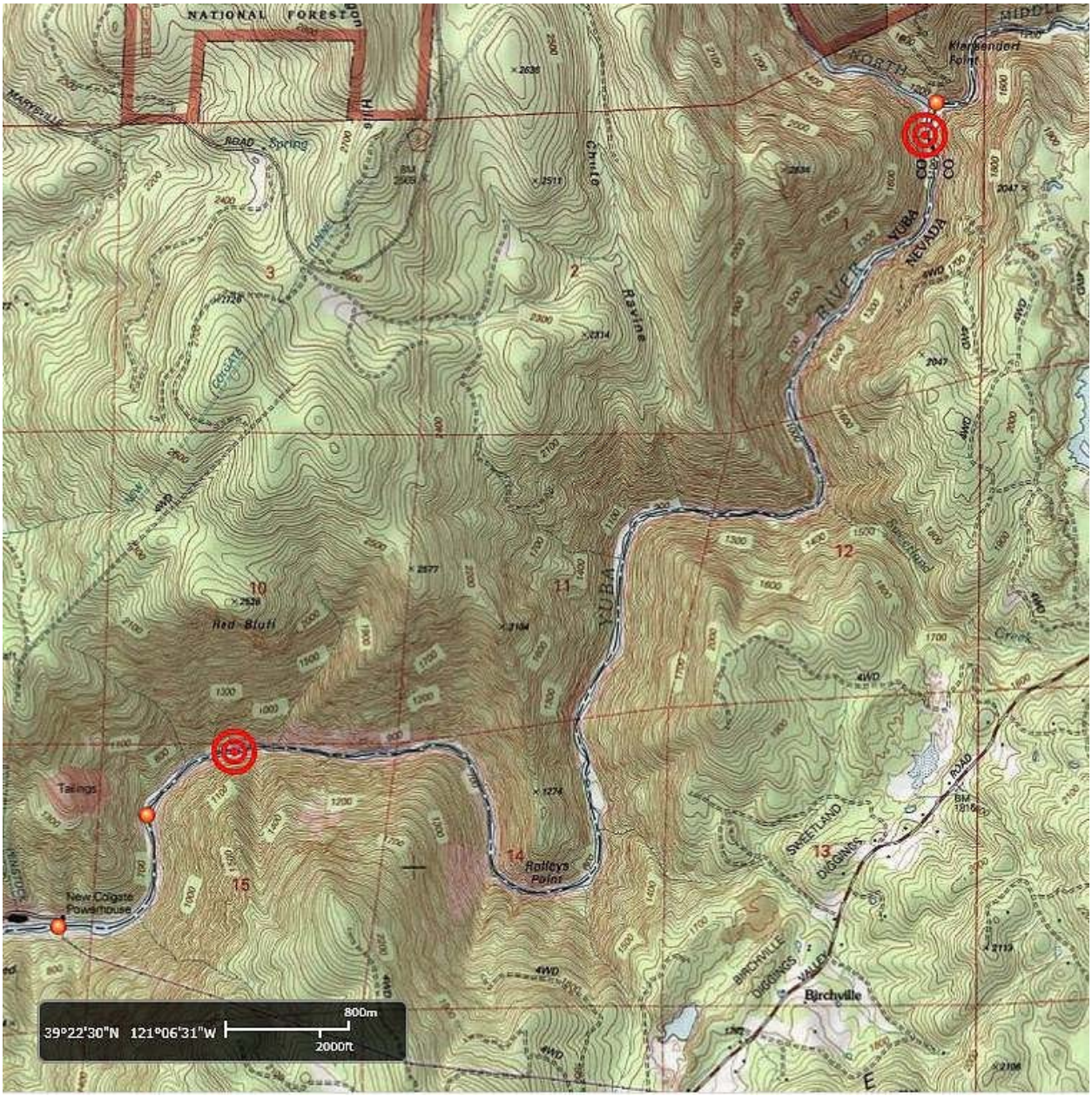

Figure 3.0-3. Yuba River – Middle/North Yuba River Reach: overview aerial image. The approximate extent of the March 2011 reconnaissance areas are demarcated by red dots (one section). Concentric red circles indicate approximate extent of inaccessible middle section of reach (with boat and at low flows).

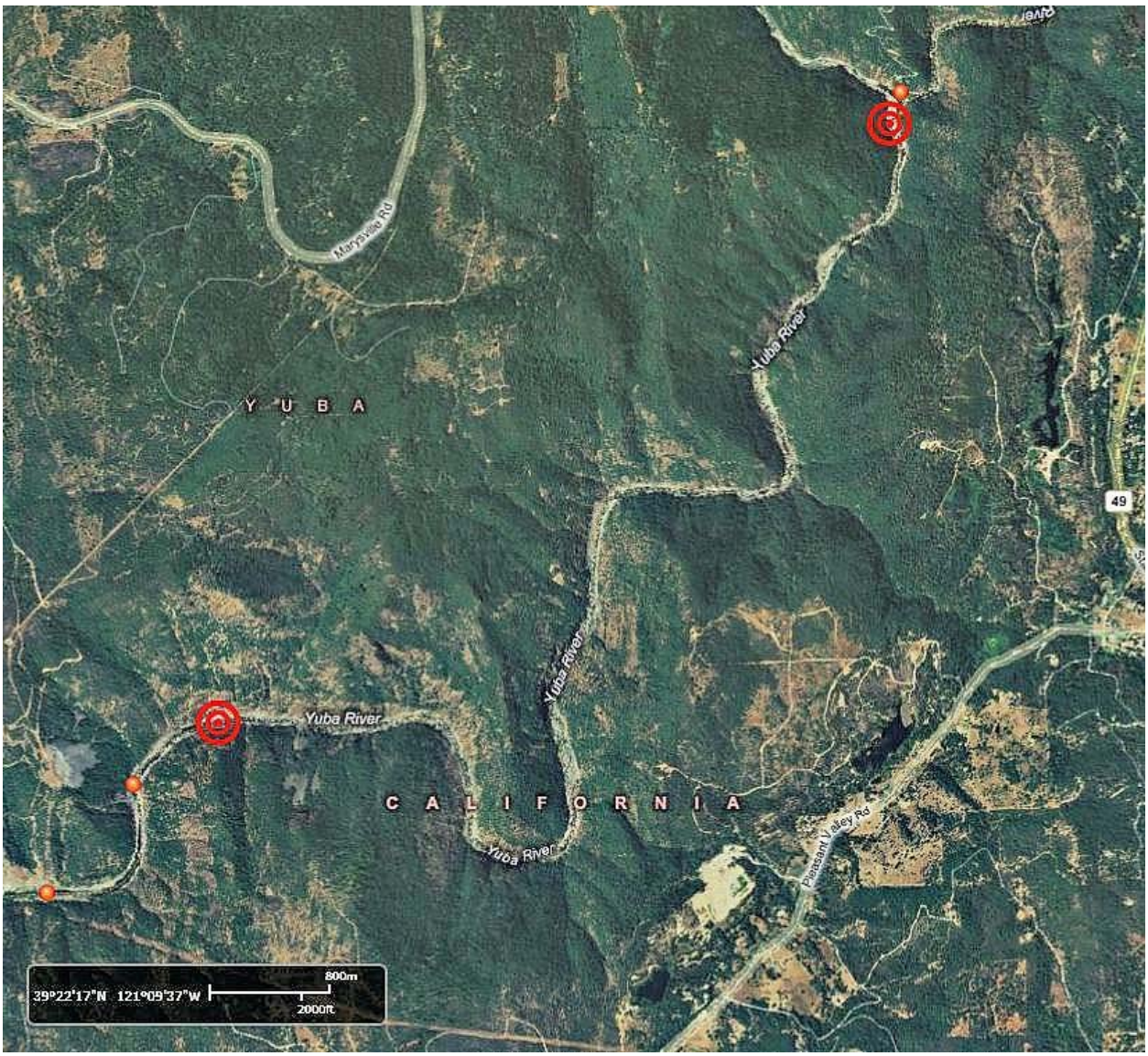

Figure 3.0-4. Yuba River – Middle/North Yuba River Reach: aerial image of upstream section investigated in March 2011. The reach was not traversible during the March 2011 reconnaissance; investigation was limited to visual observations at the Middle/North Yuba Confluence only. Concentric red circles indicate approximate limit of accessible section of reach (with boat and at low flows).

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Figure 3.0-5. Yuba River – Middle/North Yuba River Reach: aerial image of downstream section investigated in March 2011. The approximate extent of the March 2011 reconnaissance area is demarcated by red dots. Concentric red circles indicate approximate limit of accessible section of reach (at low flows).

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Aerial video captures: Yuba River - Middle/North Yuba River Reach (MNYRR)

Figure 3.0-6. Yuba River MNYRR, Section 1 at RM 34.0, looking upstream from New Colgate Powerhouse.

Figure 3.0-7. Yuba River MNYRR, Section 1 at RM 34.1, looking upstream.

Figure 3.0-8. Yuba River MNYRR, Section 1 at RM 34.3, looking upstream.

Figure 3.0-9. Yuba River MNYRR, Section 1 at RM 34.4, looking upstream.

Figure 3.0-10. Yuba River MNYRR, Section 1 at RM 34.5, looking upstream.

Figure 3.0-11. Yuba River MNYRR, Section 1 at RM 34.7, looking upstream.

Figure 3.0-12. Yuba River MNYRR, Section 2 at RM 35.6, looking upstream.

Figure 3.0-13. Yuba River MNYRR, Section 2 at RM 36.7, looking upstream.

Figure 3.0-14. Yuba River MNYRR, Section 2 at RM 37.4, looking upstream.

Figure 3.0-15. Yuba River MNYRR, Section 2 at RM 39.0, looking upstream.

Figure 3.0-16. Yuba River MNYRR, Section 3 at RM 39.6, looking upstream.

Ground photos: Yuba River - Middle/North Yuba River Reach (MNYRR)

Figure 3.0-17. Yuba River MNYRR, Section 1 at RM 34, run/mid-channel pool looking upstream from New Colgate Powerhouse, March 7, 2011.

Figure 3.0-18. Yuba River MNYRR, Section 1 at RM 34.1, low-gradient riffle looking upstream, March 7, 2011.

Figure 3.0-19. Yuba River MNYRR, Section 1 at RM 34.3, mid-channel pool looking upstream, March 7, 2011.

Figure 3.0-20. Yuba River MNYRR, Section 1 at RM 34.4, trench pool looking upstream, March 7, 2011.

Figure 3.0-21. Yuba River MNYRR, Section 1 at RM 34.5, edgewater habitat near high gradient riffle, looking upstream, March 7, 2011.

Figure 3.0-22. Yuba River MNYRR, Section 1 at RM 34.7, low-gradient riffle, looking upstream, March 7, 2011.

Figure 3.0-23. Yuba River MNYRR, Section 3 at RM 39.6, confluence of Middle/North Yuba, looking downstream, March 9, 2011.