FLOW FLUCUATION MONITORING FOR FOOTHILL YELLOW-LEGGED FROG *(Rana boylii)* ON THE SOUTH FORK AMERICAN RIVER, EL DORADO COUNTY, CALIFORNIA FOR THE EL DORADO HYDROELECTRIC PROJECT (FERC NO. 184)

Prepared for:

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JOB 514/10

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 Monitoring Requirements

The El Dorado Irrigation District (District) owns and operates the El Dorado Hydroelectric Project (Project) in El Dorado County, California. The Project is licensed by the Federal Energy Regulatory Commission (Project 184). The District, in coordination with the U.S. Forest Service, the California State Water Resources Control Board, and the Ecological Resources Committee, developed the Project 184 Foothill Yellow-legged Frog Monitoring Plan (Plan) as required by the Project 184 License[1]. The Plan requires monitoring for foothill yellow-legged frog (*Rana boylii*; FYLF) be conducted at four sites "June through September at any time the SFAR flow is 100 cfs or less and the reach between Kyburz Diversion Dam and Silver Creek changes 50 cfs or more in 1 day."

On August 25 at approximately 6:00 pm, the 36 inch by-pass valve at Kyburz Diversion Dam opened causing streamflows in the SFAR below Kyburz diversion dam to increase from approximately 24 cfs to 98 cfs for a period of approximately one hour (Figure 1). The release from the Kyburz Diversion Dam resulted in a flow fluctuation on the SFAR that triggered monitoring as required by the Plan. This report summarizes the results of monitoring conducted pursuant to the Plan.

[1] United States Forest Service Section 4(e) Conditions 37 and 38; State Water Resources Control Board 401 Water Quality Certification Condition 13; Project 184 Settlement Agreement Sections 7 and 8.

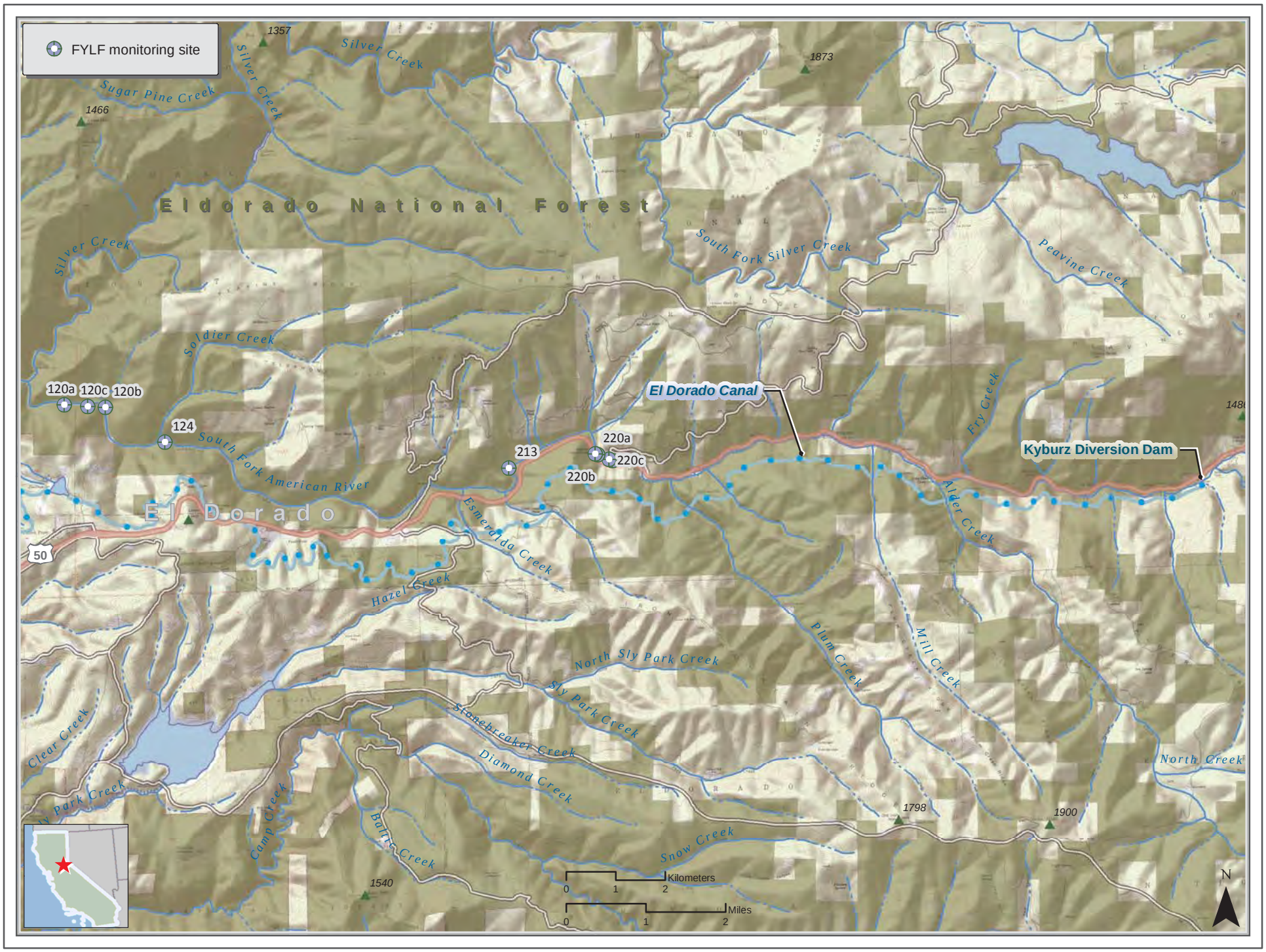

Figure 1. Flow fluctuation monitoring sites and Kyburz Diversion Dam.

1.2 FYLF Status, Distribution and Current Threats to Populations

The FYLF is designated as a Federal Species of Concern, a Forest Service Sensitive species, and a California Species of Special Concern. FYLF occur in the Coast Ranges from the Santiam River in Oregon south to the San Gabriel River in Los Angeles County and along the west slopes of the Sierra/Cascade crest in most of central and northern California. Other isolated populations have been reported in Baja California Norte (Loomis 1965), in southern California, and at Sutter Buttes in Butte County, California (Stebbins 2003). The elevational range of FYLF extends from sea level to 2,042 m (6,700 ft.) in Baja California Norte. In California, FYLF have been recorded in the Sierra as high as 1,830 m (6,000 ft.) near McKessick Peak, Plumas National Forest and 1,940 m (6,365 ft.) at Snow Mountain in Trinity County (Stebbins 2003). In the Project Area, FYLF are recorded along the mainstem SFAR as far upstream as Riverton and downstream to Slab Creek Reservoir (USFS, file data).

In the Sierra Nevada, FYLF have disappeared from an estimated 66 percent of their former range (Stebbins 2003). Non-native predators, land use conversion, pesticide use, and modification of hydrology are considered the main threats to FYLF populations (Jennings and Hayes 1994, Davidson et al. 2002). Non-native bullfrogs (*Lithobates catesbeiana*) negatively affect FYLF populations via larval competition and direct predation (Moyle 1973, Kupferberg 1997, Crayon 1998). Signal crayfish feed on FYLF eggs and tadpoles (Rombough and Hayes, 2005; Wiseman et al. 2005) and have been shown to negatively affect other amphibians through direct predation and egg mass displacement in ponds (Nyström et al. 2001). Invasive fish, particularly centrarchids, are suspected to feed upon FYLF (Werschkul and Christensen 1977, Van Wagner 1996). Construction of dams and altered hydrological systems continue to threaten FYLF populations by reduction of breeding habitat and scouring of egg masses by untimely water releases (Lind et al. 1996, GANDA 2005).

2.0 METHODS

2.1 Visual Encounter Surveys

Visual Encounter Surveys (VES) were conducted at a total of eight subsites including sites 120a, 120b, 120c,124R, 213R, 220a, 220b, and 220c) (Figure 1). Surveys were conducted according to *A Standardized Approach for Habitat Assessments and Visual Encounter Surveys for the Foothill Yellow-Legged Frog* (*Rana boylii*) (Seltenrich and Pool 2002). All VES were conducted by GANDA biologists Kevin Wiseman and Reed Levitt. Sites 120R and 124R were surveyed on August 31, 2009 and Sites 213R and 220R were surveyed on September 1, 2009.

Survey data were recorded onto Visual Encounter Survey Data Sheets for each subsite surveyed. Separate data sheets were completed for tadpoles, while data for young-of-the-year (YOY), juveniles and adults were recorded on separate data sheets. YOY were defined as recently metamorphosed frogs, 20-29 mm snout-vent length (SVL). Juvenile and subadult frogs were defined as frogs from previous years' cohorts, ranging approximately 30-40 mm SVL, but not considered of adult size. Adults were defined as frogs $\geq$ 40 mm SVL.

Data parameters collected for tadpoles included: tadpole group location in site; number of tadpoles in each group; distance from the shore; velocity; total length; substrate; percent algae and detritus; and, water depth. The data parameters collected for juvenile and adult FYLF included: number of frogs observed; frog location within the site; sex; age; snout-vent length; habitat type; activity; percent cover of vegetation; percent shade; and, substrate.

3.0 RESULTS

3.1 Visual Encounter Survey Results

Results for the visual encounter surveys are summarized in Table 1. Copies of survey data sheets are provided in Appendix A, and site photographs are located in Appendix B.

Table 1. Survey results for the Kyburz Diversion Dam flow fluctuation monitoring.

Subsite #	Date	Beg. Time	End Time	Actual VES time (min.)	Beg. Air Temp. (°C)	End Air Temp. (°C)	Water Temp. (edgew.) (°C)	Water Temp. (channel) (°C)	# Egg Masses	# Tadpoles/ # groups	# Juvenile /YOY Frogs	# Adult Frogs
120a	8/31/09	1025	1050	25	24.5	25	17	20	0	0	0	0
120b	8/31/09	1145	1200	15	31	27	19	19	0	0	0	0
120c	8/31/09	1105	1135	30	25	29	17	16.5	0	0	0	0
124R	8/31/09	1350	1442	42	27	27	19.5	20	0	**1**	0	0
213R	9/01/09	1005	1105	50	21.5	24.5	17.5	17	0	**1/1**	**6**	0
220a	9/01/09	0830	0850	20	17	17	16.5	17	0	0	0	0
220b	9/01/09	0855	0925	30	17	21	17	17	0	0	0	0
220c	9/01/09	0930	0950	20	21	21	18	17.5	0	0	0	0

3.1.1 Site 120R – SFAR upstream of Silver Creek

Site 120R is located on the SFAR approximately 1.0 km upstream of the confluence with Silver Creek at an elevation of 685 m (2,240 ft). The total site length is 352 m and includes three subsites: 120a, 120b, and 120c.

Subsite 120a (Photos 1-2, App. B) is located approximately 27.4 km downstream of the discharge site (Figure 1). No FYLF life stages were observed during the survey. Fish observed at this site included cyprinids and suckers. Osprey, crayfish, and bear scat were also observed during the survey.

Subsite 120b (Photos 3-4, App. B) is located approximately 26.6 km downstream of the discharge site (Figure 1). Subsite 120b was largely dry during the survey on August 31, 2009, except for an area approximately 20 x 20 m which contained a few small, shallow (20 cm max. depth) pools (Photo 4, App. B). Cyprinid fish were observed at this site, but no FYLF life stages were observed.

Subsite 120c (Photos 5-6, App. B) is located approximately 26.9 km downstream of the discharge site (Figure 1). No FYLF lifestages were observed at this site. Fish observed at this site included salmonids, cyprinids, centrarchids, and suckers.

3.1.2 Site 124R – SFAR at confluence with Soldier Creek

Site 124R is located on the SFAR at the confluence with Soldier Creek at an elevation of 755 m (2,480 ft). Subsite 124R (Photo 7, App. B) is located approximately 24.8 km downstream of the discharge site. One FYLF tadpole (Gosner stage 37) was observed within the site during the survey (Photo 8, App. B; Table 1; App. A). Fish observed at this site included salmonids and cyprinids. One juvenile mountain garter snake (*Thamnophis elegans elegans*, ~25 cm SVL), an osprey, and crayfish were also observed at the site.

3.1.3 Site 213R – SFAR upstream of Ogilby Creek

Site 213R is located on the left bank of the SFAR about 0.6 km (1,970 ft) upstream of the confluence with Ogilby Creek, at an elevation of 930 m (3,050 ft). Subsite 213R (Photos 9 and 12, App. B) is located approximately16.1 km downstream of the discharge site (Figure 1). Biologists from U.C. Davis identified at least two FYLF egg masses at this site in 2009, noted by the pink flagging left behind, dated June 24. One FYLF tadpole was observed (Photo 10, App. B) at Gosner stage 43 which had four fully developed legs in addition to a tail. In addition, six young-of-the-year FYLF were observed (see Photo 11, App. B), two of which measured 17 mm snout-urostyle length (App. A). Fish observed at this site included cyprinids and suckers. One juvenile Sierra garter snake (*Thamnophis couchii*) was also observed at the site.

3.1.4 Site 220R – SFAR at Maple Grove

Site 220R is located near Maple Grove Campground at an elevation of 965 m (3,160 ft). Three subsites were established within the site: 220a, 220b, and 220c. The total site length is 286 m.

Subsite 220a (Photos 13-14, App. B) is located approximately 13.8 km downstream of the discharge site (Figure 1). No FYLF lifestages were observed during the survey. Juvenile cyprinid fish were observed at the site in addition to one juvenile Sierra garter snake (*T. couchii*, 25 cm SVL) observed approximately 40 m upstream of the top of Subsite 220a.

Subsite 220b (Photos 15-16, App. B) is located approximately 13.8 km downstream of the discharge site (Figure 1). No FYLF lifestages were observed during the survey. Juvenile cyprinid fish were observed at the site.

Subsite 220c (Photos 17-18, App. B) is located approximately 13.5 km downstream of the discharge site (Figure 1). No FYLF lifestages were observed during the survey. Fish observed included salmonids, juvenile cyprinids, and sucker juveniles. One juvenile Sierra garter snake (*T. couchii*, 25 cm SVL) was also observed (App. A).

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Appendix A: Visual Encounter Survey Data Sheets

Foothill Yellow-Legged Frog
River and Creek Visual Encounter Survey Data Sheet
Tadpoles

Date: mm 8 dd 31 yy 09 Site #: 120 Subsite #: 120A River Name/Location: SFAR – upstream of Silver Creek confl. Observers: KOW RSL
Survey Method: tandem separate Start Time: 1025 End Time: 1050 Actual VES Time: 25 min. Start Air Temp: 24.5°C End Air Temp: 25.0°C
Water Temp: (edgewater) 17°C (main channel) 20°C (pool) 16°C Discharge: ~20 cfs Total Site Length: _____ Subsite Length: _____
Search Area Length: _____ Search Area Width: _____ Total Area Searched: (m^2): _____ Site Visit: 1 2 3 4
Weather: *Sky*: Overcast Partly Overcast Clear *Wind:* Inclement Fair Ideal Past 24 hrs: *Sky*: Overcast Partly Overcast Clear *Wind:* Inclement Fair Ideal
Photograph # (index to notebook): _____ Roll/Disc/Card #: _____

Group Letter[1]	Distance[2] (m)	Approx. No. of Tadpoles[3]	Distance From Shore[4]	Max. Water Depth[5] (cm)	Velocity[6] (cm/sec)	Tadpole Stage[7]	Gosner Stage[8]	Avg. TL[9] (mm)	% Algae	% Detritus	Dominant Substrate[10]	Micro-Habitat[11]	River or Creek Habitat[12]	Water Temp. (°C)
A														

[1] Group Letter – if multiple groups of tadpoles at a site/subsite
[2] Distance – distance from bottom of site/subsite
[3] No. of Tadpoles – Estimate the total number of tadpoles for the area. If tadpole counts are determined by number/meter^2, convert number of tadpoles/m^2 to number of tadpoles/site/subsite
[4] Distance From Shore – For an aggregation of tadpoles, measure to the center of the group. If tadpoles are dispersed along the shoreline, record an average distance from the water's edge.
[5] Max. Water Depth – Max. depth at tadpole location
[6] Velocity – measure where tadpoles are located
[7] Tadpole Stage – (1) no legs, (2) rear legs, (3) rear legs and front nubs, (4) legs fully grown, but with tail, (5) mixed
[8] Gosner Stage or Field Stage (e.g., GS 36 *or* FS 3)
[9] Avg. TL – average total length of tadpoles
[10] Dominant Substrate – (1) silt/clay/mud, (2) sand, (3) gravel/pebble, (4) cobble, (5) boulder, (6) bedrock, (7) small woody debris, (8) large woody debris (9) aquatic vegetation
[11] Microhabitat – (1) isolated side pool, (2) connected side pool, (3) scour pool, (4) backwater pool, (5) side channel, (6) boulder/sedge, (7) edgewater, (8) pool tail-out, (9) riffle, (10) other
[12] River or Creek Habitat (1) low gradient riffle, (2) high gradient riffle, (3) run, (4) glide, (5) main channel pool, (6) step-pool, (7) other

Fish Present Yes No Type: Salmonid Centrarchid Cyprinid Other: sucker juvenile
Herpetofauna & Lifestage (A J T E) tree frog _____ bullfrog _____ western pond turtle _____ garter snake _____ Other rattlesnake on LB TO SITE
Other Species Observed: osprey, crayfish, Bear scat
Comments: – RUSTY-COLORED SILT STILL PRESENT IN EDGEWATERS AND CONNECTED side pools
– 3 isolated side pools (one had tadpoles in 2007)

photos: KOW (1) bottom → u/s
(2) " → d/s
(3) mid-L → u/s
(4) " → d/s
(5) TOP → u/s
(6) " → d/s

QA/QC (initials): _____ Date: _____

Foothill Yellow-Legged Frog
River and Creek Visual Encounter Survey Data Sheet
Tadpoles

Date: mm 8 dd 31 yy 09 Site #: 120 Subsite #: 120B River Name/Location: SFAR - upstream of Silver Creek Confl. Observers: KMW RSL
Survey Method: tandem separate Start Time: 1145 End Time: 1200 Actual VES Time: 15 min. Start Air Temp: 31°C End Air Temp: 27°C
Water Temp: (edgewater) 19°C (main channel) 19°C (pool) 20°C Discharge: ~20 cfs Total Site Length: _____ Subsite Length: _____
Search Area Length: _____ Search Area Width: _____ Total Area Searched: (m^2): _____ Site Visit: 1 2 3 4
Weather: *Sky*: Overcast Partly Overcast Clear *Wind:* Inclement Fair Ideal Past 24 hrs: *Sky*: Overcast Partly Overcast Clear *Wind:* Inclement Fair Ideal
Photograph # (index to notebook): _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ Roll/Disc/Card #: _____

Group Letter[1]	Distance[2] (m)	Approx. No. of Tadpoles[3]	Distance From Shore[4]	Max. Water Depth[5] (cm)	Velocity[6] (cm/sec)	Tadpole Stage[7]	Gosner Stage[8]	Avg. TL[9] (mm)	% Algae	% Detritus	Dominant Substrate[10]	Micro-Habitat[11]	River or Creek Habitat[12]	Water Temp. (°C)
V														

[1] Group Letter – if multiple groups of tadpoles at a site/subsite
[2] Distance – distance from bottom of site/subsite
[3] No. of Tadpoles – Estimate the total number of tadpoles for the area. If tadpole counts are determined by number/meter^2, convert number of tadpoles/m^2 to number of tadpoles/site/subsite
[4] Distance From Shore – For an aggregation of tadpoles, measure to the center of the group. If tadpoles are dispersed along the shoreline, record an average distance from the water's edge.
[5] Max. Water Depth – Max. depth at tadpole location
[6] Velocity – measure where tadpoles are located
[7] Tadpole Stage – (1) no legs, (2) rear legs, (3) rear legs and front nubs, (4) legs fully grown, but with tail, (5) mixed
[8] Gosner Stage or Field Stage (e.g., GS 36 *or* FS 3)
[9] Avg. TL – average total length of tadpoles
[10] Dominant Substrate – (1) silt/clay/mud, (2) sand, (3) gravel/pebble, (4) cobble, (5) boulder, (6) bedrock, (7) small woody debris, (8) large woody debris (9) aquatic vegetation
[11] Microhabitat – (1) isolated side pool, (2) connected side pool, (3) scour pool, (4) backwater pool, (5) side channel, (6) boulder/sedge, (7) edgewater, (8) pool tail-out, (9) riffle, (10) other
[12] River or Creek Habitat (1) low gradient riffle, (2) high gradient riffle, (3) run, (4) glide, (5) main channel pool, (6) step-pool, (7) other

Fish Present Yes No Type: Salmonid Centrarchid Cyprinid Other: _____
Herpetofauna & Lifestage (A J T E) tree frog _____ bullfrog _____ western pond turtle _____ garter snake _____ Other _____
Other Species Observed: _____

Comments: – site dry @ bottom; pools begin @ ~50 m; photos KMW (13): bottom → d/s
(14): bottom → u/s
– small 20 x 2 m area of small pools (~20 cm max depth) see photo (16), (15): dry pool @ ~40 m
(16): small pools @ ~50 m (max. depth 20cm)
– site largely dry except for above area and top where it (17): mid site → d/s
side channel reconnects with main channel. (18): " → u/s
(19): top → d/s
(20): top → u/s

QA/QC (initials): _____ Date: _____

Foothill Yellow-Legged Frog
River and Creek Visual Encounter Survey Data Sheet
Tadpoles

Date: mm 8 dd 31 yy 09 Site #: 120 Subsite #: 120C River Name/Location: SFAR - upstream of Silver Creek confl. Observers: KMW RSL
Survey Method: tandem separate Start Time: 1105 End Time: 1135 Actual VES Time: 30 min. Start Air Temp: 25°C End Air Temp: 29°C
Water Temp: (edgewater) 17°C (main channel) 16.5°C (pool) _____ Discharge: ~20 cfs Total Site Length: _____ Subsite Length: _____
Search Area Length: _____ Search Area Width: _____ Total Area Searched: (m^2): _____ Site Visit: 1 2 3 4
Weather: *Sky*: Overcast Partly Overcast Clear *Wind:* Inclement Fair Ideal Past 24 hrs: *Sky*: Overcast Partly Overcast Clear *Wind:* Inclement Fair Ideal
Photograph # (index to notebook): _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ Roll/Disc/Card #: _____

Group Letter[1]	Distance[2] (m)	Approx. No. of Tadpoles[3]	Distance From Shore[4]	Max. Water Depth[5] (cm)	Velocity[6] (cm/sec)	Tadpole Stage[7]	Gosner Stage[8]	Avg. TL[9] (mm)	% Algae	% Detritus	Dominant Substrate[10]	Micro-Habitat[11]	River or Creek Habitat[12]	Water Temp. (°C)
Ø														

[1] Group Letter – if multiple groups of tadpoles at a site/subsite
[2] Distance – distance from bottom of site/subsite
[3] No. of Tadpoles – Estimate the total number of tadpoles for the area. If tadpole counts are determined by number/meter^2, convert number of tadpoles/m^2 to number of tadpoles/site/subsite
[4] Distance From Shore –For an aggregation of tadpoles, measure to the center of the group. If tadpoles are dispersed along the shoreline, record an average distance from the water's edge.
[5] Max. Water Depth – Max. depth at tadpole location
[6] Velocity – measure where tadpoles are located
[7] Tadpole Stage – (1) no legs, (2) rear legs, (3) rear legs and front nubs, (4) legs fully grown, but with tail, (5) mixed
[8] Gosner Stage or Field Stage (e.g., GS 36 *or* FS 3)
[9] Avg. TL – average total length of tadpoles
[10] Dominant Substrate – (1) silt/clay/mud, (2) sand, (3) gravel/pebble, (4) cobble, (5) boulder, (6) bedrock, (7) small woody debris, (8) large woody debris (9) aquatic vegetation
[11] Microhabitat – (1) isolated side pool, (2) connected side pool, (3) scour pool, (4) backwater pool, (5) side channel, (6) boulder/sedge, (7) edgewater, (8) pool tail-out, (9) riffle, (10) other
[12] River or Creek Habitat (1) low gradient riffle, (2) high gradient riffle, (3) run, (4) glide, (5) main channel pool, (6) step-pool, (7) other

Fish Present (Yes) No Type: Salmonid (RBT) Centrarchid (SMB) Cyprinid Other: sucker juveniles
Herpetofauna & Lifestage (A J T E) tree frog _____ bullfrog _____ western pond turtle _____ garter snake _____ Other _____
Other Species Observed: kingfisher

Comments: photos: KMW (7) bottom → u/s
(8) " → d/s
(9) midsite → d/s
(10) " → u/s
(11) top → d/s
(12) " → u/s

QA/QC (initials): _____ Date: _____

Foothill Yellow-Legged Frog
River and Creek Visual Encounter Survey Data Sheet
Tadpoles

Date: mm 8 dd 31 yy 09 Site #: 124R Subsite #: — River Name/Location: SFAR @ Soldier Creek Observers: KPW RSL
Survey Method: tandem separate Start Time: 1350 End Time: 1442 Actual VES Time: 42 min Start Air Temp: 27°C End Air Temp: 27°C
Water Temp: (edgewater) 19.5°C (main channel) 20°C (pool) 23.5°C Discharge: ~20 cfs Total Site Length: _____ Subsite Length: _____
Search Area Length: _____ Search Area Width: _____ Total Area Searched: (m^2): _____ Site Visit: 1 2 3 4
Weather: *Sky*: Overcast Partly Overcast Clear *Wind:* Inclement Fair Ideal Past 24 hrs: *Sky*: Overcast Partly Overcast Clear *Wind:* Inclement Fair Ideal
Photograph # (index to notebook): _____ Roll/Disc/Card #: _____

Group Letter[1]	Distance[2] (m)	Approx. No. of Tadpoles[3]	Distance From Shore[4]	Max. Water Depth[5] (cm)	Velocity[6] (cm/sec)	Tadpole Stage[7]	Gosner Stage[8]	Avg. TL[9] (mm)	% Algae	% Detritus	Dominant Substrate[10]	Micro-Habitat[11]	River or Creek Habitat[12]	Water Temp. (°C)	
A	95	1	0.2	25	0	3	37	50	40	40	4, 5	2	1	23.5	Photos 36-40
												pool	2x4m		

[1] Group Letter – if multiple groups of tadpoles at a site/subsite
[2] Distance – distance from bottom of site/subsite
[3] No. of Tadpoles – Estimate the total number of tadpoles for the area. If tadpole counts are determined by number/meter^2, convert number of tadpoles/m^2 to number of tadpoles/site/subsite
[4] Distance From Shore – For an aggregation of tadpoles, measure to the center of the group. If tadpoles are dispersed along the shoreline, record an average distance from the water's edge.
[5] Max. Water Depth – Max. depth at tadpole location
[6] Velocity – measure where tadpoles are located
[7] Tadpole Stage – (1) no legs, (2) rear legs, (3) rear legs and front nubs, (4) legs fully grown, but with tail, (5) mixed
[8] Gosner Stage or Field Stage (e.g., GS 36 *or* FS 3)
[9] Avg. TL – average total length of tadpoles
[10] Dominant Substrate – (1) silt/clay/mud, (2) sand, (3) gravel/pebble, (4) cobble, (5) boulder, (6) bedrock, (7) small woody debris, (8) large woody debris (9) aquatic vegetation
[11] Microhabitat – (1) isolated side pool, (2) connected side pool, (3) scour pool, (4) backwater pool, (5) side channel, (6) boulder/sedge, (7) edgewater, (8) pool tail-out, (9) riffle, (10) other
[12] River or Creek Habitat (1) low gradient riffle, (2) high gradient riffle, (3) run, (4) glide, (5) main channel pool, (6) step-pool, (7) other

7'1 J T. sirtalis @ +50 m swimming in mainstem

Fish Present Yes No Type: Salmonid Centrarchid Cyprinid Other: _____
Herpetofauna & Lifestage (A J T E) tree frog _____ bullfrog _____ western pond turtle _____ garter snake 1 J, 2 Other _____
T. sirtalis ~50m d/s of site, LB
Other Species Observed: OSPREY, CRAYFISH photos KPW 26-29
Comments: _____
1 J T. concbit photos KPW (21-25) in between 120B + 124R
(30): bottom → u/s
(31): " → d/s
(32): Soldier Creek confl. from LB
(33): isolated pools @ ~20 m extends to ~50 m
(34): midsite → d/s
(35): " → u/s
(41): top → d/s
(42): " → u/s

QA/QC (initials): _____ Date: _____

Foothill Yellow-Legged Frog
River and Creek Visual Encounter Survey Data Sheet
Juveniles/Subadults and Adults

Date: mm 9 dd 01 yy 09 Site #: 213R Subsite #: — River Name/Location: SFAR – upstream of Ogilby Creek (CONFL.) Observers: KMW RSL
Survey Method: tandem separate Start Time: 1005 End Time: 1105 Actual VES Time: 50 min. Start Air Temp: 21.5°C End Air Temp: 24.5°C
Water Temp: (edgewater) 17.5°C (main channel) 17.0°C (pool) — Discharge: ~20 cfs Total Site Length: _____ Subsite Length: _____
Search Area Length: _____ Search Area Width: _____ Total Area Searched: (m^2): _____ Site Visit: 1 2 3 4
Weather: *Sky*: Overcast Partly Overcast Clear *Wind:* Inclement Fair Ideal Past 24 hrs: *Sky*: Overcast Partly Overcast Clear *Wind:* Inclement Fair Ideal
Photograph # (index to notebook): _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ Roll/Disc/Card #: _____

Number of Frogs	Distance[1]	Sex (M/F)	Age[2] (J, A)	Snout-Vent Length (mm)	Activity[3]	River or Creek Habitat[4]	Microhabitat Type[5]	Dominant Substrate[6]	Comments
1	1	—	YOY	17	2, 5	3	7	2	photos 68-69; jumped from bank hid under large gravel
1	4	—	YOY	17	2	3	7	5	
1	11	—	tad w/ legs	41	9	1	2	4	GS 43; 18.0°C; AL 10%; DEP 20+; photo 70 (tadpole datasheet)
1	68	—	YOY	~17	2, 8	4	7	4	not captured, photos 73-75
1	~64 FROM TOP	—	YOY	~19	9	4	7	4	" ; 1 m from UCD #6 FLAG
1	~44 FROM TOP	—	YOY	~19	2	4	7	4	not captured
1	@ TOP	—	YOY	~20	2	1	6	5	"

[1] Distance – distance from bottom of site/subsite to frogs
[2] Age – J = Juvenile/Subadult (<= 39 mm), A = Adult (>= 40 mm), snout-vent length
[3] Activity – (1) sitting in shade, (2) basking, (3) hiding, (4) calling, (5) swimming, (6) foraging, (7) amplexus, (8) floating, (9) underwater, (10) other
[4] River or Creek Habitat – (1) low gradient riffle, (2) high gradient riffle, (3) run, (4) glide, (5) main channel pool, (6) step-pool, (7) other
[5] Microhabitat – (1) isolated side pool, (2) connected side pool, (3) scour pool, (4) backwater pool, (5) side channel, (6) boulder/sedge, (7) edgewater, (8) pool tail-out, (9) riffle, (10) exposed bank, (11) protected bank, (12) other
[6] Dominant Substrate – (1) silt/clay/mud, (2) sand, (3) gravel/pebble, (4) cobble, (5) boulder, (6) bedrock, (7) small woody debris, (8) large woody debris, (9) aquatic vegetation, (10) margin vegetation, (11) other

Fish Present Yes No Type: Salmonid Centrarchid Cyprinid Other: suckers
Herpetofauna & Lifestage (A J T E) tree frog _____ bullfrog _____ western pond turtle _____ garter snake 1 J Other T. couchii (not captured)
Other Species Observed: _____
Comments: _____

photos KMW: (66): bottom → d/s
(67): " → u/s
(68): YOY underwater
(69): YOY
(70): 4 legged tad @
(71): midsite → u/s
(72): " → d/s
(73-75): YOY @ 68 m
(76): top → d/s
(77): " → u/s

QA/QC (initials): _____ Date: _____

Foothill Yellow-Legged Frog
River and Creek Visual Encounter Survey Data Sheet
Tadpoles

Date: mm 9 dd 01 yy 09 Site #: 213R Subsite #: — River Name/Location: SFAR - upstream of Cubic Bar Creek confl. Observers: KOW RSL
Survey Method: tandem separate Start Time: 1005 End Time: 1105 Actual VES Time: 50 min Start Air Temp: 21.5°C End Air Temp: 24.5°C
Water Temp: (edgewater) 17.5°C (main channel) 17.0°C (pool) — Discharge: ~20 cfs Total Site Length: _____ Subsite Length: _____
Search Area Length: _____ Search Area Width: _____ Total Area Searched: (m^2): _____ Site Visit: 1 2 3 4
Weather: *Sky*: Overcast Partly Overcast Clear *Wind:* Inclement Fair Ideal Past 24 hrs: *Sky*: Overcast Partly Overcast Clear *Wind:* Inclement Fair Ideal
Photograph # (index to notebook): _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ Roll/Disc/Card #: _____

Group Letter[1]	Distance[2] (m)	Approx. No. of Tadpoles[3]	Distance From Shore[4]	Max. Water Depth[5] (cm)	Velocity[6] (cm/sec)	Tadpole Stage[7]	Gosner Stage[8]	Avg. TL[9] (mm)	% Algae	% Detritus	Dominant Substrate[10]	Micro-Habitat[11]	River or Creek Habitat[12]	Water Temp. (°C)
A	11	1	0.2	20	0	4	43	41	10	20	4	2	1	18.0°C

photo KOW 70

[1] Group Letter – if multiple groups of tadpoles at a site/subsite
[2] Distance – distance from bottom of site/subsite
[3] No. of Tadpoles – Estimate the total number of tadpoles for the area. If tadpole counts are determined by number/meter^2, convert number of tadpoles/m^2 to number of tadpoles/site/subsite
[4] Distance From Shore –For an aggregation of tadpoles, measure to the center of the group. If tadpoles are dispersed along the shoreline, record an average distance from the water's edge.
[5] Max. Water Depth – Max. depth at tadpole location
[6] Velocity – measure where tadpoles are located
[7] Tadpole Stage – (1) no legs, (2) rear legs, (3) rear legs and front nubs, (4) legs fully grown, but with tail, (5) mixed
[8] Gosner Stage or Field Stage (e.g., GS 36 *or* FS 3)
[9] Avg. TL – average total length of tadpoles
[10] Dominant Substrate – (1) silt/clay/mud, (2) sand, (3) gravel/pebble, (4) cobble, (5) boulder, (6) bedrock, (7) small woody debris, (8) large woody debris (9) aquatic vegetation
[11] Microhabitat – (1) isolated side pool, (2) connected side pool, (3) scour pool, (4) backwater pool, (5) side channel, (6) boulder/sedge, (7) edgewater, (8) pool tail-out, (9) riffle, (10) other
[12] River or Creek Habitat (1) low gradient riffle, (2) high gradient riffle, (3) run, (4) glide, (5) main channel pool, (6) step-pool, (7) other

Fish Present Yes No Type: Salmonid Centrarchid Cyprinid Other: suckers
Herpetofauna & Lifestage (A J T E) tree frog _____ bullfrog _____ western pond turtle _____ garter snake _____ Other _____
Other Species Observed: _____
Comments: _____

QA/QC (initials): _____ Date: _____

Foothill Yellow-Legged Frog
River and Creek Visual Encounter Survey Data Sheet
Juveniles/Subadults and Adults

Date: mm 09 dd 01 yy 09 Site #: 220 Subsite #: 220A River Name/Location: SFAR @ Maple Grove Observers: KDW RSL
Survey Method: tandem (circled) separate Start Time: 0830 End Time: 0850 Actual VES Time: 20 min. Start Air Temp: 17°C End Air Temp: 17°C
Water Temp: (edgewater) 16.5°C (main channel) 17°C (pool) — Discharge: ~20 cfs Total Site Length: ____ Subsite Length: ____
Search Area Length: ____ Search Area Width: ____ Total Area Searched: (m^2): ____ Site Visit: 1 2 3 4
Weather: *Sky*: Overcast Partly Overcast Clear (circled) *Wind*: Inclement Fair Ideal (circled) Past 24 hrs: *Sky*: Overcast Partly Overcast Clear *Wind*: Inclement Fair Ideal
Photograph # (index to notebook): ____ Roll/Disc/Card #: ____

Number of Frogs	Distance[1]	Sex (M/F)	Age[2] (J, A)	Snout-Vent Length (mm)	Activity[3]	River or Creek Habitat[4]	Microhabitat Type[5]	Dominant Substrate[6]	Comments
∅									

1 Distance – distance from bottom of site/subsite to frogs
2 Age – J = Juvenile/Subadult (<= 39 mm), A = Adult (>= 40 mm), snout-vent length
3 Activity – (1) sitting in shade, (2) basking, (3) hiding, (4) calling, (5) swimming, (6) foraging, (7) amplexus, (8) floating, (9) underwater, (10) other
4 River or Creek Habitat – (1) low gradient riffle, (2) high gradient riffle, (3) run, (4) glide, (5) main channel pool, (6) step-pool, (7) other
5 Microhabitat – (1) isolated side pool, (2) connected side pool, (3) scour pool, (4) backwater pool, (5) side channel, (6) boulder/sedge, (7) edgewater, (8) pool tail-out, (9) riffle, (10) exposed bank, (11) protected bank, (12) other
6 Dominant Substrate – (1) silt/clay/mud, (2) sand, (3) gravel/pebble, (4) cobble, (5) boulder, (6) bedrock, (7) small woody debris, (8) large woody debris, (9) aquatic vegetation, (10) margin vegetation, (11) other

Fish Present Yes (circled) No Type: Salmonid Centrarchid Cyprinid (circled) Other: ____
Herpetofauna & Lifestage (A J T E) tree frog ____ bullfrog ____ western pond turtle ____ garter snake (circled) ____ Other ____ — 1 JN ~25 cm SVL 40 m u/s of top (video taken) T. couchii
Other Species Observed: crayfish, river otter sign
Comments: photos KDW (49) Reed in river
(50) top of site → d/s
(51) " → u/s
(52) midsite → u/s
(53) " → d/s
(54) bottom → d/s
(55) " → u/s

QA/QC (initials): ____ Date: ____

Foothill Yellow-Legged Frog
River and Creek Visual Encounter Survey Data Sheet
Juveniles/Subadults and Adults

Date: mm 9 dd 1 yy 09 Site #: 220 Subsite #: 220B River Name/Location: SFAR @ MAPLE GROVE Observers: KOW ASL
Survey Method: tandem separate Start Time: 0855 End Time: 0925 Actual VES Time: 30 min. Start Air Temp: 17°C End Air Temp: 21.0°C
Water Temp: (edgewater) 17°C (main channel) 17°C (pool) — Discharge: ~20 cfs Total Site Length: _____ Subsite Length: _____
Search Area Length: _____ Search Area Width: _____ Total Area Searched: (m^2): _____ Site Visit: 1 2 3 4
Weather: *Sky*: Overcast Partly Overcast Clear *Wind:* Inclement Fair Ideal Past 24 hrs: *Sky*: Overcast Partly Overcast Clear *Wind:* Inclement Fair Ideal
Photograph # (index to notebook): _____ Roll/Disc/Card #: _____

Number of Frogs	Distance[1]	Sex (M/F)	Age[2] (J, A)	Snout-Vent Length (mm)	Activity[3]	River or Creek Habitat[4]	Microhabitat Type[5]	Dominant Substrate[6]	Comments
Ø									

[1] Distance – distance from bottom of site/subsite to frogs
[2] Age – J = Juvenile/Subadult (<= 39 mm), A = Adult (>= 40 mm), snout-vent length
[3] Activity – (1) sitting in shade, (2) basking, (3) hiding, (4) calling, (5) swimming, (6) foraging, (7) amplexus, (8) floating, (9) underwater, (10) other
[4] River or Creek Habitat – (1) low gradient riffle, (2) high gradient riffle, (3) run, (4) glide, (5) main channel pool, (6) step-pool, (7) other
[5] Microhabitat – (1) isolated side pool, (2) connected side pool, (3) scour pool, (4) backwater pool, (5) side channel, (6) boulder/sedge, (7) edgewater, (8) pool tail-out, (9) riffle, (10) exposed bank, (11) protected bank, (12) other
[6] Dominant Substrate – (1) silt/clay/mud, (2) sand, (3) gravel/pebble, (4) cobble, (5) boulder, (6) bedrock, (7) small woody debris, (8) large woody debris, (9) aquatic vegetation, (10) margin vegetation, (11) other

Fish Present Yes No Type: Salmonid Centrarchid Cyprinid Other: _____
Herpetofauna & Lifestage (A J T E) tree frog _____ bullfrog _____ western pond turtle _____ garter snake _____ Other _____
Other Species Observed: _____
Comments: _____

photos KOW: (56): bottom → u/s
(57): " → d/s
(58): midsite → u/s
(59): " → d/s
(60): top → u/s
(61): " → d/s

QA/QC (initials): _____ Date: _____

Foothill Yellow-Legged Frog
River and Creek Visual Encounter Survey Data Sheet
Juveniles/Subadults and Adults

Date: mm 9 dd 01 yy 09 Site #: 220 Subsite #: 220c River Name/Location: SFAR – Maple Grove Observers: KDW RSL
Survey Method: tandem separate Start Time: 0930 End Time: 0950 Actual VES Time: 20 min. Start Air Temp: 21.0°C End Air Temp: 21.0°C
Water Temp: (edgewater) 18°C (main channel) 17.5°C (pool) – Discharge: ~20 cfs Total Site Length: _____ Subsite Length: _____
Search Area Length: _____ Search Area Width: _____ Total Area Searched: (m^2): _____ Site Visit: 1 2 3 4
Weather: *Sky*: Overcast Partly Overcast Clear *Wind:* Inclement Fair Ideal Past 24 hrs: *Sky*: Overcast Partly Overcast Clear *Wind:* Inclement Fair Ideal
Photograph # (index to notebook): _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ Roll/Disc/Card #: _____

Number of Frogs	Distance[1]	Sex (M/F)	Age[2] (J, A)	Snout-Vent Length (mm)	Activity[3]	River or Creek Habitat[4]	Microhabitat Type[5]	Dominant Substrate[6]	Comments
Ø									

[1] Distance – distance from bottom of site/subsite to frogs
[2] Age – J = Juvenile/Subadult (<= 39 mm), A = Adult (>= 40 mm), snout-vent length
[3] Activity – (1) sitting in shade, (2) basking, (3) hiding, (4) calling, (5) swimming, (6) foraging, (7) amplexus, (8) floating, (9) underwater, (10) other
[4] River or Creek Habitat – (1) low gradient riffle, (2) high gradient riffle, (3) run, (4) glide, (5) main channel pool, (6) step-pool, (7) other
[5] Microhabitat – (1) isolated side pool, (2) connected side pool, (3) scour pool, (4) backwater pool, (5) side channel, (6) boulder/sedge, (7) edgewater, (8) pool tail-out, (9) riffle, (10) exposed bank, (11) protected bank, (12) other
[6] Dominant Substrate – (1) silt/clay/mud, (2) sand, (3) gravel/pebble, (4) cobble, (5) boulder, (6) bedrock, (7) small woody debris, (8) large woody debris, (9) aquatic vegetation, (10) margin vegetation, (11) other

Fish Present Yes No Type: Salmonid Centrarchid Cyprinid Other: sucker juveniles
Herpetofauna & Lifestage (A J T E) tree frog _____ bullfrog _____ western pond turtle _____ garter snake _____ Other _____
Other Species Observed: 1 J T. couchii ~25 cm SVL
Comments: photos KDW

(62): midsite → u/s
(63): " → d/s
(64): top → u/s
(65): " → d/s

QA/QC (initials): _____ Date: _____

Appendix B: Site Photographs

Photo 1. Bottom of site 120a, view upstream. 8/31/09

Photo 2. Top of site 120a, view downstream. 8/31/09

Photo 3. Top of site 120b, view upstream. 8/31/09

Photo 4. Subsite 120b, showing small area containing remaining shallow pools. 8/31/09

Photo 5. Top of site 120c, view upstream. 8/31/09

Photo 6. Subsite 120c, view upstream from midsite. 8/31/09

Photo 7. Site 124R, bottom of site looking upstream. 8/31/09

Photo 8. Tadpole (Gosner stage 37) observed at Site 124R. 8/31/09

Photo 9. Bottom of site 213R, view upstream. 9/01/09

Photo 10. Tadpole (Gosner stage 43) observed at Site 213R. 9/01/09

Photo 11. Young-of-the-year FYLF (1 of 6) observed at Site 213R. 9/01/09

Photo 12. Site 213R, view from midsite looking downstream. 9/01/09

Photo 13. Bottom of Subsite 220a, view upstream. 9/01/09

Photo 14. Subsite 220a, view upstream from midsite. 9/01/09

Photo 15. Subsite 220b, view upstream from bottom of site. 9/01/09

Photo 16. Subsite 220b, view downstream from top of site. 9/01/09

Photo 17. Subsite 220c, view upstream from midsite. 9/01/09

Photo 18. Subsite 220c, view downstream from midsite. 9/01/09