

**FLOW FLUCUATION MONITORING FOR
FOOTHILL YELLOW-LEGGED FROG (*Rana boylei*) 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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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 (USFS), 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 License¹. The Plan requires monitoring for foothill yellow-legged frog (FYLF) 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.”

The El Dorado Irrigation District conducted geomorphology monitoring on Caples Creek from August 2-6, 2010. Test flows associated with the geomorphology monitoring had the potential to cause a flow fluctuation on the South Fork American River which in turn would trigger the requirement to conduct foothill yellow-legged frog surveys. In order to collect baseline data prior to the test flow releases, the District conducted foothill yellow-legged frog surveys at the four flow fluctuation monitoring sites on July 26 and 27, 2010. These survey results were intended to be a basis for comparison with subsequent survey data in the event that a flow fluctuation occurred during the test flow releases. The District was able to adjust operations at the diversion dam to avoid a flow fluctuation during the tests flow releases; therefore, a subsequent survey was not required. This report describes the results of the surveys conducted on July 26 and 27, 2010.

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.

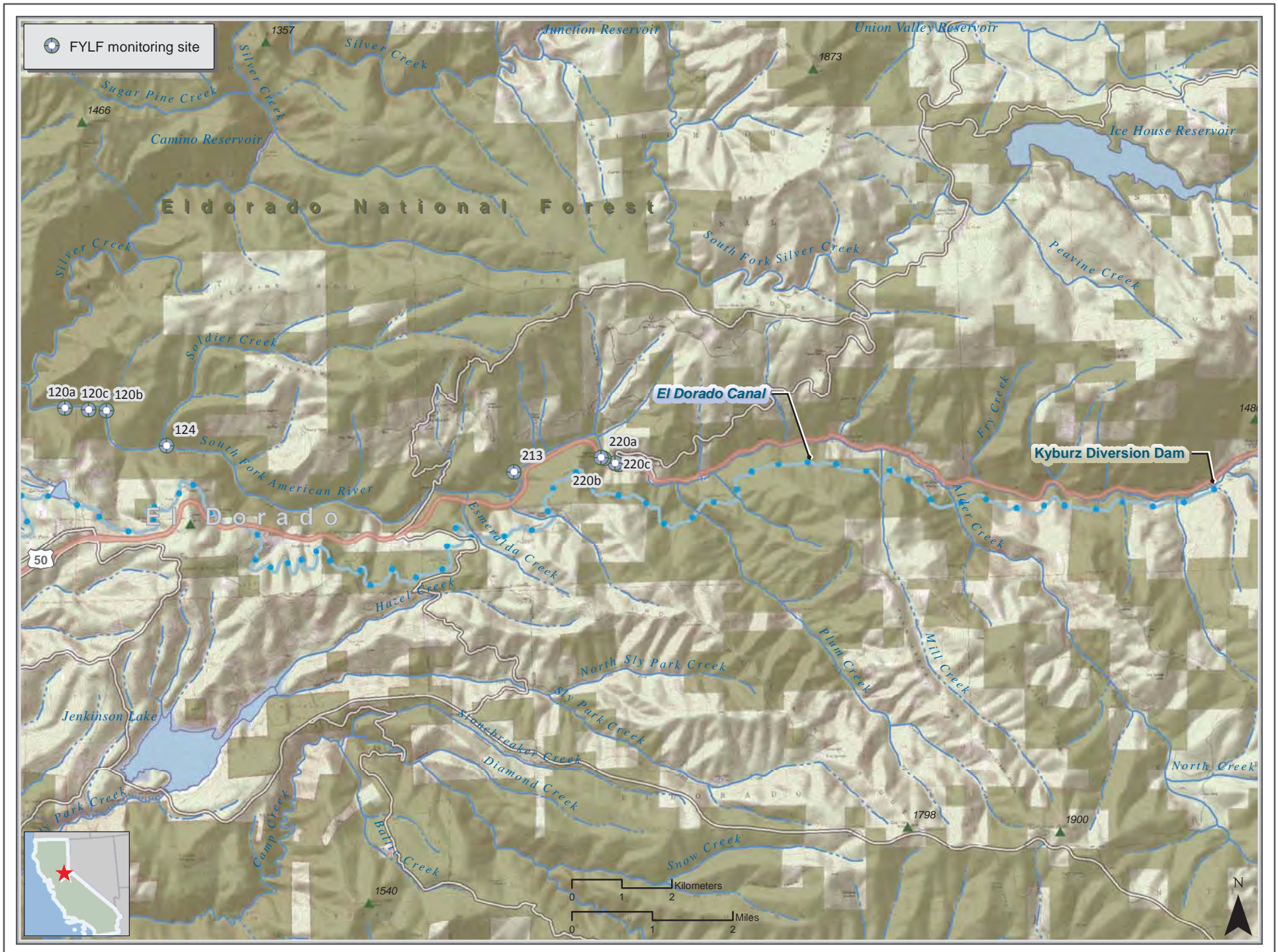


Figure 1. FYLF flow fluctuation monitoring sites.

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 on the SFAR including subsites 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 boylei)* (Seltenrich and Pool 2002). All VES were conducted by GANDA biologist Kevin Wiseman and EID biologist Brian Deason. Subsites 120a, 120b, 120c, 124R were surveyed on July 27, 2010. Subsites 213R, 220a, 220b, and 220c were surveyed on July 26, 2010, with USFS biologists Jann Williams and Rick Evans.

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 ≥ 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 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	7/27/10	1115	1140	25	23	24	20	20	0	0	0	0
120b	7/27/10	1315	1340	25	26	26	26	—	0	0	0	0
120c	7/27/10	1220	1245	25	26	27	21	21	0	0	0	0
124R	7/27/10	1545	1605	20	22	22	21	21	0	0	0	0
213R	7/26/10	1335	1400	25	32.5	32.5	23.5	21	0	0	0	0
220a	7/26/10	1130	1152	22	30	30	19.5	18.5	0	0	0	0
220b	7/26/10	1200	1220	20	30	30	20	18.5	0	0	0	0
220c	7/26/10	1230	1250	20	30.5	30.5	22.5	19.5	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 contained a relatively large amount of flowing water on July 27, 2010, compared to surveys conducted in 2009 (Photos 1-2, App. B). No FYLF life stages were

observed during the survey. One juvenile Sierra garter snake (*Thamnophis couchii*, ~35 cm SVL), signal crayfish (*Pacifasticus leniusculus*), and cyprinid young-of-the-year (YOY) were also observed at the site.

Subsite 120b contained a relatively large amount of water in the pools on July 27, 2010, compared to surveys conducted in 2009 (Photos 3-4, App. B). No FYLF life stages were observed during the survey, however many of the pools contained Pacific chorus frog (*Pseudacris regilla*) tadpoles. Two juvenile and one adult Sierra garter snake (*T. couchii*) were also observed in addition to cyprinid YOY and western sucker (*Catostomus occidentalis*) juveniles.

Subsite 120c contained a relatively large amount of water in the pools on July 27, 2010, compared to surveys conducted in 2009 (Photos 5-6, App. B). No FYLF lifestages were observed at this site. One juvenile Sierra garter snake (*T. couchii*) and cyprinid YOY were observed.

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) (Photos 7-8, App. B). No FYLF lifestages were observed at this site on July 27, 2010, however, cyprinid YOY and crayfish were observed.

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) (Photos 9-10, App. B). No FYLF lifestages were observed at this site on July 26, 2010. Cyprinid fish were observed at this site, and one juvenile Sierra garter snake (*T. couchii*; 40 cm SVL) was captured and regurgitated a juvenile brown trout (*Salmo trutta*; 56 mm total length) that was consumed head-first.

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 was surveyed on July 26, 2010. No FYLF lifestages were observed during the survey. Cyprinid YOY, dead crayfish, a juvenile Sierra garter snake (*T. couchii*), and another adult Sierra garter snake was observed enroute to the site.

Subsite 220b was surveyed on July 26, 2010 (Photos 11-12, App. B). No FYLF lifestages were observed during the survey. No FYLF lifestages were observed during the survey, however cyprinid YOY and dead crayfish were observed.

Subsite 220c was surveyed on July 26, 2010 (Photos 13-14, App. B). No FYLF lifestages were observed during the survey. Fish observed at this site included cyprinids and speckled dace (*Rhinichthys osculus*).

4.0 LITERATURE CITED

- Crayon, J.J. 1998. *Rana catesbeiana* (bullfrog) Diet. Herpetological Review 29(4):232.
- Davidson, C., H. B. Shaffer, and M. R. Jennings. 2002. Spatial tests of the pesticide drift, habitat destruction, UV-B, and climate-change hypotheses for California amphibian declines. Conservation Biology 16:1588-1601.
- El Dorado Irrigation District (EID). 2007. Project 184 Foothill yellow legged frog monitoring plan. May, 2007. 6 pp. plus appendices.
- Garcia and Associates (GANDA). 2005. Results of 2004 Surveys and Monitoring for Foothill Yellow-Legged Frog (*Rana boylei*) within the Rock Creek-Cresta Project Area, North Fork Feather River, and 2002-2004 Recreation And Pulse Flow Biological Evaluation Summary. Report to Pacific Gas and Electric Company by Garcia and Associates, San Francisco, CA.
- _____. 2008. Results of 2007 Surveys for Foothill Yellow-legged Frog (*Rana boylei*) on the South Fork American River, El Dorado County, California for the Eldorado Hydroelectric Project (FERC No. 184). Prepared for Eldorado Irrigation District. January 2008.
- Jennings, M.R., and M.P. Hayes. 1994. Amphibian and reptile species of special concern. Final report submitted to the California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova, California.
- Kupferberg, S.J. 1997. Bullfrog (*Rana catesbeiana*) invasion of a California river: the role of larval competition. Ecology 78, 1736-1751.
- Lind, A.J., H.H. Welsh, Jr., and R.A. Wilson. 1996. The effects of a dam on breeding habitat and egg survival of the foothill yellow-legged frog (*Rana boylei*) in northwestern California. Herpetological Review 27(2):62-67.
- Loomis, R.B. 1965. The yellow-legged frog, *Rana boylei*, from the Sierra San Pedro Martin, Baja California Norte, Mexico. Herpetologica 21(1):78-80.

- Moyle, P. B. 1973. Effects of introduced bullfrogs, *Rana catesbeiana*, on the native frogs of the San Joaquin Valley, California. *Copeia* 1973:18-22.
- Nyström et al. 2001. The influence of multiple introduced predators on a littoral pond community. *Ecology* 82: 1023-1039.
- Rombough, C.J. and M.P. Hayes. 2005. *Rana boylei* (Foothill yellow-legged frog) Predation: eggs and hatchlings. *Herpetological Review* 36(2): 163-164.
- 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 boylei*). May 2002. Pacific Gas and Electric Company, Technical and Ecological Services, unpublished report.
- Stebbins, R.C. 2003. *A Field Guide to Western Reptiles and Amphibians*. Third Edition. Houghton Mifflin Company, Boston, New York.
- Van Wagner, T.J. 1996. Selected life history and ecological aspects of a population of foothill yellow-legged frogs (*Rana boylei*) from Clear Creek, Nevada County, California. Masters Thesis, Department of Biological Sciences, California State University, Chico. 143 pp.
- Werschkul, D. F., and M. T. Christensen. 1977. Differential predation by *Lepomis macrochirus* on the eggs and tadpoles of *Rana*. *Herpetologica* 33:237-241.
- Wiseman, K. D., K.R. Marlow, R.E. Jackman, and J.E. Drennan. 2005. *Rana boylei* (foothill yellow-legged frog) predation. *Herpetological Review* 36(2): 162-163.

Appendix A: Visual Encounter Survey Data Sheets

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

Date: mm 7 dd 27 yy 10 Site #: 120 Subsite #: 120A River Name/Location: S FAR Observers: KOU BD
 Survey Method: tandem separate Start Time: 1115 End Time: 1410 Actual VES Time: 25 min. Start Air Temp: 23 °C End Air Temp: 24 °C
 Water Temp: (edgewater) 20 (main channel) 20 (pool) 20 Discharge: 170 cfs Total Site Length: _____ Subsite Length: _____
 Search Area Length: _____ Search Area Width: _____ Total Area Searched: (m²): _____ Site Visit: 1 2 3 4
 Weather: Sky: Overcast Partly Overcast Clear Wind: Inclement Fair Ideal 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 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 Centrachid ^{YOKS} Cyprinid Other: _____
 Herpetofauna & Lifesage (A J T E) tree frog _____ bullfrog _____ western pond turtle _____ garter snake 15 Other _____
 Other Species Observed: Crayfish
 Comments: _____
T. conchi. < 35 cm SVL
no stomach contents
(photos) 309-312

photo 308: bottom of 120A view up
 313: pool midsite where FyLF tadpo seen in previous years.
 314: top of 120A view d/s

QA/QC (initials): _____ Date: _____

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

Date: mm 7 dd 27 yy 10 Site #: 120 Subsite #: 120B River Name/Location: SFA Observers: KAW BD
 Survey Method: tandem separate Start Time: 1315 End Time: 1340 Actual VES Time: 25 min Start Air Temp: 26°C End Air Temp: 26°C
 Water Temp: (edgewater) 26 (main channel) — (pool) 24.5 Discharge: 170 cfs Total Site Length: Subsite Length:
 Search Area Length: Search Area Width: Total Area Searched: (m²): Site Visit: 1 2 3 4
 Weather: Sky: Overcast Partly Overcast Clear Wind: Inclement Fair Idea Past 24 hrs: Sky: Overcast Partly Overcast Clear Wind: Inclement Fair Idea
 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
0									

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 10% Other: garter snake 3
 Herpetofauna & Lifestage (A J T E) tree frog 20 I bullfrog western pond turtle Other: T. conchii (25, 1A)
 Other Species Observed:
 Comments: KAW photo 325: 120B m/fe view
326: " " " "
327: " " " "
328: " " " "
photo 324-325
dont appear to have prey bulges

QA/QC (initials): Date:
KAW 321: bottom 120B view w/s
327: top 120B view d/s
322-23: underwtr pool, damaged by
326: pools near top of site

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

Juveniles/Subadults and Adults

Date: mm 7 dd 27 yy 10 Site #: 1200 Subsite #: 1200 River Name/Location: S FAR Observers: KPW BD
 Survey Method: tandem separate Start Time: 1220 End Time: 1245 Actual VES Time: 25 min Start Air Temp: 26°C End Air Temp: 27°C
 Water Temp: (edgewater) 21 (main channel) 21 (pool) Discharge: 170 cfs Total Site Length: _____ Subsite Length: _____
 Search Area Width: _____ Total Area Searched: (m²): _____ Site Visit: 1 2 3 4
 Weather: Sky: Overcast Partly Overcast Clear Wind: Inclement Fair Ideal Partly Overcast Clear Wind: Inclement Fair Ideal
 Photograph # (index to notebook): _____ Past 24 hrs: Sky: Overcast Partly Overcast Clear Wind: Inclement Fair Ideal
 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
0									

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 Y015 Other: _____
 Herpetofauna & Lifesage (A J T E) tree frog _____ bullfrog _____ western pond turtle _____ garter snake 1 J Other _____
 Other Species Observed: _____

Comments: - crossing difficult @ 170 cfs
- flowing throughout site (not normally)
photo 321: below 1200 river site
337: by 1200 river site
photo 315: 120 cfs midite. view w/s
316: 26: " " normally " " w/s
317: " " " " w/s
318: " " " " w/s

QA/QC (initials): _____ Date: _____

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

Date: mm 7 dd 27 yy 10 Site #: 124R Subsite #: 1 River Name/Location: SFAR @ Soldier Creek Observers: KAW ED
 Survey Method: tandem separate Start Time: 1545 End Time: 1605 Actual VES Time: 20 min. Start Air Temp: 22°C End Air Temp: 22°C
 Water Temp: (edgewater) 21 (main channel) 21 (pool) _____ Discharge: 170 cfs Total Site Length: _____ Subsite Length: _____
 Search Area Length: _____ Search Area Width: _____ Total Area Searched: (m²): _____ Site Visit: 1 2 3 4
 Weather: Sky: Overcast Partly Overcast Clear Overcast Wind: Inclement Fair Ideal Partly Overcast Clear Overcast 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
0									

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: 2 Crayfish Kingfisher

Comments: _____

 photo 333: bottom of 124R, view ups
 334: view across r.v.e. to Soldier Creek confluence
 335: top of 124R view d/s
 QA/QC (initials): _____ Date: _____

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

Date: mm 7 dd 26 yy 10 Site #: 213R Subsite #: — River Name/Location: STAR - upstream of Academy Camp Observers: KM BD JW RE
 Survey Method: tandem separate Start Time: 1335 End Time: 1400 Actual VES Time: 15 Min. Start Air Temp: 32.5 °C End Air Temp: 32.5 °C
 Water Temp: (edgewater) 23.5 °C (main channel) 21 (pool) Discharge: 170 cfs Total Site Length: _____ Subsite Length: _____
 Search Area Width: _____ Total Area Searched: (m²): _____ Site Visit: 1 2 3 4
 Weather: Sky: Overcast Partly Overcast Clear Wind: Inclement Fair Ideal Clear Wind: Inclement Fair Ideal
 Photograph # (index to notebook): _____ Past 24 hrs: Sky: Overcast Partly Overcast Clear Wind: Inclement Fair Ideal 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 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 Cyprinid Y01 Other: _____
 Herpetofauna & Lifesage (A J T E) tree frog bullfrog western pond turtle garter snake 12 Other _____
 Other Species Observed: _____
 Comments: _____
 photo 300: bottom 213R view u/s
 301-305: cyprinids in pool undewatered
 307: top 213R view d/s
 T. Conchi: 40 cm SVL
 contained Brown trout (= 56 mm TL)
 ntu HF (photo 306)

QA/QC (initials): _____ Date: _____

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

Date: mm 7 dd 26 yy 10 Site #: 220 Subsite #: 220A River Name/Location: SPAR O MAPLE GROVE Observers: KON BD JW RE
 Survey Method: random separate Start Time: 1130 End Time: 1152 Actual VES Time: 22 min Start Air Temp: 30°C End Air Temp: 30°C
 Water Temp: (edgewater) 19.5 (main channel) 18.5 (pool) Discharge: 170 cfs Total Site Length: _____ Subsite Length: _____
 Search Area Length: _____ Search Area Width: _____ Total Area Searched: (m²): _____ Site Visit: 1 2 3 4
 Weather: Partly Overcast Clear Fair Ideal Fair Wind: Inclement 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
0									

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 T. conchii
 Other Species Observed: Crayfish (Dead)
 Comments: _____
1 Adult T. conchii obs. en route to 220A

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

Date: mm 7 dd 26 yy 10 Site #: 220 Subsite #: 220B River Name/Location: S FAR - @ MAPLE GROVE Observers: KAW BD JW RE
 Survey Method: tandem separate Start Time: 1200 End Time: 1220 Actual VES Time: 20 min. Start Air Temp: 30°C End Air Temp: 30°C
 Water Temp: (edgewater) 20 (main channel) 18.5 (pool) Discharge: 170 cfs Total Site Length: _____ Subsite Length: _____
 Search Area Length: _____ Search Area Width: _____ Total Area Searched: (m²): _____ Site Visit: 1 2 3 4
 Weather: Sky: Overcast Partly Overcast Clear Wind: Inclement Fair Ideal 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
0									

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 Y01s Other: _____
 Herpetofauna & Lifestage (A J T E) tree frog bullfrog western pond turtle garter snake Other
 Other Species Observed: crayfish remains
 Comments: _____

_____ photo 296: midsite view d/s
 _____ 297: " " u/s

Foothill Yellow-Legged Frog

River and Creek Visual Encounter Survey Data Sheet

Juveniles/Subadults and Adults

Date: mm 7 dd 26 yy 10 Site #: 220 Subsite #: 220C River Name/Location: S FAR @ MAPLE GROVE Observers: KMN BD JWR RE
 Survey Method: tandem separate Start Time: 1230 End Time: 1250 Actual VES Time: 20 min. Start Air Temp: 30.5°C End Air Temp: 30.5°C
 Water Temp: (edgewater) 22.5°C (main channel) 19.5°C (pool) Discharge: 170 cfs Total Site Length: _____ Subsite Length: _____
 Search Area Length: _____ Search Area Width: _____ Total Area Searched: (m²): _____ 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
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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: SPEARLEED DACE
 Herpetofauna & Lifestage (A J T E) tree frog _____ bullfrog _____ western pond turtle _____ garter snake _____ Other _____
 Other Species Observed: _____
 Comments: _____

 photo 298: bottom of subsite 220C view u/s
 299: top " " d/s

QA/QC (initials): _____ Date: _____

Appendix B: Site Photographs



Photo 1. Bottom of site 120a, view upstream.

7/27/10



Photo 2. Top of site 120a, view downstream.

7/27/10



Photo 3. Bottom of site 120b, view upstream.

7/27/10



Photo 4. Top of site 120b, view downstream.

7/27/10



Photo 5. Midsite 120c, view upstream.

7/27/10



Photo 6. Top of site 120c, view downstream.

7/27/10



Photo 7. Bottom of site 124, view upstream.

7/27/10



Photo 8. Top of site 124, view downstream.

7/27/10



Photo 9. Bottom of site 213R, view upstream.

7/27/10



Photo 10. Top of site 213R, view downstream.

7/27/10



Photo 11. Midsite 220b, view downstream.

7/27/10



Photo 12. Midsite 220b, view upstream.

7/27/10



Photo 13. Bottom of site 220c, view upstream.

7/27/10



Photo 14. Top of site 220c, view downstream.

7/27/10