

**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, 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) 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 12, 2009, an accidental release occurred from Spillway 47C on the El Dorado Canal. This release resulted in the release of approximately 85 cubic feet per second (total of 2.6 acre-feet) of water from the El Dorado Canal and conveyed to the South Fork American River (SFAR) (Figure 1). Spillway 47C releases are conveyed into Randolph Canyon which enters the SFAR between the confluences of Silver Creek and Soldier Creek. The release from Spillway 47C 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.

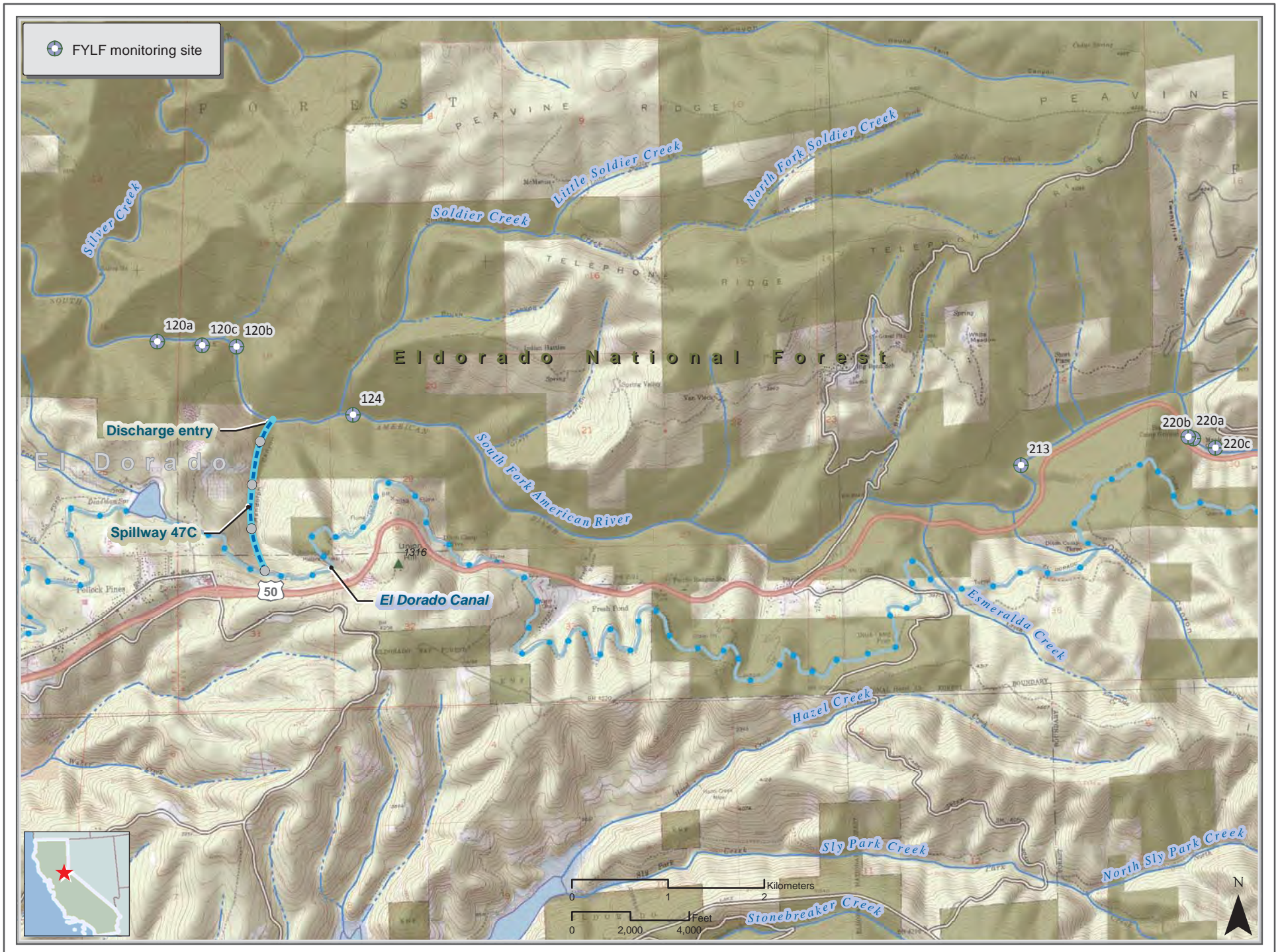


Figure 1. Flow fluctuation monitoring sites and spillway 47c.

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, three located downstream of the discharge entry into the SFAR (subsites 120a, 120b, 120c), and five located upstream of the discharge entry into the SFAR (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 in teams of two biologists which included EID biologist Brian Deason and GANDA biologists Ian Chan or Kevin Wiseman. Sites 120R and 124R were surveyed on August 17 and Sites 213R and 220R were surveyed on August 21, 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 ≥ 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 Spillway 47C 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
Downstream of Discharge Point												
120a	8/17/09	1125	1200	30	24	---	18.5	19	0	0	0	0
120b	8/17/09	1330	1400	30	27	28	21	19.5	0	0	0	1
120c	8/17/09	1230	1300	30	24	24	19.5	19	0	0	0	1*
Upstream of Discharge Point												
124R	8/17/09	1635	1705	30	25	25	21	21	0	0	0	0
213R	8/21/09	1105	1155	40	27	29.5	19.5	19.5	0	1	0	0
220a	8/21/09	0945	1010	25	23.5	27	19.5	20	0	0	0	0
220b	8/21/09	0920	0945	25	20.25	22.5	19.5	19.5	0	0	0	0
220c	8/21/09	1020	1035	15	27	27.5	20	20	0	0	0	0

* Adult frog observed ~120 m downstream of site 120c.

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 is located approximately 1878 m downstream of the discharge site.

Subsite 120a was largely dry on August 17, 2009, but there was evidence of silt deposition, noted by the red staining on exposed boulders and cobbles (Photo 2, App. B). Two to three millimeters of reddish/orange fine sediment was deposited throughout the main channel portion of the site. No FYLF life stages were observed during the survey. Fish observed at this site included salmonids, cyprinids, and suckers.

Subsite 120b is located approximately 1047 m downstream of the discharge site, and is the closest FYLF monitoring site downstream of the discharge site. Evidence of siltation was noted throughout the site (Photos 11-12, App. B). One adult FYLF was observed five meters from the top of the site (App. A). Fish observed at this site included salmonids, cyprinids, and suckers. One mountain garter snake (*Thamnophis elegans elegans*, ~30 cm SVL), and one adult treefrog (*Pseudacris regilla*) were also observed.

Subsite 120c is located approximately 1420 m downstream of the discharge site. There was evidence of siltation on the main stem portion of the river in this area (Photos 7-8, App. B). No FYLF lifestages were observed at this site. Fish observed at this site included salmonids, cyprinids, 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 is located approximately 756 m upstream of the discharge site.

There was no evidence of silt or organic debris present at Site 124R during the survey on August 17, 2009 (Photos 14-19, App. B). No FYLF lifestages were observed. Fish observed at this site included salmonids, cyprinids, and suckers. One juvenile Sierra garter snake (*Thamnophis couchii*, ~25 cm SVL) 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 is located approximately 9389 m upstream of the discharge site.

There was no evidence of silt or organic debris present at Site 213R during the survey on August 21, 2009 (Photo 20, App. B). 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 21, App. B) at Gosner stage 42-43 which had four fully developed legs in addition to a tail. Fish observed at this site included cyprinids and suckers. Two juvenile Sierra garter snakes (*Thamnophis couchii*, 23 and 26 cm SVL) were 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 is located approximately 11,684 m upstream of the discharge site.

There was no evidence of silt or organic debris present at Site 220a during the survey on August 21, 2009 (Photo 22, App. B). No FYLF lifestages were observed during the survey. Juvenile suckers and one juvenile Sierra garter snake (*T. couchii*, 43 cm SVL) were also observed at the site.

Subsite 220b is located approximately 11,723 m upstream of the discharge site. There was no evidence of silt or organic debris present at Site 220b during the survey on August 21, 2009. No FYLF lifestages were observed during the survey. Juvenile suckers were observed at the site.

Subsite 220c is located approximately 11,983 m upstream of the discharge site. There was no evidence of silt or organic debris present at Site 220c during the survey on August 21, 2009 (Photo 23, App. B). No FYLF lifestages were observed during the survey. Salmonid fish were observed at the site.

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Appendix A: Visual Encounter Survey Data Sheets

Appendix B: Site Photographs



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

8/17/09



Photo 2. Site 120a, view downstream at E0709968, N4295523.

8/17/09



Photo 3. Top of site 120a, view downstream.

8/17/09



Photo 4. Microhabitat where adult FYLF was observed, ~120 m below Site 120c.

8/17/09



Photo 5. Bottom of Site 120c, view upstream.

8/17/09



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

8/17/09



Photo 7. Top of Site 120c, view upstream.

8/17/09



Photo 8. Top of Site 120c, view upstream.

8/17/09



Photo 9. Bottom of Site 120b, view upstream.

8/17/09



Photo 10. Bottom of Site 120b, view downstream.

8/17/09



Photo 11. Site 120b, midsite, view upstream.

8/17/09



Photo 12. Site 120b, midsite, view upstream.

8/17/09



Photo 13. Top of Site 120b, view downstream.

8/17/09



Photo 14. Bottom of Site 124R at Soldier Creek confluence, view upstream.

8/17/09



Photo 15. Bottom of Site 124R at Soldier Creek confluence, view downstream.

8/17/09



Photo 16. Site 124R at Soldier Creek confluence, view downstream from mid-site.

8/17/09



Photo 17. Site 124R at Soldier Creek confluence, view upstream from mid-site.

8/17/09



Photo 18. Top of Site 124R at Soldier Creek confluence, view downstream.

8/17/09



Photo 19. Top of Site 124R at Soldier Creek confluence, view upstream.

8/17/09



Photo 20. Site 213R, upstream of Ogilby Creek confluence, view upstream.

8/21/09



Photo 21. Foothill yellow-legged frog tadpole observed at Site 213R.

8/21/09



Photo 22. Bottom of site 220a, view upstream.

8/21/09



Photo 23. Bottom of site 220c, view upstream.

8/21/09