Placer County Water Agency
Middle Fork American River Project
(FERC Project No. 2079)

DRAFT
FOOTHILL YELLOW-LEGGED FROG
MONITORING PLAN

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List of Acronyms

CDFG	California Department of Fish and Game
CNDDB	California Natural Diversity Database
Commission	Federal Energy Regulatory Commission
FERC	Federal Energy Regulatory Commission
FYLF	Foothill yellow-legged frog
FYLFMP	Foothill Yellow-legged Frog (Rana boylii) Monitoring Plan
GPS	Global Positioning System
m	meters
MFP	Middle Fork American River Project
ºC	degrees Celsius
ºF	degrees Fahrenheit
PCWA	Placer County Water Agency
Project	Middle Fork American River Project
SD	Supporting Document
State Water Board	State Water Resources Control Board
USDA-FS	United States Department of Agriculture-Forest Service
USFWS	United States Fish and Wildlife Service

1.0 INTRODUCTION

This Foothill Yellow-legged Frog (*Rana boylii*) Monitoring Plan (FYLFMP) was developed for the Placer County Water Agency's (PCWA) Middle Fork American River Project (MFP or Project) located on the west slope of the Sierra Nevada range primarily in Placer County, California. Foothill yellow-legged frog (*Rana boylii*) (hereafter, FYLF), is a United States Department of Agriculture-Forest Service (USDA-FS) Sensitive Species and California Species of Special Concern.

The goal of the FYLFMP is to obtain, for comparative purposes, periodic information on populations of FYLF in selected bypass and peaking reaches associated with MFP under the flow regimes specified in the new license. This information will be compared to historic FYLF population data collected during MFP relicensing (AQ 12 – Special-Status Amphibian and Aquatic Reptile Technical Study Report 2007 [AQ 12 – TSR] PCWA 2010a; Supporting Document [SD] B).

2.0 FYLFMP ORGANIZATON

The FYLFMP is organized into the following sections:

Section 3.0 FYLFMP Objective: This section defines the purpose of the FYLFMP.

Section 4.0 Monitoring Approach: This section describes the approach for monitoring FYLF populations over the term of the new license, including monitoring locations and schedule and sampling and analyses methods.

Section 5.0 Reporting: This section outlines reporting that will be required over the term of the new license and describes agency consultation that would be conducted following the completion of each monitoring period.

Section 6.0 Literature Cited: This section provides a list of documents or other resources that are referenced in the FYLFMP.

3.0 FYLFMP OBJECTIVE

The FYLFMP describes monitoring and reporting of FYLF populations at select sites in the bypass and peaking reaches associated with the MFP over the term of the license. This information will be used to characterize FYLF populations associated with the flow regimes specified in the license. Specifically, the objectives of the FYLFMP are to:

- Monitor FYLF species abundance in select locations in the bypass and peaking reaches including tributaries;
- Document the upstream distribution of FYLF in the Rubicon River and the Middle Fork American River; and
- Determine the timing of the initiation of FYLF breeding season in the Rubicon River and Middle Fork American River.

4.0 MONITORING APPROACH

This section describes the approach for monitoring FYLF populations, including monitoring locations and schedule, sampling methods, and analytical methods. The field sampling methods and analyses are consistent with those conducted in 2007 for the AQ 12 – TSR (PCWA 2010a; SD B).

4.1 MONITORING LOCATIONS AND SCHEDULE

FYLF monitoring sites in the bypass and peaking reaches are provided in FYLFMP Table 1 and depicted on FYLFMP Map 1. FYLF populations at these locations were sampled in 2007 as part of the MFP relicensing studies (AQ 12 – TSR [PCWA 2010a; SD B]).

FYLF monitoring will be conducted in Years 2, 3, 7, 8, 13, 14, and thereafter for two consecutive years during every ten-year period for the term of the license. Supplemental timing of initiation of breeding season surveys also will be conducted in association with the first two years with pulse flow releases. These supplemental surveys will be conducted at MF26.2 and R3.5 on the Middle Fork American River and Rubicon River, respectively.

4.2 SAMPLING METHODS

To monitor the abundance, distribution, and timing of initiation of FYLF breeding in the bypass and peaking reaches different types of monitoring will be conducted. The following describes the sampling method by study objective.

4.2.1 Abundance Surveys

Abundance surveys will be conducted three times during each monitoring year, including twice in the spring/early summer to detect eggs and early tadpoles and once in the late summer/early fall to detect older tadpoles and young-of-the-year. The first spring visit will be conducted when river temperatures reach a daily average of approximately 11–12ºC (51.8–54.6^{o}F) and when breeding is verified at one of the monitoring sites in the bypass or peaking reaches (refer to Timing and Initiation of Breeding Season Surveys below). These surveys will follow the Visual Encounter Protocol described in *Measuring and Monitoring Biological Diversity: Standard Methods for Amphibians* (Heyer et al, 1994; Attachment A) and incorporate United States Fish and Wildlife Service (USFWS) decontamination guidelines (Attachment B), or their successors. Only experienced personnel will be used to conduct the surveys.

At each monitoring location, two surveyors will search the stream banks, back channel areas, and potential instream habitats for FYLF progressing in a slow, methodical fashion. To aid in the detection of eggs and tadpoles, surveyors will use a viewing box in shallow margin areas and snorkel in deeper water where feasible. At each sampling location, a minimum of 1,000 meters (m) will be surveyed. For sites located at tributary confluences, a minimum of 1,000 m will be surveyed in the mainstem, as well as 1,000 m up the tributary where possible. During each survey, data (time of the survey,

Global Positioning System [GPS] locations, weather conditions, and water and air temperatures at the channel margin and within the channel) will be collected to describe the sampling site and document observations (lifestage, sex, size, developmental Gosner stage (Gosner 1960), and GPS location) of FYLF. A California Native Species Field Survey form for FYLF detections will be prepared and submitted to the California Natural Diversity Database (CNDDB).

4.2.2 Distribution Surveys

To document the upstream distribution of FYLF in the Rubicon River and Middle Fork American River, distribution surveys will be completed once in the late summer during each monitoring period. The surveys will be conducted following the methods described previously, and extend the survey area for a minimum of approximately 2,000 m from the most upstream documented occurrence of FYLF. Depending on access (due to difficult terrain), the additional survey area may encompass contiguous habitat or discontinuous habitat. If additional FYLF are identified during these surveys, the survey area will be expanded until the upstream distribution of FYLF is determined during each monitoring period.

4.2.3 Timing of Initiation of Breeding Season Surveys

To determine the timing of the initiation of breeding season, repeat reconnaissance level surveys will be conducted at MF26.2 and R3.5 on the Middle Fork American River and Rubicon River, respectively, prior to and up to the initiation of breeding. The surveys will begin in late March–May, depending on when daily average water temperatures are estimated to be approaching 11–12^{o}C. At least two surveyors will conduct a visual search for egg masses in suitable breeding habitats. These qualitative surveys will be conducted in years when abundance surveys are conducted and also during the first two years when pulse flows are released.

Hydrology (at existing gages) and water temperatures (continuous, 15-minute) will be monitored from March 1 through October 31 during the years when surveys are completed. Water temperatures will be monitored at a minimum of four locations, including on the Rubicon River at Ellicott Bridge and above Ralston Powerhouse and on the Middle Fork American River at MF29.4 downstream of Brushy Canyon Creek and upstream of Ralston Afterbay. A description of these locations and the water temperature monitoring is included in the Water Temperature Monitoring Plan (PCWA 2010b; SD A).

4.3 ANALYSES METHODS

The following describes the analyses methods to be used.

4.3.1 Abundance Surveys

The number of observations by life stage (egg mass, metamorphs, adults) by monitoring site and survey date will be summarized in tabular format. FYLF densities (average number of observations per kilometer [km]) at each monitoring site will be compared

graphically. The life stage density monitoring data will be compared to the data collected as part of the AQ 12 – TSR (PCWA 2010a; SD B) and those from the previous FYLF monitoring surveys. Hydrology (i.e., spring accretion flows, recent spill history and timing), water temperature, and other data collected as part of the surveys, will be reviewed and related to the abundance patterns.

4.3.2 Distribution Surveys

The distribution survey data from the Middle Fork American River and Rubicon River will be used to develop a distribution map for FYLF. The distribution map will be compared to the data collected as part of the AQ 12 – TSR (PCWA 2010a; SD B) and those from the previous monitoring surveys. Recent hydrology, water temperature, and other data collected as part of the surveys, will be reviewed and related to the distribution patterns, as appropriate.

4.3.3 Timing of Initiation of Breeding Season Surveys

The timing of initiation of breeding observed at the monitoring sites will be related to water temperature and hydrology data. The timing of oviposition in the monitoring area will be estimated and presented in a table. If the reconnaissance-level surveys following pulse flow releases are conducted in years without scheduled abundance and distribution surveys, the results will be included in the subsequent monitoring report (described below).

5.0 REPORTING

A FYLF Monitoring Report will be prepared and distributed to the USDA-FS, State Water Resources Control Board (State Water Board), and California Department of Fish and Game (CDFG) for review and comment within 120 days following the completion of each two-year monitoring period. The report will follow the general presentation layout for the FYLF data provided in the AQ 12 – TSR (PCWA 2010a; SD B). A 60-day review period will be provided to the agencies. Based on the results of the monitoring and comments received during the review process, PCWA and the agencies may hold a meeting to discuss the results or modify the monitoring program. Within 60 days of receipt of comments, or within 60 days following any meeting, comments will be addressed and the final report will be filed by PCWA with the agencies (USDA-FS, State Water Board, USFWS, and CDFG) and the Federal Energy Regulatory Commission (FERC or Commission).

6.0 LITERATURE CITED

Gosner, K.L. 1960. A simplified table for staging anuran embryos and larvae with notes on identification. Herpetologica 16:183–190.

Heyer, W. R., M. A. Donnelly, R. W. McDiarmid, L. C. Hayek and M. S. Foster, Eds. 1994. Measuring and monitoring biological diversity: Standard methods for amphibians. Biological Diversity Handbook Series. Washington D.C., Smithsonian Institution Press.

PCWA. 2010a. AQ 12 – Special-Status Amphibian and Aquatic Reptile Technical Study Report (2007). Available in PCWA's Application for New License – Supporting Document B.

____. 2010b. Water Temperature Monitoring Plan. Available in PCWA's Application for New License – Supporting Document A.

United States Fish and Wildlife Service (USFWS). 2005. Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog, August 2005.

TABLES

FYLFMP Table 1. Foothill Yellow-Legged Frog Monitoring Site Locations.

River and Monitoring Sites[1] (River Mile)	Reach Type		Monitoring Site Type	Tributary Confluence Site	Relation to Monitoring Plan Objectives
	Bypass Reach	Peaking Reach			
Middle Fork American River					
AMPH MF 6.4		●	Tributary/Mainstem	American Canyon Creek	Abundance
AMPH MF 9.3		●	Tributary/Mainstem	Todd Creek Gas Canyon Slug Canyon	Abundance
AMPH MF 14.1		●	Tributary/Mainstem	Otter Creek	Abundance
AMPH MF 24.1		●	Tributary/Mainstem	North Fork of the Middle Fork American River	Abundance
AMPH MF 26.2	●		Mainstem	No	Abundance and timing of breeding season
AMPH MF 29.4	●		Mainstem	No	Distribution and abundance
Rubicon River					
AMPH R 1.2	●		Mainstem	No	Abundance
AMPH R 3.5	●		Mainstem	Long Canyon Creek	Abundance and timing of breeding season
AMPH R 14.3	●		Mainstem	No	Abundance
AMPH R 20.9	●		Mainstem	No	Distribution and abundance

[1]All study sites will be surveyed a minimum of 1,000 m in stream length. Tributary site surveys will also include a minimum of 1,000 m upstream on the tributary where possible.

MAPS

ATTACHMENT A

Measuring and Monitoring Biological Diversity: Standard Methods for Amphibians (Heyer et al., 1994)

STANDARD VES (HEYER et al. 1994) WITH AUGMENTED FIELD DATASHEETS

YARNELL, S. 2007.

This Visual Encounter Survey (VES) protocol and associated datasheet are for use in stream reaches up to several thousand feet in length where information on all lifestages and the micro-habitat associations of each individual is desired. The data from this survey protocol is intended to 1) describe the abundance, distribution and micro-habitat associations of *R. boylii*, and 2) provide the data necessary to coordinate with other stream reach study efforts, such as instream flow studies where hydrodynamic modeling will be used.

The VES protocol is as described in Heyer et al. (1994), and is summarized for stream habitats as follows. Habitats are searched along a several meter wide transect parallel to the stream at the water's edge, and the number of animals encountered over a period of time is recorded. Using a moderate level of search effort, individuals active on the surface of the ground, on rocks, or at the water's edge are identified, and captured and measured if possible. Rocks, logs and other surface cover objects are also overturned in search of individuals, then returned to their original position to minimize disturbance to the habitat. Habitats are not systematically destroyed in order to find animals, and voucher specimens are not collected unless absolutely necessary for identification. In shallow water habitats, hand dip nets are used to capture individual adults and sub-adults, and to seine the channel bottom to collect tadpoles. This search effort in shallow water habitats is balanced to minimize habitat disturbance, but adequately sift through any silt, gravel or vegetation where individuals may be hiding. Use of a viewing box in shallow, wadable areas to help in detection of egg and tadpole lifestages is recommended. Likewise, where safe and possible, snorkeling in deeper water (0.5-2m deep) adjacent to good breeding habitat (e.g. edges of cobble bars) can greatly aid in detection of egg masses, and is recommended during spring surveys. To effectively survey stream segments, both banks are walked with a minimum of two surveyors. Wherever possible, surveys are completed walking upstream so that as individuals seek cover in the stream, often swimming downstream, they are not counted twice. In addition, eggmasses are generally attached to the downstream side of cobbles and are easier to detect when walking upstream. However, surveys could proceed in the downstream direction if surveyors are well-practiced in identification, are manually feeling and checking behind cobbles and boulders for eggmasses, and can adequately keep track of any downstream migrating individuals.

A list of field equipment required to complete the surveys is attached at the end of this protocol. In general, equipment should be selected to be lightweight and compact enough to fit within a daypack so that surveyors can be fully mobile.

The associated datasheet was developed to document the additional microhabitat data needed at each observation. It is similar to datasheets used in previous academic research and hydropower relicensing studies (Lind, 1997; PG&E 2002; Yarnell, 2005). In order to simplify the complications and potential errors associated with multiple datasheets each for a different lifestage, a single datasheet is used for each survey,

regardless of time of year and focus of survey (ex: breeding surveys in spring vs. tadpole/rearing surveys in summer). The data for each lifestage observed during the survey is recorded on a single row. The microhabitat data collected for each lifestage may differ and as a result, some fields in the row may be marked as N/A (ex: depth at eggmass for an adult observation). Small modifications to the datasheet may be made to accommodate unique survey situations (such as associated mesohabitat number rather than associated GPS point when identifying observation location), but these should be kept to a minimum.

Note that the datasheet is designed to be printed in landscape format on 8x14 paper with the code list printed on the back side of the page (FYLF VES survey datasheet.xls file). Details on recording data are provided below. The datasheet is designed for collection of data in metric units, so use of English units must be explicitly noted.

General Data

Site: Name of stream and reach to be surveyed. If sub-reaches are used, clarify which sections are to be surveyed. For example: South Yuba River, Reach A-1, river mile 12.5–13.5.

Start/End UTM: Coordinates of start and end survey locations on the stream in NAD27 datum (designate other datum if needed). Record saved waypoint (wypt) number accuracy of point (in meters).

Elevation: Record from Topo map or GPS and circle source (note range of error)

Photo numbers: Record digital photo ID numbers for photos taken throughout survey. Include photos of the start and end locations, typical mid-channel habitat, typical edgewater and backwater habitats, examples of breeding habitat (occupied or otherwise), example individuals where possible (adults, juveniles, eggs and tadpoles) and any other interesting or unique habitat features.

Observers(s): Names of surveyors

Date: Month, Day, Year

Survey Start/End Time: Record start/end times of survey (note time of breaks for lunch, etc on bottom of sheet if necessary). This should reflect actual survey/search time.

Weather: Describe general cloud cover; enter code from list:

C Clear

PC Partly Cloudy

MC Mostly Cloudy

O Overcast

R Rainy

Start/End Temp (C): Record temperature of air (in the shade) and water (thalweg and edgewater) at start, mid-day (if applicable) and end of survey. Edgewater temp should be within 0.3 m of shore in a shallow slow-moving location.

Bullfrogs? Fish? Note presence/absence of bullfrogs, fish or crayfish anywhere in survey reach. If needed, add notes at bottom of page.

Field sketch completed? At the bottom of the page, note whether a rough field sketch was completed on the back of the datasheet. The sketch serves as rough indicator of habitat throughout the survey reach and can be used to delineate which portions of the reach may *not* have been surveyed (e.g. very deep or fast areas near a steep heavily vegetated bank).

Detailed Data

***Note: Microhabitats are defined as the immediate/local habitat surrounding the observation site of the individual. This may be the shallow side habitat or backwater where eggs and tads occur or the habitat immediately adjacent to an adult perch site. Measurements should be made as near to the individual as possible but still describing the average conditions of the immediately adjacent habitat. On average, but not always, the microhabitat would be within a 0.5m or so of the observation.

***Note: Some fields are applicable only to certain lifestages. Be sure to record N/A in the datasheet field for field not appropriate to the observation. Do not leave fields blank.

Life Stage/Sex: Note life stage of individual; enter code from list:

AF Adult Female

AM Adult Male

AU Adult Unknown

J Juvenile/Sub-adult

Y Young of Year/metamorph (newly emerged – fall only)

T Tadpole

E Egg mass

Total #: Number of individuals noted in a single micro-habitat (ex: 1 adult male on emergent boulders in a riffle vs. 50 tadpoles in a single small side channel pool)

Length (mm): Snout to vent length for adults/sub-adults; Total length for tadpoles; Diameter for egg masses

Developmental Stage: Gosner stage for egg masses and tadpoles. If categorized, then note categories on back of datasheet.

Mesohabitat Type: Local larger-scale habitat where individual was observed based on USFSR5 meso-habitat types (see USFSR5 publication for more info on defining mesohabitats); enter code from list:

CAS Cascade

- jumbled steep reaches with either coarse substrate or bedrock

SPO Step-pool

- includes steep reaches with plunge pools and vertical scour pools

SCP Side-channel Pool

- includes eddies, backwater pools, lateral scour pools, corner pools

POO Pool

- includes flatwater, dammed pools, confluence pools, mid-channel pools and pool tail-outs

EDG Edgewater

- shallow edgewater habitat adjacent to riffles, runs

RUN Run

- slow gently moving flow, faster than a pool, slower than a riffle

HGR High Gradient Riffle/Rapid

- rippled swift water, rapids of high gradient (~ >2%)

LGR Low Gradient Riffle

- rippled swift water of low gradient (~ <2%)

OTH Other

- describe either in same field or in comments field

Riparian Type: Describe dominant riparian/adjacent channel vegetation based on Lind 1997 to provide data on vegetation encroachment; enter code from list:

GCBar	Gravel/Cobble Bar (side or mid channel, clear of veg)
WIL	Pure Willow
WIL/ALD	Willow/Alder Mix
MRIP	Mature Riparian
BDX	Bedrock (clear of veg)

Canopy Cover Class: Cover directly above microhabitat where individual was noted; enter code from list:

1	0–25%
2	25–50%
3	50–75%
4	75–100%

Distance to Shore (m): Distance from observation perpendicular to water's edge at closest shore. Primarily important for eggs/tadpoles.

Microhabitat Substrate: Dominant substrate type near perch for adults/sub-adults, microhabitat substrate for tadpoles or egg masses

SLT	Silt
SND	Sand (< 2mm)
GRV	Gravel (2 – 64 mm)
COB	Cobble (64 – 256 mm)
BLD	Boulder (> 256 mm)
BDX	Bedrock
MXD	Mixed (describe how mixed – GC or CG with dominant size first)

Attach/Perch Substrate: Substrate size of perch for adults/sub-adults/juveniles or attachment site for egg masses (N/A for tadpoles)

SLT Silt

SND Sand (< 2mm)

GRV Gravel (2–64 mm)

COB Cobble (64–256 mm)

BLD Boulder (> 256 mm)

BDX Bedrock

VEG Vegetation/LWD – specify

Total Depth (m): For all lifestages, record average total depth of the microhabitat

Depth to eggs/tads (m): For egg masses, record depth to center of egg mass; for tadpoles, record depth to tads if different than average total depth of microhabitat, if it's the same, note 'same'.

Mid-column Velocity (m/s): For all lifestages, record average local mid-column flow velocity of the microhabitat. Mid-column velocity should be taken at 0.6 times the total depth for depths < 1m. For depths > 1m, record the average of the velocity at 0.2 times the depth and 0.8 times the depth. For egg masses, this should be directly above or immediately adjacent to the oviposition site.

Velocity at eggs/tads (m/s): For egg masses, record velocity at/adjacent to center of egg mass; for tadpoles, record velocity at tads if different than mid-column velocity of microhabitat, if it's the same, note 'same'.

Local Water Temp (C): Temperature of water in local microhabitat

Location of Observation: Code or some identifier of location in survey reach where observation was recorded. Could be a GPS waypoint number or an associated meso-habitat number correlating to another study.

Comments: Include here any information on local habitat condition, species condition, presence of non-natives, photo description, etc.

REFERENCES:

EN.REFLIST Lind, A.J. (1997). Survey Protocol for Foothill Yellow-legged Frogs (*Rana boylii*) in Streams. USDA Forest Service, Pacific Southwest Research Station, Arcata, CA. DG:S27L01A.

Seltenrich, C.P. and Pool, A.C. (2002). A Standardized Approach for Habitat Assessments and Visual Encounter Surveys for the Foothill Yellow-legged Frog (*Rana boylii*). Pacific Gas & Electric Company.

Yarnell, S. M. (2005). Spatial Heterogeneity of *Rana boylii* Habitat: Physical Processes, Quantification and Ecological Meaningfulness. PhD Dissertation. Hydrologic Sciences, University of California, Davis.

USFSR5 meso-habitat types

EN.REFLISTField Equipment List

Required:

Field notebook

Datasheets (w/copy of survey protocol) and clipboard

Clean copies of study site aerial/topo maps (for sketching habitats, etc)

Pencil, pen, sharpie

Stopwatch

Flagging

Thermometer

Binoculars

Dip net or small handheld net for scooping tadpoles and catching individuals

Clear see-thru rulers (marked in metric) to measure individual length

Small clear plastic vial or wide-mouth bottle to capture tads for identification

Camera – extra batteries, memory card

Scale for pictures (ruler, pencil of known length, etc)

Handheld GPS – extra batteries

Velocity meter w/wading rod or other stick/device to measure depth – Marsh McBirney recommended – need accuracy in low velocities - +/- 0.01 m/s ideal.

Waders

First Aid kit

Personal – water, food, sunscreen, bug juice, etc

Recommended:

Viewing box (ideal if made of plexiglass, but could be lightweight plastic with clear plastic affixed to hole in bottom)

Snorkeling gear – drysuit, mask/snorkel, shoes

Rope to tie off and use in swift water

Hand lens (aid in identifying mouth parts on tadpoles)

30m tape – w/metric markings

Optional:

Range finder – to record large scale distances (river width, length of bar, etc)

Compass

Walkie talkies

Inflatable kayak, inner tube, or some means of floating river if needed – includes lifejackets, drybags, paddles, ropes, etc.

Site (stream/reach/subreach)_____ Date: _____ Page _____ of _____

Start North UTM: WYPT: East UTM: Accuracy:	Elevation: GPS Topo	Photo #s: start: end: breeding: Other: mid-channel: Edgwtr: adults: eggs/tads:					Observer(s):
End North UTM: WYPT: East UTM : Accuracy:	Survey Start Time: End Time:	Weather:	Start Temp (C) - Air: Thalweg: Edgwtr:	End Temp (C) - Air: Thalweg: Edgwtr:			Bullfrogs? Fish? Crayfish?

Life Stage /Sex	Total #	Length (mm)	Develop. Stage	Meso-habitat Type	Riparian Type	Canopy Cover Class	Dist to Shore (m)	Microhabitat Substrate (mm)	Attach/Perch Substrate (mm)	Total Depth (ft)	Dist. From Surface to Eggs/Tads (ft)	Mean Column Velocity* (ft/s)	Velocity at Eggs/Tads (ft/s)	Local Water Temp (C)	Location of Observation	Comments

If depth is ≤ 2.5 ft then measure velocity at 0.6 of depth from the surface. If depth is ≥ 2.5 ft than measure velocity at 0.8 and 0.2 of depth from the surface.

Foothill Yellow-legged Frog VES Survey Form CODES

VARIABLE	CODE	Description	Comments
Life Stage/Sex	AF	Adult - Female	
	AM	Adult - Male	
	AU	Adult - Unknown	
	J	Juvenile/Sub-adult	
	Y	Young of Year/Metamorph (fall only)	
	T	Tadpole	
	E	Egg Mass	
Length (mm)	Snout to vent length for adults/sub-adults; Total length for tadpoles; Diameter for egg masses		
Mesohabitat Type	CAS	Cascade	jumbled steep reaches with either coarse substrate or bedrock
	SPO	Step-pool	includes steep reaches with plunge pools and vertical scour pools
	SCP	Side-channel Pool	includes eddies, backwater pools, lateral scour pools, corner pools
	POO	Pool	includes flatwater, dammed pools, edgewater, confluence pools, mid-channel pools and
	EDG	Edgewater	shallow edgewater habitat adjacent to riffles, runs
	RUN	Run	slow gently moving flow, faster than a pool, slower than a riffle
	HGR	High Gradient Riffle/Rapid	riffles, rapids of high gradient (~ > 2%)
	LGR	Low Gradient Riffle	riffles of low gradient (~ < 2%)
	OTH	Other	describe in comments field
Riparian Type	GCBar	gravel/cobble bar (no veg)	
(stage of succession)	WIL	pure willow	
	WIL/ALD	willow/alder mix	
	MRIP	mature riparian	
	BDX	Bedrock (little/no veg)	
Microhabitat Substrate	SLT	silt	
	SND	sand (< 2mm)	
	GRV	gravel (2 - 64 mm)	
	COB	Cobble (64 - 256 mm)	
	BLD	Boulder (> 256 mm)	
	BDX	Bedrock	
	MXD	Mixed	describe how mixed - e.g. GC for dominant gravel, secondary cobble
Microhabitat Depth	TOTAL Depth of microhabitat (m)		
Depth at Eggs/Tads	Eggs - depth to center of egg mass; Tads - depth to tads if diff than average total depth		
Microhabitat Velocity	Average MID-COLUMN velocity of microhabitat (m/s)		
Velocity at Eggs/Tads	Eggs - velocity at/adjacent to center of egg mass; Tads - velocity at tads if diff than mid-column velocity		
Local Water Temp	Water Temperature in microhabitat		
Distance to Shore (m)	Distance from observation perpendicular to water's edge on nearest shore		

VARIABLE	CODE	Description
Developmetal Stage		Gosner stage for egg masses and tadpoles.
Eggs	1	New 1-3 days old - compact, blue, no silt, small eggs
	2	~ 1 week old - looser, some silt on eggs, water in eggs
	3	~2 wks old (close to hatching) - very loose, eggs detaching, start to see tail in embryos, possibly strung out if
Tadpoles	1	
	2	
	3	
	4	
	5	
Canopy Cover Class	1	0-25%
	2	25-50%
	3	50-75%
	4	75-100%
Attach/Perch Substrate	SLT	silt
	SND	sand (< 2mm)
	GRV	gravel (2 - 64 mm)
	COB	Cobble (64 - 256 mm)
	BLD	Boulder (> 256 mm)
	BDX	Bedrock
	VEG	Vegetation/LWD - specify veg type

Rough field sketch - delineate areas NOT surveyed (too deep/fast, heavy veg)

ATTACHMENT B

USFWS Decontamination Guidelines

Notes on Collecting Habitat Suitability Criteria (HSC) availability data

Data is collected to determine range of depths and velocities available throughout the survey reach, and will be used to develop HSC curves for FYLF eggs and tadpole lifestages.

Control Point - Code for contol points identified at each site. Describe control points in description box below.

Survey Point - Point number from Total Station (**If scope and rod used instead, then reference where in field notebook details on station, elevation, etc

Mesohabitat Unit Type - Based on USFSR5 mesohabitat unit designations. See codes for VES datasheet.

Depth (m) - Total Depth at measurement point

Velocity (m/s) - Mid-column velocity at measurement point

Substrate - Categorical size of substrate at measurement point:

Silt/fines	Small Cobble (64-128mm
Sand (<2mm)	Large Cobble (128-256
Gravel (2-64mm)	Small Boulder (256-512mm)
	Large Boulder (>512mm)
	Bedrock

Notes - Any anomalies, errror or description pertaining to that measurement point

CONTROL POINTS

Code	Description