Study 3.4[1]

SPECIAL-STATUS AMPHIBIANS – FOOTHILL YELLOW-LEGGED FROG SURVEYS

August 2011

1.0 Project Nexus

Yuba County Water Agency's (YCWA or Licensee) continued operation and maintenance (O&M) of the Yuba River Development Project (Project) has a potential to affect the special-status[2] amphibian, foothill yellow-legged frog (FYLF) (*Rana boylii*), which is considered a State Species of Special Concern by the California Department of Fish and Game (CDFG).

2.0 Resource Management Goals of Agencies with Jurisdiction Over the Resource to be Studied

YCWA believes that four agencies have jurisdiction over special-status amphibians in the geographic area covered in this study proposal: 1) the United States Department of Agriculture, Forest Service (Forest Service) on National Forest System (NFS) land; 2) United States Department of Interior, Fish and Wildlife Service (USFWS); 3) California Department of Fish and Game (CDFG); and 4) State Water Resources Control Board Division of Water Rights (SWRCB). Each of these agencies and their jurisdiction, as understood by YCWA at this time, is discussed below.

Forest Service

The Forest Service's jurisdiction and applicable management goals are described by the Forest Service from page 59 to 76 in the Forest Service's March 2, 2011 letter to FERC providing the Forest Service's comments on YCWA's PAD. The Forest Service's jurisdiction and management goals are not repeated here.

USFWS

USFWS's jurisdiction and goals and objectives are described by USFWS on pages 1 through 3 of USFWS's March 7, 2011 letter to FERC that provided USFWS's comments on YCWA's Pre-Application Document (PAD). USFWS's jurisdiction, goals and objectives are not repeated here.

[1] After consultation with Relicensing Participants, YCWA, at its own risk, agreed to begin this study in 2011 prior to FERC's Study Determination. If FERC includes this study in its Determination, YCWA will consider the study ahead of schedule.

[2] Special-status amphibians are considered those species: 1) formally listed by the United States Department of Agriculture Forest Service as a Sensitive Species or a Management Indicator Species; 2) listed under the federal Endangered Species Act (ESA) as Proposed or a Candidate for listing as endangered or threatened or proposed for delisting; 3) listed under the California Endangered Species Act (CESA) as Proposed for listing as endangered or threatened or proposed for delisting; or 5) formally listed by California Department of Fish and Game as a Species of Concern. For the purpose of this study proposal, species listed as threatened or endangered under the ESA or CESA are addressed separately.

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CDFG
CDFG's jurisdiction is described by CDFG on page 1 of CDFG's March 2, 2011 letter to FERC providing CDFG's comments on YCWA's PAD. CDFG's goal, as described on page 2 of CDFG's letter is to preserve, protect, and as needed, to restore habitat necessary to support native fish, wildlife and plant species.

SWRCB
SWRCB has authority under the federal Clean Water Act (33 U.S.C. §11251-1357) to restore and maintain the chemical, physical and biological integrity of the Nation's waters. Throughout the relicensing process the SWRCB maintains independent regulatory authority to condition the operation of the Project to protect water quality and the beneficial uses of stream reaches consistent with Section 401 of the federal Clean Water Act, the Regional Water Quality Control Board Basin Plans, State Water Board regulations, CEQA, and any other applicable state law.

3.0 Study Goals and Objectives

The goal of this study is to develop information concerning the special-status amphibians associated with Project-affected stream reaches, and related Project recreation features or activities.

The specific objectives of this study are as follows:

- Identify, compile, and map known occurrences of FYLF, including life history stage and associated habitat information as available. At a minimum, produce a map of known occurrences with a supplemental table that includes information on the exact location, date found, how many individuals (if available), and the source of the sighting (museum database, agency record, etc.).
- Identify habitats in the study area potentially suitable for FYLF, and evaluate the suitability of these habitats for the species.
- Perform biological surveys in suitable habitats and determine approximate period in which breeding and rearing occurs if FYLF is found. Compile incidental observations from other aquatic studies documenting other native amphibians, and non-native aquatic species that may affect the distribution of FYLF.

4.0 Existing Information and Need for Additional Information

Existing and relevant information regarding known and potentially occurring locations of special-status amphibians in the Project Vicinity[3] are available from California Natural Diversity Database (CNDDB), museum records, and other sources. FYLF is the only special-status

[3] For the purposes of the Relicensing, the Project Vicinity is defined as the area surrounding the Project in the order of a county or United States Geological Survey 1:24,000 topographic quadrangle.

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amphibian in the area. Information and a life history description of FYLF, included in Section 7.3 of YCWA's Pre-Application Document (YCWA 2010), is useful in identifying preferred habitats and documenting where the species have been found to date. Table 4.0-1 summarizes habitat requirements of FYLF by life stage.

Table 4.0-1. Foothill yellow-legged frog habitat requirements by life stage.

Egg Masses[1]	Larvae[1]	Juveniles and Adults[1]
Egg masses are deposited in low to moderate gradient streams, usually within shallow, edgewater areas of low velocity with cobble/boulder substrate in open, sunny areas with little riparian vegetation; often adjacent to low gradient cobble/boulder bars, tributary confluences, side and backwater pools, or pool tail-outs with coarse substrates. In small streams may occur in step pools and other microhabitats that meet basic conditions for substrate, water depth, and velocity.	Generally in low velocity segments of streams, such as edgewater habitat adjacent to riffles or cascades, in main channel pools, and plunge-pools that provide escape cover (e.g., substrate interstices, vegetation, and detritus for cover). Larvae, at least in early stages, show affinity to oviposition sites, but may disperse to shallow, warm, low velocity near-shore habitats with smaller substrate (i.e., gravel/sand) as the season progresses.	Perennial streams and ephemeral creeks with pools. Prefer areas that provide exposed basking sites and cool shady areas adjacent to water's edge. Shallow, flowing water, preferentially in small to moderate-sized streams with some cobble-sized substrate.

[1] Sources of information: Jennings and Hayes 1994, PG&E 2001, Lind 2005.

FYLF is a stream-adapted species and is not associated with ponds, lakes, or other lentic habitats. Within large streams, FYLF often occurs near tributaries, which may provide important seasonal habitats (e.g., in winter and during the hottest part of the summer) (VanWagner 1996; Seltenrich and Pool 2001). Breeding tends to occur in spring or early summer and eggs are laid in areas of shallow, slow moving, waters near the shore. FYLF are infrequent in habitats where introduced fish and American bullfrog occur (Jennings et al. 1994).

The CNDDB (CDFG 2003) reports 24 occurrences of FYLF in the Project Vicinity. The records cited by Vindum and Koo (1999) for the drainages of the North, Middle, and South Yuba rivers occur above Project-affected reaches. California Academy of Sciences (2010) has 17 FYLF records from Sierra County, seven from Yuba County, and six from Nevada County. The Museum of Vertebrate Zoology has nine specimens from Yuba County. Despite widespread documentation of FYLF in the region, few of these records are from the Project Area.[4] In the vicinity of Log Cabin Diversion Dam on Oregon Creek, there are records for FYLF (adults and subadults); FYLF also have been documented upstream and downstream of Our House Diversion Dam on the Middle Yuba River. Tahoe National Forest reports 150 occurrences of FYLF within 10 miles of the Project Vicinity; at least 16 of which are located in the Project Area. Most of the records are in the vicinity of Oregon Creek, North Yuba River, Kanaka Creek, Grizzly Creek, Woodruff Creek, Grizzly Gulch, and the Middle and South Yuba rivers. Other areas with multiple TNF FYLF records include Blue Ravine, Deer Creek, Devils Canyon, Fiddle Creek, Hornswoggle Creek, Humbug Creek, Indian Creek, Moores Flat, Rapps Ravine, and Willow Creek. During stream habitat mapping in 2009, YCWA observed FYLF in Oregon Creek and in Middle Yuba River downstream of Our House Diversion Dam.

[4] For the purposes of this document, the Project Area is defined as the area within the existing Federal Energy Regulatory Commission (FERC) existing Project Boundary and the land immediately surrounding the FERC Project Boundary (*i.e.,* within about 0.25 mile of the FERC Project Boundary) and includes Project-affected reaches between facilities and downstream to the next major water controlling feature or structure.

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In most cases, existing information is too general to meet the objectives of the study. Additional information needed includes specific and current localities of FYLF and its habitat in relation to Project facilities; and sufficient information on normal Project O&M activities that might affect populations.

5.0 Study Methods and Analysis

5.1 Study Area

The study area consists of stream reaches affected by the Project; it also includes tributaries unaffected by the Project up to 0.5 mile (mi) upstream from the normal high water line of Project-affected stream reaches, if suitable habitat for FYLF is accessible to the species from habitat in the mainstem of the river. This includes: 1) the Middle Yuba River from and including Our House Diversion Dam Impoundment to the confluence with the North Yuba River, 2) Oregon Creek from and including the Log Cabin Diversion Dam Impoundment to the confluence with the Middle Yuba River, 3) the North Yuba River from and including New Bullards Bar Dam Reservoir to the confluence with the Middle Yuba River, and 4) the portion of the Yuba River from the confluence of the North and Middle Yuba rivers to New Colgate Powerhouse. The Yuba River below New Colgate Powerhouse is below 600 feet (ft) in elevation and thus outside of the known or expected distribution of FYLF, which extends from about 600 ft to 5,000 ft in elevation (Moyle 1973, Seltenrich and Pool 2002, ECORP Consulting, Inc. 2005).

In addition, the study area includes tributaries up to 1.0 mile (mi) upstream of New Bullards Bar Reservoir, Our House Diversion Dam Impoundment and Log Cabin Diversion Dam Impoundment if suitable habitat is accessible to the species from habitat in the reservoirs and impoundments. FYLF may make seasonal movements between tributaries and mainstem streams.

The study area also includes one study site on each of two stream reaches unaffected by the Project: 1) Oregon Creek immediately upstream of the Log Cabin Diversion Dam Impoundment; and 2) a stream reach in the Yuba River watershed with comparable geomorphic attributes to at least some of the larger Project-affected stream reaches. The locations of these two study sites will be determined as described in Section 5.3.2.

If YCWA proposes an addition to the Project, the study area will be expanded if necessary to include areas potentially affected by the addition.

5.2 General Concepts and Procedures

The following general concepts and practices apply to the study:

- Personal safety is the most important consideration of each fieldwork team.
- Licensee will make a good faith effort to obtain permission to access private property where needed well in advance of entering the property.

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- Field crews may make minor variances to the FERC-approved study in the field to accommodate actual field conditions and unforeseen problems. When minor variances are made, Licensee's field crew will follow the protocols in the FERC-approved study.
- When Licensee becomes aware of major variances to the FERC-approved study, Licensee will issue an e-mail to the Relicensing Contact List describing the variance and reason for the variance. Licensee will contact by phone the Forest Service (if the variance is on National Forest System land), USFWS, SWRCB and CDFG to provide an opportunity for input regarding how to address the variance. Licensee will issue an e-mail to the Relicensing Contact List advising them of the resolution of the variance. Licensee will summarize in the final study report all variances and resolutions.
- Licensee's performance of the study does not presume that Licensee is responsible in whole or in part for measures that may arise from the study.
- Global Positioning System (GPS) data will be collected using either a Map Grade Trimble GPS (sub-meter data collection accuracy under ideal conditions), a Recreation Grade Garmin GPS unit (3 meter data collection accuracy under ideal conditions), or similar units. GPS data will be post-processed and exported from the GPS unit into Geographic Information System (GIS) compatible file format in an appropriate coordinate system using desktop software. The resulting GIS file will then be reviewed by both field staff and Licensee's relicensing GIS analyst. Metadata will be developed for deliverable GIS data sets. Upon request, GIS maps will be provided to agencies in a form, such as ESRI Shapefiles, GeoDatabases, or Coverage with appropriate metadata, that is useful for interactive data analysis and interpretation. Metadata will be Federal Geographic Data Committee (FGDC) compliant.[5]
- Licensee's field crews will record incidental observations of aquatic and wildlife species observed during the performance of this study. All incidental observations will be reported in the appropriate Licensee report (e.g., incidental observations of special-status fish recorded during fieldwork for the Special-Status Turtles – Western Pond Turtle Study will be reported in Licensee's Stream Fish Populations Study report). The purpose of this effort is not to conduct a focus study (no effort in addition the specific field tasks identified for the specific study) or to make all field crews experts in identifying all species, but only to opportunistically gather data during the performance of the study.
- Field crews will be trained on and provided with materials (e.g. Quat-128 [didecyl dimethyl ammonium chloride], scrub brush, etc.) for decontaminating their boots, waders, and other equipment between study sites. Major concerns are amphibian chytrid fungus (*Batrachochytrium dendrobatidis*), and invasive invertebrates (e.g. zebra mussels, *Dreissena polymorpha*). This is of primary importance when moving: 1) between tributaries and mainstem reaches; 2) between basins (e.g. Middle Yuba River, Yuba River and North Yuba River); and 3) between isolated wetlands or ponds and river or stream environments.

[5] The Forest Service and CDFG each have requested that a copy of the GIS maps be provided to them when the maps are available.

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5.3 Study Methods

The study will be completed in five steps, each of which is described below.

Prior to conducting field work, YCWA will obtain necessary CDFG scientific collection permits and will adhere to accepted decontamination guidelines to minimize the likelihood of transmitting diseases (USFWS 2005).

5.3.1 Step 1 – Map Occurrences

YCWA will map known occurrences of FYLF based on a query of the CNDDB, agency records, museum records, and consultation with regional experts. The map will be supplemented with a table that includes information on the exact location, date found, how many individuals (if available), and the source of the sighting (museum database, agency record, etc.).

5.3.2 Step 2 - Identify Potential Habitat and Select Survey Sites

YCWA will review available data sources to identify areas of potentially suitable habitat for FYLF (emphasizing potential breeding habitat) based on the description of habitat elements presented in Table 4.0-1. Data sources may include aerial photographs; the Project helicopter video, National Wetland Inventory (NWI) maps, United States Geological Survey (USGS) 1:24,000 topographic quadrangle, hydrologic data, and other sources of information that would allow for assessment of habitat conditions within the study area.

YCWA will conduct a field reconnaissance at specific locations to assess on-site habitat conditions if other data sources are not adequate to this purpose. Sites will be logged by GPS position, photographs will be taken of each site from various angles, and a preliminary habitat assessment will be conducted. Pertinent habitat characteristics to be recorded will include stream channel form and dimensions, gradient, substrate types, and vegetation types (e.g., aquatic, emergent, overhanging, and canopy).

Following review of habitat data sources, a representative set of sites determined to be potentially suitable habitat or all sites, if few suitable sites are identified, will be selected for surveys. Although the number and locations of surveys sites cannot be determined in advance, it is anticipated that at least one site will be placed in each reach affected by the Project, with additional sites as needed to represent the range of conditions where FYLF may occur and potential types of Project effects in each reach; and a total of two sites will be placed in stream reaches unaffected by the Project. One of these non-Project-affected sites will be located in Oregon Creek immediately upstream of the Log Cabin Diversion Dam Impoundment. The other non-Project-affected site will be located in a stream reach in the Yuba River watershed with comparable geomorphic attributes to at least some of the larger Project-affected stream reaches. It is understood that the number of sites may be constrained by access limitations, such as occur in the North Yuba River from New Bullards Bar Dam to the Middle Yuba River, and in parts of the Yuba River.

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YCWA provided a summary of the information described above to the Relicensing Participants. One week after providing the information to the Relicensing Participants, YCWA met with interested and available Relicensing Participants to collaborate regarding sampling locations. YCWA made a good faith effort to schedule the consultation on a day or days convenient to YCWA and interested Relicensing Participants, and provided an email notice at least 14 days in advance of the meeting or site visit. If collaborative agreement is not reached, YCWA will note the disagreements in its final report, including why YCWA did not adopt the recommendation. Table 5.3-1 summarizes collaboratively agreed upon survey site locations in Project-affected sections of the Middle Yuba River, North Yuba River, Yuba River, and Oregon Creek. It was also agreed that a non-Project-affected site will be located in the North Yuba River upstream of New Bullards Bar Reservoir.

The selection of survey sites will take into account site-specific conditions, including safety, accessibility (i.e., road or trail access, topography), permission from landowners to survey on private lands, and potential impact from Project O&M. Survey sites may be disproportionately located near (i.e., within 0.25 mi) of a confluence based on research that supports the importance of proximate tributaries as non-breeding habitat for FYLF associated with larger and/or higher elevation rivers (Kupferberg 1996, Van Wagner 1996, Marlow et al. 2007). Survey site length will range from 750 to 1,000 meters (2,461 to 3,281 ft) on the Project-affected reach, based on the extent of suitable habitat and access. The same site dimensions will apply to the two non-Project-affected sites. To the extent reasonable, FYLF survey sites will be co-located with other relicensing study sites.

Table 5.3-1. Proposed survey effort and locations of FYLF survey sites on Project-affected stream reaches.

RM	River/Location Description[1]
MIDDLE YUBA RIVER	
11.0 - 11.6	0.4 mi D/S of Our House Diversion Dam (Our House Diversion Dam Reach)
4.3 - 5.1	6.9 mi D/S of Our House Diversion Dam at Oregon Creek confluence (Our House Diversion Dam Reach and Oregon Creek Reach)[2]
3.1 - 3.7	8.3 mi D/S of Our House Diversion Dam and 0.9 mi D/S of Oregon Creek confluence (Oregon Creek Reach)
0.0 - 0.3	11.7 mi D/S of Our House Diversion Dam and 4.3 mi D/S of Oregon Creek confluence (Oregon Creek Reach)[3]
NORTH YUBA RIVER	
0.0 - 0.5	1.8 mi D/S of New Bullards Bar Dam (New Bullards Bar Dam Reach)
YUBA RIVER	
39.6 - 39.7	2.3 mi D/S of New Bullards Bar Dam at North Yuba confluence (Middle/North Yuba Reach)[3]
34.1 - 34.7	7.3 mi D/S of New Bullards Bar Dam, 0.2 mi U/S of New Colgate Powerhouse (Middle/North Yuba Reach)
OREGON CREEK	
0.0 - 0.6	3.5 mi D/S of Log Cabin Diversion Dam (Log Cabin Diversion Dam Reach)
2.0 - 2.6	1.5 mi D/S of Log Cabin Diversion Dam (Log Cabin Diversion Dam Reach)

[1] Location descriptions are based on the upstream extent of each proposed site.
[2] Site is comprised of contiguous sections of Our House Diversion Dam Reach and Oregon Creek Reach on either side of Oregon Creek confluence; data will be recorded separately from each reach section.
[3] Site length less than 750 meters because of impassable conditions

YCWA will invite interested and available Relicensing Participants into the field to comment on the final selection of survey sites.

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5.3.3 Step 3 – Conduct Surveys

Surveys for FYLF will occur during the breeding season and will follow the VES standard protocols developed by Pacific Gas & Electric Company (PG&E) for hydroelectric project applications (PG&E and NID 2009), which are modified from Seltenrich and Pool (2002). Specifically, two surveyors working in tandem will search along both banks of streams, back channel areas, and potential instream habitats for FYLF walking slowly while one observer scans ahead. Habitats along each bank will be searched. To aid in the detection of eggs and larvae, surveyors will use a viewing box in shallow margin areas. In water too deep to survey by wading, or where substrate configuration (e.g., large boulders) or other factors render the viewing box ineffective, snorkeling will be employed in appropriate habitats during searches where safely accessible. Each FYLF detection will be recorded by life stage along with the associated habitat data based on procedures described in PG&E and NID (2009), including water temperature, depth, and substrate characteristics. Detailed water velocity, depth, and substrate data (i.e., information pertinent to habitat suitability curve [HSC] development) will be collected for detections of tadpoles on Oregon Creek; at survey sites on the Middle Yuba, North Yuba, and Yuba River, these data will only be collected for a representative sub-set of tadpole detections. Egg mass locations will be recorded by GPS (ideally, Map Grade Trimble GPS) and flagged, photographed, and/or described sufficiently so that egg mass locations can be re-surveyed if the site is used for the performance of Study 3-4, Special-Status Amphibians – Foothill Yellow-Legged Frog Habitat Modeling. Tadpole locations will also be recorded by Map Grade Trimble GPS.

Three FYLF VES visits will be conducted at all sites; two visits in the spring/early summer for the detection of egg masses, and one in the summer to detect tadpoles. A fourth survey will be conducted at sites where egg masses and/or tadpoles were documented in any of the previous surveys; this fourth survey will be in late summer/early fall and intended to document late stage tadpoles and the post-metamorphic stage. The first survey will occur when water temperature monitoring data being collected in the Water Temperature Monitoring Study indicate that temperatures have reached a daily average of 51.8-53.6ºF (11-12ºC) (although FYLF has been reported to sometimes breed at water temperatures as low as 50ºF (10ºC) [Amy Lind, personal communication], a survey-trigger temperature of 51.8ºF should ensure that surveys are not initiated prematurely). Temperature data from the lowest elevation monitoring sites in reaches proposed for surveys will be used for this purpose. The onset of the breeding season may also be assessed by weekly observations at one or more "sentinel sites" in the Middle Yuba, North Yuba, and/or Oregon Creek (i.e., locations in or near the study area where FYLF breeding activity can be easily monitored), if there are locations in these streams where FYLF is known to breed. Sentinel site monitoring would begin in April, and observations of gravid female FYLF or egg masses at these sites may also provide a trigger to initiate the surveys in other locations. As noted in Section 5.2 (General Concepts and Procedures), incidental observations of certain other species will be reported in the study report(s) appropriate to the species. The standard protocols for FYLF VES require recording observations of all amphibians, reptiles, or turtles that are observed during the VES, including the approximate number and the life stage(s) present. Following the initial VES, surveyors will complete a habitat characterization of each study location, following standard operating procedures.

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5.3.4 Step 4 – Prepare, Format and Quality Assurance/Quality Control Data

Following field surveys, YCWA will develop GIS maps depicting special-status species occurrences, potential habitat, project facilities and features, and other information collected during the study. Field data will then be subject to quality assurance and quality control (QA/QC) procedures, including spot-checks of transcription and comparison of GIS maps with field notes.

5.3.5 Step 5 – Prepare Report

YCWA will prepare a report that includes the following sections: 1) Study Goals and Objectives; 2) Methods and Analysis; 3) Results; 4) Discussion; and 5) Description of Variances from the FERC-approved study proposal, if any. At a minimum, the following summaries/data presentations will be provided, along with the supporting data (in Excel spreadsheet and GIS layers, as appropriate):

- Presence/absence of FYLF by survey period (e.g., spring, summer), sample reach tributary, and river
- Abundance of FYLF egg masses by survey period, sample reach tributary, and river
- Abundance of FYLF tadpoles/tadpole groups by survey period, sample reach tributary, and river
- Abundance of FYLF young of the year (metamorphs), subadults, and adults by survey period, sample reach tributary, and river
- Descriptive summaries of FYLF egg mass and tadpole habitat characteristics (at least n, mean, minimum, maximum, and standard error values) overall and by river and/or tributary
- Summary and maps of site habitat assessments
- Maps depicting the number of FYLF observations by life stage at each survey site
- The report will also include pertinent water temperature data, including margin temperatures collected during the Water Temperature Monitoring Study (Study 2.5).

For all special-status species observations, YCWA will complete the appropriate CNDDB form and transmit the form to the CNDDB.

5.3.6 Step 6 – Collaboration Regarding Need for and Scope of Focused Studies in Second Year

YCWA will meet with interested and available Relicensing Participants no later 6 weeks prior to the date that YCWA's Initial Study Report is scheduled to be filed with FERC to review data available from the study at that time and discuss the need for and scope of additional limited scope studies. For example, if the study documents only post-metamorphic life stages of FYLF (adult, juvenile, or young-of-year) or if only late stage larvae are detected (i.e., the results do not indicate where FYLF breeding occurred), further focused survey for egg masses and/or early

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tadpoles in the same stream may be appropriate. In addition, if incidental observations of invasive bullfrogs (*Lithobates* [*Rana*] *catesbeianus*) and crayfish, known predators of FYLF, collected by YCWA during this study and other relicensing studies suggests that these species occur in numbers that could adversely affect FYLF and their occurrence is related to the Project, focused studies for these species may be needed. These focused studies could determine their extent/distribution, relative abundance, and lifestage distribution within Project-affected reaches. VES methods for FYLF can be adapted for bullfrog surveys in lotic waters. For crayfish, PG&E's Pit 3,4,5 FYLF monitoring plan could provide examples of methods for counting. These are only examples, and other conditions or circumstances may indicate a need for other focused studies of a particular site. If YCWA and Relicensing Participants collaboratively agree focused studies are needed in a second year, YCWA and Relicensing Participants will collaboratively develop a new study proposal and YCWA will file it with FERC prior to or at the same time YCWA files its Initial Study Report, and implement the study as directed by FERC.

6.0 Study-Specific Consultation

YCWA will engage in the following study-specific consultation:

- YCWA will collaborate with Relicensing Participants regarding study site locations and will invite interested and available Relicensing Participants into the field to comment on the final selection of study sites (Step 2).

- YCWA will collaborate with Relicensing Participants regarding need for focused second year studies (Step 6).

7.0 Schedule

YCWA anticipates the schedule to complete the study as follows assuming FERC issues its Study Determination by September 16, 2011 and the study is not disputed by a mandatory conditioning agency:

Identify Habitat and Select Survey Sites (Step 1)..... October 2011 – March 2012
Conduct Surveys (Step 2) ..... March – August 2012
QA/QC (Step 3) ..... August 2012
Report Preparation (Step 4) ..... August - September 2012

8.0 Consistency of Methodology with Generally Accepted Scientific Practices

This study is consistent with the goals, objectives, and methods outlined for recent FERC hydroelectric relicensing efforts in California, and uses well established data from CDFG and other reputable sources for the analysis.

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9.0 Level of Effort and Cost

YCWA estimates that the cost to complete this study in 2011 dollars is between $155,000 and $215,000.

10.0 References Cited

California Academy of Sciences (CAS). 2010. Herpetology Records. Available online: http://www.calacademy.org/research/herpetology/catalog/Index.asp. Accessed January 21, 2010.

CDFG (California Department of Fish and Game). 2003. Biogeographic Data Branch. California Natural Diversity Database (CNDDB). Version 3.1.0-Dated January 4, 2010. Available online: http://www.dfg.ca.gov/bdb/html/cnddb.html. Accessed January 20, 2010.

____. 2011. Yuba River Hydroelectric Project (Project No. 2246-058) Comments on the Pre-Application Document, Scoping Document 1, and Additional Resource Study Requests. March 2, 2011.

ECORP Consulting, Inc. 2005. Draft results of the 2004 (Year 1) amphibian monitoring program for foothill yellow-legged frog and mountain yellow-legged frog. El Dorado Hydroelectric Project (FERC Project No. 184). Report to El Dorado Irrigation District. May 18, 2005.

Jennings, M. R., and M. P. Hayes. 1994. Amphibian and reptile species of special concern in California. Final Report to the California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova, CA. 225 pp.

Kupferberg, S. J. 1996. Hydrologic and geomorphic factors affecting conservation of a river-breeding frog (*Rana boylii*). Ecological Applications 6:1332-1344.

Lind, A. 2005. Reintroduction of a declining amphibian: determining an ecologically feasible approach for the foothill yellow-legged frog (*Rana boylii*) through analysis of decline factors, genetic structure, and habitat associations. Ph.D. Dissertation, University of California, Davis. 169 pp.

Marlow, K., Drennan, J., Jackman, R., and K. Wiseman. 2007. Effects of pulsed flows on the foothill yellow-legged frog (*Rana boylii*). Presentation at California-Nevada Working Amphibian Populations Task Force Group Meeting 2007. Las Vegas, NV. Available online: <http://ice.ucdavis.edu/CANVDecliningAmphibians/DAPTF2007/DAPTF2007Agenda.htm#Kupfer>. Accessed November 2007.

Moyle, P.B. 1973. Effect of introduced bullfrogs, *Rana catesbeiana*, on the native frogs of the San Joaquin Valley, California. Copeia 1973:18-22.

Museum of Vertebrate Zoology (MVZ). 2010. Herpetological records for Yuba, Sierra, and Nevada counties, California. University of California, Berkeley. Available online: http://mvzarctos.berkeley.edu/SpecimenSearch.cfm. Accessed January 21, 2010.

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PG&E (Pacific Gas and Electric Company). 2001. Survey protocols, standard operating procedures, and data sheets for amphibian surveys and habitat assessments. May 2001. Unpublished.

_____ and NID (Nevada Irrigation District). 2009. Study 2.3.6. Foothill Yellow-Legged Frog Surveys Study. Revised Study Plan, Drum Spaulding Project and Yuba Bear Hydroelectric Project.

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 boylii*). Pacific Gas and Electric Company.

USFWS. 2005. Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog. Available online:

http://www.fws.gov/sacramento/es/documents/crf_survey_guidance_aug2005.doc. Accessed November 2007.

Van Wagner, T. 1996. Selected life history and ecological aspects of a population of foothill yellow-legged frogs (*Rana boylii*) from Clear Creek, Nevada City, California. Master's Thesis, California State University Chico. 143pp.

Vindum, J.V. and M.S. Koo. 1999. Amphibians and reptiles of the Tahoe National Forest: historical collections and the results of 1997-1999 California Academy of Science Surveys. Dept. of Herpetology, California Academy of Sciences.

Yuba County Water Agency (YCWA). 2010. Yuba River Development Project relicensing Pre-Application Document.

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