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

FINAL

AQ 12 – SPECIAL-STATUS AMPHIBIAN AND AQUATIC REPTILE TECHNICAL STUDY REPORT – 2007

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EXECUTIVE SUMMARY

This report describes the special-status amphibian and aquatic reptile study conducted by the Placer County Water Agency (PCWA) associated with the AQ 12 - Special-Status Amphibian and Aquatic Reptile Technical Study Plan (AQ 12 - TSP), which was included in Supporting Document (SD) H of the Pre-Application Document (PAD) for the Middle Fork American River Project (MFP or Project) (PCWA 2007). The study was conducted from spring through fall 2007 to characterize special-status amphibians and reptiles and their habitats in the vicinity of the MFP. Specifically, the study assessed three species: (1) California Red-legged Frog (*Rana draytonii*) (hereafter, CRLF), a federally threatened species and California Species of Special Concern; (2) Foothill Yellow-legged Frog (*Rana boylii*) (hereafter, FYLF), a U.S. Department of Agriculture-Forest Service (USDA-FS) Sensitive Species and California Species of Special Concern; and (3) Western Pond Turtle (*Clemmys marmorata*) (hereafter, WPT), a California Species of Special Concern. A draft report was distributed to the Aquatics Technical Working Group (TWG) on February 5, 2008 for a 60 day comment period. The comment period ended on April 4, 2008. Oral comments were received at the March 10, 2008 Aquatics TWG meeting and have been addressed in this report. No written comments were received.

The field surveys and data analysis included: (1) a U.S. Fish and Wildlife Service (USFWS) protocol-level habitat site assessment for CRLFs; (2) FYLF habitat, distribution, and abundance; (3) depth, velocity, and substrate data collection at FYLF breeding (egg mass) and tadpole locations to provide habitat suitability criteria for instream flow habitat modeling; and (4) WPT potential breeding habitat mapping.

The CRLF site assessment was conducted within one mile of Project facilities and features, Project recreation facilities, dispersed concentrated use areas, potential Project betterments, and along and bypass and peaking reaches. The CRLF USFWS protocol-level habitat site assessment is summarized below and provided in detail in Attachment A. Attachment A was provided under separate cover to the USFWS for their review and comment. FYLF field surveys were conducted at locations in bypass reaches[1] and the peaking reach[2], their tributaries, and on comparison stream reaches. WPT nesting habitat mapping was completed at Project facilities and features, Project recreation facilities, dispersed concentrated use areas, and potential Project betterments. Mapping was also completed along bypass and peaking reaches and near

[1] A bypass reach is a segment of a river or stream downstream of a diversion facility or reservoir where Project operations result in the diversion of a portion of the water from that reach. Bypass reaches associated with the MFP include: the Middle Fork American River between French Meadows Dam and Ralston Afterbay; the Rubicon River between Hell Hole Dam and Ralston Afterbay; Duncan Creek between the diversion dam and its confluence with the Middle Fork American River; and the North and South Forks of Long Canyon Creek and the mainstem of Long Canyon Creek from the diversion dams to the confluence with the Rubicon River.

[2] The MFP has a single peaking reach, which extends from Oxbow Powerhouse / Ralston Afterbay to the high-water mark of Folsom Reservoir. In this reach, flows fluctuate substantially to meet power demands or to support whitewater recreation.

Project reservoirs (French Meadows Reservoir, Hell Hole Reservoir, Ralston Afterbay, and Middle Fork Interbay).

The following provides a detailed description of field data collection, data analysis and results, and a review of existing information of known occurrences and habitat associations of the three species.

1.0 STUDY OBJECTIVES

The objectives of the amphibian and reptile study described in the AQ 12 - Special-Status Amphibian and Aquatic Reptile Technical Study Plan (TSP (PCWA 2007) are:

- Identify and map potential habitat for CRLF and FYLF in the study area.
- Document the distribution and abundance of CRLF populations in the study area, as required by USFWS.
- Document the distribution and abundance of FYLF populations in the study area.
- Document the timing and length of FYLF breeding season.
- Identify existing data and obtain new data necessary to develop habitat suitability criteria (HSC) for FYLF.
- Characterize the water stage, velocity, and temperature of various flow regimes as it relates to FYLF habitat through coordination with the instream flow and water temperature studies.
- Document the presence of potential WPT nesting habitat near Project reservoirs and potential Project betterment inundation zones.
- Document the presence of WPT during CRLF and FYLF surveys.

Figure AQ-12-1 shows the AQ 12 - TSP study (PCWA 2007) objectives and the study elements associated with each objective. It also shows where information developed is documented.

2.0 STUDY IMPLEMENTATION

Study elements described in the AQ 12 - TSP (PCWA 2007) were initiated in 2007 and will be completed in 2009. Study elements that have been completed and outstanding study elements are discussed further below.

2.1 STUDY ELEMENTS COMPLETED

The following study elements have been completed:

CRLF

- Conducted USFWS CRLF site 3 assessment.
- Identified and mapped potential CRLF habitat in the study area.
- Documented the distribution and abundance of CRLF in the study area.

FYLF

- Identified and mapped potential breeding and rearing habitat in the study area.
- Documented the distribution and abundance of FYLF populations in the study area.
- Documented the timing and length of FYLF breeding season.
- Identified existing data and obtained new data necessary to develop HSC for FYLF.
- Selected FYLF modeling sites in coordination with the Aquatic Technical Working Group (TWG).

WPT

- Documented the presence of WPT during CRLF and FYLF surveys.
- Mapped potential WPT nesting habitat in study area.
- Documented the presence of potential WPT nesting habitat near Project reservoirs and potential Project betterment inundation zones.
- Verified WPT habitat around Project reservoirs with ground surveys.

2.2 DEVIATION FROM TECHNICAL STUDY PLAN

FYLF

Voluntary Enhancements

Several perennial tributary survey sites, not identified in the AQ 12 - TSP (PCWA 2007), were surveyed in 2007 as either qualitative sampling or an incidental one-time site visit locations including the confluences of American Canyon Creek, Pond Creek, and Jesse Creek with the Middle Fork American River and Wallace Canyon Creek, a tributary to Long Canyon Creek (Map AQ 12-1). These surveys were voluntarily completed by PCWA and augment studies described in the study plan. The following briefly described these surveys.

The confluence of American Canyon Creek with the Middle Fork American River at RM 6.4 was added as a qualitative sampling site. It was surveyed once using the VES protocol in late September to determine the presence of FYLF on the creek and on the mainstem. Two tributary confluences to the Middle Fork American River (Pond Creek and Jesse Creek) and one tributary confluence to Long Canyon Creek (Wallace Canyon Creek) were also added as incidental one-time site visit locations. These tributaries were checked near their confluences with the mainstem rivers once in fall for presence of FYLF.

2.3 OUTSTANDING STUDY ELEMENTS

The following study elements will be completed in 2008 and 2009 and presented in the Technical Study Repots (TSR) listed below:

CRLF

- If determined necessary by USFWS, conduct protocol-level CRLF surveys in accordance with the *Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog, August 2005*. This contingency study, if needed, will be completed in 2008 and reported in the 2008 AQ 12 - Technical Study Report (TSR), as described in the AQ 12 - TSP (PCWA 2007).

FYLF

- Meet with Aquatic TWG to discuss FYLF survey results and determine if additional limited scope surveys (i.e., distribution and abundance or timing and length of breeding season) are needed in 2008. This consultation with the Aquatic TWG will be completed in early 2008. Contingency studies, if needed, will be completed in 2008 and reported in the 2008 AQ 12 - TSR, as described in the AQ 12 - TSP.
- Collect FYLF egg validation data at instream flow modeling sites in spring 2008. This information will be reported in the 2009 AQ 1 - Instream Flow TSR.
- Develop HSC for eggs and tadpoles in consultation with the Aquatic TWG, based on data collected during surveys and existing information sources. This information will be developed in 2008 and reported in the 2009 AQ 1 - Instream Flow TSR.
- Develop a life stage periodicity chart for FYLF that identifies the season of the year (time period) when each life stage is likely to be present within the Project area. This data will be used to determine when the HSC information is applicable for evaluating effects of flow alterations on potential FYLF habitat. This information will be developed in 2008 and reported in the 2009 AQ 1 - Instream Flow TSR.
- Characterize water stage and velocity under different flow regimes as they relate to FYLF habitat through coordination with the instream flow study (AQ 1 - Instream Flow TSP (PCWA 2007)). Water stage and velocity information under different flow regimes will be analyzed and reported in the 2009 AQ 1 - Instream Flow TSR.

FYLF and WPT

- Characterize instream temperatures under different flow regimes as it relates to FYLF and WPT habitat through coordination with the water temperature study AQ 4 - Water Temperature (PCWA 2007). Temperature information under different flow regimes will be analyzed and reported in the 2009 AQ 4 - Water Temperature Modeling TSR.

2.4 PROPOSED MODIFICATIONS TO TECHNICAL STUDY PLAN

No modifications are proposed to the AQ 12 - TSP (PCWA 2007).

3.0 EXTENT OF STUDY AREA

The study area for CRLF, FYLF, and WPT is limited to the elevational distribution of each species within the Project area and includes bypass and peaking reaches, and Project reservoirs and diversion pools.

The elevational distribution for each species is listed below:

- CRLF - below 5,000 feet in elevation (Jennings and Hayes 1994);
- FYLF - below 4,500 feet in elevation (personal communication with Jann Williams, USDA-FS regarding known sightings in the region; this elevation would be increased if individuals are found near 4,500 feet); and
- WPT - below 6,000 feet in elevation.

Study Area	Project Facilities and Features, Recreation Facilities, and Other Stakeholder Identified Recreation Areas
10 feet	▪ On either side of trails
20 feet	▪ around the perimeter of the large reservoirs, medium reservoirs, and diversion pools ▪ outside the perimeter fence of powerhouses, switchyards, and substations ▪ around ancillary support facilities and Project fences
30 feet	▪ on either side of penstocks, valve houses, and removable sections ▪ around gaging stations and weirs ▪ on either side of communication lines, powerlines, photovoltaic poles and lines, and roads and access points
60 feet	▪ around gatehouses, surge tanks, adits, portals, microwave reflectors, radio towers, sediment disposal, and laydown areas
100 feet	▪ around recreation facilities and dispersed concentrated use areas

The study area for CRLF and WPT also includes off-channel ponds and wetlands that may be present within a buffer area (100 feet) around potential Project betterments including new facilities, roads, trails, staging, and disposal sites, as well as new inundation areas.

4.0 STUDY APPROACH

The study approaches for each species are provided below.

4.1 CALIFORNIA RED-LEGGED FROG

As described in the AQ 12 - TSP (PCWA 2007), a CRLF Site Assessment consistent with the *Revised Guidance on Site Assessment and Field Surveys for the California Red-legged Frog, August 2005* (USFWS 2005) was completed for the MFP. This assessment included the following components: determine whether the Project is within the current or historic range of CRLF; identify any known records of CRLF within a 1-mile radius of the project; and describe upland and aquatic habitats within 1-mile of the Project boundaries. The site assessment also included a discussion of whether suitable habitat for CRLF is present within 1-mile of the MFP. The site assessment was prepared following standard protocols to provide USFWS with the information they deem necessary to determine if protocol-level CRLF surveys are required for the Project. The CRLF Site Assessment was developed as a stand-alone document in the specific format required by the USFWS (Attachment A) to facilitate consultation. Attachment A has been provided to the USFWS under separate cover for review and comment. PCWA will consult with the USFWS in early 2008 to identify if additional protocol-level CRLF surveys are necessary. Results of the USFWS consultation will be communicated to the Aquatic TWG.

4.2 FOOTHILL YELLOW-LEGGED FROG

4.2.1 Study Sites

To determine the distribution and abundance of FYLF within the bypass and peaking reaches, different types of sampling sites were selected. These included representative sites within each of the bypass and peaking reaches, tributary confluence sites, comparison sites on non-Project rivers, one-time qualitative sampling sites in hard to access areas, and one-time incidental sampling sites typically surveyed in conjunction with other aquatic sampling efforts (e.g., fish population surveys) or to investigate habitat at small tributaries. Selection of the sampling sites was completed in consultation with the Aquatic TWG.

Rather than selecting sites at subjectively defined ‘good’ habitat locations, a stratified sampling approach was used to select representative sampling sites that reflected the range of habitats present in the study area. In this approach, stream reaches were first stratified by geomorphic type. The geomorphic stream reaches were further stratified by accessibility. Refer to the 2006 Geomorphology and Riparian Habitat Characterization Study Plan (PCWA 2007) for more information on selection of representative study sites within each of the geomorphic reaches. The representative study sites were spatially located to help identify the upstream distribution of FYLF (above Ralston Afterbay) in the bypass streams and the distribution along the length of the peaking reach (below Ralston Afterbay). The study sites were also located to facilitate comparison of FYLF abundance between stream reaches. Additional sampling

sites were selected at the confluences of accessible perennial tributaries where potential breeding habitat may exist.

Comparison sampling sites were selected in non-Project-affected reaches including Shirttail Creek on the North Fork American River, North Fork American River, and North Fork of the Middle Fork American River. Qualitative sampling sites, where surveys were less frequent (one visit), were selected at perennial tributaries where potential breeding habitat may exist or where the FYLF distribution was uncertain, but access was difficult. Incidental one-time site visits were also made to a few small tributary locations to assess potential breeding habitat and at a few locations in larger rivers as part of fish population surveys. Map AQ 12-1 provides the locations of all amphibian and reptile study sites, delineated by type (representative sampling study sites, additional study sites (e.g., at tributary confluences), comparison study sites, qualitative sampling locations, and incidental one-time sampling locations). Table AQ 12-1 lists details about each study site, including survey type, geomorphic type, presence of FYLF (from incidental sightings), and relation to study plan objectives. Table AQ 12-2 provides details on the location and extent of each study site. Photographs and a description of each survey site are provided in Appendix A, and aerial maps of each site are provided in Appendix B.

4.2.2 Methods

The following describes the approach to meet each of the study objectives: (1) identify and map potential FYLF habitat; (2) determine the distribution and abundance of FYLF in the study area; (3) determine the timing and length of the breeding season; (4) develop HSC; and (5) characterize the potential effects of stage and velocity fluctuations on FYLF and their habitat through coordination with the AQ 1 - Instream TSP (PCWA 2007).

Identify and Map Potential FYLF Habitat

Potential breeding and rearing habitat for FYLF was identified and mapped in the bypass reaches and the peaking reach based on site visits, a review of the aerial photography and video surveys, and helicopter surveys. Potential breeding and rearing habitat is defined as:

- *Breeding Habitat* - Shallow, near-shore 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 tailouts with coarse substrates.
- *Rearing Habitat* - Similar to breeding habitats early in the season; but tadpoles may distribute to shallow, warm, low velocity near-shore habitats with smaller substrate (i.e., gravel/sand) as the season progresses.

Breeding and rearing habitat was classified as follows:

- *Suitable* - River reaches that have moderate gradients and valley widths wide enough to create frequent depositional features that provide locally low-gradient, low velocity (<10 cm/s), relatively shallow (<50 cm) mesohabitats, such as shallow pool tailouts and wide runs with shallow margins where egg masses and tadpoles can persist.
- *Limited* - River reaches where narrow confined conditions and steep gradients create only small, patchily distributed, shallow, low velocity mesohabitats in the channel.
- *Unsuitable* - River reaches where shallow, low velocity mesohabitats are typically not present.

A habitat characterization of the study and comparison sites was also completed during the distribution and abundance surveys, which included a qualitative assessment of presence of predators, food availability (presence of algae), and observations of water temperature and flow stability.

FYLF individuals have not been documented in California above 4,500 ft, as temperatures are likely too cold and the annual growing season is too short to provide enough resources for eggs to reach metamorphosis before winter. Therefore, elevations above 4,500 feet were considered unsuitable for all lifestages. This elevational boundary is depicted on both the study site map (AQ Map 12-1) and the habitat suitability map (AQ Map 12-2).

Distribution and Abundance Surveys

Known occurrences of FYLF within the study area based on agency consultation and a review of existing information were identified and mapped. Field surveys were conducted in spring and/or late summer or early fall at the study sites identified on Map AQ 12-1 to further document the distribution and abundance of FYLF. In the study area, all of the surveys, except for the incidental one-time site visits, followed the Visual Encounter Protocol described in *Measuring and Monitoring Biological Diversity: Standard Methods for Amphibians* (Heyer et al, 1994; Appendix AQ 12-A of PCWA 2007) and incorporated USFWS decontamination guidelines (Appendix B of USFWS 2005).

Specifically, two surveyors searched 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 used a viewing box in shallow margin areas and snorkeled in deeper water where feasible. At each sampling location, a minimum of 1,000 meters (m) was surveyed. For sites located at tributary confluences, a minimum of 1,000 m was surveyed in the mainstem as well as 1,000 m up the tributary, where possible. During each survey, data (time of the survey, GPS locations, weather conditions, and water and air temperatures at the channel margin and within the channel) were collected to describe the sampling site and document observations (lifestage, sex, size, and GPS location) of FYLF.

The “representative,” “additional,” and “comparison” study sites (see Map AQ 12-1) were visited three times: 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 was completed when river temperatures reached a daily average of approximately 11 - 12ºC (51.8 - 54.6^{o}F) and when breeding was verified in one or more comparison sites or survey sites in the bypass or peaking reaches. Six locations with difficult access were visited only once after the breeding season (one-time qualitative sites) when the likelihood of detecting individuals was highest (Map AQ 12-1). At these sites, a qualitative presence and absence survey was conducted following the VES protocol. A California Native Species Field Survey form for all FYLF detections was prepared and submitted to the Natural Diversity Database (CNDDB). At the “one-time incidental” sites, habitat was assessed and visual observations of FYLF were noted, but a VES protocol survey was not completed.

Timing and Length of Breeding Season

Water temperatures and breeding were monitored to determine the timing of the onset of breeding. Water temperatures were continuously monitored at 15-minute intervals at the Middle Fork American River (MF26.0) just upstream of Ralston Afterbay and at numerous other sites throughout the study area (Appendix C). The timing and length of breeding data collected in this study were compared to ongoing studies in other Sierran watersheds to determine if breeding in the Project area was coincident to breeding in other watersheds. This comparison was used to develop a range of dates for when breeding is likely to occur in the study area.

Habitat Suitability Criteria Development

Existing FYLF HSC data were compiled and reviewed. The sources reviewed included the final report by the Foothill Yellow-legged Frog Habitat Suitability Criteria Technical Working Group for the Desabla-Centerville relicensing project (FERC Project No. 803) (Lind and Yarnell 2007) and results from an academic research study conducted by Kupferberg et al. (2007).

New habitat suitability data (based on habitat utilization) were collected at the survey study sites where breeding populations were identified during the distribution and abundance surveys. During the spring surveys, habitat data on egg masses and early tadpoles were collected. During the summer (August), data on older tadpoles were collected. Data collected typically included:

- Specimen lifestage; size; and developmental Gosner stage (Gosner 1960);
- Microhabitat data (type, GPS location);
- Riparian data (type, extent of cover);
- Water temperature;
- Substrate (size, composition);
- Distance to waters edge; and

- Hydraulic data (total depth, mid-column velocity, depth and velocity) at each observation.

At three of the breeding sites (NFMF2.3, R1.2, and R3.5), the amount of habitat available in different depth, velocity, and substrate categories was recorded. At each of the three sites, the following data were collected:

- Hydraulic habitat (depth and velocity) availability in the surveyed areas. This was the planform area of available hydraulic habitat searched at the survey site, where 'hydraulic habitats' are regions of categorical depth and velocity. These were depths of 0-0.5, 0.5-1.2, 1.2-1.8, and >1.8 m, and velocities of 0-0.15, 0.15-0.4, 0.4-0.6, and >0.6 m/s. Area for each category of velocity and depth was calculated from a scaled field sketch of hydraulic habitat polygons and hydraulic habitats were verified with field measurements of depth and velocity.
- Substrate was collected at all of the point measurement of depth and velocity in the survey sites.

Habitat utilization and habitat availability data were summarized in histograms. The habitat utilization data were summarized by large river sites (abundant habitat with depths greater than 0.5 m) and small stream sites (streams where habitat with depths greater than 0.5 m was rare). The utilization data were compared to HSC data from Kupferberg et al. (2007) and Lind and Yarnell (2007). The utilization data were also compared between study sites in the bypass and peaking reaches and comparison sites (sites on the North Fork American River and North Fork of the Middle Fork American River).

Actual development of HSC for the instream flow modeling on bypass and peaking reaches will be completed by the Aquatic TWG as part of the AQ 1 - Instream Flow TSP (PWCA 2007). The habitat utilization data collected as part of this study and data sets available from other rivers/studies will be used to develop the HSC.

4.2.3 Modeling Coordination for Determining Stage and Velocity Effects

FYLF instream flow modeling sites were selected in coordination with the Aquatic TWG as part of the AQ 1 - Instream Flow TSP (PWCA 2007) study site selection process. Site visits were conducted in August 2007 with the Aquatic TWG. FYLF modeling sites were selected in the bypass and peaking reaches that were representative of the range of habitats present and included active breeding locations where possible. The results of the spring FYLF surveys were used to help select the modeling sites. The target goal was to select two modeling sites in the peaking reach and two sites in the bypass reaches.

At the North Fork American River (NF 35.7) and North Fork of the Middle Fork American River (NFMF 2.3) FYLF comparison study sites, two cross-sections were placed in breeding locations to quantify stage-discharge relationships as part of the AQ 1 - Instream Flow TSP (PWCA 2007).

4.3 WESTERN POND TURTLE

Known occurrences of WPT within the study area were identified and mapped, based on agency consultation and a review of existing information. Incidental sightings of WPT during the other aquatic surveys, including the FYLF, CRLF, and fish population surveys were recorded. During the FYLF and CRLF field surveys, surveyors inspected pools and backwaters for WPT. A California Native Species Filed Survey form for all WPT detections was prepared and submitted to the Natural Diversity Database (CNDDB).

Information on potential WPT pond and wetland habitats in the study area (including near Project facilities and potential Project betterments) was developed based on a review of aerial photography of the study area, helicopter surveys, and reconnaissance surveys conducted by PCWA in 2007. Aerial photographs of the study area were reviewed to identify potential pond and wetland habitats occurring within the WPT study area, including permanent or semi-permanent natural ponds, or artificial impoundments such as stock ponds and irrigation ponds. All photos were full-color orthophotos taken on September 13 and 15, 2005, at a sensor height of 12,000 feet above ground level and at a photo scale of 1:2000 with 35% overlap, subsequently scanned at 2000 DPI, creating 18-inch pixel resolution.

GIS maps of potential WPT nesting locations along bypass and peaking reaches, near Project reservoirs, and within the potential inundation zone associated with the potential Hell Hole Reservoir Seasonal Storage Increase betterment were initially developed based on the following criteria:

- Slope of 15 degrees or less;
- Southeast, south, or southwest aspect;
- 150 foot buffer around perennial streams and reservoirs; and
- below 6,000 ft in elevation.

Along the bypass and peaking reaches the GIS mapping of slope and aspect was overlain as polygons on aerial orthophotography and provided in this report. The 150 foot buffer from the centerline of the streams is presented along with a supplemental 300 foot buffer. At the Project reservoirs, a field survey of the potential nesting locations identified from the GIS mapping near Hell Hole Reservoir, French Meadows Reservoir, Ralston Afterbay, and Middle Fork Interbay was conducted in October 2007. The field surveys verified the GIS slope and aspect analysis and quantified the amount of area that had either grassy or dry clay/loam/silt soils in open areas with canopy cover less than about 10%. The initial GIS map with the potential WPT nesting habitat was updated based on the field surveys.

Final analysis of potential nesting habitat associated with Project reservoirs consisted of quantifying the amount of nesting habitat above different water surface elevations in the reservoirs (GIS analysis). It was assumed that nesting habitat must remain dry the entire year (e.g. occur above the maximum water surface elevation). Daily reservoir

water surface elevation data were analyzed to determine the maximum water surface elevation during each water year (1975 - 2003 period of record). Annual maximum water surface elevations were then grouped by water year types (wet, above normal, below normal, dry, and critically dry) based on the water year types in the PCWA's Final 2005-2006 Hydrology Study Status Report (PCWA 2007). For each water year type, the average and median maximum annual water surface elevation were calculated. In addition, the range of maximum annual water surface elevations was determined for each water year type. Using this information, three representative reservoir water surface elevations were chosen for analyzing the amount of potential WPT habitat at each reservoir. The polygon maps, overlain on orthophotographs, of the verified potential nesting habitat used in the analysis were also generated.

In addition, WPT habitat was identified and incidental sightings were recorded as part of the CRLF surveys conducted within 1-mile of the MFP. Low-elevation helicopter surveys of the CRLF study area were conducted in August 2007. Potential pond and wetland habitat was identified and noted on maps. Detailed information for ponds and wetlands identified during the helicopter surveys was collected during reconnaissance surveys, as described below. Inaccessible areas were surveyed by helicopter only.

Ground surveys of pond habitats identified in the CRLF study area were conducted in August through December 2007 by teams of two biologists in conjunction with CRLF site assessment surveys. Data collected at each site included: size and maximum depth of each pond; presence of emergent or overhanging vegetation; substrate; and pond status (perennial or ephemeral). The GPS location was also collected at each site. Observations of WPT individuals and the presence of other wildlife species were also collected.

5.0 RESULTS

5.1 CALIFORNIA RED-LEGGED FROG

Based on the results of the CRLF Site Assessment, it was determined that the MFAR and Rubicon River do not represent habitat for CRLF and are dispersal barriers as defined by USFWS. Large and moderate creeks and small tributaries within the study area are high-gradient, do not support backwater areas, and do not support appropriate vegetation for egg attachment or cover. Therefore, they do not represent potential breeding habitat for CRLF.

Project reservoirs (Hell Hole Reservoir and Ralston Afterbay) are large, and/or deep reservoirs that are greater than 50 acres in size and are not considered appropriate habitat for CRLF as defined by USFWS. Middle Fork Interbay is a deep, in-channel impoundment of the MFAR. This impoundment does not represent CRLF habitat because it is located in a steep, rocky river canyon, the impoundment has no emergent vegetation, and it supports only very sparse willows around the perimeter. Furthermore, it represents a dispersal barrier to CRLF. Project diversion pools (North Fork and South Fork Long Canyon Creek diversion pools) are too shallow, do not retain water through

the breeding period, do not support emergent or aquatic vegetation for egg attachment, and have no surrounding riparian vegetation.

The majority of off-channel ponds observed in the study area do not represent potential breeding habitat for one or more of the following reasons: they support extensive predator populations (e.g., bull frogs or predatory fish species such as mosquito fish and bass); do not provide aquatic or emergent vegetation for egg attachment; do not support dense, shrubby riparian vegetation, vegetation for cover and protection from predators; or they do not support water long enough to allow for complete metamorphosis of tadpoles. However, two ponds in the Horseshoe Bar area were determined to represent potential CRLF breeding habitat (Ponds D and E) because the ponds (1) have water greater than 2 1/3 feet deep that would attract adult CRLF; (2) retain the water long enough for CRLF to complete metamorphosis; and (3) support dense, bramble-forming vegetation on the banks of the pond that may provide structure for egg attachment or that may provide cover from predators.

One additional pond, Summit Hill Ranch Pond, is located on private property where access was not granted. Information collected on this pond is limited to characteristics identifiable from aerial photo review and helicopter surveys. Information obtained on this pond was insufficient to determine if the pond represents potential CRLF breeding habitat.

One occurrence of CRLF is documented within the study area on Ralston Ridge within the PG&E Transmission Line right-of-way in 2001. The area that this frog was observed in does not support characteristics of breeding habitat and experts believe that this frog was observed during dispersal. No frogs have been observed at this site since 2001 and the entire area was burned during the Ralston Ridge fire.

Two ponds at Horseshoe Bar were identified as potential CRLF breeding habitat. Other ponds in the Horseshoe Bar area may be potential dispersal habitat, but not breeding habitat.

The USFWS protocol-level site assessment report is attached in Attachment A. This report will be submitted to USFWS for review and a determination on whether protocol-level surveys will need to be conducted.

5.2 FOOTHILL YELLOW-LEGGED FROG

5.2.1 Habitat Characterization

The bypass and peaking reaches associated with the MFP were typical of bedrock-controlled Sierran rivers that flow through incised canyons with coarse substrates. Most of the perennial streams and rivers in the study area below 4,500 ft in elevation provided suitable geomorphic habitat for one or more lifestages of the FYLF. Adults in particular are adaptable and can use most types of stream habitat for foraging or refuge provided it has perennial or even occasionally ephemeral flow. Notable exceptions are large instream reservoirs that likely prohibit movement and contain large predatory fish.

For a population to persist however, adults must live in proximity, likely less than several kilometers (km) (R. Bourke, unpublished data), to suitable breeding and rearing habitat.

Suitable geomorphic breeding and rearing habitat, defined above in Section 4.2.2, occurred in many of the study streams. Breeding and rearing habitat was limited in the upper Middle Fork American River, Duncan Creek, lower Long Canyon Creek, and some of the tributary streams due to confined channel conditions and high stream gradients. Map AQ 12-2 shows the distribution of suitable, limited, and unsuitable breeding and rearing habitats across the study area based on geomorphic channel characteristics.

Non-native bullfrogs and smallmouth bass, potential predators of FYLF, were only observed in the lower North Fork American River (a comparison river study site) upstream and downstream of Lake Clementine. This was the warmest reach of river in the study area. Bullfrogs and smallmouth bass were not observed in the cooler river reaches associated with the MFP. These species may be a factor in the apparent absence of FYLF below Lake Clementine (see Section 5.2.2 Distribution and Abundance Surveys below), however they were present some distance upstream of Lake Clementine where FYLF were present. In the study area, non-native brown trout and crayfish were observed at several locations in the bypass and peaking reaches. Native aquatic garter snakes, a known predator of FYLF, were present throughout the study area. The presence of native and non-native predators likely limits reproductive success for FYLF and thus may decrease the quality of suitable breeding and rearing habitat in the study area, but the magnitude or importance of the relationship is uncertain.

Cold water temperatures were observed in the upper reaches of Duncan and Long Canyon creeks (during the spring), in the Middle Fork American River immediately downstream of French Meadows Reservoir, Middle Fork Interbay, and Ralston Afterbay, and in the Rubicon River immediately downstream of Hell Hole Reservoir (Figure AQ 12-2, Map AQ 12-3a and AQ 12-3b). Fluctuating late spring and summer flows were observed in the peaking reach of the Middle Fork American River downstream of Ralston Afterbay/Oxbow Powerhouse. Cold water temperatures and fluctuating flows can limit the suitability of breeding and rearing habitat (Jones et al 2005; Kupferberg et al 2007).

Detailed descriptions and photos of the habitat in each survey site are provided in Appendix A. A summary description of each study reach is provided in Appendix D.

5.2.2 Distribution and Abundance Surveys

FYLF were dispersed widely throughout the study area in varying densities depending on stream size, flow regulation, and water temperatures (Table AQ 12-3; Map AQ 12-4). Abundance was highest in the downstream reaches of the Rubicon River and in comparison reaches and tributaries. Abundance was low in the Middle Fork American River bypass reach upstream of Ralston Afterbay, and individuals were observed rarely in the Middle Fork American River peaking reach. No individuals were observed above

approximately 1,800 ft in elevation on the Middle Fork American River, 3,350 ft elevation on the Rubicon River, and above 1,550 ft elevation on Long Canyon Creek (near the Long Canyon Creek confluence with the Rubicon River).

In the study area, breeding was observed in the lower portions of the Rubicon River and Middle Fork American River bypass reaches, in four lower elevation tributaries to the peaking reach (American Canyon Creek, Gas Canyon Creek, Todd Creek, and Otter Creek), and in the comparison river reaches (Figure AQ 12-3). No egg masses were observed in the mainstem of the Middle Fork American River peaking reach. Fall surveys generally reflected this distribution with the highest number of observed tadpoles and young-of-the-year in the Rubicon River, peaking reach tributaries, and at comparison sites (Figure AQ 12-4a and AQ 12-4b).

The density of egg masses at breeding locations, a common index of FYLF population size, varied by river reach (Figure AQ 12-3). The Rubicon River bypass reach had the highest density of egg masses (19 egg masses/km in the three lower sites) and the Middle Fork American River bypass reach had one of the lowest densities of egg masses (2 egg masses/km). The tributaries along the peaking reach (Todd Creek, Gas Canyon and Otter Creek) had moderate egg mass densities (average of 9 egg masses/km). Two of the unregulated comparison sites, Shirttail Creek and the upper site on the North Fork of the Middle Fork American River, had high egg mass densities similar to the lower Rubicon River of 17 egg masses/km and 14 egg masses/km, respectively. Two of the comparison survey sites, North Fork of the Middle Fork American River near the confluence with the Middle Fork American River and the mainstem of the North Fork American River near Shirttail Creek, had low egg mass densities (3 egg masses/km and 2 egg masses/km, respectively) (Figure AQ 12-3).

Summer tadpole surveys were completed in August as planned. The warm spring and summer conditions, however, led to early development of individuals such that by August approximately half of the 2007 cohort were fully metamorphosed. As a result, most tadpole observations were of late stage tadpoles. The distribution and abundance of the different FYLF lifestages in the bypass and peaking reaches, comparison reaches, and the tributaries are described in detail in Appendix E.

5.2.3 Timing and Length of Breeding Season

Due to warm, dry weather conditions in early 2007 across northern California, spring-like air and water temperatures occurred approximately two to three weeks earlier than typically observed. As a result, most monitored populations of FYLF initiated breeding at dates earlier than previously recorded. Eggs were first observed on April 1 on the South Fork Eel River in the Coast Range (personal communication S. Kupferberg), on May 1 on the Poe and Cresta reaches of the North Fork Feather River in the northern Sierras (personal communication J. Drennan), and April 2 on the Pit River in the Southern Cascade Range (personal communication. K. Breedveld). Each of these dates was a few days to several weeks earlier than previously recorded, with the exception of the Poe reach on the North Fork Feather River, which had egg masses documented on April 18 in 2004. The length of the 2007 breeding season for these

monitored populations was typical of previous years, lasting four to six weeks depending on location. In general, the timing of FYLF breeding in any given river system is dependent on air and water temperatures, flow regime, and solar day length. In the northern Sierra and southern Cascade ranges, data from monitored populations show breeding has occurred between early April and late June, and lasted from two to six weeks depending on climatic and flow conditions.

In the study area, breeding occurred between approximately May 10 and June 5. Water temperatures reached a daily average of 54 ^{o}F (approximate minimum temperature for oviposition (Jones et al. 2005)) as early as April 24 in the downstream portions of each regulated reach and continued to increase into early May (Figure AQ 12-5). Even though water temperatures were sufficiently warm at documented breeding sites to support oviposition in late April, breeding was not observed in the study area until May 8, when two pairs of adults were observed in amplexus on the North Fork of the Middle Fork American River comparison site and on Todd Creek. Egg masses were first documented at Gas Canyon Creek on May 11. The first round of spring VES surveys were initiated on May 17, and the second round of spring surveys were completed on June 14 (Table AQ 12-3). Although each survey site was only visited twice in spring, the timing was such that the majority of egg masses at each site were documented during the first visit, with fewer to no egg masses documented during the second visit. Based on the developmental stage of eggs observed during surveys, oviposition appeared to occur between May 10 and June 5 across the study area, with oviposition beginning later at colder sites.

Of the survey sites where no breeding occurred, most had water temperatures that either remained below 54 ^{o}F or increased to a maximum of only about 60 ^{o}F for two to three months, and thus were likely too cold to support successful reproduction (Figure AQ 12-5). Sites that supported oviposition had daily average temperatures above 60 ^{o}F for at least three to four months, providing ample time for rearing and metamorphosis of tadpoles. Several non-breeding sites had daily average temperatures well above 65 ^{o}F for most of the summer, but these were all located in the peaking reach where flow fluctuations or other factors may prohibit successful reproduction (Figure AQ 12-5).

The timing of breeding within the study area was comparable to the timing observed in other monitored populations in 2007, although it was slightly later than observations on the North Fork Feather River, north of the study area. Warm water temperatures likely supported earlier breeding than would be typically observed, possibly up to two weeks earlier. The observed four week duration of breeding in the study area is similar to other monitored populations and likely represents the typical length of activity in any given year.

The timing and length of the breeding season, based on field observations, are described in detail for the bypass and peaking reaches, comparison stream reaches and the tributaries in Appendix F.

5.2.4 Habitat Suitability Criteria Development

Microhabitat data (depth, velocity, and substrate data) were collected at 132 egg mass locations and 244 tadpole groups during the VES surveys to develop habitat suitability (utilization) data. The habitat utilization data were collected from 11 study sites. The number of egg masses and tadpole groups observed at each study site, grouped by river size (small stream versus large river), is summarized in Table AQ 12-4. The large river sites are further classified in Table AQ 12-4 as bypass or peaking reaches or comparison sites.

Lind and Yarnell (2007) evaluated 33 datasets from rivers across northern California to determine which habitat variables and datasets would be most applicable for habitat suitability criteria development. Ultimately, habitat suitability criteria were created for egg masses and tadpoles for mean-column velocity, total depth, and substrate utilization based on a combined dataset that included data from the West Branch Feather River (2006), Butte Creek (2006), the South Fork Feather River (2005), and the Pit River (2002-2004). Utilization data from this combined dataset and from the Eel River (S. Kupferberg, unpublished data) were compared to the PCWA data directly via histograms.

Kupferberg et al. (2007) also developed habitat suitability criteria for egg masses and tadpoles that can be compared to the PCWA data. The Kupferberg et al. (2007) egg mass criteria were based on data collected in 2006 at a study site on the South Fork Eel River and the tadpole criteria were based on results from experimental field and laboratory studies. The criteria are similar to the Lind and Yarnell (2007) data. Suitable mean-column velocity for egg masses was defined as 0.0-10 cm/s and suitable total depth for egg masses was defined as 0.0-50 cm. Suitable mean-column velocity for tadpoles was defined as 0.0-5 cm/s and suitable depth for tadpoles was defined as 0.0-50 cm.

Egg Masses

Histograms of mean-column velocity and total depth for egg masses observed during the surveys at large river MFP study sites show that mean-column velocity at the egg masses was typically less than 12 cm/s and depth was less than 65 cm (Figure AQ 12-6). The velocity utilization for oviposition at the small stream MFP study sites was similar to that observed at the large river sites, but the depth utilization appears to be shallower (less than 30 cm for all egg masses) (Figure AQ 12-7). Average values for mean-column velocity for egg masses were similar between small stream and large river MFP study sites (3.5 cm/s versus 5.0 cm/s, respectively), but mean total depth at small stream MFP study sites was approximately half the mean depth at large river MFP study sites (14.8 cm versus 30.3 cm).

The observed egg masses were primarily found attached to cobble or boulder in habitats dominated by cobble, boulder or mixed substrate sizes. One egg mass was found attached to bedrock, and a few egg masses were found attached to cobble or boulder in bedrock-dominated habitats (Table AQ 12-5).

Habitat availability was not limited at large river sites, but was limited in small stream sites. Figure AQ 12-8 shows velocity and depth habitat availability collected at three representative large river sites where habitat use data were collected (R1.2, R3.5, and NFMF2.3). A large amount of various depth and velocity habitat was available. The amount of habitat used by the 23 egg masses observed at these three sites was approximately 8.5 m^2 (approximately 0.37 m^2 per egg mass). The amount of habitat available for oviposition was several hundreds of square meters. At the small stream sites, deep water (greater than 0.5 m) was not present or very limited, which likely accounts for the shallower mean depth at egg mass locations on the small stream sites versus the large river sites.

The distributions of depth and mean-column velocity values observed at egg mass locations at large river MFP study sites were generally similar to the distributions of values in the Lind and Yarnell (2007) data, clustering at low velocities and shallow depths (Figure AQ 12-6); however, mean-column velocities and depths were slightly higher in the MFP study rivers. The mean-column velocities and depths in the MFP study rivers were 5.0 cm/s and 30.3 cm, respectively, compared with 2.2 cm/s and 19.6 cm , respectively, in the rivers evaluated by Lind and Yarnell (2007).

Mean values for total depth and mean-column velocity for egg masses were similar between large river bypass reach study sites and large river comparison sites (Figures AQ 12-9a and AQ 12-9b). Mean-column velocity was slightly higher in large river bypass reach study sites than in large river comparison sites (5.2 cm/s versus 3.8cm/s, respectively). Total depth was slightly less in large river bypass reach study sites than in the comparison sites (32.1cm versus 26.7cm, respectively).

Tadpoles

At large river sites, mean-column velocity for late season tadpoles (August) was typically less than 6 cm/s and depth was typically less than 25 cm (Figures AQ 12-10 and AQ 12-11). Data collected during the spring was primarily for newly hatched tadpoles located adjacent to the egg mass locations. For the large river sites, the spring tadpole data are compared to the August tadpole data in Figure AQ 12-11. The spring tadpole data likely reflects the location of the egg masses more than selection of habitat by the young tadpoles.

A comparison of the mean-column velocity and depth histograms for the small stream sites and large river sites indicate that tadpole velocity utilization was similar, but the depth utilization at the small stream sites appears to be slightly less (Figures AQ 12-12, AQ 12-13a and AQ 12-3b). Average values for mean-column velocity for tadpoles at the small stream and large river survey sites were 0.9 cm/s and 1.1 cm/s, respectively. Mean depth at small stream sites was 5.9 cm while mean depth at large river sites was 12.4 cm. Part of the difference may have been an artifact of the smaller number of samples in the small stream site dataset, which may not have reflected the tail of the distribution adequately. Less deep water habitat was available at the small stream sites, but this likely is not a factor in the difference as there was water deeper than was utilized in the small streams.

The distributions of depth and mean-column velocity observed for tadpoles at the large river MFP study sites were generally similar to the distribution of values in the Lind and Yarnell (2007) data, clustering at low velocities and shallow depths (Figure AQ 12-10). Total depths for the Lind and Yarnell (2007) data ranged from 2 cm to 100 cm with a mean value of 22.6 cm. The MFP data ranged from 0.0 cm to 76.2 cm with a mean of 12.4 cm. The mean-column velocity data for the MFP data clustered at values less than 4 cm/s and ranged up to 27.4 cm/s, with an average of 1.1 cm/s. These values were similar to the Lind and Yarnell (2007) data, which also clustered at less than 4 cm/s, ranged up to 28 cm/s, with an average of 3.4cm/s.

Mean-column velocity and total depth use for tadpoles was similar between large river bypass reach study sites and large river comparison sites, but the range of values was greater in the large river bypass reach study sites (Figures AQ 12-13a and AQ 12-13b). As a result, mean-column velocity was higher in the large river bypass reach study sites than comparison sites (1.7 cm/s versus 0.2 cm/s, respectively), as was total depth (13.9 cm versus 9.9 cm, respectively). The higher velocities observed in the large river bypass reach study sites data are largely from the survey site at the confluence of the Rubicon River and Long Canyon Creek. At this site, a large number of tadpoles were found along the edges of a run where velocities were greater than zero and depths were slightly higher than those observed along the margins of pools, which was the most common mesohabitat location.

5.2.5 Coordination to Determine Stage and Velocity Effects

The habitat use data collected as part of this study and habitat data sets available from studies on other rivers will be used by the Aquatic TWG to develop HSC for use in the AQ 1 - Instream Flow Study (PCWA 2007) to model flow effects on FYLF egg mass and tadpole habitat in the study area. Modeling for FYLF will be completed at four of the instream flows study sites selected by the Aquatic TWG in coordination with this study in August 2007. The selected instream flow modeling sites are described in the AQ 1 - Instream Flow TSP (PCWA 2007). Of the four study sites where FYLF habitat modeling will be completed, two modeling sites are located in the peaking reach (MF4.8 and MF14.1) and two are located in the bypass reaches upstream of Ralston Afterbay (MF26.1 and R3.5). The two sites in the peaking reach include several pool tailout locations and lateral channel habitat locations that are potential FYLF breeding habitat. At each of the two modeling sites in the bypass reaches, one run habitat unit and one pool tailout habitat unit will be modeled. Breeding (egg masses and tadpoles) was documented in these habitat units during the 2007 surveys. Data on egg mass locations will be collected during the spring of 2008 to help validate the habitat suitability output from the models.

In addition, at the North Fork American River (NF 35.7) and North Fork of the Middle Fork American River (NFMF 2.3) FYLF comparison study sites, two cross-sections were located on FYLF breeding and rearing habitat to quantify stage-discharge relationships. These cross-sections will be used as part of the instream flow modeling to identify the stage changes that occur under natural flow conditions.

5.3 WESTERN POND TURTLE

Eight WPT turtles were observed during the 2007 CRLF, FYLF, and fish population surveys, as shown in Table AQ 12-6. Six of these observations were in the Middle Fork American River or tributaries downstream of Ralston Afterbay (peaking reach) and two were in the North Fork American River. Two hatchlings were observed in Otter Creek, while the remaining individuals were adults. Map AQ 12-5 shows the locations of the 2007 WPT sightings and the historical WPT sightings in the study area.

Several off-channel pond and wetland habitats were identified during CRLF site assessment surveys conducted within 1 mile of Project facilities and features, recreation facilities, and other stakeholder identified recreation areas; and within one mile of potential Project betterments including new facilities, roads, trails, staging and disposal sites, and new inundation area. However, none of these ponds are located within the study area for WPT. WPT have been documented in some of the surveyed ponds located outside of the WPT study area, including ponds located at Horseshoe Bar on the Middle Fork American River. Refer to Attachment A - CRLF Site Assessment, for a detailed description of each pond including maps and photographs.

The GIS and field mapping of potential WPT nesting habitat at each of the Project reservoirs was analyzed in relation to reservoir water surface elevations. The results are shown in Table AQ 12-7. GIS maps of ground verified (soil, vegetation, slope, aspect) potential habitat with polygons depicting applicable reservoir water surface elevations are included in Appendix G. Three water surface elevations, full pool and two lower elevations, were used for the analysis of French Meadows and Hell Hole reservoirs. The water surfaces roughly represent the range of annual maximum water surface elevations during wet, above normal, below normal, dry, and critically dry water year types (based on a 1975 to 2003 record) (Figure AQ 12-14). On Ralston Afterbay and Middle Fork Interbay, full pool is typically reached for multiple days each year; therefore, only the full pool water surface elevation was used for the WPT nesting habitat analysis.

Due to steep slopes, vegetation, and rocky soils, the amount of WPT nesting habitat on the Project reservoirs was very limited. At both French Meadows and Hell Hole reservoirs, the potential areas for nesting occurred in the upstream portions of the reservoirs where grassy areas and loamy soils existed above the spring/summer high water surface elevation. A large amount of suitable soil also existed at a lower elevation inside the reservoirs when the water surface was low (e.g., in fall); however, these areas were inundated each spring and early summer when the reservoirs were filled for storage, and thus were not considered suitable habitat. The amount of filling each year depends on the water year type.

Middle Fork Interbay and Ralston Afterbay are often at full pool; therefore, potential habitat for WPT nesting was delineated above the high water mark on these reservoirs. Middle Fork Interbay is comprised almost entirely of steep bedrock slopes, with the exception of one small area on the north side of the reservoir at the boat ramp where suitable soil, vegetation, and slope occurred. While this area is potential nesting

habitat, disturbance from vehicles would be common. Ralston Afterbay is also dominated by steep slopes, rocky soils, and vegetation; however, a small grassy, low-lying patch of suitable nesting soils is located about 1,000 feet upstream of the dam on the north side of the reservoir (see map in Appendix G).

Along the bypass and peaking river reaches there are abundant locations for potential (slope and aspect) WPT nesting habitat. GIS maps of both a 150 foot and 300 foot buffer (from the center of the river) of suitable slope and aspect are provided in Appendix G. Soils and canopy cover within these polygons was not field verified. However, along the rivers there are open canopy areas with suitable soils.

6.0 LITERATURE CITED

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TABLES

Table AQ 12-1. Amphibian Study Site Descriptions.

River and Study Sites[1] (River Mile)	Amphibian Habitat Modeling Site	Study Site Type	Rosgen Geomorphic Channel Type (Mainstem)[2]	Tributary Confluence Site	Incidental FYLF Observations[3]	Relation to Study Plan Objectives
Middle Fork American River						
AMPH MF 6.4	No	Qualitative (One Visit)	F (at transition to B2c)	Yes - American Canyon Creek	Mainstem - No Tributary - No	Distribution, abundance and timing of breeding season
AMPH MF 9.3	No	Tributary/Mainstem	F (at transition to B2c)	Yes - Todd Creek & Gas Canyon	Mainstem - Yes Tributary - Yes	Distribution, abundance and timing of breeding season
AMPH MF 11.0	No	Qualitative (One Visit)	F	Yes - Canyon Creek	Mainstem - No Tributary - No	Distribution, abundance and timing of breeding season
AMPH MF 14.1	Yes	Tributary/Mainstem	F	Yes - Otter Creek	Mainstem - No Tributary - Yes	Distribution, abundance and timing of breeding season
AMPH MF 17.0	No	Incidental One-time Site Visit	NA	Yes - Jesse Canyon	Tributary - No	Distribution
AMPH MF 18.1	No	Incidental One-time Site Visit	NA	Yes - Pond Creek	Tributary - No	Distribution
AMPH MF 19.1	No	Representative Geomorphic QSS[4]	F	No	Mainstem - No	Distribution, abundance and timing of breeding season
AMPH MF 21.0	No	Tributary/Mainstem	F	Yes - Volcano Creek	Mainstem - No Tributary - Yes	Distribution, abundance and timing of breeding season
AMPH MF 24.1	No	Tributary/Mainstem	F	NF MF American River	Mainstem - Yes Tributary - Yes	Distribution, abundance and timing of breeding season
AMPH MF 26.2	Yes	Representative Geomorphic QSS	Bc/F	No	Mainstem - Yes	Distribution, abundance and timing of breeding season
AMPH MF 29.4	No	Representative Geomorphic QSS	Bc/F	No	Mainstem - Yes	Distribution, abundance and timing of breeding season

Table AQ 12-1. Amphibian Study Site Descriptions (continued).

River and Study Sites[1] (River Mile)	Amphibian Habitat Modeling Site	Study Site Type	Rosgen Geomorphic Channel Type (Mainstem)[2]	Tributary Confluence Site	Incidental FYLF Observations[3]	Relation to Study Plan Objectives
AMPH MF 30.4	No	Qualitative (One Visit)	Bc/F	Yes - Brushy Canyon	Mainstem - No Tributary - No	Distribution
AMPH MF 35.3	No	Qualitative (One Visit)	Bc/F	No	Mainstem - No	Distribution
AMPH MF 36.2	No	Representative Geomorphic QSS	Ba/Fb	No	Mainstem - No	Distribution, abundance and timing of breeding season
AMPH MF 39.7	No	Qualitative (One Visit)	Ba/Fb	Yes- Duncan Creek	Mainstem - No Tributary - No	Distribution
Rubicon River						
AMPH R 1.2	No	Representative Geomorphic QSS	Bc/F	No	Mainstem - Yes	Distribution, abundance and timing of breeding season; HSC site[5]
AMPH R 3.5	Yes	Representative Geomorphic QSS	B at mouth (but A upstream)	Yes Long Canyon Creek	Mainstem - Yes Tributary - Yes	Distribution, abundance and timing of breeding season; HSC site[5]
AMPH R 5.2	No	Qualitative (One Visit)	B/Fb	Yes - Pilot Creek	Mainstem - Yes Tributary - Yes	Distribution
AMPH R 14.3	No	Representative Geomorphic QSS	B/Fb	No	Mainstem - Yes	Distribution, abundance and timing of breeding season
AMPH R 20.9	No	Representative Geomorphic QSS	B/Fb	No	Mainstem - Yes	Distribution, abundance and timing of breeding season
AMPH R 22.6	No	Qualitative (One Visit)	B/Fb	Yes - South Fork Rubicon River	Mainstem - No Tributary - No	Distribution
AMPH R 25.7	No	Representative Geomorphic QSS	C	No	Mainstem - No	Distribution, abundance and timing of breeding season
Long Canyon Creek						
AMPH LC 5.6	No	Incidental One-time Site Visit	NA	Yes - Wallace Canyon	Tributary - No	Distribution
AMPH LC 9.0	No	Representative Geomorphic QSS	F	No	Mainstem - No	Distribution, abundance and timing of breeding season

Table AQ 12-1. Amphibian Study Site Descriptions (continued).

River and Study Sites[1] (River Mile)	Amphibian Habitat Modeling Site	Study Site Type	Rosgen Geomorphic Channel Type (Mainstem)[2]	Tributary Confluence Site	Incidental FYLF Observations[3]	Relation to Study Plan Objectives
North and South Fork Long Canyon Creeks Confluence						
AMPH LC 11.4	No	Tributary/Mainstem	F and B (North and South Forks)	Yes - SF/NF Long Canyon Creeks	Mainstem - No Tributary - No	Distribution, abundance and timing of breeding season
North Fork American River						
AMPH NF 21.2	No	Comparison	F	Yes - MF American River	Mainstem - Yes Tributary - No	Distribution, abundance and timing of breeding season
AMPH NF 31.5	No	Incidental One-time Site Visit	NA	No	Mainstem - No	Distribution
AMPH NF 35.7	Stage Only	Comparison	F/G Transition	Yes - Shirttail Creek	Mainstem - Yes Tributary - Yes	Distribution, abundance and timing of breeding season
AMPH NF 53.7	No	Incidental One-time Site Visit	NA	No	Mainstem - No	Distribution
North Fork of the Middle Fork American River						
AMPH NFMF 2.3	Stage Only	Comparison	F/B	No	Mainstem - Yes	Distribution, abundance and timing of breeding season; HSC site[5]

[1]All study sites were surveyed a minimum of 1000m in stream length. Tributary sites also included a minimum of 1,000m upstream on the tributary where possible.

[2]Rosgen, D. L. 1996. Applied River Morphology. Wildland Hydrology, Pagosa Springs, Colorado.

[3]FYLF = Foothill Yellow-Legged Frog.

[4]QSS = 2006 geomorphology and riparian Quantitative Study Site.

[5]HSC = Habitat Suitability Criteria data collection.

Table AQ 12-2. Foothill Yellow-legged Frog Study Site Locations.

River and Study Sites (River Mile)	Location Description	Total Length (km)	Start of Surveyed Reach		Elevation (ft)	End of Surveyed Reach		Mainstem or Tributary	Site Map (Appendix B)
			East UTM	North UTM		East UTM	North UTM		
Middle Fork American River									
AMPH MF 6.4	Middle Fork American River	0.89	677910	4311873	669	678687	4311668	Mainstem	B-1
	American Canyon Creek	1.05	678265	4311633	833	679028	4311202	Tributary	
AMPH MF 9.3	Middle Fork American River	1.41	678890	4314825	710	680121	4314344	Mainstem	B-2
	Todd Valley Creek	0.14	679853	4314532	768	679903	4314653	Tributary	
	Gas Canyon Creek	0.34	679016	4314768	745	679133	4315049	Tributary	
AMPH MF 11.0	Middle Fork American River	0.537	681583	4313752	776	682005	4313752	Mainstem	B-3
	Canyon Creek	0.36	681804	4313648	838	681910	4313365	Tributary	
AMPH MF 14.1	Middle Fork American River	1.60	685474	4313591	799	685981	4314839	Mainstem	B-4
	Otter Creek	1.31	685723	4314209	902	686474	4314255	Tributary	
AMPH MF 17.0	Jesse Creek	-	687744	4317449	869	-	-	Tributary	
AMPH MF 18.1	Pond Creek	-	688074	4317887	892	-	-	Tributary	
AMPH MF 19.1	Middle Fork American River (Cache Rock)	1.33	688775	4318377	940	689630	4319133	Mainstem	B-5
AMPH MF 21.0	Middle Fork American River	0.97	690928	4318757	1017	691754	4319098	Mainstem	B-6
	Volcano Canyon Creek	0.44	691470	4319073	1072	691433	4319478	Tributary	
AMPH MF 24.1	Middle Fork American River below Ralston Afterbay	1.26	694712	4319953	1162	694968	4319790	Mainstem	B-7
	North Fork of the Middle Fork American River at Middle Fork American River Confluence	1.02	695120	4320335	1150	695789	4320570	Tributary	
AMPH MF 26.2	Middle Fork American River above Ralston Afterbay	0.99	696382	4319775	1297	696786	4320344	Mainstem	B-8
AMPH MF 29.4	Middle Fork American River	1.09	700258	4321506	1650	701148	4321488	Mainstem	B-9
AMPH MF 30.4	Middle Fork American River	1.02	701687	4321635	1742	702558	4321708	Mainstem	B-10
	Brushy Canyon Creek	0.16	702383	4321604	1815	702481	4321484	Tributary	
AMPH MF 35.3	Middle Fork American River downstream of Middle Fork Interbay	0.80	706831	4322671	2428	707402	4322453	Mainstem	B-11

Table AQ 12-2. Foothill Yellow-legged Frog Study Site Locations (continued).

River and Study Sites (River Mile)	Location Description	Total Length (km)	Start of Surveyed Reach		Elevation (ft)	End of Surveyed Reach		Mainstem or Tributary	Site Map (Appendix B)
			East UTM	North UTM		East UTM	North UTM		
AMPH MF 36.2	Middle Fork American River upstream of Middle Fork Interbay	0.29	708258	4322377	2630	708414	4322618	Mainstem	B-12
AMPH MF 39.7	Middle Fork American River at Duncan Creek	0.51	712203	4323834	3443	712599	4324091	Mainstem	B-13
	Duncan Creek at Middle Fork American River	0.10	712439	4323900	3383	712471	4323996	Tributary	
Rubicon River									
AMPH R 1.2	Rubicon River	1.44	697236	4318618	1258	698092	4317719	Mainstem	B-14
AMPH R 3.5	Rubicon River at Long Canyon Creek	0.95	699961	4317859	1389	700553	4318011	Mainstem	B-15
	Long Canyon Creek at Rubicon River	0.65	700286	4318217	1546	700693	4318428	Tributary	
AMPH R 5.2	Rubicon River at Pilot Creek	0.94	700695	4316431	1620	700813	4315690	Mainstem	B-16
	Pilot Creek	0.42	700756	4316087	1634	700450	4315913	Tributary	
AMPH R 14.3	Rubicon River	1.40	709887	4310449	2560	710995	4310096	Mainstem	B-17
AMPH R 20.9	Rubicon River below Ellicot Bridge	1.12	717248	4314071	3365	717774	4314878	Mainstem	B-18
AMPH R 22.6	Rubicon River at South Fork Rubicon River Confluence	0.65	719132	4316278	3610	719490	4316755	Mainstem	B-19
	South Fork Rubicon River at Rubicon River Confluence	0.18	719198	4316461	3577	719326	4316350	Tributary	
AMPH R 25.7	Rubicon River below Hell Hole Reservoir	1.35	720862	4320033	3975	721167	4321192	Mainstem	B-20
Long Canyon Creek									
AMPH LC 5.6	Wallace Creek	-	707907	4317350	3074	-	-	Tributary	
AMPH LC 9.0	Ramsey Crossing	0.95	711754	4319380	3745	712385	4319704	Mainstem	B-21

Table AQ 12-2. Foothill Yellow-legged Frog Study Site Locations (continued).

River and Study Sites (River Mile)	Location Description	Total Length (km)	Start of Surveyed Reach		Elevation (ft)	End of Surveyed Reach		Mainstem or Tributary	Site Map (Appendix B)
			East UTM	North UTM		East UTM	North UTM		
North and South Fork Long Canyon Creeks Confluence									
AMPH LC 11.4	Long Canyon Creek	0.56	714647	4321731	4083	715088	4322045	Mainstem	B-22
	North Fork Long Canyon Creek	1.02	715088	4322045	4169	715165	4322943	Tributary	
	South Fork Long Canyon Creek	0.53	715088	4322045	4147	715544	4322232	Tributary	
North Fork American River									
AMPH NF 21.2	North Fork American River at Middle Fork American River Confluence	1.50	669999	4309256	536	669850	4310330	Mainstem	B-23
	Middle Fork American River at North Fork American River Confluence	0.63	670132	4309231	564	670607	4308985	Tributary	
AMPH NF 31.5	North Fork American River	-	678442	4318807	784	-	-	Mainstem	
AMPH NF 35.7	Shirttail Creek	0.95	681523	4323461	1033	682087	4323287	Tributary	B-24
	North Fork American River at Shirttail Creek and Bunch Canyon	1.61	680907	4322641	916	681473	4323725	Mainstem	
	Bunch Canyon	0.29	681001	4322830	952	680832	4323045	Tributary	
AMPH NF 53.7	North Fork American River	-	691800	4338960	1824	-	-	Mainstem	
North Fork of the Middle Fork American River									
AMPH NFMF 2.3	North Fork of the Middle Fork American River	0.79	697164	4321632	1330	697610	4321959	Mainstem	B-25
	North Fork of the Middle Fork American River downstream of Circle Bridge	0.31	696376	4321274	1271	696599	4321216	Mainstem	

Table AQ 12-3. Summary of Foothill Yellow-legged Frog Survey Results.

Site		Survey Date(s)	Number of Observations						
			Adult Females	Adult Males	Adult Unknown	Juveniles/ Subadults	Young-of-the-Year	Tadpoles	Egg Masses
Middle Fork American River									
AMPH MF 6.4	Mainstem	9/24/2007	0	0	1	0	2	0	0
		Totals	**0**	**0**	**1**	**0**	**2**	**0**	**0**
AMPH MF 6.4	Tributary - American Canyon	9/24/2007	3	0	3	2	20	0	0
		Totals	**3**	**0**	**3**	**2**	**20**	**0**	**0**
AMPH MF 9.3	Mainstem at Todd Creek	5/17/2007	0	0	1	0	0	0	0
		6/5/2007	0	1	0	0	0	0	0
		8/23/2007	3	0	2	0	0	0	0
		Totals	**3**	**1**	**3**	**0**	**0**	**0**	**0**
AMPH MF 9.3	Mainstem at Gas Canyon	5/17/2007	0	0	0	0	0	0	0
		6/5/2007	0	0	0	0	0	0	0
		8/22/2007	1	1	5	0	0	0	0
		Totals	**1**	**1**	**5**	**0**	**0**	**0**	**0**
AMPH MF 9.3	Tributary - Todd Creek	5/17/2007	4	0	2	4	0	0	1
		6/5/2007	1	0	0	0	0	0	0
		8/23/2007	0	0	0	0	0	0	0
		Totals	**5**	**0**	**2**	**4**	**0**	**0**	**1**
AMPH MF 9.3	Tributary - Gas Canyon	5/17/2007	4	5	0	4	0	0	4
		6/5/2007	1	1	0	4	0	0	0
		8/23/2007	0	0	1	0	0	0	0
		Totals	**5**	**6**	**1**	**8**	**0**	**0**	**4**
AMPH MF 11.0	Mainstem	8/23/2007	0	0	0	0	0	0	0
		Totals	**0**	**0**	**0**	**0**	**0**	**0**	**0**
AMPH MF 11.0	Tributary - Canyon Creek	8/23/2007	0	0	0	0	0	0	0
		Totals	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Table AQ 12-3. Summary of Foothill Yellow-legged Frog Survey Results (continued).

Site		Survey Date(s)	Number of Observations						
			Adult Females	Adult Males	Adult Unknown	Juveniles/ Subadults	Young-of-the-Year	Tadpoles	Egg Masses
Middle Fork American River (continued)									
AMPH MF 14.1	Mainstem	5/21/2007	0	0	0	0	0	0	0
		6/6/2007	0	0	0	0	0	0	0
		8/22/2007	0	0	0	0	0	0	0
		Totals	**0**	**0**	**0**	**0**	**0**	**0**	**0**
AMPH MF 14.1	Tributary - Otter Creek	5/21/2007	0	5	2	0	0	0	12
		6/6/2007	0	0	3	0	0	1025	1
		8/22/2007	2	0	4	1	224	55	0
		Totals	**2**	**5**	**9**	**1**	**224**	**1080**	**13**
AMPH MF 17.0	Tributary - Jesse Creek	10/15/2007	0	0	0	0	0	0	0
	* Incidental Observation Approximate Count	**Totals**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
AMPH MF 18.1	Tributary - Pond Creek	10/15/2007	0	0	0	0	0	0	0
	* Incidental Observation Approximate Count	**Totals**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
AMPH MF 19.1	Mainstem	5/24/2007	0	0	0	0	0	0	0
		6/11/2007	0	0	0	0	0	0	0
		8/30/2007	0	0	0	0	0	0	0
		Totals	**0**	**0**	**0**	**0**	**0**	**0**	**0**
AMPH MF 21.0	Mainstem	5/24/2007	0	0	0	0	0	0	0
		6/11/2007	0	0	0	0	0	0	0
		8/30/2007	0	0	0	0	0	0	0
		Totals	**0**	**0**	**0**	**0**	**0**	**0**	**0**
AMPH MF 21.0	Tributary - Volcano Canyon Creek	5/24/2007	0	0	0	0	0	0	0
		6/11/2007	0	0	0	0	0	0	0
		8/30/2007	0	0	0	0	0	0	0
		Totals	**0**	**0**	**0**	**0**	**0**	**0**	**0**
AMPH MF 24.1	Tributary - North Fork of the Middle Fork American River	5/23/2007	0	0	0	0	0	0	2
		6/8/2007	0	2	0	0	0	570	1
		8/31/2007	0	0	2	0	86	9	0
		Totals	**0**	**2**	**2**	**0**	**86**	**579**	**3**

Table AQ 12-3. Summary of Foothill Yellow-legged Frog Survey Results (continued).

Site		Survey Date(s)	Number of Observations						
			Adult Females	Adult Males	Adult Unknown	Juveniles/ Subadults	Young-of-the-Year	Tadpoles	Egg Masses
Middle Fork American River (continued)									
AMPH MF 24.1	Mainstem	5/23/2007	0	0	0	0	0	0	0
		6/8/2007	0	0	0	0	0	0	0
		8/31/2007	0	0	0	0	0	0	0
		Totals	**0**	**0**	**0**	**0**	**0**	**0**	**0**
AMPH MF 26.2	Mainstem	5/22/2007	0	0	1	0	0	0	0
		6/7/2007	1	0	0	0	0	0	2
		8/21/2007	1	0	1	0	28	2	0
		Totals	**2**	**0**	**2**	**0**	**28**	**2**	**2**
AMPH MF 29.4	Mainstem	5/25/2007	0	0	0	0	0	0	0
		6/12/2007	0	0	0	1	0	0	0
		8/29/2007	1	0	0	0	0	0	0
		Totals	**1**	**0**	**0**	**1**	**0**	**0**	**0**
AMPH MF 30.4	Mainstem	8/29/2007	0	0	0	0	0	0	0
		Totals	**0**	**0**	**0**	**0**	**0**	**0**	**0**
AMPH MF 30.4	Tributary - Brushy Canyon (Qualitative)	8/29/2007	0	0	0	0	0	0	0
		Totals	**0**	**0**	**0**	**0**	**0**	**0**	**0**
AMPH MF 36.2	Mainstem	5/29/2007	0	0	0	0	0	0	0
		6/13/2007	0	0	0	0	0	0	0
		Totals	**0**	**0**	**0**	**0**	**0**	**0**	**0**
AMPH MF 39.7	Mainstem at Duncan Creek (Qualitative)	8/29/2007	0	0	0	0	0	0	0
		Totals	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Table AQ 12-3. Summary of Foothill Yellow-legged Frog Survey Results (continued).

Site		Survey Date(s)	Number of Observations						
			Adult Females	Adult Males	Adult Unknown	Juveniles/ Subadults	Young-of-the-Year	Tadpoles	Egg Masses
Rubicon River									
AMPH R 1.2	Mainstem	5/22/2007	3	4	4	0	0	0	18
		6/7/2007	4	5	6	3	0	2910	7
		8/21/2007	1	1	16	18	101	49	0
		Totals	**8**	**10**	**26**	**21**	**101**	**2959**	**25**
AMPH R 3.5	Mainstem - Rubicon River	5/25/2005	3	4	1	2	0	0	18
		6/12/2007	2	4	7	9	0	4850	1
		8/24/2007	1	0	34	11	187	103	0
		Totals	**6**	**8**	**42**	**22**	**187**	**4953**	**19**
AMPH R 3.5	Tributary - Long Canyon Creek	5/25/2005	4	0	4	4	0	0	0
		6/12/2007	1	0	2	2	0	0	0
		8/24/2007	0	0	12	11	46	14	0
		Totals	**5**	**0**	**18**	**17**	**46**	**14**	**0**
AMPH R 5.2	Mainstem	8/28/2007	1	0	5	2	72	2	0
		Totals	**1**	**0**	**5**	**2**	**72**	**2**	**0**
AMPH R 5.2	Tributary - Pilot Creek (Qualitative)	8/28/2007	1	0	9	0	24	2	0
		Totals	**1**	**0**	**9**	**0**	**24**	**2**	**0**
AMPH R 14.3	Mainstem	5/30/2007	0	0	0	0	0	200	24
		6/14/2007	0	2	1	1	0	4500	0
		8/27/2007	0	0	3	0	67	25	0
		Totals	**0**	**2**	**4**	**1**	**67**	**4725**	**24**
AMPH R 20.9	Mainstem	5/29/2007	1	0	1	0	0	0	4
		6/13/2007	0	0	0	0	0	400	0
		8/28/2007	0	0	0	0	1	0	0
		Totals	**1**	**0**	**1**	**0**	**1**	**400**	**4**
AMPH R 22.6	Mainstem	8/22/2007	0	0	0	0	0	0	0
		Totals	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Table AQ 12-3. Summary of Foothill Yellow-legged Frog Survey Results (continued).

Site		Survey Date(s)	Number of Observations						
			Adult Females	Adult Males	Adult Unknown	Juveniles/ Subadults	Young-of-the-Year	Tadpoles	Egg Masses
Rubicon River (continued)									
AMPH R 22.6	Tributary - South Fork Rubicon River (Qualitative)	8/22/2007	0	0	0	0	0	0	0
		Totals	**0**	**0**	**0**	**0**	**0**	**0**	**0**
AMPH R 25.7	Mainstem	5/30/2007	0	0	0	0	0	0	0
		6/14/2007	0	0	0	0	0	0	0
		8/27/2007	0	0	0	0	0	0	0
		Totals	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Long Canyon Creek									
AMPH LC 5.6	Tributary - Wallace Creek * Incidental Observation Approximate Count	8/30/2007	0	0	0	0	0	0	0
		Totals	**0**	**0**	**0**	**0**	**0**	**0**	**0**
AMPH LC 9.0	Mainstem - Ramsey Crossing	5/31/2007	0	0	0	0	0	0	0
		6/15/2007	0	0	0	0	0	0	0
		8/21/2007	0	0	0	0	0	0	0
		Totals	**0**	**0**	**0**	**0**	**0**	**0**	**0**
North and South Fork Long Canyon Creeks Confluence									
AMPH LC 11.4	Tributary - North Fork Long Canyon Creek	5/31/2007	0	0	0	0	0	0	0
		6/15/2007	0	0	0	0	0	0	0
		8/21/2007	0	0	0	0	0	0	0
		Totals	**0**	**0**	**0**	**0**	**0**	**0**	**0**
AMPH LC 11.4	Tributary - South Fork Long Canyon Creek	5/31/2007	0	0	0	0	0	0	0
		6/15/2007	0	0	0	0	0	0	0
		8/21/2007	0	0	0	0	0	0	0
		Totals	**0**	**0**	**0**	**0**	**0**	**0**	**0**
North Fork American River									
AMPH NF 21.2	Mainstem (Comparison)	5/21/2007	0	0	0	0	0	0	0
		6/6/2007	0	0	0	0	0	0	0
		8/20/2007	0	0	0	0	0	0	0
		Totals	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Table AQ 12-3. Summary of Foothill Yellow-legged Frog Survey Results (continued).

Site		Survey Date(s)	Number of Observations						
			Adult Females	Adult Males	Adult Unknown	Juveniles/ Subadults	Young-of-the-Year	Tadpoles	Egg Masses
North Fork American River (continued)									
AMPH NF 21.2	Tributary - Middle Fork American River	5/21/2007	0	0	0	0	0	0	0
		6/6/2007	0	0	0	0	0	0	0
		8/20/2007	0	0	0	0	0	0	0
		Totals	**0**	**0**	**0**	**0**	**0**	**0**	**0**
AMPH NF 31.3	Mainstem * Incidental Observation Approximate Count	10/4/2007	0 **0**	0 **0**	>10 **>10**	0 **0**	>100 **>100**	0 **0**	**0** **0**
AMPH NF 35.7	Mainstem (Comparison)	5/18/2007	3	3	1	21	0	0	0
		6/4/2007	1	1	2	7	0	650	3
		8/20/2007	8	0	29	2	33	0	0
		Totals	**12**	**4**	**32**	**30**	**33**	**650**	**3**
AMPH NF 35.7	Tributary - Shirttail Creek (Comparison)	5/18/2007	6	10	10	19	0	0	14
		6/4/2007	11	11	12	19	0	4900	2
		8/20/2007	11	4	40	72	250	74	0
		Totals	**28**	**25**	**62**	**110**	**250**	**4974**	**16**
AMPH NF 35.7	Tributary - Bunch Canyon (Comparison)	5/18/2007	3	0	0	5	0	0	0
		6/4/2007	1	0	1	11	0	0	0
		8/20/2007	0	6	6	3	33	0	0
		Totals	**4**	**6**	**7**	**19**	**33**	**0**	**0**
AMPH NF 53.7	Mainstem * Incidental Observation Approximate Count	8/31/2007	0 **0**	0 **0**	>10 **>10**	0 **0**	>100 **>100**	0 **0**	0 **0**
North Fork of the Middle Fork of the American River									
AMPH NFMF 2.3	Mainstem (Comparison)	5/23/2007	8	2	3	3	0	0	9
		6/8/2007	3	1	8	0	0	2275	0
		8/24/2007	9	0	9	2	69	40	0
		Totals	**20**	**3**	**20**	**5**	**69**	**2315**	**9**
AMPH NFMF 2.3	Mainstem - Downstream of Circle Bridge (Comparison)	5/23/2007	1	1	0	0	0	0	4
		6/11/2007	0	0	0	0	0	22	1
		8/24/2007	0	2	3	0	46	13	0
		Totals	**1**	**3**	**3**	**0**	**46**	**35**	**5**

Table AQ 12-4. Sites Where Habitat Suitability Data Were Collected.

Site	Number of	
	Egg Masses	Tadpole Groups
Small Stream Sites (limited habitat >0.5 m deep)		
MF 14.1 Otter Creek	13	14
MF 9.3 Gas Canyon and Todd Creeks	9	0
R 5.2	0	2
R 3.5 Long Canyon Creek*	0	2
Large River Bypass Reach Sites		
MF 26.2	2	1
R 1.2	25	16
R 3.5 Rubicon River*	19	85
R 14.3	24	28
R 20.9	4	1
Large River Comparison Sites		
MF 24.1 North Fork of the Middle Fork American River	3	11
NF 35.7 North Fork American River & Shirttail Creek	19	43
NFMF 2.3	14	41
Total	**132**	**244**

*R3.5 is split in this table between the Rubicon River and Long Canyon Creek.

Table AQ 12-5. Dominant* Substrate Used by Foothill Yellow-legged Frog Tadpoles and Egg Masses.

Substrate	Tadpole		Egg Mass	
	Microhabitat	Attached	Microhabitat	Attached
Silt	0	0	0	0
Sand (<2 mm)	0	0	0	0
Gravel (2 - 64 mm)	12	13	6	0
Cobble (64 - 256 mm)	201	174	95	68
Boulder (>256 mm)	25	17	16	59
Bedrock	3	2	2	1
Total	**241**	**206**	**119**	**128**

*Some of the substrate was mixed, but only the dominant substrate type is shown.

Table AQ 12-6 Summary of Incidental Sightings during 2007 Aquatic Field Surveys.

Site Name	Location	Survey Date	Species	Comment
Middle Fork American River				
AMPH MF 4.8	Middle Fork American River	7/2007	Western Pond Turtle	Female turtle approximately 6 years old.
AMPH MF 9.3	Middle Fork American River	6/5/2007	Pearl Shell Mussel	Collected within 150 meters downstream of Gas Canyon confluence.
		6/5/2007	Rattlesnake	Juvenile snake.
AMPH MF 11.0	Middle Fork American River	9/12/2007	Western Pond Turtle	Turtle found upstream of Canyon Creek on the mainstem.
AMPH MF 14.1	Otter Creek	6/6/2007	Pearl Shell Mussel Shell Fragment	Shell fragment found in Otter Creek.
		6/6/2007	Pearl Shell Mussel Shell Fragment	
		6/6/2007	Pearl Shell Mussel Shell Fragment	
		6/6/2007	Western Pond Turtle	Male turtle with 7 growth rings and 90 mm carapace.
		6/6/2007	Western Pond Turtle	Two hatchling turtles observed in creek.
	Middle Fork American River	7/9/2007	Western Pond Turtle	Female turtle approximately 7 years old observed.
		7/10/2007	Pearl Shell Mussel Shell Fragment	Shell found on bar in cutoff channel downstream of the Otter Creek confluence.
		missing date	Pearl Shell Mussel	About 100 feet or so downstream of confluence on submerged cobble bar on river left.
		missing date	Pearl Shell Mussel Shell Fragment	Found upstream of Otter Creek and Middle Fork American River confluence.
		10/2/2007	Foothill Yellow Legged Frog	A 56 mm female frog on river right of left side channel.
AMPH MF 29.4	Middle Fork American River	6/12/2007	California Newt	Newt egg mass observed in a run under a large boulder.
AMPH MF24.1	North Fork of the Middle Fork American River at Middle Fork American River	5/23/2007	Pearl Shell Mussel Shell Fragment	Observed approximately 1/2 mile upstream of the confluence.
		5/23/2007	California King Snake	Snake observed on cobble bar.
Rubicon River				
AMPH R 1.2	Rubicon River	7/10/2007	Pearl Shell Mussel Shell Fragment	Observed during instream flow site selection upstream in NFMFAR.

Table AQ 12-6. Summary of Incidental Sightings during 2007 Aquatic Field Surveys (continued).

Site Name	Location	Survey Date	Species	Comment
Rubicon River (continued)				
AMPH R 3.5	Rubicon River	9/17/2007	Pearl Shell Mussel Shell Fragment	Fragment found downstream of footbridge on the mainstem.
AMPH R 20.9	Rubicon River below Ellicot Bridge	5/30/2007	California Newt	Several newts were seen in Rubicon River during survey.
Long Canyon Creek				
AMPH LC 0.0	Rubicon River at Long Canyon Creek	5/25/2007	California Newt	Newt adult and egg masses found in side channel pool.
		6/12/2007	River Otter	One individual observed in a pool below a high gradient riffle.
AMPH LC 9.0	Ramsey Crossing	5/31/2007	California Newt	100's of mostly male newts observed throughout creek.
North and South Fork Long Canyon Creeks Confluence				
AMPH LC 11.4	Long Canyon Creek	6/15/2007	California Newt	11 newts were observed during survey.
	North Fork Long Canyon Creek	6/15/2007	California Newt	13 newts were observed during survey.
North Fork American River				
AMPH NF 21.2	North Fork American River at Middle Fork American River Confluence	5/21/2007	Bullfrog	Bullfrog and tadpoles observed on river right.
	Middle Fork American River at North Fork American River Confluence	9/1/2006	River Otter	Approximately 2 or 3 individuals observed swimming in pool at confluence.
AMPH NF 31.3	North Fork American River at Ponderosa Bridge	10/4/2007	Bullfrog Tads	1000+ tadpoles observed during snorkel survey.
		10/4/2007	Pearl Shell Mussel	Six mussels observed at pool head during snorkel survey.
		10/4/2007	Western Pond Turtle	Adult turtle observed during snorkel survey.
		missing date	Western Pond Turtle	Sub adult turtle observed approximately 1 river mile down stream of Ponderosa bridge.
Reservoirs				
Hell Hole Reservoir	Upper Hell Hole Reservoir	10/25/2007	Bald Eagle	Two individuals observed in trees in close proximity to the reservoir.

Table AQ 12-7. Western Pond Turtle (WPT) Breeding Habitat at Project Reservoirs at Varying Water Surface Elevations (WSE).

Project Reservoirs and Water Years	Water Surface Elevation (ft)[1]						GIS WSE Used for Analysis (ft)	Potential WPT Habitat above GIS WSE (acres)
	Average	Minimum	Maximum	Median	25%	75%		
Hell Hole Reservoir[2]								
Wet	4630.1	4619.5	4636.0	4631.3	4629.2	4631.4	4630	1.0
Above Normal	4626.2	4619.3	4632.6	4627.7	4623.2	4628.0		
Below Normal	4617.8	4587.5	4630.7	4626.5	4615.1	4629.2	4580	54.2
Dry	4577.3	4529.1	4630.9	4579.8	4541.0	4607.3		
Critically Dry	4570.3	4527.6	4590.4	4582.3	4566.4	4584.6	4540	72.2
French Meadows Reservoir[2]								
Wet	5262.7	5261.8	5263.5	5262.8	5262.6	5263.0	5260	0.6
Above Normal	5260.6	5257.3	5262.8	5260.7	5259.2	5262.8		
Below Normal	5259.5	5252.7	5262.6	5261.3	5259.0	5261.7		
Dry	5237.3	5212.6	5253.9	5240.0	5231.4	5246.5	5240	25.2
Critically Dry	5224.5	5193.7	5241.2	5232.6	5218.0	5237.1	5220	34.9
Ralston Afterbay[2]								
All Water Years	1177.5	1175.5	1179.9	1176.9	1176.6	1177.7	1180.0	0.07
Middle Fork Interbay[2]								
All Water Years	2528.0	2527.3	2529.9	2527.8	2527.7	2528.0	2530.0	0.02

[1] Water Surface Elevations are based on the MAXIMUM water surface elevations for all years of each water year type (1975 to 2003). For example, for wet water years, 4630.1 feet was the average water surface elevation for all the wet years during the period of record.

[2] WSE data were obtained from the following gages: French Meadows Reservoir (No. 11427400) and Hell Hole Reservoir (No. 11428700). Water surface elevations for Ralston Afterbay and Middle Fork Interbay are the full pool water surface elevations.

FIGURES

Figure AQ 12-1. Amphibian Objectives and Related Study Elements and Reports.

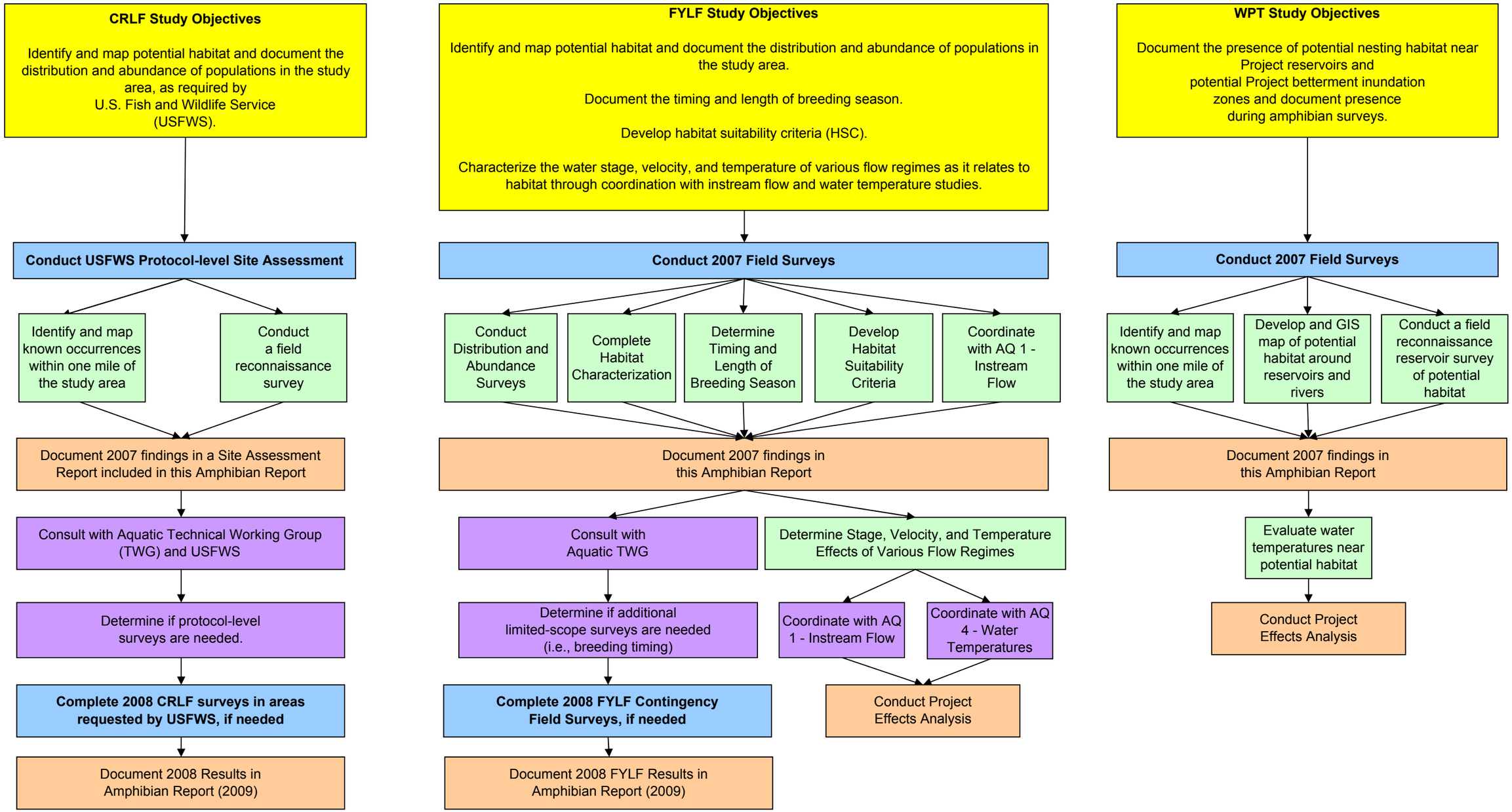
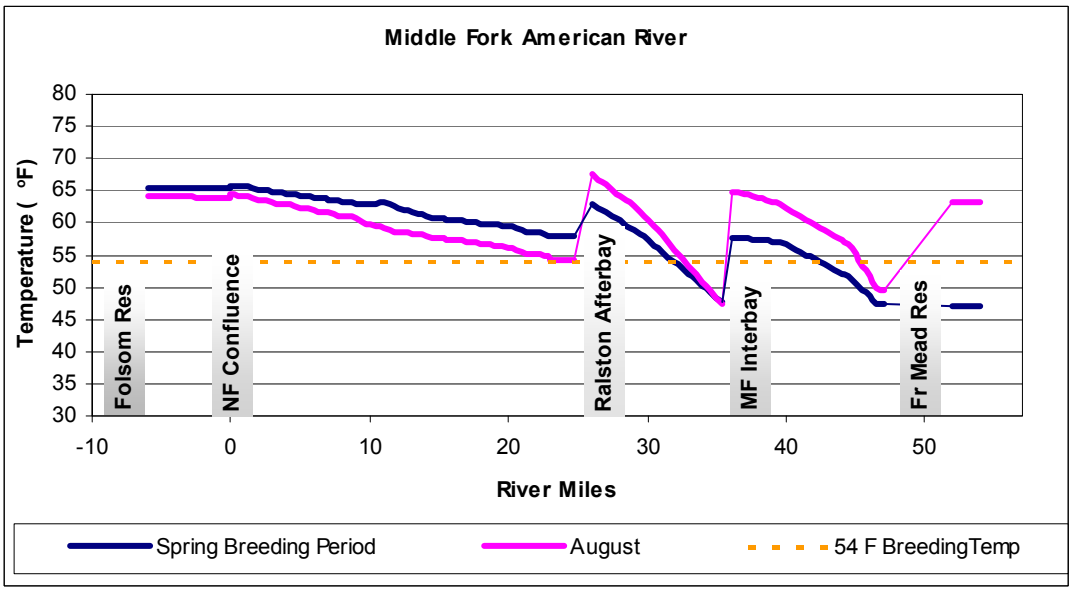
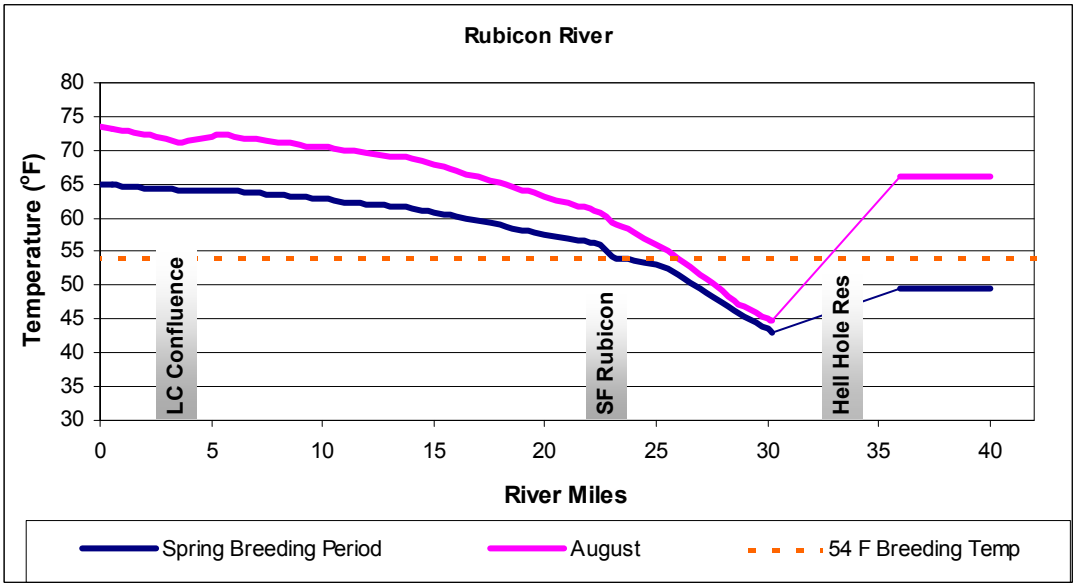


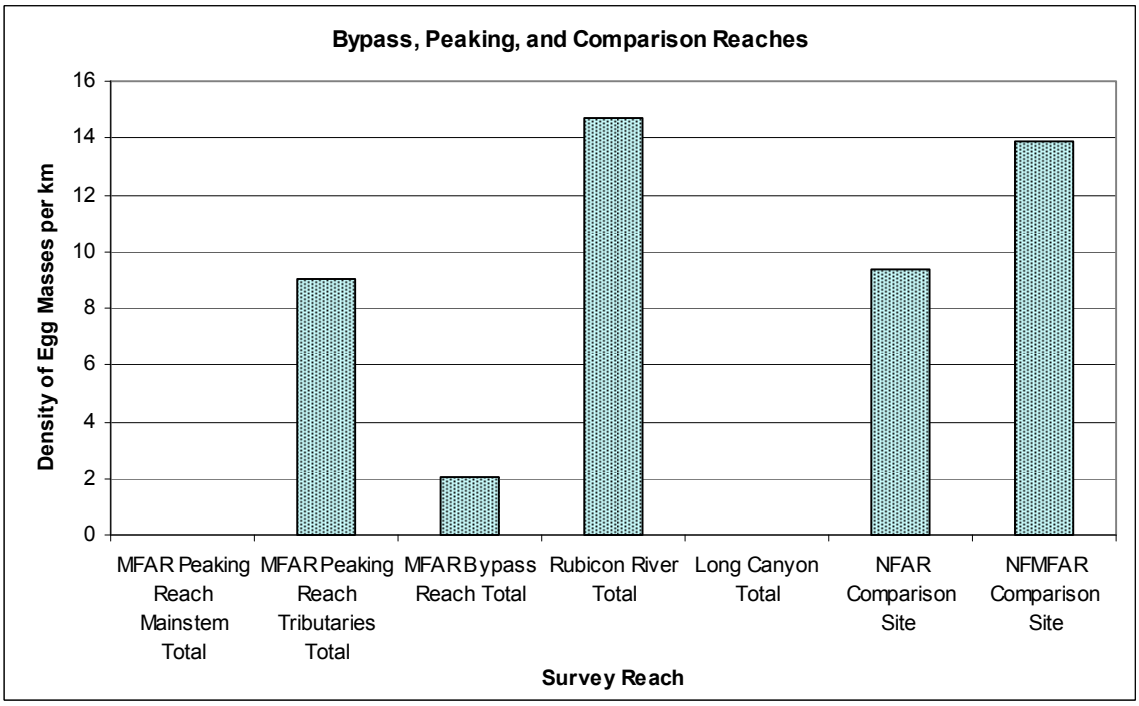
Figure AQ 12-2. Longitudinal Profile of Average Seasonal Water Temperatures in the Middle Fork American River (top) and Rubicon River (bottom).[1]





[1]'August' is August 1-31, 2007; 'Breeding' is May 10-June 5, 2007.

Figure AQ 12-3. Density of Foothill Yellow-legged Frog Egg Masses Sorted by Bypass, Peaking, and Comparison Reach (top) and Breeding Site (bottom) .



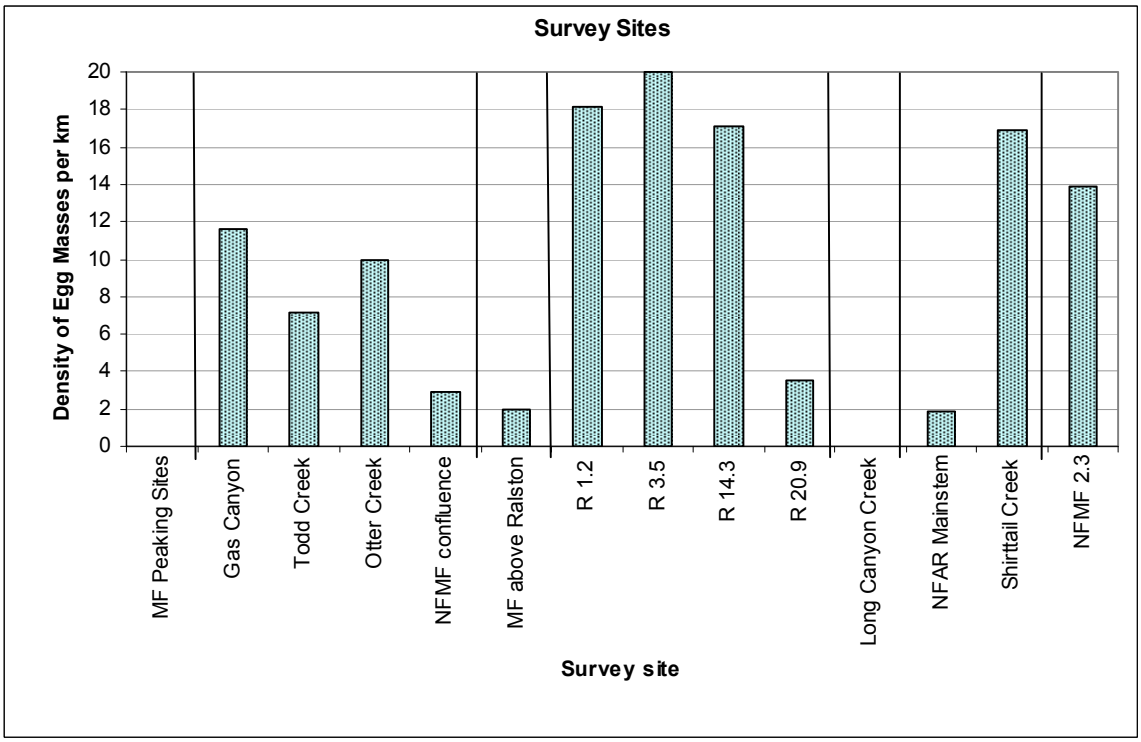


Figure AQ 12-4a. Distribution of Foothill Yellow-legged Frog Observations by Lifestage in the Middle Fork American River Peaking Reach (top), Bypass Reach (middle), and Peaking Reach Tributaries (bottom).

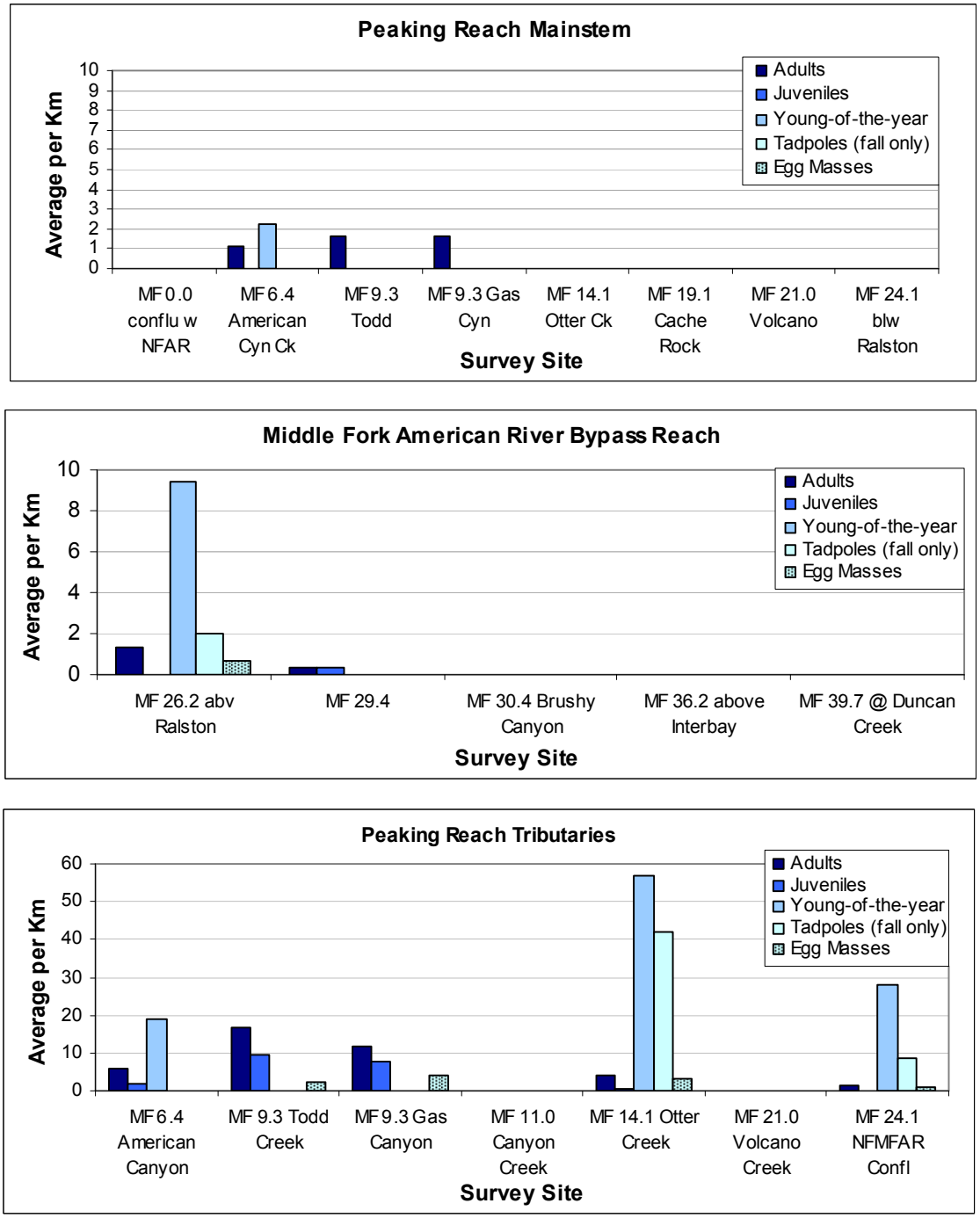
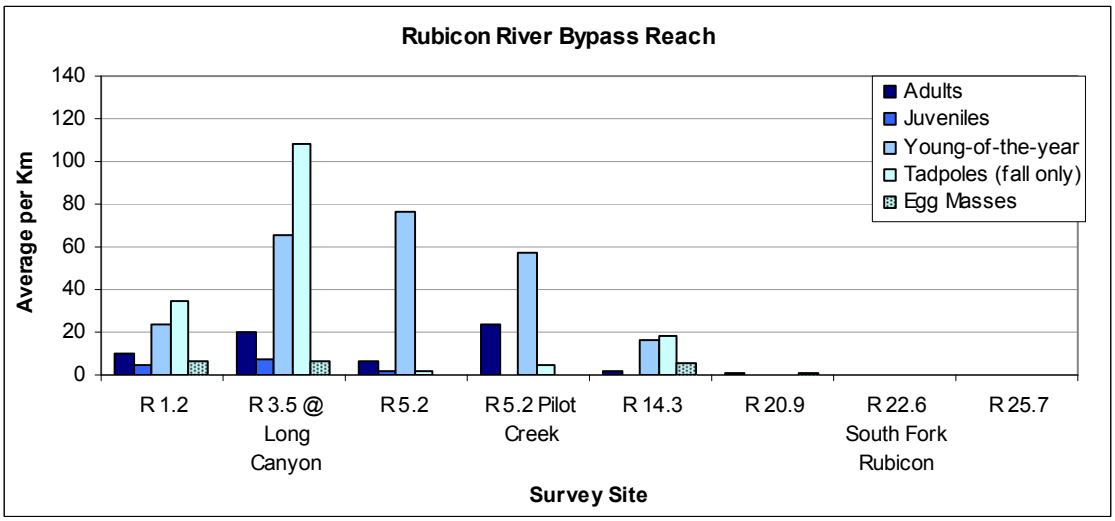


Figure AQ 12-4b. Distribution of Foothill Yellow-legged Frog Observations by Lifestage in the Rubicon River (top) and the Comparison Reaches (bottom).



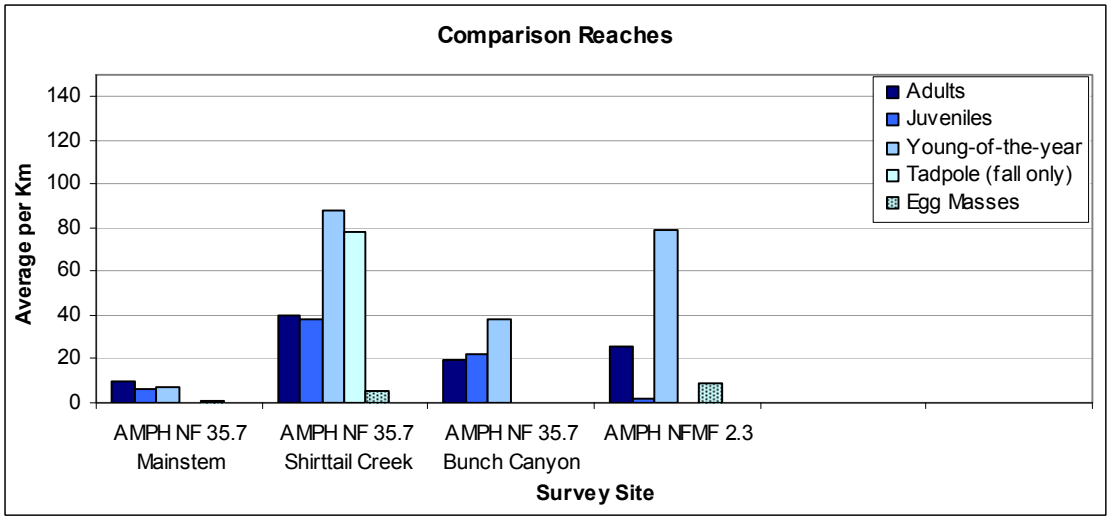
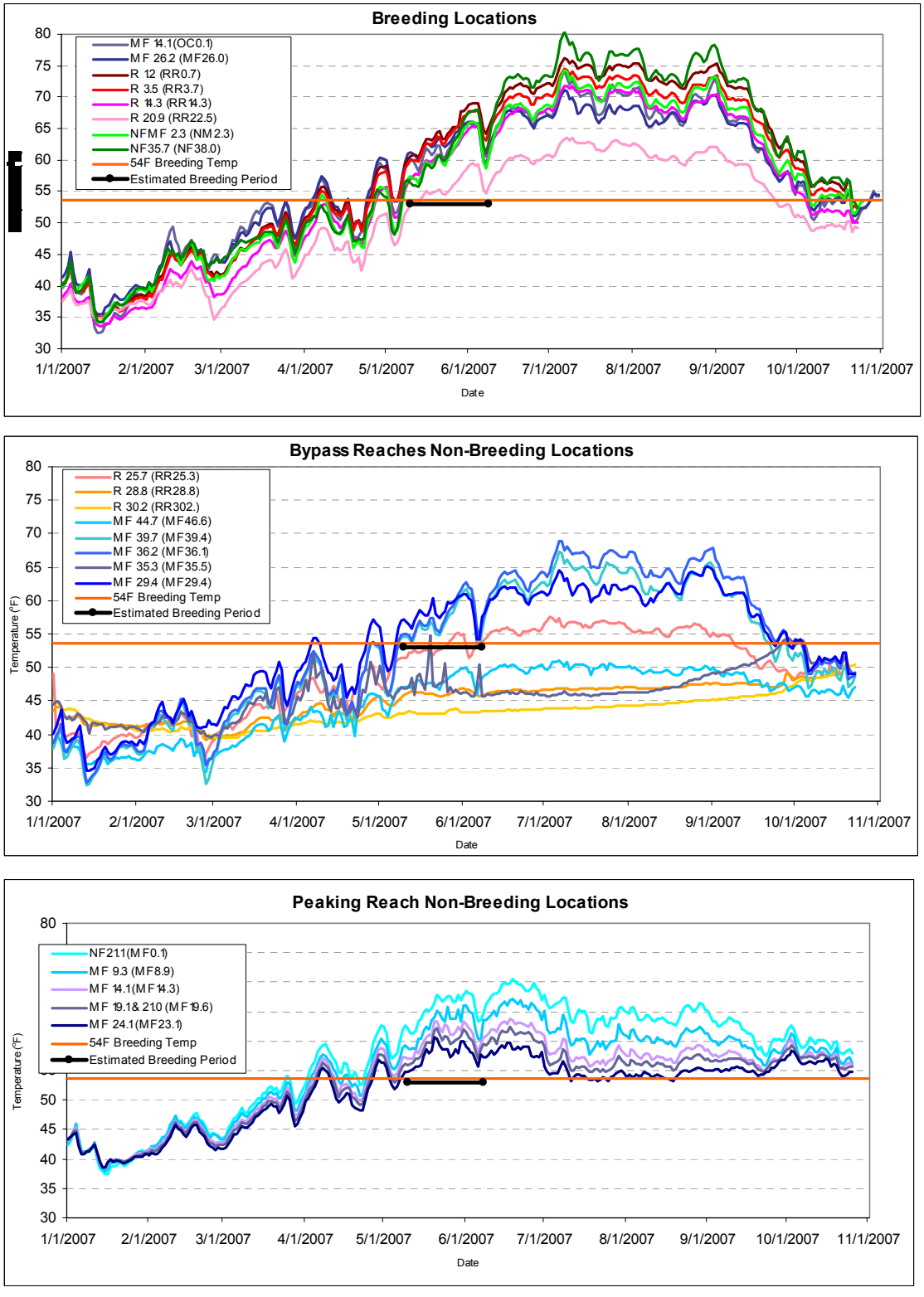
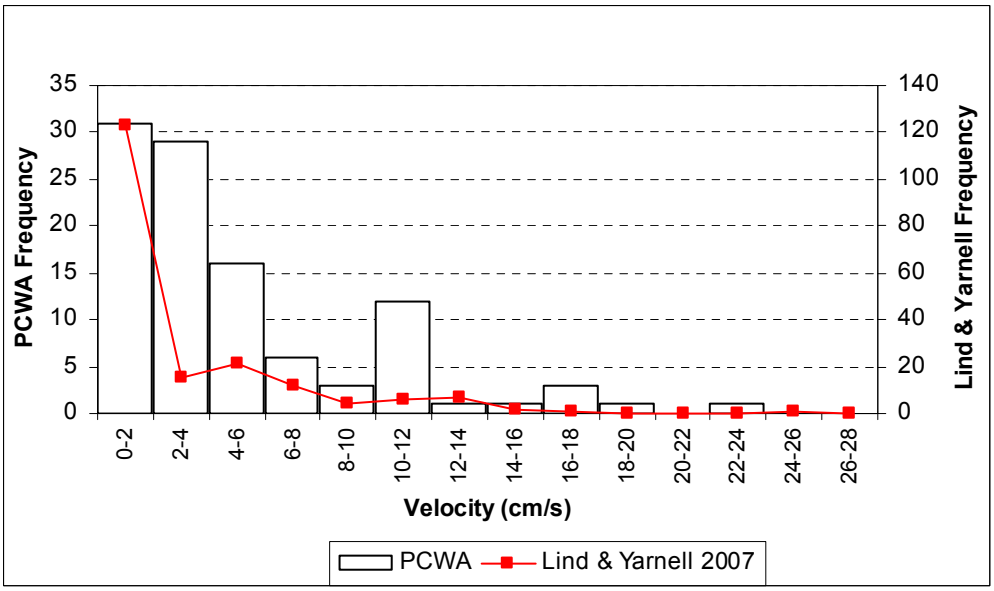


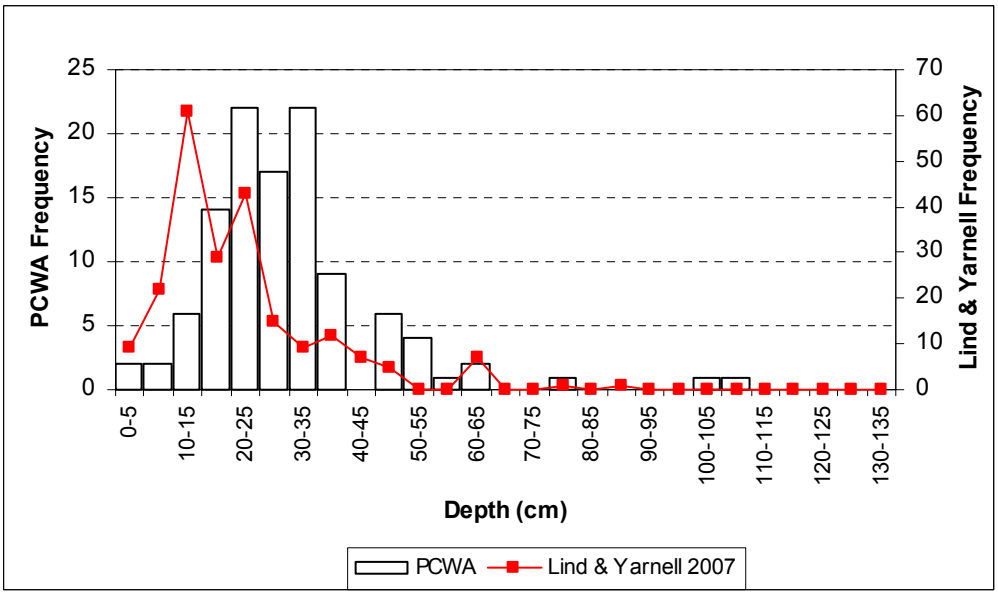
Figure AQ 12-5. Annual Profile of Average Daily Water Temperatures for Breeding Locations (top), Non-Breeding Locations (middle), and Non-Breeding Locations (bottom) with Suitable Temperatures.[1]



[1]Orange line represents the 54°F (12°C) minimum temperature for FYLF breeding.
Black line represents the estimated FYLF breeding period.
The temperature logger location that is nearest to the breeding location is given in parentheses.

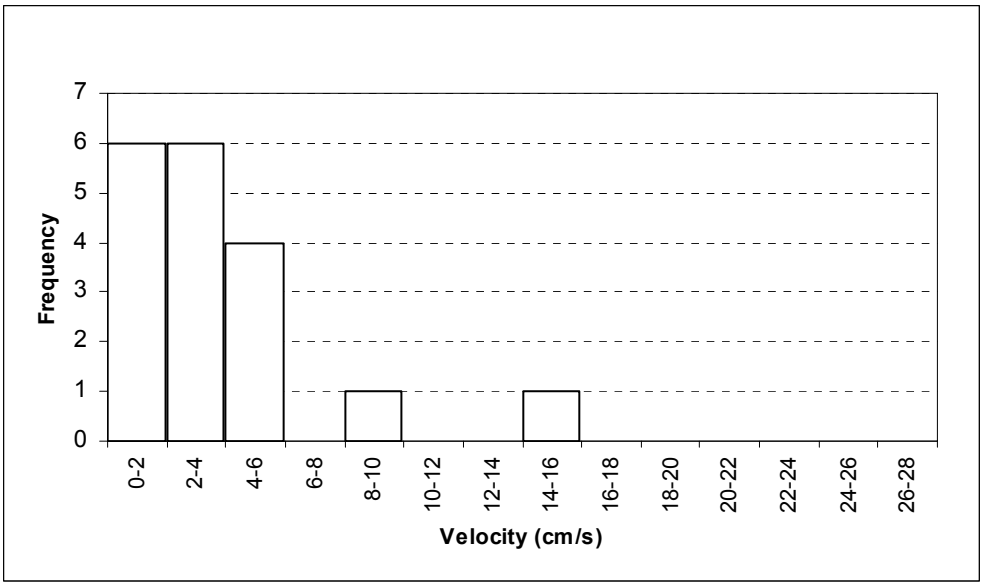
Figure AQ 12-6. Distribution of Observed Mean-column Velocity (top) and Total Depth (bottom) at Egg Masses in Large River Sites.





Lind and Yarnell (2007) data are from a combined data set from the West Branch Feather River (2006), Butte Creek (2006), the South Fork Feather River (2005) and the Pit River (2002-2004).
Note: the scales on the two x-axes are different.

Figure AQ 12-7. Distribution of Observed Mean-column Velocity (top) and Total Depth (bottom) at Egg Masses in Small River Sites.



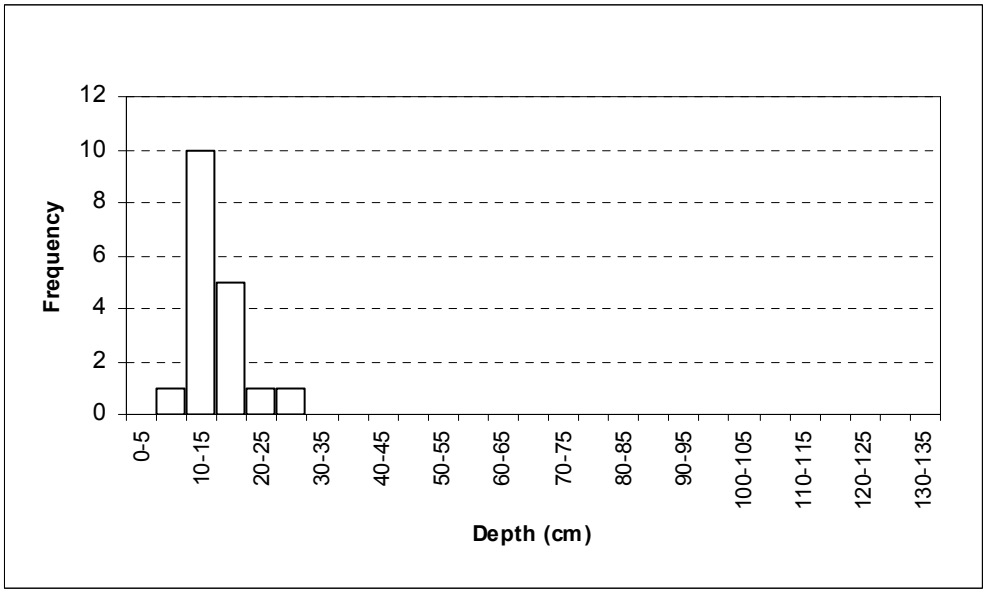
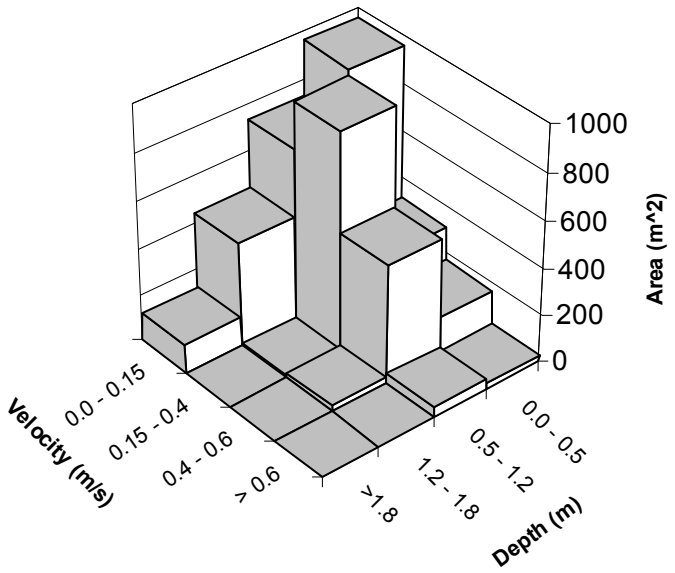


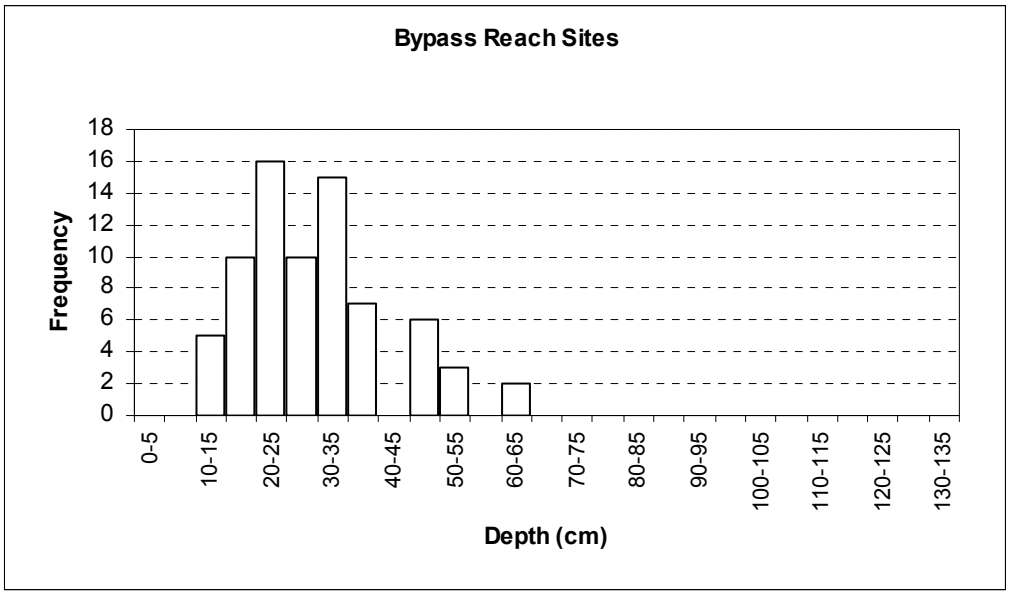
Figure AQ 12-8. Distribution of Available Habitat at HSC Sites.



Area Used For Egg Masses = 8.5 m^2
(23 egg masses @ about 0.4 m^2 / egg mass)

	Depth (m)				
Velocity (m/s)	>1.8	1.2 - 1.8	0.5 - 1.2	0.0 - 0.5	Total
0.0 - 0.15	120	441	727	958	2247
0.15 - 0.4	0	9	931	306	1246
0.4 - 0.6	0	26	508	167	701
> .6 0	0	0	41	23	64
Total	120	476	2207	1454	

Figure AQ 12-9a. Distribution of Observed Total Depth at Egg Masses in Large River Bypass Reach Sites (top) and Large River Comparison Sites (bottom).



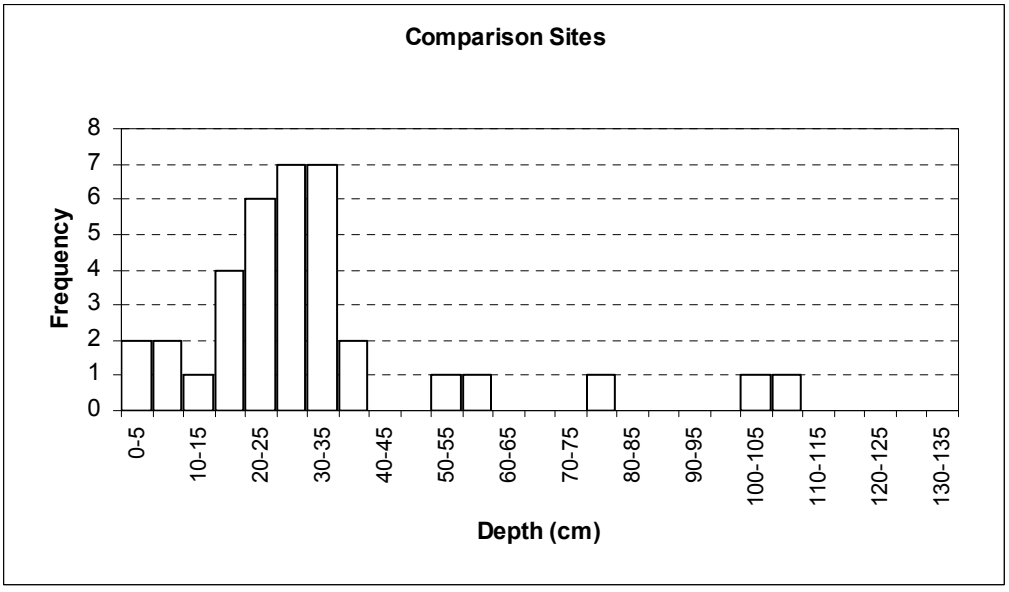
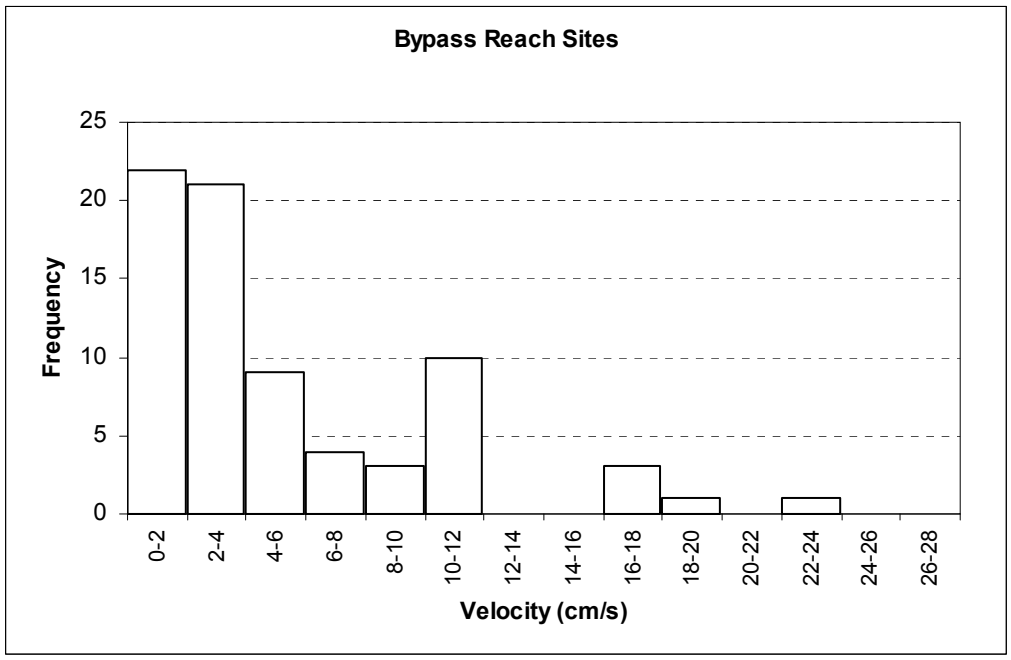


Figure AQ 12-9b. Distribution of Observed Mean-column Velocities at Egg Masses in Large River Bypass Reach Sites (top) and Large River Comparison Sites (bottom).



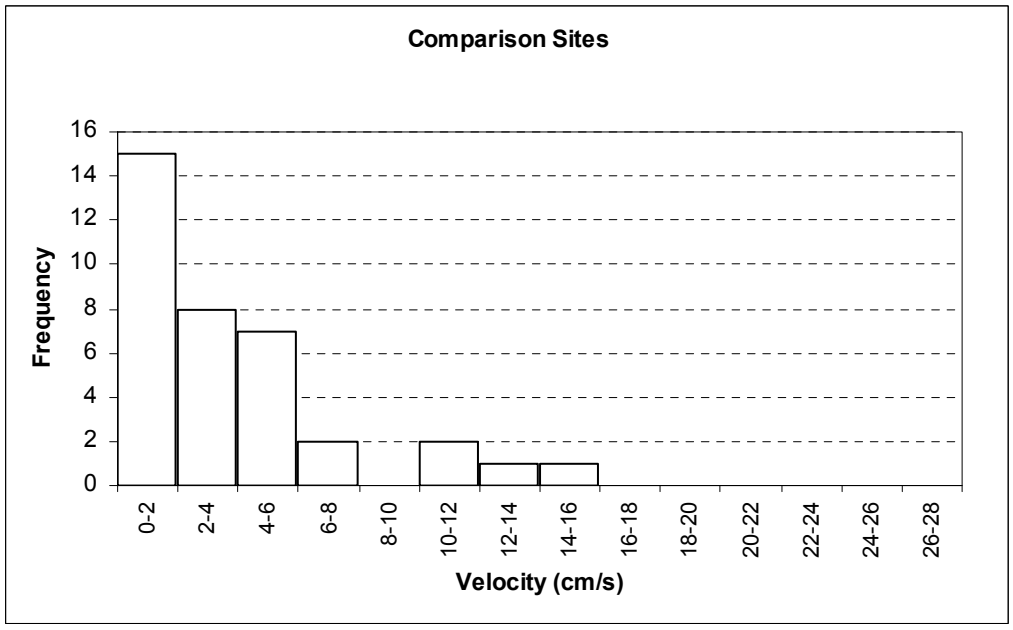
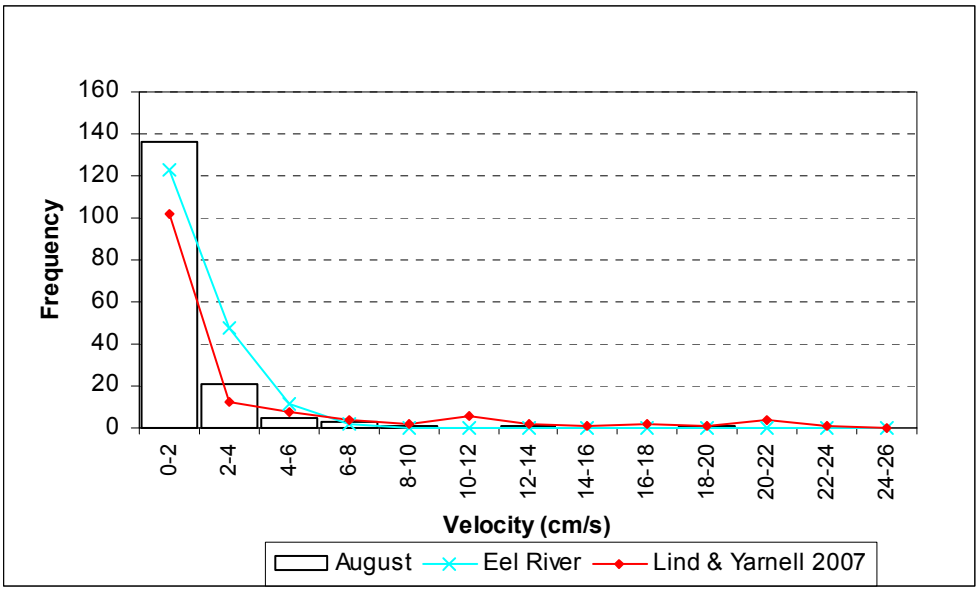
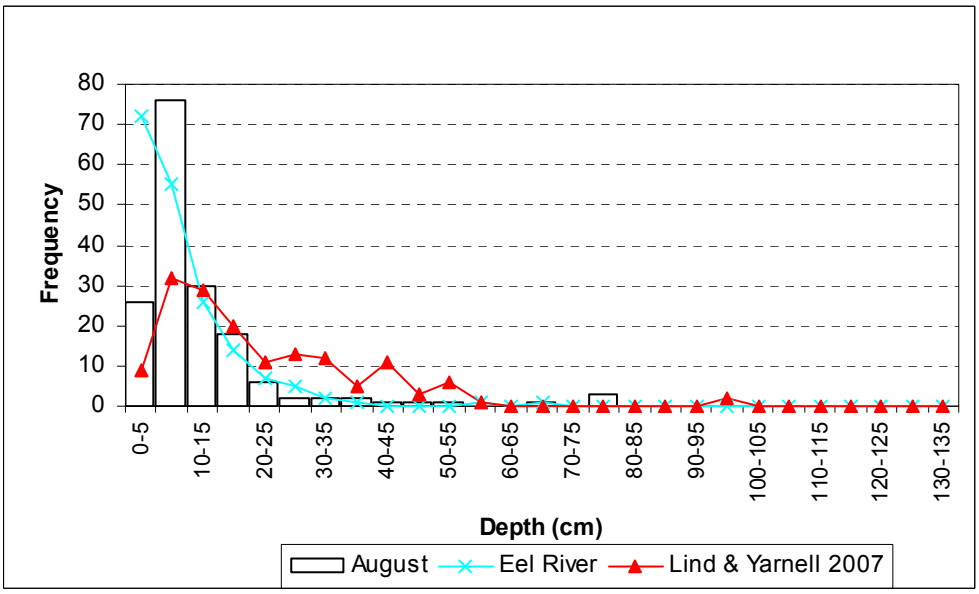


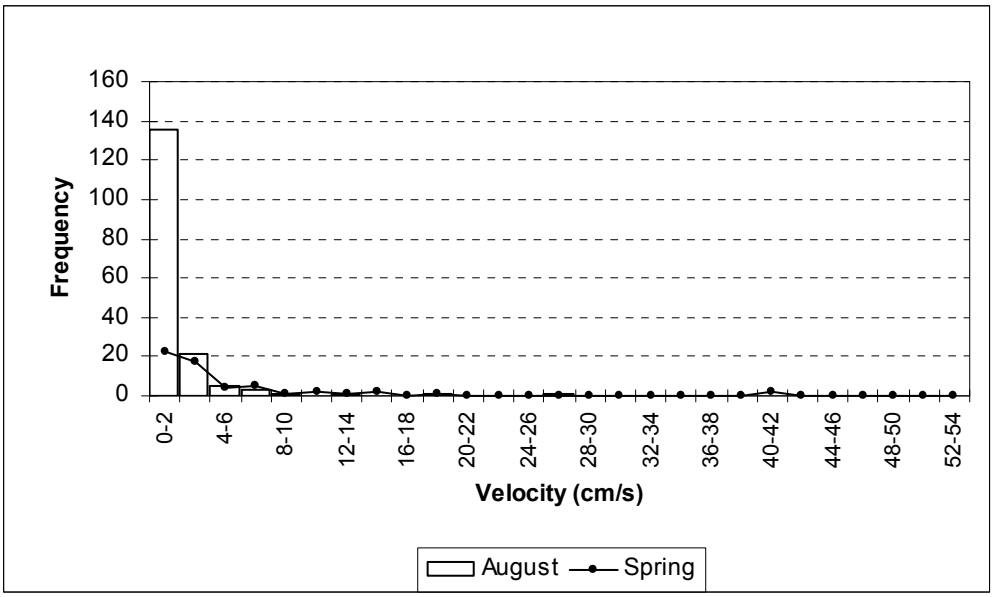
Figure AQ 12-10. Distribution of Observed Mean-column Velocity (top) and Total Depth (bottom) at Tadpoles in Large River Sites.





Lind and Yarnell (2007) data are from a combined data set from the West Branch Feather River (2006), Butte Creek (2006), the South Fork Feather River (2005) and the Pit River (2002-2004).
The Eel River data is unpublished data from S. Kupferberg.

Figure AQ 12-11. Distribution of Observed Mean-column Velocity (top) and Total Depth (bottom) at Tadpoles in Large River Sites in Spring and in August.



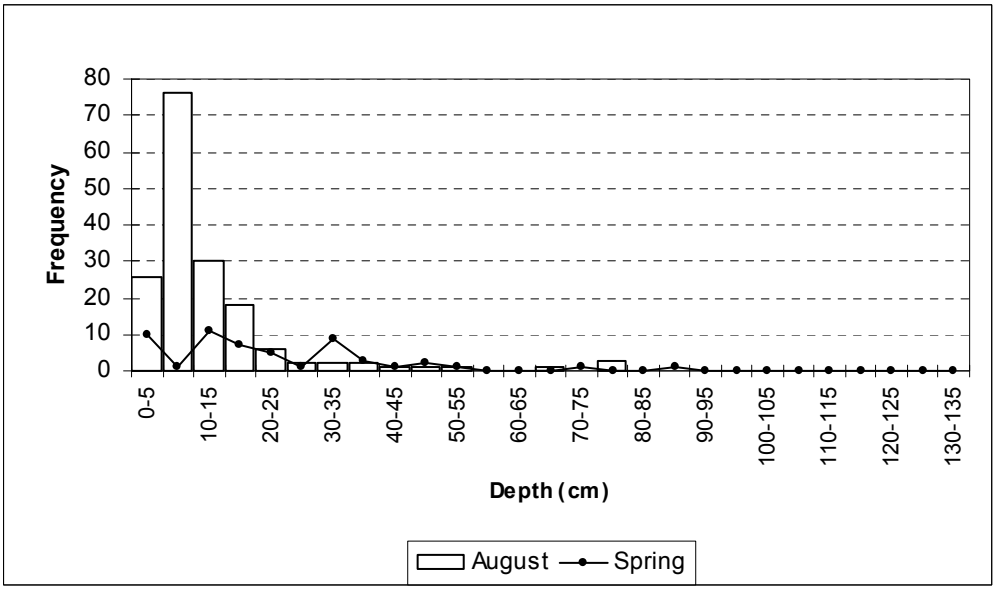
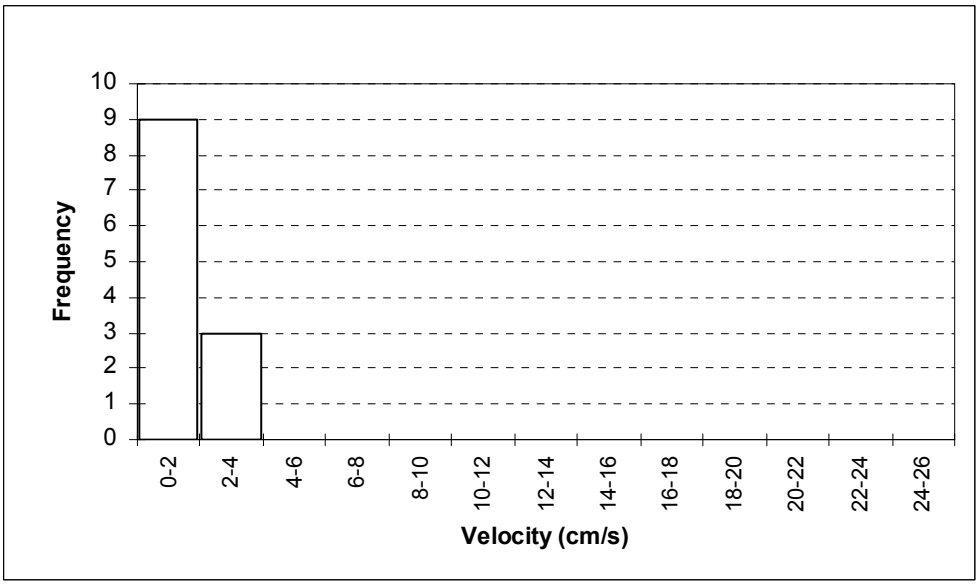


Figure AQ 12-12. Distribution of Observed Mean-column Velocity (top) and Total Depth (bottom) at Tadpoles in August in Small River Sites.



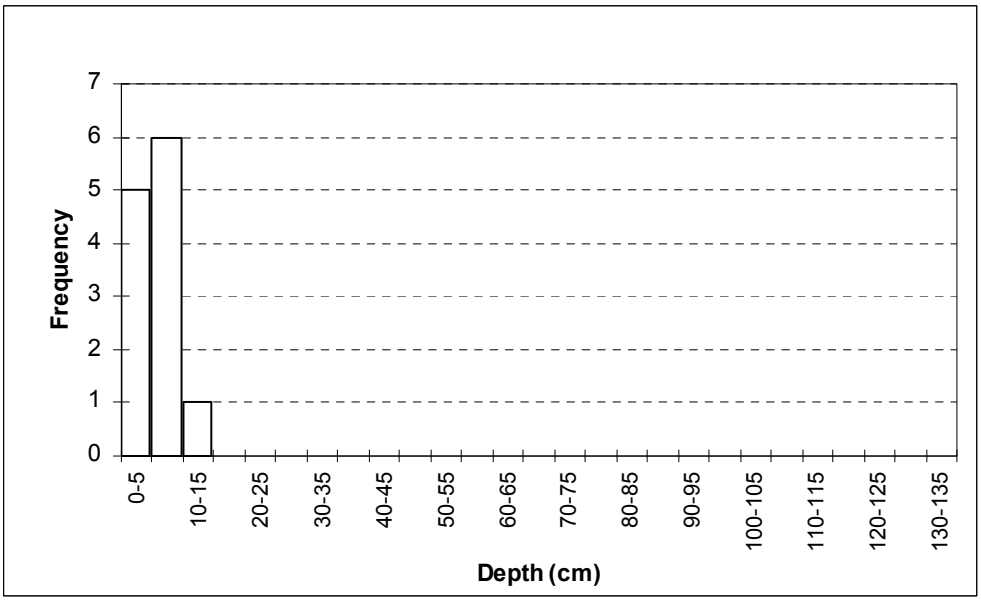
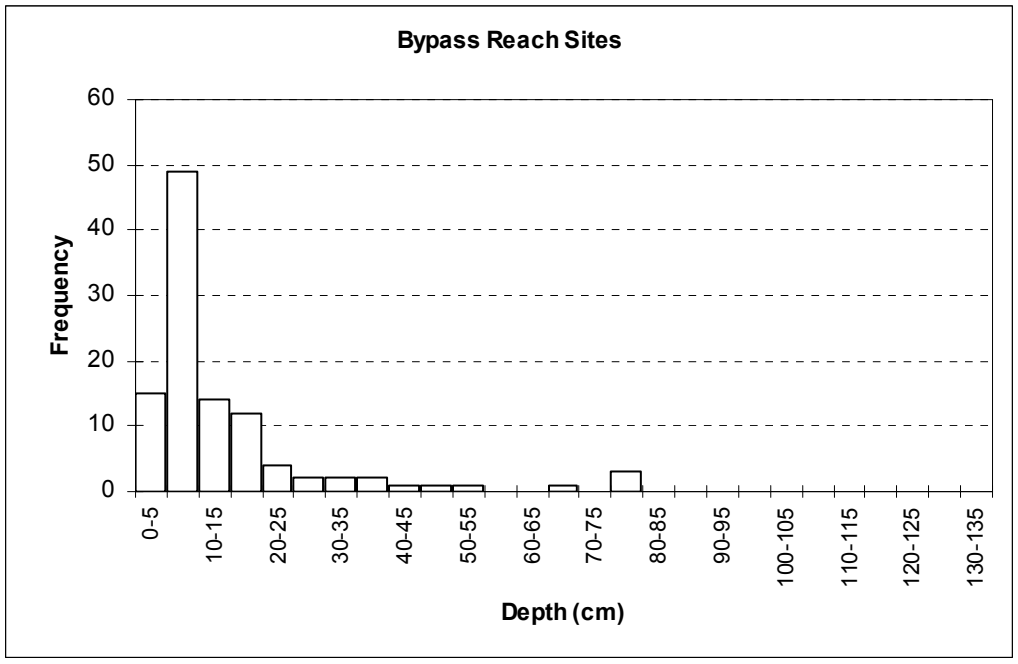


Figure AQ 12-13a. Distribution of Observed Total Depth at Tadpoles in August in Large River Bypass Reach Sites (top) and Large River Comparison Sites (bottom).



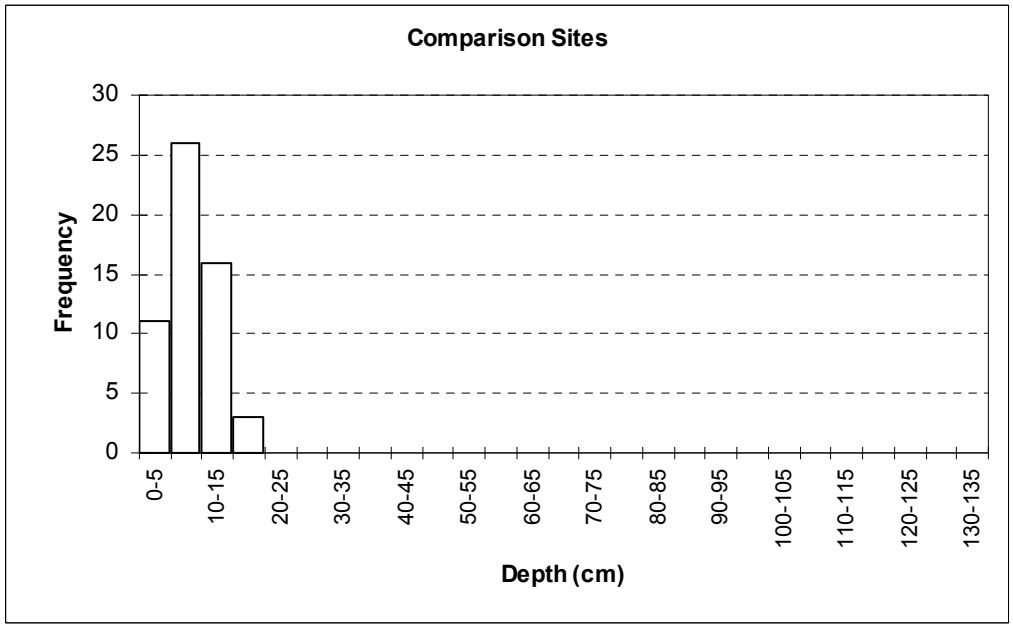
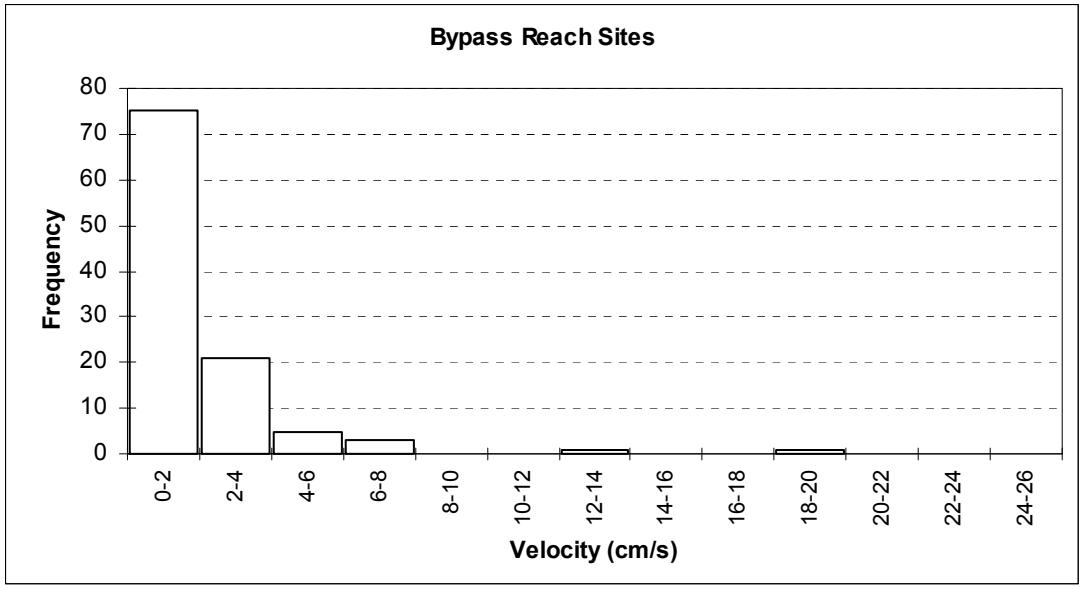


Figure AQ 12-13b. Distribution of Observed Mean-column Velocity at Tadpoles in August in Large River Bypass Reach Sites (top) and Large River Comparison Sites (bottom).



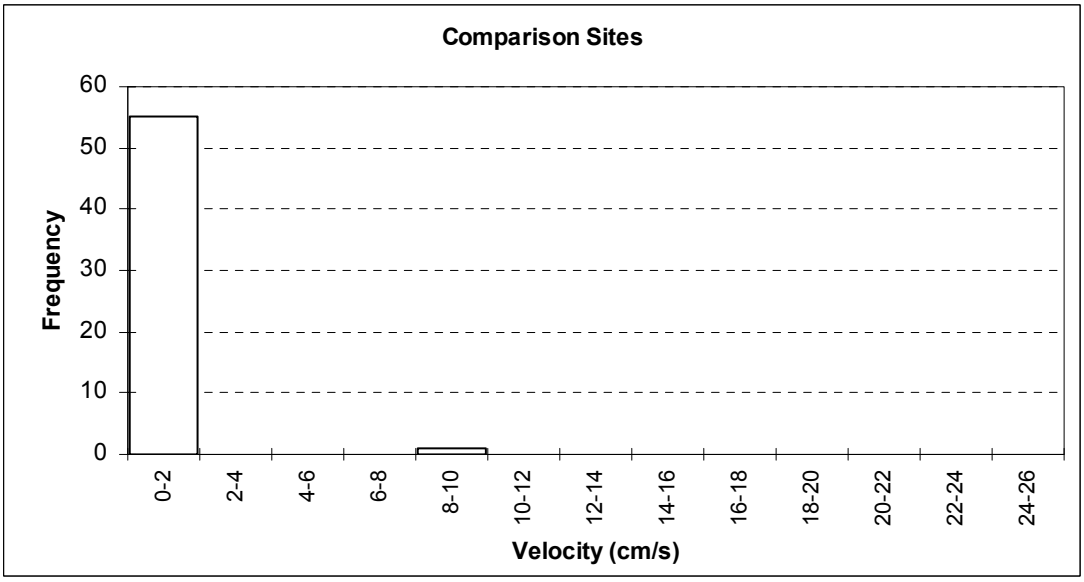
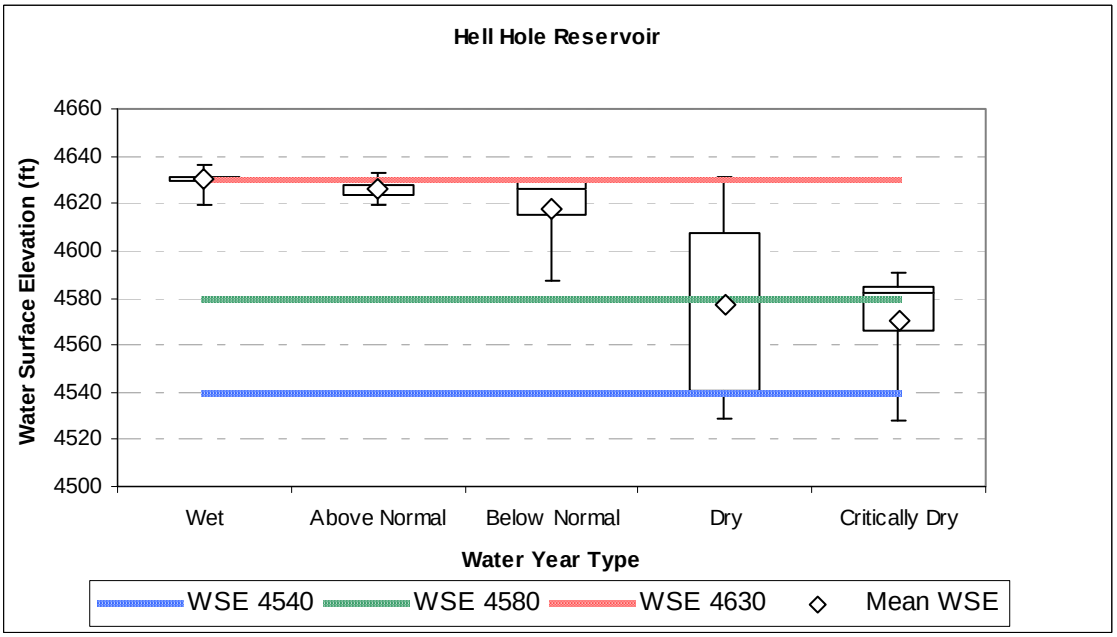
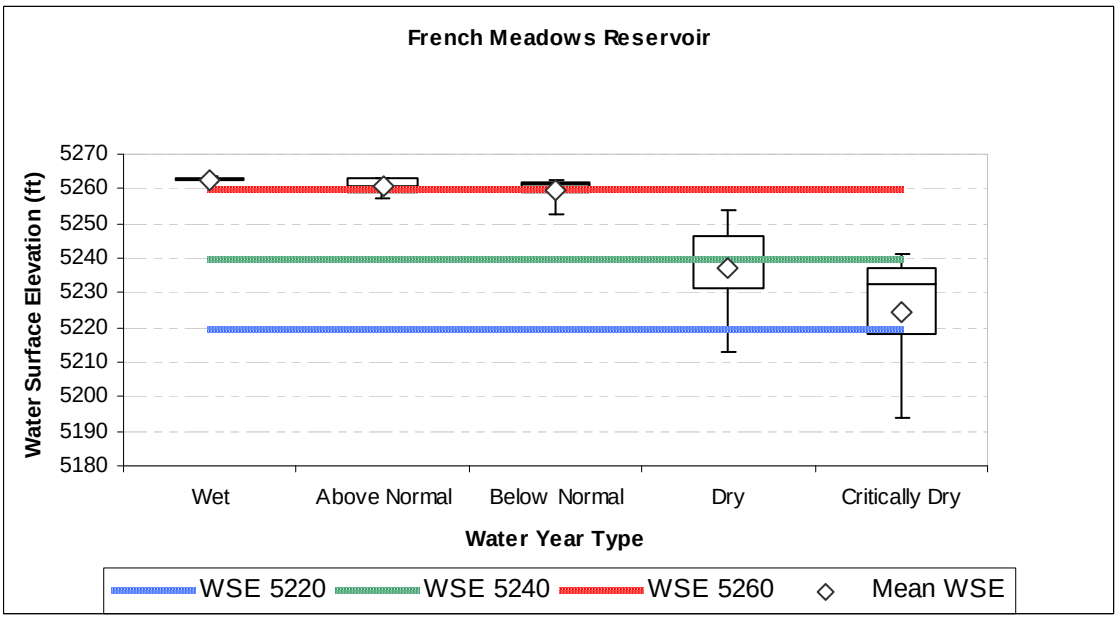


Figure AQ 12-14. Hell Hole Reservoir and French Meadows Reservoir Water Surface Elevations (WSE) for Estimating Western Pond Turtle Habitat[1, 2, 3].





[1]Water surface elevations are based on the annual MAXIMUM water surface elevations for all years of each water year type (1975 to 2003).

[2]The three colored lines indicate the three water surface elevations that were used to estimate western pond turtle habitat.

[3]Box plots show maximum, 75%, median, mean, 25%, and minimum water surface elevations for each water year type.

MAPS

APPENDIX A

Habitat Descriptions of Survey Sites

Physical habitat characteristics at each of the study sites surveyed for FYLFs in the bypass and peaking reaches and their tributaries and in the comparison stream reaches and their tributaries are described in the following sections.

BYPASS AND PEAKING REACHES

Physical habitat characteristics of the sites surveyed for FYLFs in the bypass and peaking reaches are described in the following sections.

Middle Fork American River , RM 0.0 - 24.7 (Peaking Reach)

Seven sites were surveyed in the peaking reach. The sites included AMPH MF 6.4, AMPH MF 9.3, AMPH MF 11.0, AMPH MF 14.1, AMPH MF 19.1, AMPH MF 21.0, and AMPH MF 24.1. The general characteristics of the sites in the peaking reach are described below.

The Middle Fork American River between the confluence with the North Fork American River and Ralston Afterbay was generally a low gradient alluvial river with high amplitude meanders around large point bars. The upper section of the peaking reach was dominated by cobble-sized material, while gravel and sand-sized particles were most common in the lower section. The exception was a one 1.2-mile long bedrock-controlled reach (Ruck-a-Chucky rapids reach), where the valley narrows and bedrock and boulders were the dominant substrate. The AMPH MF 9.3 site is located within this reach. Sediment storage was substantially greater in the peaking reach compared to upstream of Ralston Afterbay and the other bypass streams. In addition to the large point bars, side bars and numerous mid-channel bars were also present (PCWA 2007). Riparian vegetation distribution was patchy, and comprised of willow and alder shrubs and trees. Riparian canopy cover along the stream margins was generally low, although in some locations, canopy cover was dense with riparian shrubs established along the low-flow channel margins. Shallow, cobble-dominated pool tailouts and runs that can be FYLF breeding habitat were common throughout the peaking reach. In addition, small high flow side channels, with potential habitat, were present in AMPH MF 6.4 and AMPH MF 14.1.

Flows in the peaking reach fluctuated considerably both between days and within a day. Daily flows can fluctuate between the minimum instream flow requirement (75 cfs) and the capacity of the Oxbow Powerhouse (1,080 cfs). During the breeding season (May 10 through June 5), average daily flows recorded at the top of the peaking reach fluctuated from approximately 280 cfs to 750 cfs (Gage No. 11433300). During the month of August, average daily flows ranged between 435 cfs and 650 cfs. Average daily water temperatures warmed with distance downstream during the breeding season and in August. Immediately downstream of Ralston Afterbay, the average daily water temperature was 58 ^{o}F (ranging from 55 ^{o}F to 62 ^{o}F) during the breeding season. Just upstream of the North Fork American River confluence (RM 0.1), water temperatures ranged from 58 ^{o}F to 73 ^{o}F, with an average daily water temperature of 66 ^{o}F. In August just downstream of Ralston Afterbay, the average daily water temperature was 60 ^{o}F, ranging between 56 ^{o}F and 65 ^{o}F. At RM 0.1, August water temperatures ranged from 60 ^{o}F to 71 ^{o}F, with an average daily water temperature of 65 ^{o}F. Non-native predators, Brown trout and crayfish, were observed throughout the reach.

AMPH MF 6.4 Middle Fork American River

Representative breeding habitat at upstream end of cobble bar, looking upstream.

Representative habitat looking upstream across river at American Canyon Creek confluence.

AMPH MF 9.3 Middle Fork American River

Representative habitat in the Middle Fork American River, looking upstream.

Potential breeding habitat along the shallow bedrock stream margin, looking upstream. *Buca* and *Hyre* tadpoles were observed in shallow pools.

AMPH MF 11.0 Middle Fork American River

Pool habitat looking across to the Canyon Creek confluence.

Representative habitat looking upstream.

AMPH MF 14.1 Middle Fork American River

Representative habitat for the Middle Fork American River, looking downstream from the upstream end of survey reach. Potential breeding habitat was present along cobble bar margins.

Potential breeding habitat in side channel and upstream end of cobble bar, looking downstream.

AMPH MF 19.1 Middle Fork American River - Cache Rock

Representative habitat for Middle Fork American River, looking downstream.

Potential breeding habitat along cobble bar margin, looking downstream.

AMPH MF 21.0 Middle Fork American River

Representative habitat for the Middle Fork American River, looking upstream.

Potential breeding habitat along in the pool tail-out at upstream end of the cobble bar, looking upstream.

AMPH MF 24.1 Middle Fork American River Below Ralston Afterbay

Representative habitat for the Middle Fork American River, looking upstream.

Potential breeding habitat along the margin of the cobble bar, looking upstream.

Surveyed Tributaries to the Middle Fork American River, RM 0.0 - 24.7

Seven unregulated tributaries to the Middle Fork American River were surveyed for FYLF. These included American Canyon, Todd Creek, Gas Canyon, Canyon Creek, Otter Creek, Volcano Creek, and the North Fork of the Middle Fork American River. Incidental site visits were completed at two sites on tributaries to the peaking reach, including Jesse Canyon (AMPH MF 17.0) and Pond Creek (AMPH MF 18.1). Physical habitat characteristics of these creeks are described below.

<u>AMPH MF 6.4 American Canyon Creek</u>

American Canyon Creek was a narrow, confined perennial stream. Sections of cobble runs alternated with steeper bedrock cascades and pools sections. Riparian vegetation was patchy along the water's edge, and was dominated by small to medium-sized willow shrubs and alder trees. Bedrock and cobble were the dominant substrates. Suitable breeding locations were primarily available in low-gradient cobble substrate runs and shallow pool-tailouts, which occurred in about one-quarter of the site.

Flows were approximately 1 cfs during the fall surveys. Non-native aquatic predators were not observed.

AMPH MF 6.4 American Canyon Creek

Representative step-pool habitat; looking upstream.

Representative riffle-run cobble boulder habitat, looking upstream.

AMPH MF 9.3 Todd Creek

Todd Creek was an ephemeral stream in 2007. The stream channel was approximately 3 meters wide, with an adjacent floodplain along both banks. Upstream of Drivers Flat Road, valley width decreased, and the channel was confined within steep canyon walls. Riparian vegetation downstream of Drivers Flat Road was dominated by small to medium-sized willow and alder trees and shrubs. Canopy coverage along the stream margins was generally less than 25%, with dense vegetation with up to 100% cover in some areas. Bedrock and boulder were the dominant channel substrates. Suitable breeding locations occurred in shallow, low velocity areas behind bedrock/boulders along the margins of a few small plunge pools.

Spring flows were less than 1 cfs. The creek was dry during the fall field surveys. Non-native aquatic predators were not observed.

AMPH MF 9.3 Todd Creek

Eggmass was observed in the bedrock pool at the Middle Fork American River confluence. Pool dried up later in summer. No tadpoles were observed during August surveys.

Representative habitat for Todd Creek, looking upstream.

AMPH MF 9.3 Gas Canyon Creek

Gas Canyon Creek was a narrow (less than 10 meters wide), high-gradient intermittent stream with steep confined canyon walls and no floodplain. In the lower portion of the reach, small pools and cascades dominated, while upstream the gradient increased with larger cascades and pools. Canopy cover along the stream margins was variable within the reach, ranging from 0 to 100%. Willow and alder shrubs and trees were the primary shade providers. Bedrock and cobble were the dominant substrates. Suitable breeding habitat occurred in pool tail-outs and the edges of runs.

Flows were less than 5 cfs during the breeding season surveys. Water was not flowing during the August field survey, although pools remained. Crayfish were observed during surveys.

AMPH MF 9.3 Gas Canyon Creek

Breeding habitat at the downstream end of the reach near confluence with AMPH MF 9.3 site. Eggs were located along the margin.

Representative habitat for Gas Canyon Creek, looking upstream.

AMPH MF 11.0 Canyon Creek

Canyon Creek flowed within a narrow, steep canyon without floodplains. Bedrock and large boulders were the dominant substrates. Medium to small-sized alder and willow trees and shrubs were established within the channel, while oaks provided most of the overstory canopy. Canopy cover along the stream margins was typically high, although several open bedrock areas occurred. Suitable breeding habitat was not present.

Summer base flows were less than 5 cfs. During the breeding season (May 10 through June 5), average daily water temperatures within Canyon Creek just upstream of the confluence with the Middle Fork American River ranged from 52 ^{o}F to 63 ^{o}F, with an average of 58 ^{o}F. During the month of August, average daily water temperatures ranged from 57 ^{o}F to 67 ^{o}F, with an average of 62 ^{o}F. Non-native aquatic predators were not observed.

AMPH MF 11.0 Canyon Creek

Representative bedrock cascade habitat, looking upstream.

Representative cascade-pool habitat, looking upstream.

AMPH MF 14.1 Otter Creek

Otter Creek was a perennial stream approximately 4.5 meters wide, typically with a floodplain along at least one bank. Instream habitats were predominately riffles and runs near the confluence with the Middle Fork American River. The habitat transitioned to cascades and plunge-pools as channel widths decreased upstream. Floodplains also became less frequent with increased distance upstream. Riparian vegetation was dominated by large to medium-sized willow, cottonwood, and alder trees and shrubs. Canopy cover along the stream margins was usually greater than 50%. Boulder and cobble were the dominant substrates in downstream reaches, while bedrock and boulders dominated further upstream. High quality breeding locations were present along the stream margins of runs in the downstream portions of the creek.

During the breeding season (May 10 through June 5), average daily water temperatures within Otter Creek just upstream of the confluence with the Middle Fork American River ranged from 54 ^{o}F to 70 ^{o}F, with an average of 62 ^{o}F. Flows were less than 2 cfs. During the month of August, flows were less than 1 cfs, and average daily water temperatures ranged from 62 ^{o}F to 76 ^{o}F, with an average of 68 ^{o}F. Observed non-native predators included crayfish.

AMPH MF 14.1 Otter Creek

Representative habitat for Otter Creek, looking upstream.

Representative habitat along the edges of a run, looking upstream.

AMPH MF 17.0 Jesse Canyon

Jesse Canyon flowed within a steep, narrow canyon. The channel was primarily bedrock with waterfalls and chutes. Alder and willow trees and shrubs lined the channel. Suitable breeding habitat was not observed within the site.

Flow during the site visit in October was less than 0.5 cfs. Non-native aquatic predators were not observed.

AMPH MF 17.0 Jesse Canyon

Representative habitat for Jesse Canyon.

AMPH MF 18.1 Pond Creek

Pond Creek was located within a steep, narrow canyon. The channel was primarily bedrock with waterfalls and chutes. Alder and willow trees and shrubs lined the channel. Suitable breeding habitat was not observed within the site.

Flow during the site visit was less than 0.5 cfs. Non-native aquatic predators were not observed.

AMPH MF 18.1 Pond Creek

Representative habitat for Pond Creek.

Pond Creek at the confluence with the Middle Fork American River.

AMPH MF 21.0 Volcano Canyon Creek

Volcano Canyon Creek was a small perennial creek (approximately 4.5 meters wide) flowing within steep canyon walls. Instream habitats were dominated by cascades and step-pools with bedrock and large boulders as the dominant substrates. Small to medium-sized alder and willow trees and shrubs were present in the channel. Canopy cover along the stream margins was generally high, with several open bedrock sections. Suitable breeding habitat was not observed within the site.

Flows during the breeding season and August field surveys were less than 1 cfs. Non-native aquatic predators were not observed.

AMPH MF 21.0 Volcano Canyon Creek

Representative habitat for Volcano Canyon Creek, looking downstream.

Representative open bedrock habitat for Volcano Canyon Creek, looking upstream.

AMPH MF 24.1 North Fork of the Middle Fork American River at Middle Fork American River Confluence

The North Fork of the Middle Fork American River was a perennial river, approximately 11 meters wide, with a floodplain present along some reaches. Instream habitats were primarily high-gradient riffles, runs and pools, with substrates of mixed bedrock, boulder and cobble sizes. Riparian vegetation was dominated by small to large-sized willow and alder trees and shrubs. The riparian canopy cover along the stream margins was generally low (less than 25%), with greater coverage in a few small areas (up to 50%). Suitable breeding habitat occurred primarily in boulder protected areas along the stream margins of runs, although suitable habitat also occurred in a few pool tailouts and along the margins of small cobble bars in the downstream portion of the site.

During the breeding season (May 10 through June 5), average daily water temperatures within the North Fork of the Middle Fork American River 2.3 miles upstream from the confluence with the Middle Fork American River ranged from 53 ^{o}F to 70 ^{o}F, with an average of 53 ^{o}F. Flows were approximately 85 cfs. During the month of August, flows were approximately 20 cfs, and water temperatures ranged from 54 ^{o}F to 76 ^{o}F, with an average daily water temperature of 70 ^{o}F. Crayfish were the only non-native predator observed. Brown trout are known to be present, although none were observed during the field surveys.

AMPH MF 24.1 North Fork of The Middle Fork American River at Middle Fork American River Confluence

Potential breeding habitat along the margin of the cobble bar, looking upstream.

Representative habitat for the Middle Fork American River, looking downstream.

Middle Fork American River, RM 26.2 - 35.3 (Ralston Afterbay to Middle Fork Interbay)

Four sites were surveyed in this reach of the Middle Fork American River. These sites included AMPH MF 26.2, AMPH MF 29.4, AMPH MF 30.4, and AMPH MF 35.3. Physical habitat characteristics of each site are summarized below.

The Middle Fork American River between Ralston Afterbay and Middle Fork Interbay was confined within steep bedrock valley walls and was dominated by high-gradient habitats, such as step-pools, high-gradient riffles and runs. Exposed bedrock commonly occurred at the hillslope toe-bankfull width interface. The channel bed was comprised of boulders and cobbles, with frequent bedrock outcrop exposures. Sediment storage in the form of infrequent channel bars was observed throughout the reach, often lined with riparian vegetation, although the size of bars was typically small (PCWA 2007). Riparian vegetation along the stream margins was dominated by mature alders and willows. Canopy cover was typically low (less than 25%), with up to 75% cover in some locations. Suitable breeding habitat occurred primarily in boulder-protected margins of runs and cobble-dominated pool tailouts. Suitable breeding habitat was limited in the upper portion of the reach.

Flows in the reach are regulated by releases from Middle Fork Interbay Dam. During the breeding season (May 10 through June 5), flows were approximately 30 cfs to 43 cfs. During the month of August, flows ranged from approximately 18 cfs to 26 cfs (Gage No. PF-2). Average daily water temperatures warmed with distance downstream from Middle Fork Interbay to Ralston Afterbay. During the breeding season, average daily water temperatures immediately below Middle Fork Interbay ranged from 45 ^{o}F to 57 ^{o}F, with an average of 48 ^{o}F. Just upstream of Ralston Afterbay, average daily water temperatures ranged from 55 ^{o}F to 69 ^{o}F, with an average of 63 ^{o}F. During the month of August, average daily water temperatures ranged from 46 ^{o}F to 50 ^{o}F, with an average of 47 ^{o}F immediately below Middle Fork Interbay. Upstream of Ralston Afterbay, average daily water temperatures ranged from 62 ^{o}F to 73 ^{o}F, with an average of 68 ^{o}F. Non-native predators, such as brown trout and crayfish, were observed in the reach.

AMPH MF 26.2 Middle Fork American River Above Ralston Afterbay

Representative habitat for Middle Fork American River, looking upstream. Potential breeding habitat occurred along edgewater of the run.

Breeding habitat occurred in the pool tailout, looking downstream. Red flagging marks an egg-laying site.

AMPH MF 29.4 Middle Fork American River

Representative habitat for the Middle Fork American River, looking upstream.

Potential breeding habitat occurred behind the boulders and along the stream edge in the run, looking upstream.

AMPH MF 30.4 Middle Fork American River

Potential breeding habitat along river right bank, looking downstream.

Representative run habitat, looking upstream.

AMPH MF 35.3 Middle Fork American River Downstream of Middle Fork Interbay

Representative habitat, looking downstream.

Representative pool habitat, looking downstream.

Surveyed Tributaries to the Middle Fork American River, RM 26.2 - 35.3

One unregulated tributary to the Middle Fork American River between Ralston Afterbay and Middle Fork Interbay was surveyed. Physical habitat characteristics of this tributary are described below.

AMPH MF 30.4 Brushy Canyon Creek

Brushy Canyon Creek was a small, narrow bedrock stream within steep canyon walls dominated by high-gradient cascades and plunge-pools. The stream was approximately 4.5 meters wide, with no floodplains present. An oak overstory shaded the channel. Potential breeding habitat was not observed at this site.

Flow was less than 1 cfs during the August field survey. The creek was not surveyed during the breeding season. Non-native aquatic predators were not observed.

AMPH MF 30.4 Brushy Canyon Creek

Representative habitat for Brushy Canyon Creek, looking upstream.

Middle Fork American 36.2 - 47.2 (Middle Fork Interbay to French Meadows Reservoir)

Two sites were surveyed between Middle Fork Interbay and French Meadows Reservoir. These sites included AMPH MF 36.2 and AMPH MF 39.7. Physical habitat characteristics of this reach are described below.

The Middle Fork American River between Middle Fork Interbay and French Meadows Reservoir was steep and confined within a narrow canyon with high-gradient habitats and bedrock and boulder substrates. Few sediment deposits were observed within or near the active channel. Riparian vegetation along the stream margins was patchy, with sparse vegetation in some areas and denser cover in others. Suitable breeding habitat was limited within this reach.

Flows within this reach are regulated by French Meadows Dam. Except for relatively infrequent spill events during wetter years and powerhouse maintenance periods, releases are the required minimum instream flows. During the breeding season (May 10 through June 5), flows ranged between 39 cfs and 80 cfs. During the month of August, flows were between 14 cfs and 16 cfs. The maximum average daily flow during the preceding winter and spring was 772 cfs (Gage No. 11427760). Immediately downstream of French Meadows Dam, average daily water temperatures ranged from 43 ^{o}F to 54 ^{o}F, with an average of 47 ^{o}F during the breeding season. Just upstream of Middle Fork Powerhouse at RM 36.1, average daily water temperatures ranged from 51 ^{o}F to 66 ^{o}F, with an average of 58 ^{o}F. During the month of August, average daily water temperatures ranged from 46 ^{o}F to 56 ^{o}F, with an average of 50 ^{o}F immediately below French Meadows Dam. Upstream of Middle Fork Powerhouse, the August average daily water temperatures ranged from 60 ^{o}F to 70 ^{o}F, with an average of 65 ^{o}F. Non-native predators were not observed during the field surveys.

AMPH MF 36.2 Middle Fork American River Upstream of Middle Fork Interbay

Representative habitat for Middle Fork American River, looking upstream. Breeding habitat occurred along edgewater of the run.

Small area of potential breeding habitat along cobble bar left-side of photo (shown with white arrow), looking downstream.

AMPH MF 39.7 Middle Fork American River at Duncan Creek

Representative habitat for the Middle Fork American River at the Duncan Creek confluence.

Representative pool habitat along the Middle Fork American River at the Duncan Creek confluence.

Surveyed Tributaries to the Middle Fork American River, RM 36.2 - 47.2

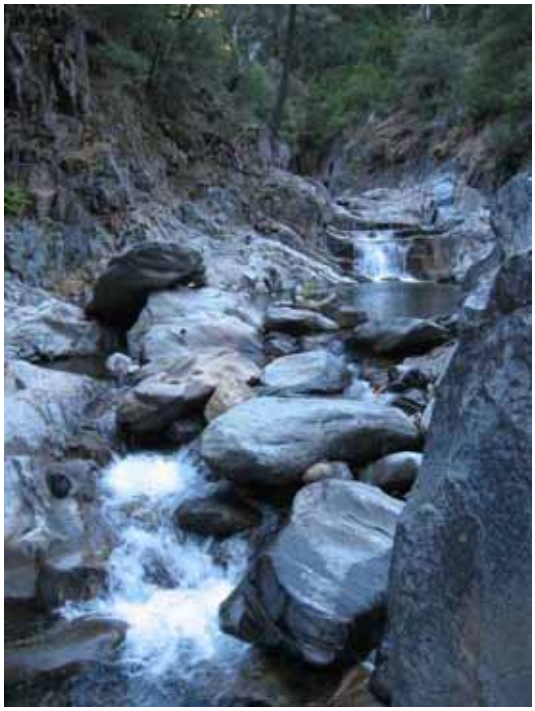
One tributary between Middle Fork Interbay and French Meadows Reservoir was surveyed. Physical habitat characteristics of this tributary, Duncan Creek, are described below.

AMPH MF 39.7 Duncan Creek

Duncan Creek was a steep, confined, bedrock-dominated stream with waterfalls and cascades interrupted by plunge pools. Some riparian vegetation was present, mostly forbs, with a few moderately-sized alders along the channel margins. Canopy cover along the stream margins was low. Suitable breeding habitat was not present in Duncan Creek at the confluence.

Average daily flows during the winter and spring preceding the site surveys in Duncan Creek below the diversion (Gage No. 11427750) ranged between 266 cfs and the minimum instream flow, which was less than 1 cfs. Just upstream of the Middle Fork American River confluence, average daily water temperatures in Duncan Creek ranged from 48 ^{o}F to 61 ^{o}F, with an average of 54 ^{o}F during the breeding season (May 10 through June 5). During the month of August, average daily water temperatures ranged from 56 ^{o}F to 68 ^{o}F, with an average of 61 ^{o}F.

AMPH MF 39.7 Duncan Creek at the Middle Fork American River



Rubicon River, RM 0.0 - 30.3 (Ralston Afterbay to Hell Hole Reservoir)

Seven sites were surveyed along the Rubicon River. These sites included AMPH R 1.2, AMPH R 3.5, AMPH R 5.2, AMPH R 14.3, AMPH R 20.9, AMPH R 22.6, AMPH R 25.7. Physical habitat characteristics of the Rubicon River are summarized below.

The Rubicon River was a perennial river, typically confined within steep canyon walls. The channel was approximately 20 meters wide, often with a floodplain or large bar along at least one bank. Instream habitats were primarily riffle-run and riffle-pool sequences with cobble bars where valley widths were greater and higher-gradient step-pools in narrow bedrock-controlled sections. Boulder, cobble and bedrock were the dominant substrates. Riparian vegetation was patchy, often established on the bars along the low flow channel margins, and dominated by small to medium-sized willow and alder trees and shrubs. Canopy cover was typically less than 25%, although it was higher in localized areas. A four-mile reach immediately downstream of Hell Hole Dam was very different from the remainder of the river downstream. This reach was widened and aggraded by the failure of Hell Hole Dam in 1964. The valley bottom was transformed from a narrow V-shape to a wider U-shaped cross-sectional profile with low stream gradient. The AMPH R 25.7 site is located within this section of the river. High quality breeding locations were available throughout the river, including large cobble bars with associated slow velocity areas, shallow pool tailouts, and wide runs with shallow cobble areas along the margins.

Flows within this reach are regulated by Hell Hole Reservoir. The maximum average daily flow immediately below Hell Hole Dam during the winter and spring preceding the site surveys was 69 cfs. During the spring breeding season (May 10 through June 5) and the month of August, flows ranged from 22 cfs to 24 cfs (Gage No. 11428800). Just upstream of Ralston Afterbay, flows during the breeding season ranged from approximately 80 cfs to 120 cfs. During August, flows were approximately 50 cfs (Gage No. P-F3). Average daily water temperatures generally increased with distance downstream from the dam. Releases from Hell Hole Reservoir were cooler than 50 ^{o}F, with little variability. During the spring breeding season, average daily water temperatures immediately below Hell Hole Dam ranged from 43 ^{o}F to 44 ^{o}F. During the month of August, average daily water temperatures ranged from 44 ^{o}F to 46 ^{o}F. Approximately three miles downstream, below the South Fork Rubicon River confluence, average daily water temperatures warmed to 56 ^{o}F (ranging between 50 ^{o}F and 62 ^{o}F) during the breeding season. In August, average daily water temperatures at this location ranged between 57 ^{o}F and 65 ^{o}F, with an average of 61 ^{o}F. Just upstream of Ralston Powerhouse, the maximum average daily water temperature during the breeding season was 72 ^{o}F, with an average of 65 ^{o}F. During the month of August, average daily water temperatures ranged from 68 ^{o}F to 78 ^{o}F, with an average of 73 ^{o}F. Brown trout were the only observed non-native predator. As crayfish were observed in surrounding reaches, they are likely also present within these surveyed sites.

AMPH R 1.2 Rubicon River

Representative run habitat for the Rubicon River, looking upstream. Breeding occurred in shallow overbank area and edge of run along left-side of photo.

Breeding habitat in the pool tailout backwater at upstream end of bar, looking upstream.

Representative deep-run breeding habitat, looking downstream.

AMPH R 3.5 Rubicon River at Long Canyon Creek

Breeding habitat in pool tailout backwater at upstream end of bar, looking upstream.

Representative habitat for the Rubicon River, looking downstream. Breeding occurred along edge of run.

AMPH R 5.2 Rubicon River at Pilot Creek

Representative habitat for the Rubicon River, looking downstream. Breeding occurred along edge of run.

Breeding habitat in pool tailout backwater at upstream end of bar, looking upstream.

AMPH R 14.3 Rubicon River

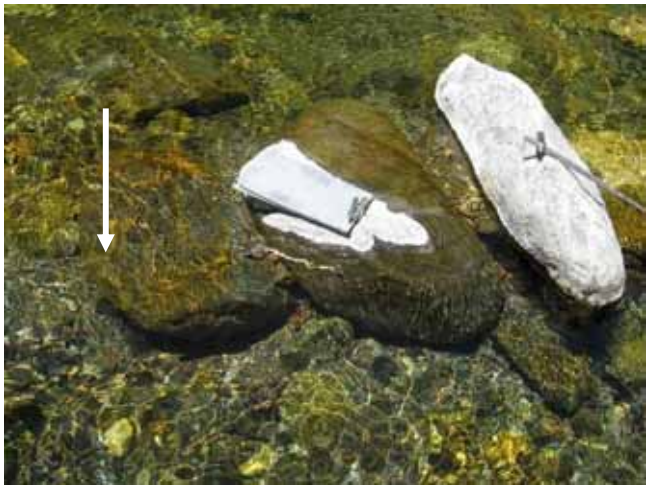
Breeding habitat on the submerged mid-channel cobble bar, looking downstream.

Representative pool/run habitat for the Rubicon River, looking downstream. Breeding occurred along edge of run, right-side of photo.

AMPH R 20.9 Rubicon River Below Ellicot Bridge

Representative habitat for the Rubicon River, looking upstream.

Potential breeding habitat, looking downstream.



Breeding on lee-side of imbricated boulders (indicated with the white arrow) in mid-channel, looking cross-stream.

AMPH R 22.6 Rubicon River at South Fork Rubicon River Confluence

Representative cascade habitat, looking upstream.

Potential breeding habitat along the edge of run, looking downstream.

AMPH R 25.7 Rubicon River Below Hell Hole Reservoir

Representative habitat for the Rubicon River, looking downstream.

Potential breeding habitat along the edge of run, looking downstream.

Surveyed Tributaries to the Rubicon River, RM 0.0 - 30.3

Two tributaries to the Rubicon River were surveyed, Long Canyon Creek and Pilot Creek. Physical habitat characteristics of these sites are summarized below.

AMPH R 3.5 Long Canyon Creek at Rubicon River

Long Canyon Creek was a perennial stream, confined within steep canyon walls and dominated by high-gradient instream habitats such as high-gradient riffles, cascades and plunge-pools. The channel was approximately 10 meters wide with no floodplains. Riparian vegetation was dominated by small to medium-sized willow and alder shrubs and trees, and canopy cover along the stream margin was typically less than 25%. Boulder and bedrock were the dominant particle sizes, with some cobble-sized material present in depositional areas. A few larger pools close to the confluence with the Rubicon River had potential breeding habitat in boulder-protected edgewater; however, suitable breeding habitat was not observed upstream.

Flow within Long Canyon Creek is diverted on North and South Fork Long Canyon Creeks primarily in the winter and spring. Diversion does not usually occur in the later summer and early fall, resulting in natural flows during this time. During the breeding season (May 10 through June 5), flows ranged from approximately 22 cfs to 40 cfs (Gage No. P-F4). Average daily water temperatures just upstream of the confluence with the Rubicon River during the breeding season ranged from 57 ^{o}F to 62 ^{o}F, with an average of 59 ^{o}F. During the month of August, average daily water temperatures ranged from 66 ^{o}F to 78 ^{o}F, with an average of 72 ^{o}F. Flows were less than 5 cfs during the August field surveys. Non-native predators were not observed during the field surveys.

AMPH R 3.5 Long Canyon Creek at Rubicon River

Representative cascade habitat for Long Canyon Creek, looking upstream.

Potential breeding habitat approximately 300 meters upstream of confluence with R 3.5.

AMPH R 3.5 Long Canyon Creek at Rubicon River (continued)

Representative run habitat on upper Long Canyon Creek, looking downstream.

AMPH R 5.2 Pilot Creek

Pilot Creek was a narrow (approximately 4.5 meters wide) perennial stream confined within steep bedrock canyon walls. Instream habitats were primarily high-gradient cascades and plunge-pools, although a few lower-gradient sections with high-gradient riffles occurred. Riparian vegetation was dominated by small to medium-sized willow and alder trees, with moderate canopy coverage along the stream margins. Potential breeding habitat was limited and associated with boulder-protected stream margins.

Flow in Pilot Creek was regulated by Sacramento Municipal Utility District (SMUD) at Stumpy Meadows Reservoir (FERC Project No. 2101). During the breeding season (May 10 through June 5), average daily water temperatures just upstream of the confluence with the Rubicon River ranged from 61 ^{o}F to 65 ^{o}F, with an average of 58 ^{o}F. Flows in Pilot Creek at this time were less than 2 cfs. During the month of August, average daily water temperatures ranged from 58 ^{o}F to 68 ^{o}F, with an average of 62 ^{o}F. Flow was less than 1 cfs during the August field surveys. Non-native predators were not observed during the site surveys.

AMPH R 5.2 Pilot Creek

Representative low-gradient habitat near the Rubicon River confluence, looking upstream.

Potential breeding habitat located behind boulders and in backwaters of pool, looking upstream.

AMPH R 5.2 Pilot Creek (continued)

Representative high-gradient habitat for Pilot Creek, looking upstream.

Long Canyon Creek and Surveyed Tributaries, RM 9 - 11.4

Two sites were surveyed along Long Canyon Creek, including one unregulated tributary. An incidental site visit was conducted at Wallace Creek. Physical habitat characteristics of each of the sites, including Wallace Creek, Long Canyon Creek at Ramsey Crossing, and at the confluence of the North and South Forks Long Canyon Creek including upstream each of the forks, are described below.

AMPH LC 5.6 Wallace Creek

Wallace Creek was a small stream (approximately 6 meters wide) located within steep canyon walls with no flood plains. The channel was very high-gradient, dominated by large boulders and bedrock waterfalls and chutes. Small to medium-sized alder and willow trees and shrubs were present in the channel, with oaks providing the overstory. Canopy cover along the stream margins was typically high. Potential breeding habitat was not observed at this site.

During the breeding season (May 10 through June 5), flows were less than 1 cfs and average daily water temperatures just upstream of the confluence with Long Canyon Creek (RM 6.8) ranged from 49 ^{o}F to 56 ^{o}F, with an average of 52 ^{o}F. During the month of August, flows were less than 1 cfs and average daily water temperatures ranged from 58 ^{o}F to 68 ^{o}F, with an average of 62 ^{o}F. Non-native aquatic predators were not observed.

AMPH LC 5.6 Wallace Creek

Representative bedrock cascade habitat, looking downstream at plunge pools.

AMPH LC 9.0 Long Canyon Creek (Ramsey Crossing)

Long Canyon Creek was a relatively narrow (approximately 6 meters wide) perennial stream confined within steep canyon walls with no floodplains. Instream habitats were primarily high-gradient cascades and step-pools, although some lower-gradient sections with runs and riffles occurred. Boulder and bedrock were the dominant substrates with some cobbles in small depositional areas. Riparian vegetation was dominated by small to medium sized willow and alder trees and shrubs, with low to moderate canopy cover along the stream margins. Suitable breeding habitat was rare, occurring in only a few larger pools that had boulder-protected edgewater.

Flow within Long Canyon Creek was diverted on North and South Fork Long Canyon creeks primarily in the winter and spring. Diversion usually does not occur in the later summer and early fall, resulting in natural flows during this time. Winter and spring flows peaked at 216 cfs, while during the breeding season (May 10 through June 5), flows were approximately 11 cfs (Gage No. P-F5). Average daily water temperatures within Long Canyon Creek just upstream of the confluence with Wallace Canyon (RM 6.8) during the breeding season ranged from 51 ^{o}F to 60 ^{o}F, with an average of 55 ^{o}F. During the month of August, flows were less than 1 cfs and average daily water temperatures ranged from 59 ^{o}F to 70 ^{o}F, with an average of 64 ^{o}F. Brown trout were observed during the field surveys.

AMPH LC 9.0 Long Canyon Creek - Ramsey Crossing

Representative habitat for Long Canyon Creek, looking downstream.

Representative run habitat for Long Canyon Creek, looking upstream.

AMPH LC 11.4 Confluence of North Fork and South Fork Long Canyon Creeks

This site is located at the confluence of the North and South Forks of Long Canyon creeks, and includes surveys along both tributaries. Both forks were perennial within the surveyed site, although sections were intermittent farther upstream. Each stream was relatively small, with channel widths less than 10 meters wide in the majority of the reach, and dominated by cascades and plunge-pools. Long Canyon Creek downstream of the confluence was narrow (less than 15 meters wide), and dominated by larger cascades and pools. Substrates were primarily bedrock, boulder and cobble, and floodplains were poorly developed or absent both upstream and downstream of the confluence. Riparian canopy coverage along the stream margins was typically high. Willows and alders were the primary shade providers with a fir and pine overstory in some areas. Suitable breeding habitat was rare.

Flow within Long Canyon Creek was diverted on North and South Fork Long Canyon creeks primarily in the winter and spring. Diversion usually does not occur in the later summer and early fall, resulting in natural flows during this time. During the field surveys, flows were less than 5 cfs. During the breeding season (May 10 through June 5), average daily water temperatures just downstream of the North and South Forks Long Canyon creeks confluence ranged from 49 ^{o}F to 56 ^{o}F, with an average of 52 ^{o}F. Water temperatures during this time period immediately below the diversion dams on both forks were slightly warmer. During the month of August, average daily water temperatures below the confluence of the forks ranged from 55 ^{o}F to 68 ^{o}F, with an average of 61 ^{o}F. Water temperatures below the South Fork Long Canyon Creek diversion were slightly cooler than those below the confluence. Below the North Fork Long Canyon Creek diversion dam, the average daily water temperature was similar to those below the confluence, but maximum daily water temperatures were greater (74 ^{o}F). Brown trout and California newts were observed during the field surveys.

AMPH LC 11.4 Long Canyon Creek

Representative habitat for North Fork Long Canyon Creek, looking downstream.

Representative habitat for South Fork Long Canyon Creek, looking downstream.

AMPH LC 11.4 South Fork Long Canyon Creek

Representative habitat for South Fork Long Canyon, looking downstream.

COMPARISON STREAM REACHES

Surveys were completed on two comparison streams, the North Fork American River and the North Fork of the Middle Fork American River. Physical habitat characteristics of the survey sites along each of these rivers are described below.

North Fork American River, RM 0 - 35.7

Two mainstem sites and two tributaries were surveyed along the North Fork American River. Incidental site visits were conducted at two additional locations along the North Fork American River. Physical habitat characteristics of each of these sites are described below.

AMPH NF 21.2 North Fork American River at Middle Fork American River Confluence

The North Fork American River upstream of the confluence with the Middle Fork American River was a perennial stream that flowed within moderately steep canyon walls. The channel was approximately 15 meters wide with long deep pools and minimal floodplains, if present. Cobble point and side bars were few, though some mid-channel bars were present. Bedrock and sand were the dominant substrates. Riparian vegetation was patchy and dominated by small to medium-sized willow and alder trees and shrubs. Canopy cover was generally low. Suitable breeding areas were not present for the majority of the site due to the dominance of long deep pools and short runs.

Flows are minimally regulated within the North Fork American River by the North Fork Dam, which forms Lake Clementine. During the breeding season (May 10 through June 5), flows ranged from approximately 50 cfs to 500 cfs. Average daily water temperatures recorded at RM 21.4 ranged from 58 ^{o}F to 74 ^{o}F, with an average of 66 ^{o}F. During the month of August, flows were approximately 40 cfs and average daily water temperatures ranged from 70 ^{o}F to 80 ^{o}F, with an average of 74 ^{o}F. Bullfrogs (adults and tadpoles), crayfish, and smallmouth bass were observed.

AMPH NF 21.2 North Fork American River at Middle Fork American River Confluence

Representative habitat for the North Fork American River, looking upstream. Potential breeding habitat occurred along margin of cobble bar.

Potential breeding habitat along cobble bar margin, looking upstream.

AMPH NF 21.2 Middle Fork American River at North Fork American River Confluence

Representative run habitat, looking upstream.

Representative pool habitat, looking downstream.

AMPH NF 31.5 North Fork American River

The North Fork American River was a perennial stream that flowed within moderately steep canyon walls. The valley bottom was mostly narrow with no floodplains. Instream habitats included riffle-pool sequences with associated cobble bars in wider channel sections and higher-gradient habitats with bedrock and boulder substrates where the valley narrowed. Riparian vegetation was patchy and dominated by small willow and alder shrubs and trees, and canopy cover was generally low Suitable breeding locations were sparse, located along the margins of cobble bars. Infrequent breeding habitat locations included shallow to moderately deep, slow velocity areas protected by boulders.

AMPH NF 31.5 North Fork American River

Representative habitat for North Fork American River.

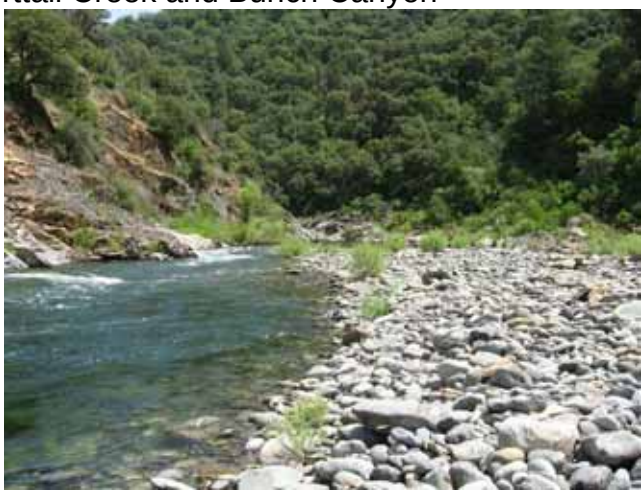
AMPH NF 35.7 North Fork American River at Shirttail Creek and Bunch Canyon

At Shirttail Creek and Bunch Canyon, the North Fork American River channel flowed within steep canyon walls, and the valley bottom widened at the tributary confluences. Instream habitats included high-gradient riffles, runs, and pools with coarse boulder and cobble substrates. Riparian vegetation distribution was patchy and dominated by small willow and alder shrubs and trees. Canopy coverage along the stream margin was generally less than 25%. Suitable breeding locations occurred in boulder-protected margins of runs and along the margin of side channel bars.

During the breeding season (May 10 through June 5), flows ranged from approximately 50 cfs to 500 cfs. A peak flow of 7,240 cfs was recorded during the early spring, prior to the breeding season (Gage No. 11427000). Average daily water temperatures just upstream of the Shirttail Creek confluence (RM 38.0) during this time ranged from 53 ^{o}F to 70 ^{o}F, with an average of 61 ^{o}F. During the month of August, flows were approximately 40 cfs and average daily water temperatures ranged from 64 ^{o}F to 76 ^{o}F, with an average of 70 ^{o}F. Observed non-native predators included brown trout, smallmouth bass and crayfish.

AMPH NF 35.7 North Fork American River at Shirttail Creek and Bunch Canyon

Representative habitat for North Fork American River, looking upstream. Potential breeding habitat occurred along margin of cobble bar (photo taken in fall).



Breeding habitat occurred along cobble bar margin, looking upstream.

AMPH NF 35.7 Shirttail Creek

Shirttail Creek was a perennial stream, approximately 6 meters wide near the confluence, typically with a small floodplain along at least one bank. Upstream, the channel narrowed and floodplains became less frequent. Instream habitats were predominately step-pools, riffles and runs, transitioning to cascades and plunge-pools as gradient increased upstream. Substrates were dominated by bedrock and boulder with cobble occurring in depositional areas. Riparian vegetation was patchy and dominated by small to medium-sized willow and alder trees and shrubs. Canopy cover along the stream margin was typically less than 50%. Quality breeding habitat locations occurred primarily in pool tailouts near the confluence, shallow boulder-protected areas along pool and run margins upstream.

During the breeding season surveys, flows were approximately 7 cfs, and in August, flows were less than 3 cfs. Non-native aquatic predators were not observed during the field surveys.

AMPH NF 35.7 Shirttail Creek

Representative habitat for Shirttail Creek, looking upstream.

Breeding habitat in pool tailout along deposition bar margin, looking upstream. Red flagging marks eggmass location (shown with white arrow).

AMPH NF 35.7 Bunch Canyon

Bunch Canyon was a small perennial stream (less than 10 meters wide) confined within steep canyon walls. The canyon was a tributary of the North Fork American River, located approximately 500 meters downstream of Shirttail Creek. In the lower portion of the reach, small pools with cobble substrate and bedrock cascades were common. Upstream, the gradient and the size of cascades and pools increased. Canopy cover along the stream margin was typically less than 50%, with up to 100% cover in some areas. Willow and alder trees and shrubs were the primary shade providers. Suitable breeding habitat occurred in pool tailouts and the edges of runs.

During the field surveys, flows were less than 5 cfs, and crayfish were observed.

AMPH NF 35.7 Bunch Canyon

Representative habitat for Bunch Canyon, looking upstream (photo taken during fall survey).

Potential breeding habitat at downstream end of reach near confluence with AMPH NFAR 35.7 site.

AMPH NF 53.7 North Fork American River

The North Fork American River at AMPH NF 53.7 is similar to that described above at AMPH NF 35.7. The river is confined within moderately steep valley walls and instream habitats are predominantly moderate-gradient riffles, runs and pools. Bedrock and boulder are the dominant substrates in higher-gradient sections, while boulder and cobble bars occur where the channel widens. Riparian vegetation was patchy, occurring on a few bars or in protected areas along the channel. Canopy cover was generally low. The vegetation was comprised of small willow and alder shrubs and trees. Suitable breeding locations occurred in boulder-protected margins of runs and along the margin of side channel bars.

AMPH NF 53.7 North Fork American River

Representative habitat for the North Fork American River.

North Fork of the Middle Fork American River

One site was surveyed along the North Fork of the Middle Fork American River, which is characterized in the following section.

AMPH NFMF 2.3 North Fork of the Middle Fork American River

The North Fork of the Middle Fork American River was a moderately-sized perennial river (approximately 11 meters wide) confined within steep canyon walls. The overall gradient of the stream was moderate with step/pool sequences and runs as the dominant habitat types. A well-developed boulder/cobble armor overlaying a bedrock channel floor was characteristic of the reach, though a few bedrock knick points were observed. Small floodplains were present on at least one side of the reach for the majority of its length. Riparian vegetation was patchy and dominated by willow and alder shrubs and trees. Canopy cover was generally less than 25%. Suitable breeding habitat was available throughout the reach and was present primarily in boulder-protected edges of runs. One large backwater in a side channel provided particularly good breeding habitat and contained abundant FYLF, Pacific Treefrog and Western Toad tadpoles during the fall survey.

During the breeding season (May 10 through June 5), flows ranged between approximately 50 cfs and 100 cfs (Gage No. P-F1). Average daily water temperatures within the North Fork of the Middle Fork American River at RM 2.3 ranged from 53 ^{o}F to 70 ^{o}F during this time period, with an average of 61 ^{o}F. During the month of August, flows were approximately 20 cfs. Average daily water temperatures ranged from 64 ^{o}F to 76 ^{o}F, with an average of 70 ^{o}F. Crayfish were observed during site visits.

AMPH NFMF 2.3 North Fork Middle Fork American River

Representative habitat for the North Fork of the Middle Fork American River, looking downstream. Potential breeding habitat occurred along edgewater of run.

Breeding habitat along cobble bar margin, looking downstream. Red flagging to the right of large boulder marks eggmass location (shown with white arrow).

AMPH NFMF 2.3 North Fork of the Middle Fork American River Downstream of Circle Bridge

Representative habitat for North Fork of the Middle Fork American River, looking upstream. Breeding habitat occurred at upstream end of bar at bottom of photo.

Breeding habitat in side channel backwater, looking upstream. Red flagging marks eggmass location (shown with white arrow).

References

PCWA. 2007. Middle Fork American River Project (FERC 2079) 2006 Draft Physical Habitat Characterization Study. April, 2007.

APPENDIX B

Aerial Maps of Survey Sites

MAPS

APPENDIX C

Temperature and Flow Summary Plots and Tables

The average, minimum, and maximum water temperatures during the 2007 spring and summer foothill yellow-legged frog surveys at the water temperature monitoring sites (PCWA 2007) are summarized in Table C-1. Water temperatures and flow are shown for selected foothill yellow-legged frog monitoring sites in the following graphs: on the Middle Fork American River (Figure C-1a through C-1j), Rubicon River (Figure C-2a through C-2f), Long Canyon Creek (Figure C-3a through C-3b), North Fork American River (Figure C-4a through C-4b), and North Fork of the Middle Fork American River (Figure C-5).

TABLES

Table C-1. Average, Maximum, and Minimum Water Temperatures at Temperature Monitoring Sites During 2007 Foothill Yellow-legged Frog Site Visits[1].

Temperature Logger ID	Site Name	River Mile	Time 1	>5/10/07	<6/8/07	Time 2	>8/1/07	<8/31/07
			Avg	MAX	MIN	Avg	MAX	MIN
Middle Fork American River and Tributaries								
MF0.1	MF American R Immediately Upstream of NF American R	0.1	65.9	72.6	58.3	64.5	71.1	60.0
MF8.9	MF American R Downstream of Ruck-a-Chucky Rapids	8.9	63.0	69.3	56.7	60.7	64.1	57.2
CC0.1	Canyon Cr Immediately Upstream of MF American R	0.1	58.4	63.4	51.9	61.6	67.2	56.6
MF11.0	MF American R Immediately Upstream of Canyon Cr	11.0	61.9	70.0	54.7	59.1	63.5	55.3
OC0.1	Otter Cr Immediately Upstream of MF American R	0.1	62.3	69.8	54.3	68.4	75.9	62.0
MF14.3	MF American R Immediately Upstream of Otter Cr	14.3	60.9	68.7	54.4	57.8	61.1	54.4
MF19.6	MF American R Downstream of Volcano Canyon Cr	19.6	59.6	64.3	54.7	56.4	58.8	54.3
MF23.1	MF American R Downstream of NF of the MF American R	23.1	57.9	63.3	53.4	54.4	57.3	51.5
MF24.3	MF American R Immediately Downstream of Oxbow Powerhouse	24.3						
MF24.6	MF American R Downstream of Ralston Afterbay Dam	24.6	59.4	65.4	54.6	59.6	64.5	55.7
MF26.0	MF American R Immediately Upstream of Ralston Afterbay Reservoir	26.0	63.1	68.8	55.4	67.5	72.7	62.4
MF29.4	MF American R Downstream of Brushy Canyon Cr	29.4	58.4	64.8	50.4	62.0	68.2	56.0
MF35.5	MF American R Immediately Downstream of Interbay Dam	35.5	47.5	56.9	45.1	47.2	49.9	46.0
MF35.9	MF American R Immediately Downstream of MF Powerhouse Outlet	35.9						
MF36.1	MF American R Immediately Upstream of MF Powerhouse	36.1	57.8	66.4	51.4	64.9	70.3	59.8
MF39.4	MF American R Immediately Upstream of Duncan Cr	39.7	57.0	63.4	49.6	62.6	67.2	58.0
MF44.6	MF American R Midway Between French Meadows Reservoir and Duncan Cr	44.6	53.0	59.4	45.7	56.5	60.5	51.8
MF46.6	MF American R Downstream of French Meadows Reservoir	46.6	48.1	56.9	42.9	49.5	56.0	45.7
MF51.9	MF American R Upstream of French Meadows Reservoir	51.9	49.0	62.3	38.5	63.3	73.8	51.9
Rubicon River and Tributaries								
RR0.5	Rubicon R Immediately Downstream of Ralston Powerhouse	0.5						
RR0.7	Rubicon R Immediately Upstream of Ralston Powerhouse	0.7	64.7	72.4	57.0	73.2	78.3	68.2
RR5.3	Rubicon R Immediately Upstream of Pilot Cr	5.3	64.2	71.9	56.3	72.3	78.3	67.1
RR9.5	Rubicon R Downstream of Big Grizzly Canyon Cr	9.5						
RR14.3	Rubicon R Between SF Rubicon R and Big Grizzly Canyon Cr	14.3	61.3	68.8	54.7	68.6	73.9	64.1
RR22.5	Rubicon R Immediately Downstream of SF Rubicon R	22.5	55.9	62.4	50.3	60.8	64.7	57.0
SF0.1	SF Rubicon R Immediately Upstream of Rubicon R	0.1	56.4	64.0	49.3	62.5	67.0	57.4
RR22.7	Rubicon R Upstream of SF Rubicon R	22.7	55.4	61.6	50.1	59.9	63.6	56.5
RR25.3	Rubicon R Upstream of Deer Cr	25.3	52.9	59.2	47.2	55.7	60.1	51.3
RR28.8	Rubicon R Downstream of Intermittent Reach	28.8	46.2	49.0	45.1	47.1	48.7	46.2
RR3.7	Rubicon R Immediately Upstream of Long Canyon Cr	3.7	64.0	71.7	56.3	71.1	77.2	66.1
RR30.2	Rubicon R Immediately Downstream of Hell Hole Reservoir	30.2	43.3	44.7	42.7	44.7	45.5	44.1
RR35.9	Rubicon R Upstream of Hell Hole Reservoir	35.9	52.3	63.5	43.0	66.1	72.0	59.8
FL0.1	Five Lakes Cr Upstream of Hell Hole Reservoir	0.1	47.8	58.7	38.5	62.4	67.0	58.1
Long Canyon Creek and Tributaries								
LC0.1	Long Canyon Cr Immediately Upstream of Rubicon R	0.1	61.4	68.8	54.5	71.8	78.0	65.9
WC1.2	Wallace Canyon Cr Upstream of Long Canyon Cr	1.2	53.8	61.5	45.2	60.0	67.6	54.2
LC6.8	Long Canyon Cr Immediately Upstream of Wallace Canyon Cr	6.8	56.7	65.8	48.3	64.3	70.2	58.6
LC11.1	Long Canyon Cr Immediately Downstream of North and South Fork Long Canyon Crs	11.1	53.0	62.0	45.4	60.5	67.8	54.6
North and South Fork Long Canyon Creeks								
NL3.1	NF Long Canyon Cr Immediately Downstream of Diversion Dam	3.1	53.8	65.9	45.0	60.9	74.2	52.9
NL3.2	NF Long Canyon Cr Immediately Upstream of Diversion Dam	3.2	53.5	62.7	45.0	58.7	62.4	54.8
SL3.2	SF Long Canyon Cr Immediately Downstream of Diversion Dam	3.3	50.5	60.4	43.1	58.1	65.6	51.7
SL3.4	SF Long Canyon Cr Immediately Upstream of Diversion Dam	3.4	50.6	60.0	44.9	55.3	64.0	48.2
North Fork American River								
NF14.9	NF American R at Auburn Dam Site	14.9	65.3	71.8	58.2	64.2	69.6	60.4
NF20.8	NF American Immediately Downstream of MF American R	20.8	65.2	71.9	58.6	63.9	70.4	59.7
NF21.4	NF American Upstream of MF American R	21.4	65.5	73.6	58.1	74.2	79.5	70.0
NF38.0	NF American Upstream of Shirttail Creek	38.0	61.8	71.7	53.4	74.7	82.7	68.8
NF54.0	NF AmericanDownstream of Euchre Bar	54.0						
North Fork of the Middle Fork American River								
NM2.3	NF of the MF American R Upstream of MF American R	2.3	61.1	69.7	53.3	70.0	76.4	64.4
Duncan Creek								
DC0.1	Duncan Cr Immediately Upstream of MF American R	0.1	54.3	61.4	47.7	60.9	67.5	56.0
DC8.4	Duncan Cr Downstream of Diversion Dam	8.4	52.0	63.2	40.7	66.2	73.2	62.3
DC8.8	Duncan Cr Immediately Upstream of Diversion Dam	8.8	50.9	64.7	39.2	63.5	68.8	60.4
PC0.1	Pilot Cr Immediately Upstream of Rubicon R	0.1	58.0	64.6	51.3	62.2	67.5	57.5

[1] The temperature data from the temperature logger closest to the selected foothill yellow-legged frog study sites was used to develop the figures contained in this appendix.

FIGURES

Figure C-1a. Temperature and Discharge at AMPH MF 6.4 / MF 9.3 Todd, Gas Canyon.

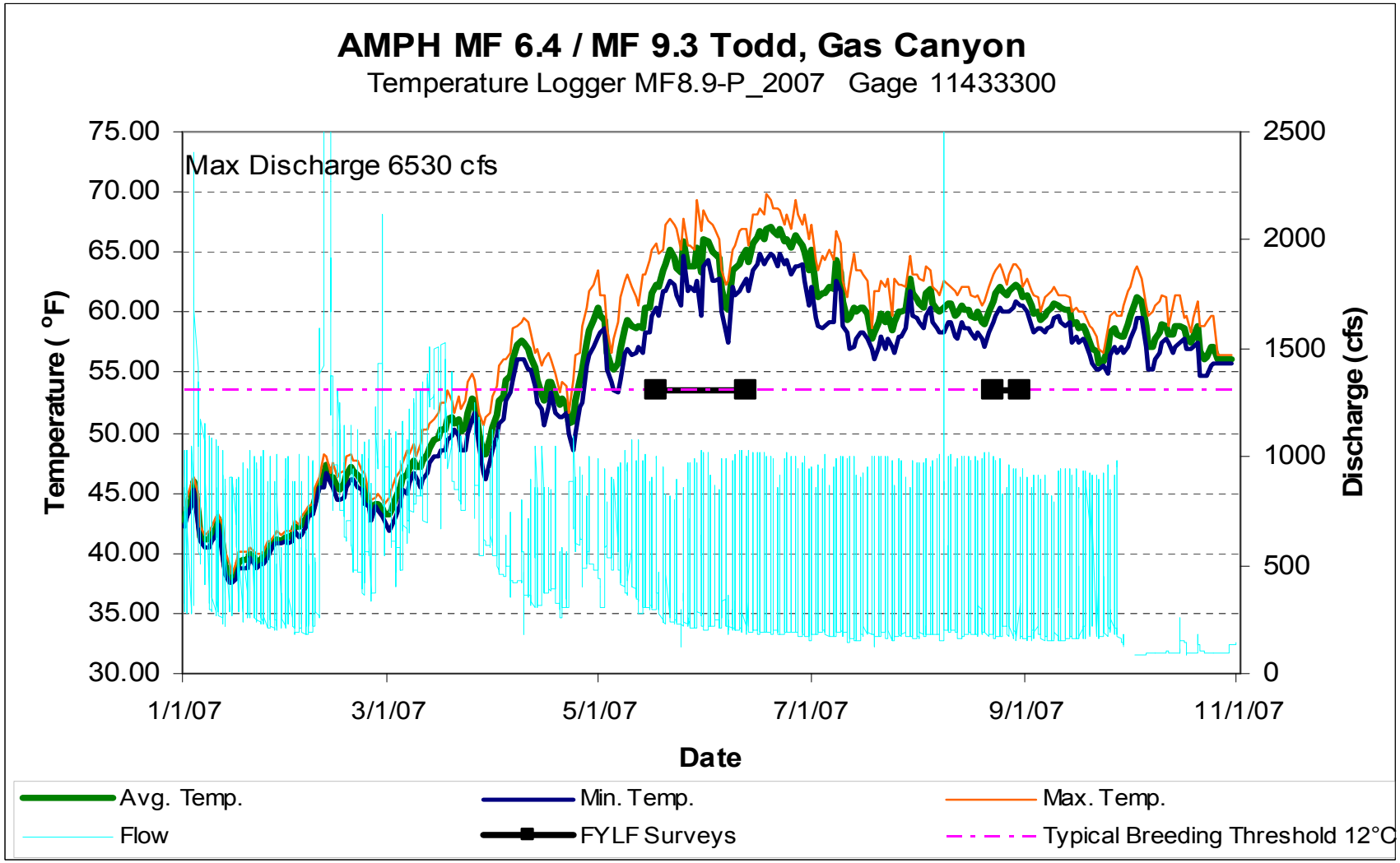


Figure C-1b. Temperature and Discharge at AMPH MF 14.1 Mainstem.

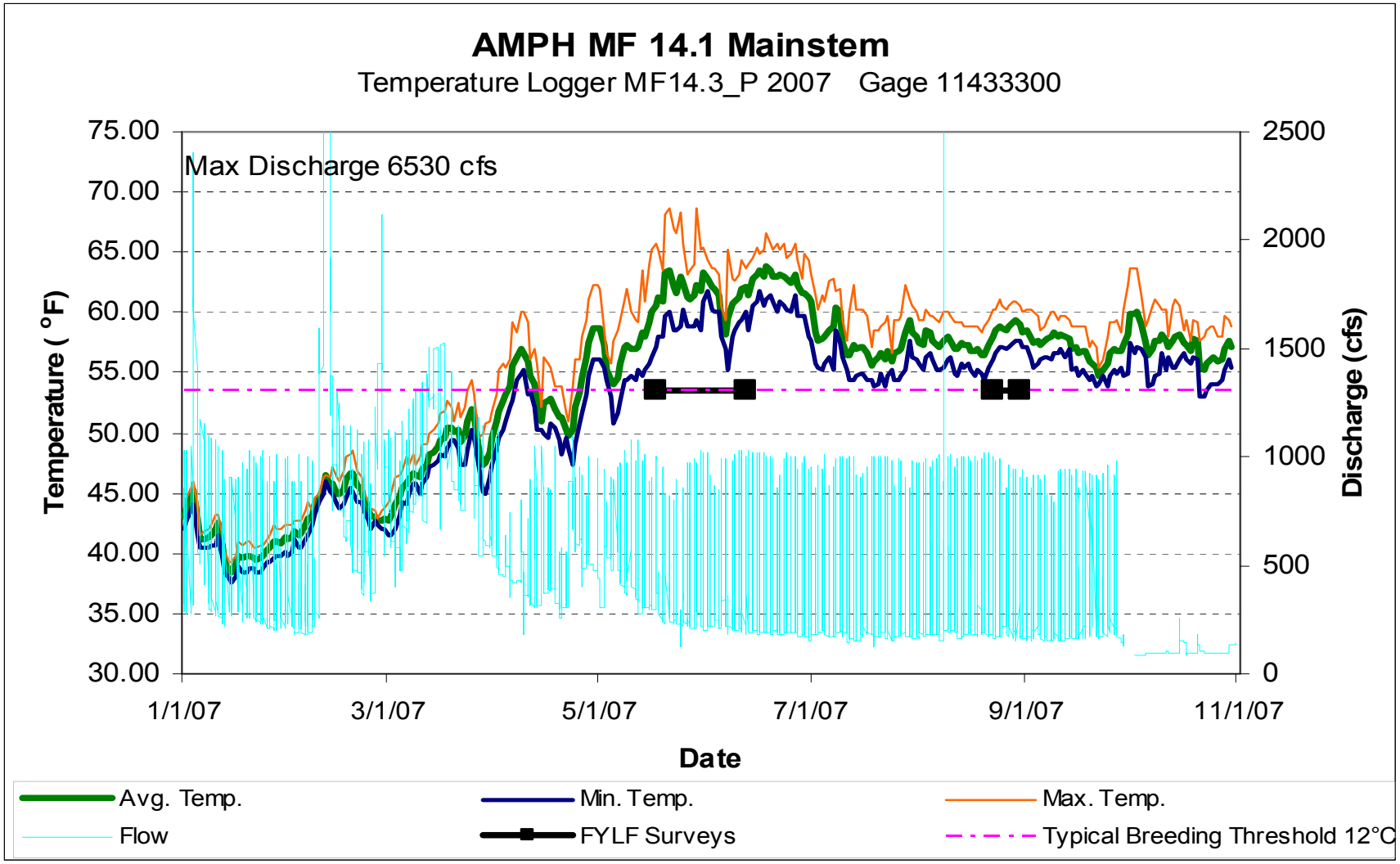


Figure C-1c. Temperature and Discharge at AMPH MF 19.1 Cache Rock / MF 21.0.

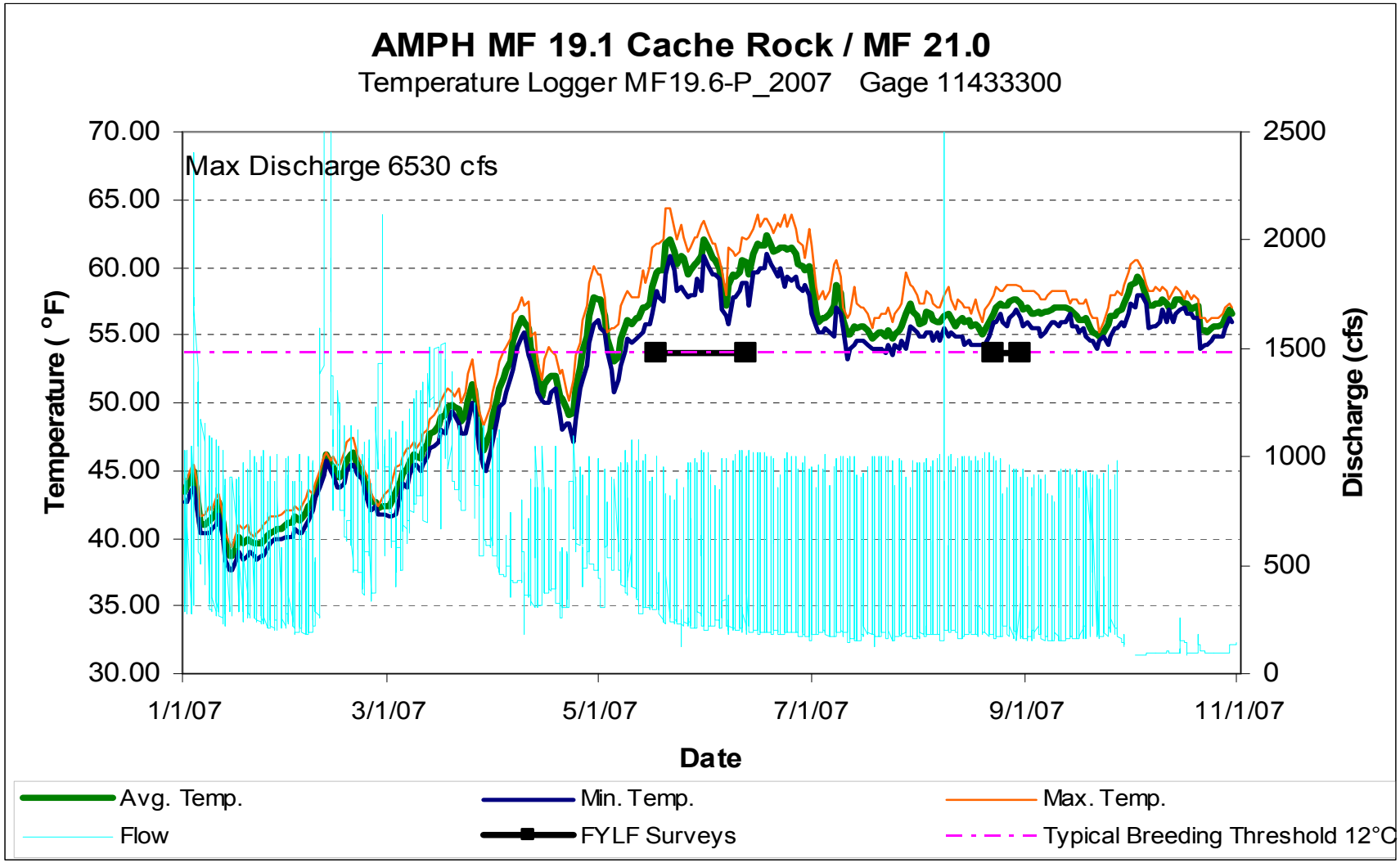


Figure C-1d. Temperature and Discharge at AMPH NF 21.2 Middle Fork American.

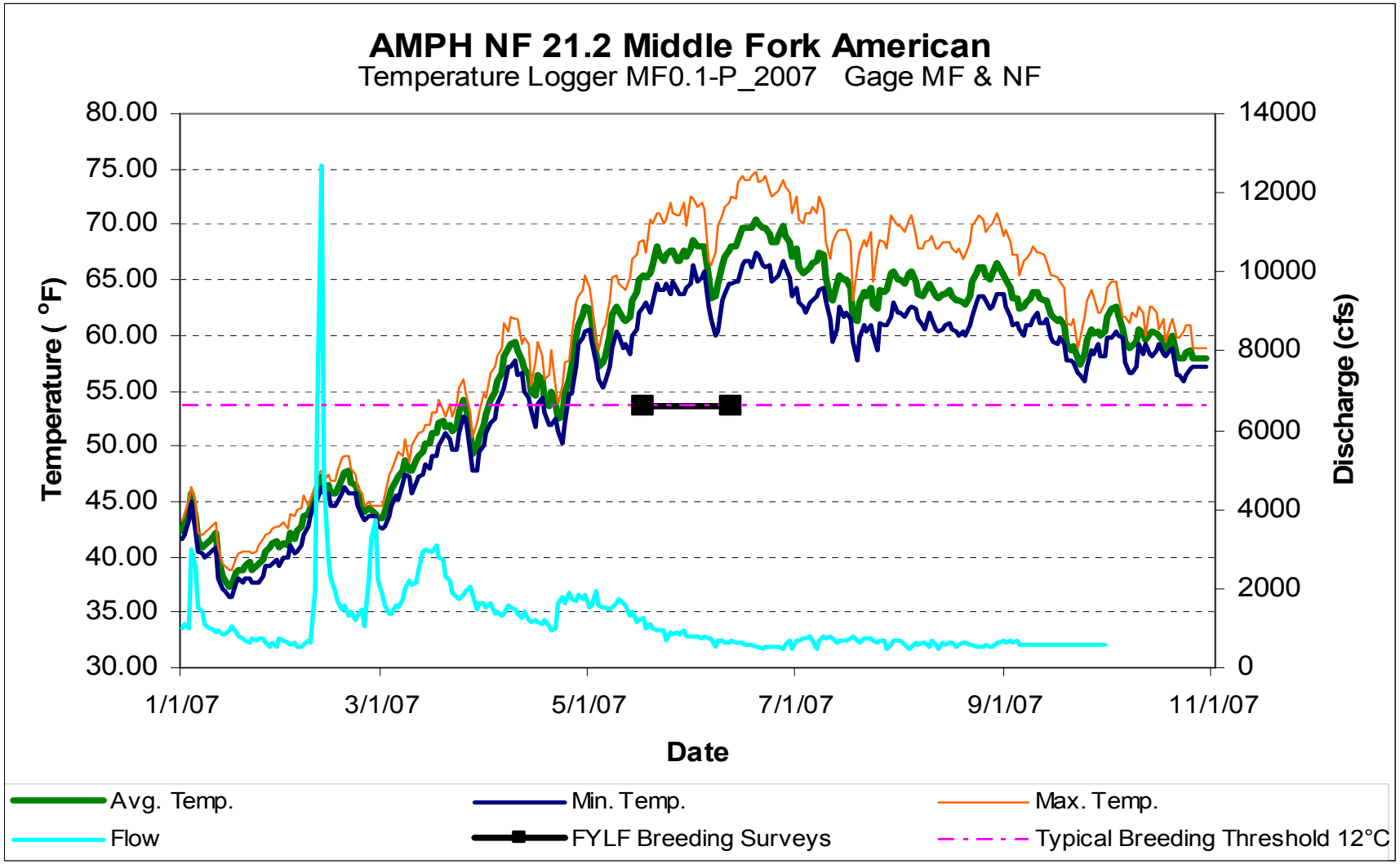


Figure C-1e. Temperature and Discharge at AMPH MF 24.1 NF of MFAR @ Confluence.

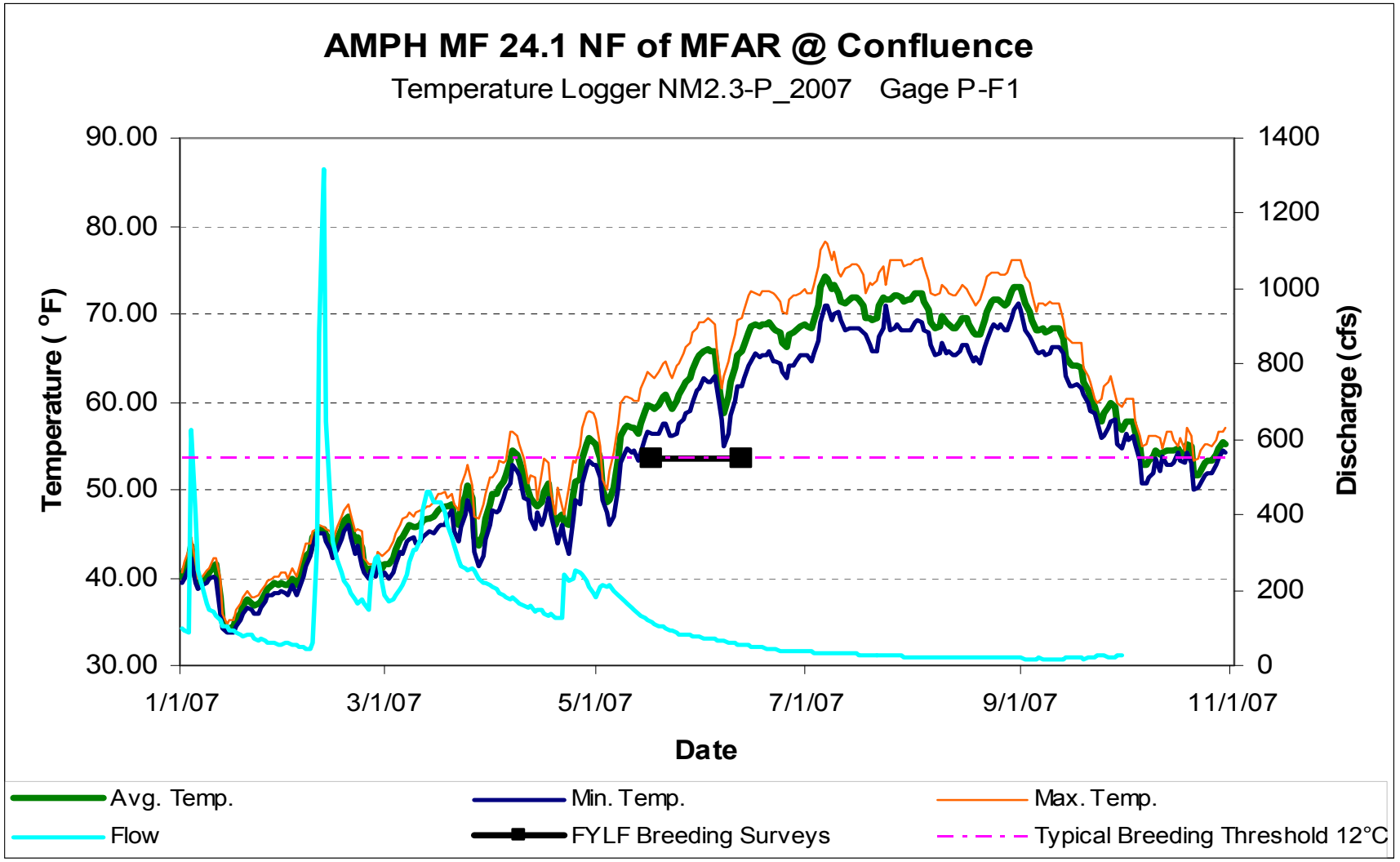


Figure C-1f. Temperature and Discharge at AMPH MF 24.1 below Ralston Afterbay.

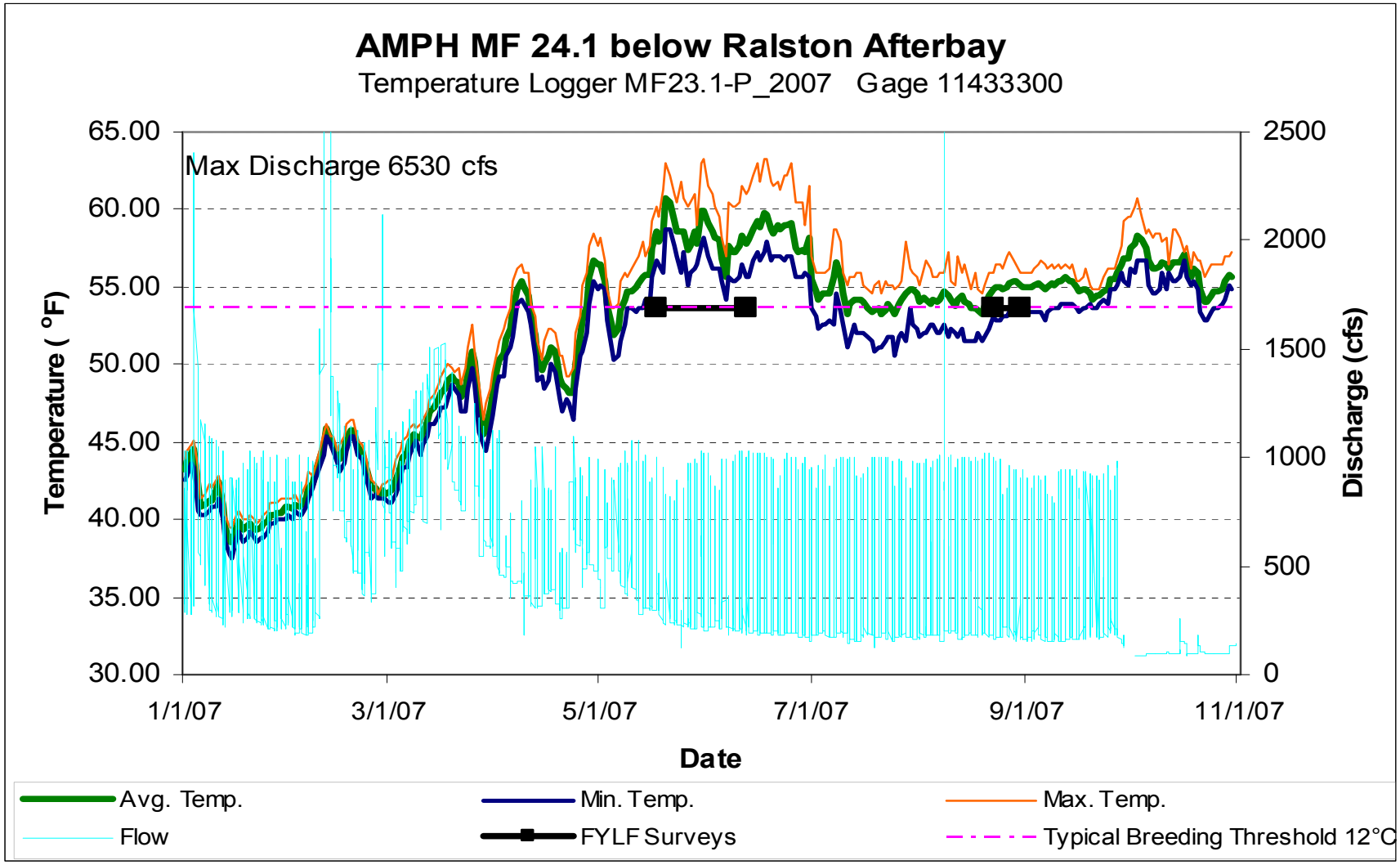


Figure C-1g. Temperature and Discharge at AMPH MF 26.2 above Ralston Afterbay.

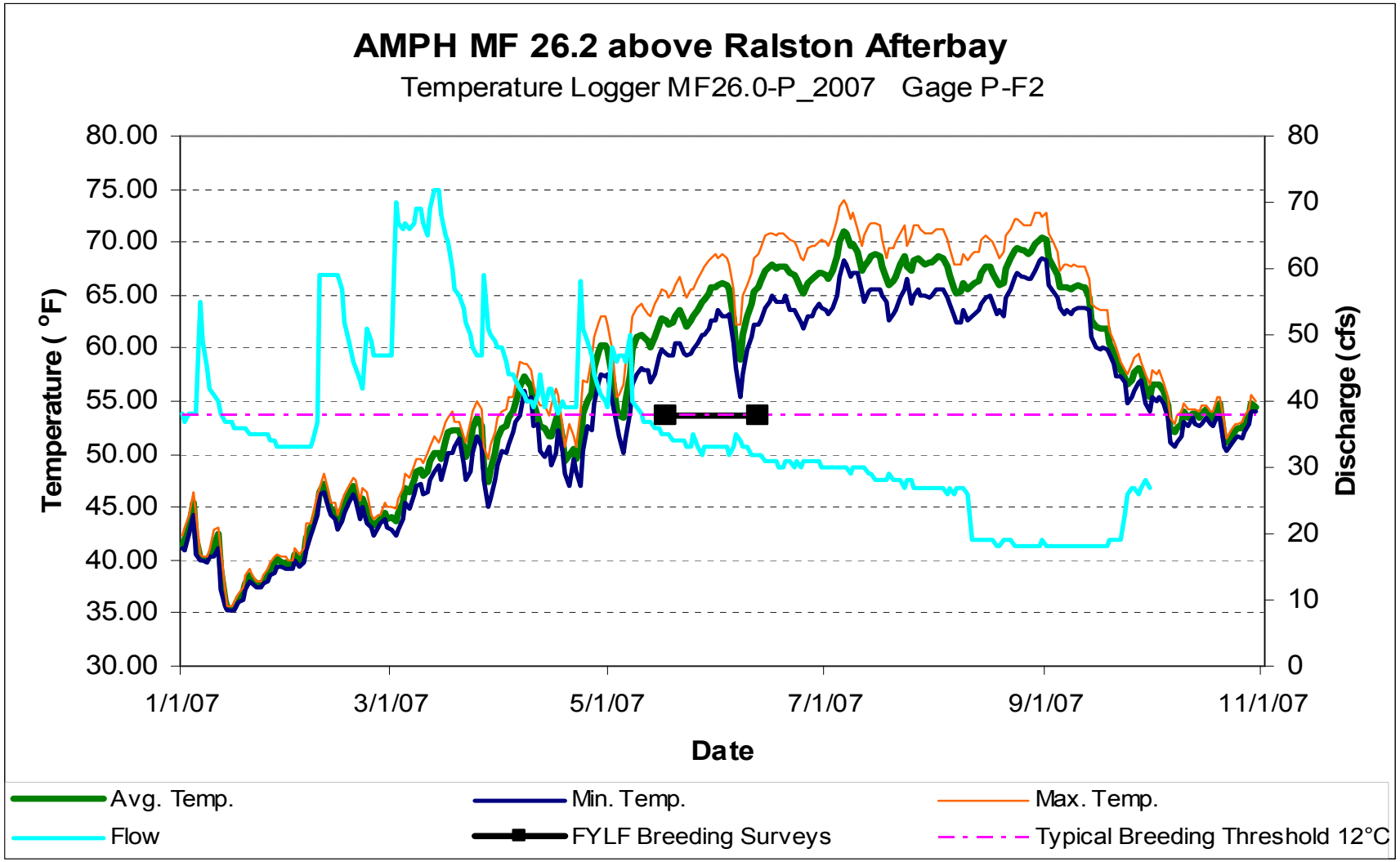


Figure C-1h. Temperature and Discharge at AMPH MF 29.4 / MF 30.4.

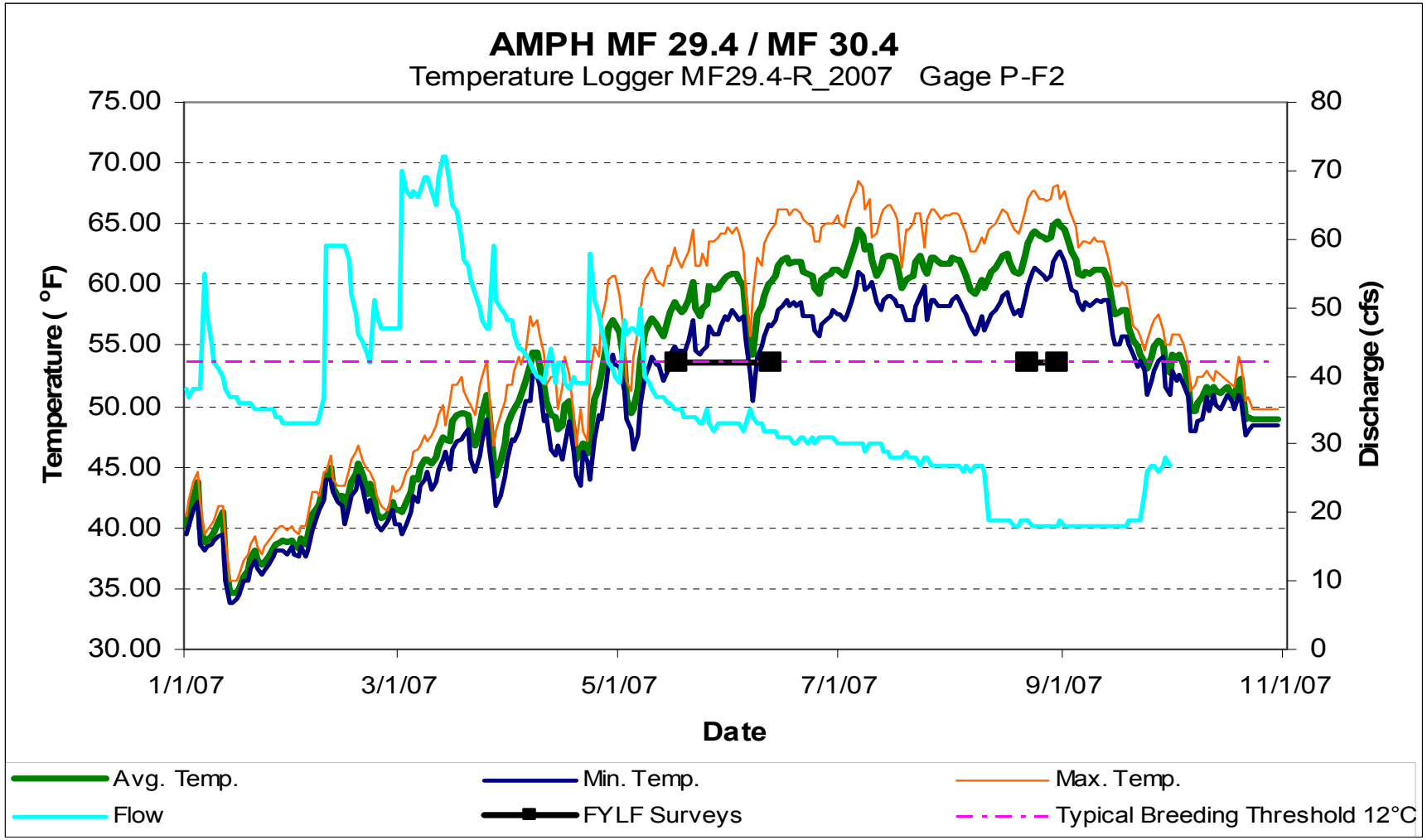


Figure C-1i. Temperature and Discharge at AMPH MF 36.2 above Interbay.

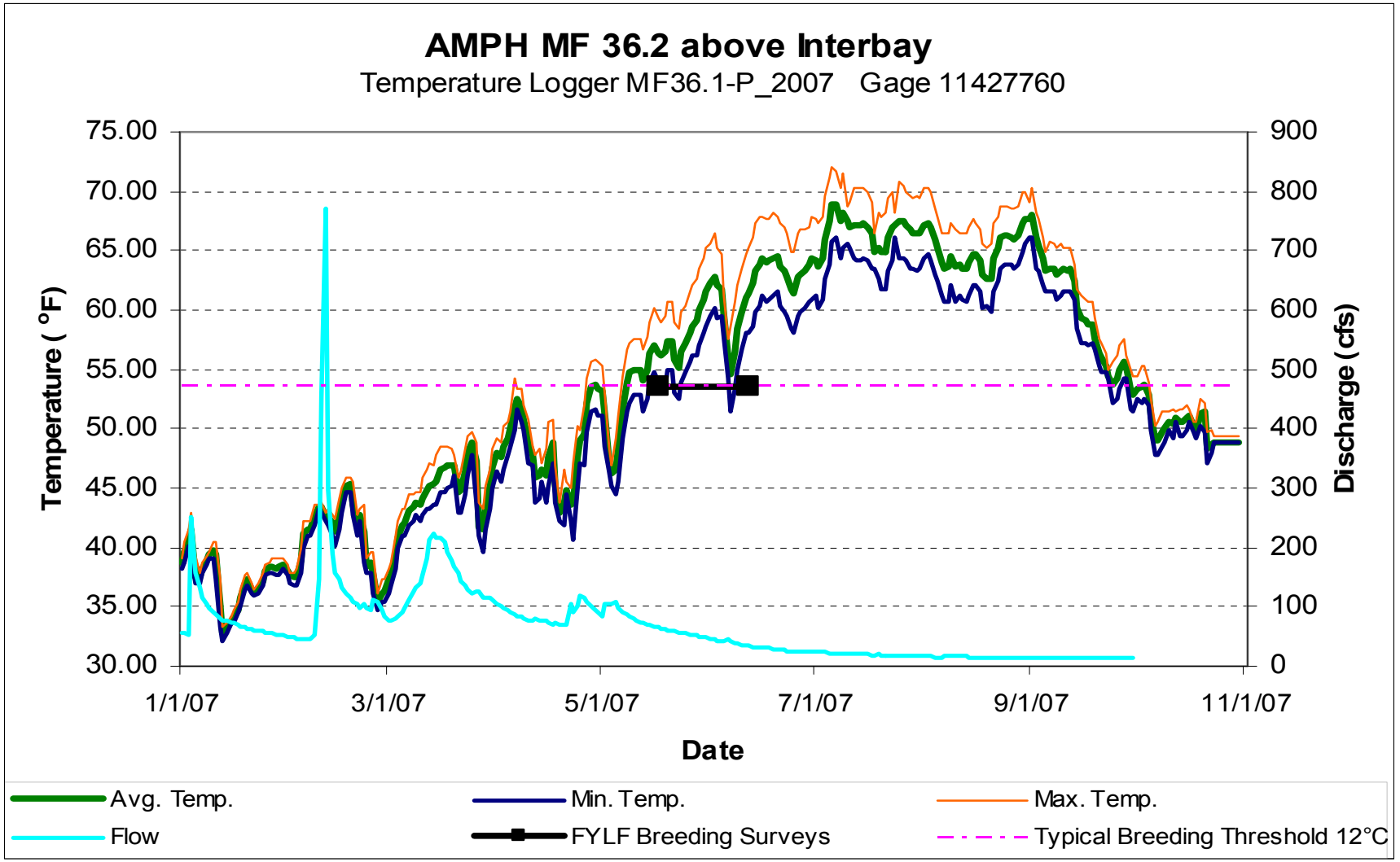


Figure C-1j. Temperature and Discharge at AMPH MF 39.7 @ Duncan Creek.

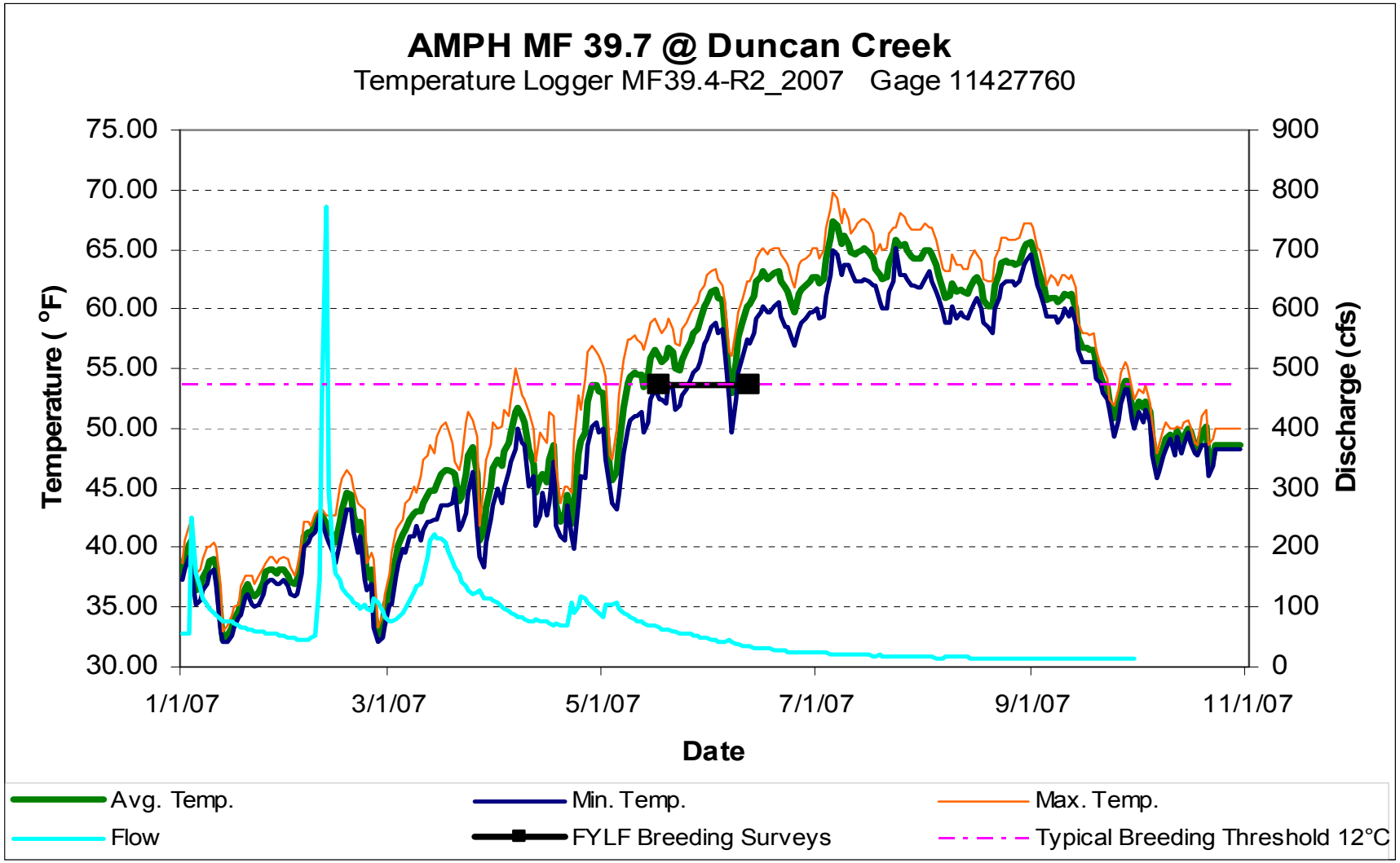


Figure C-2a. Temperature and Discharge at AMPH R 1.2.

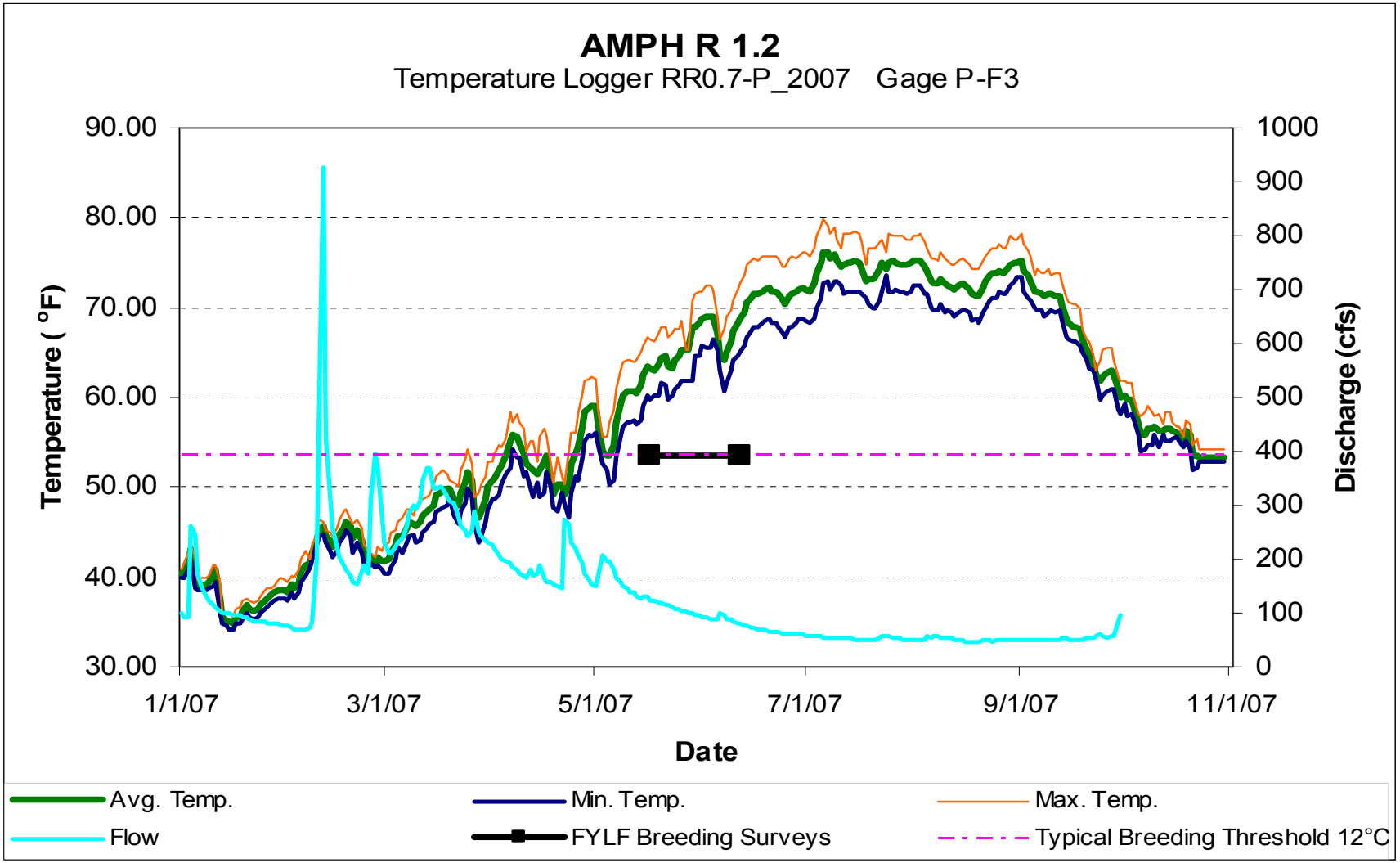


Figure C-2b. Temperature and Discharge at AMPH R 3.7 Rubicon @ Confluence Long Canyon

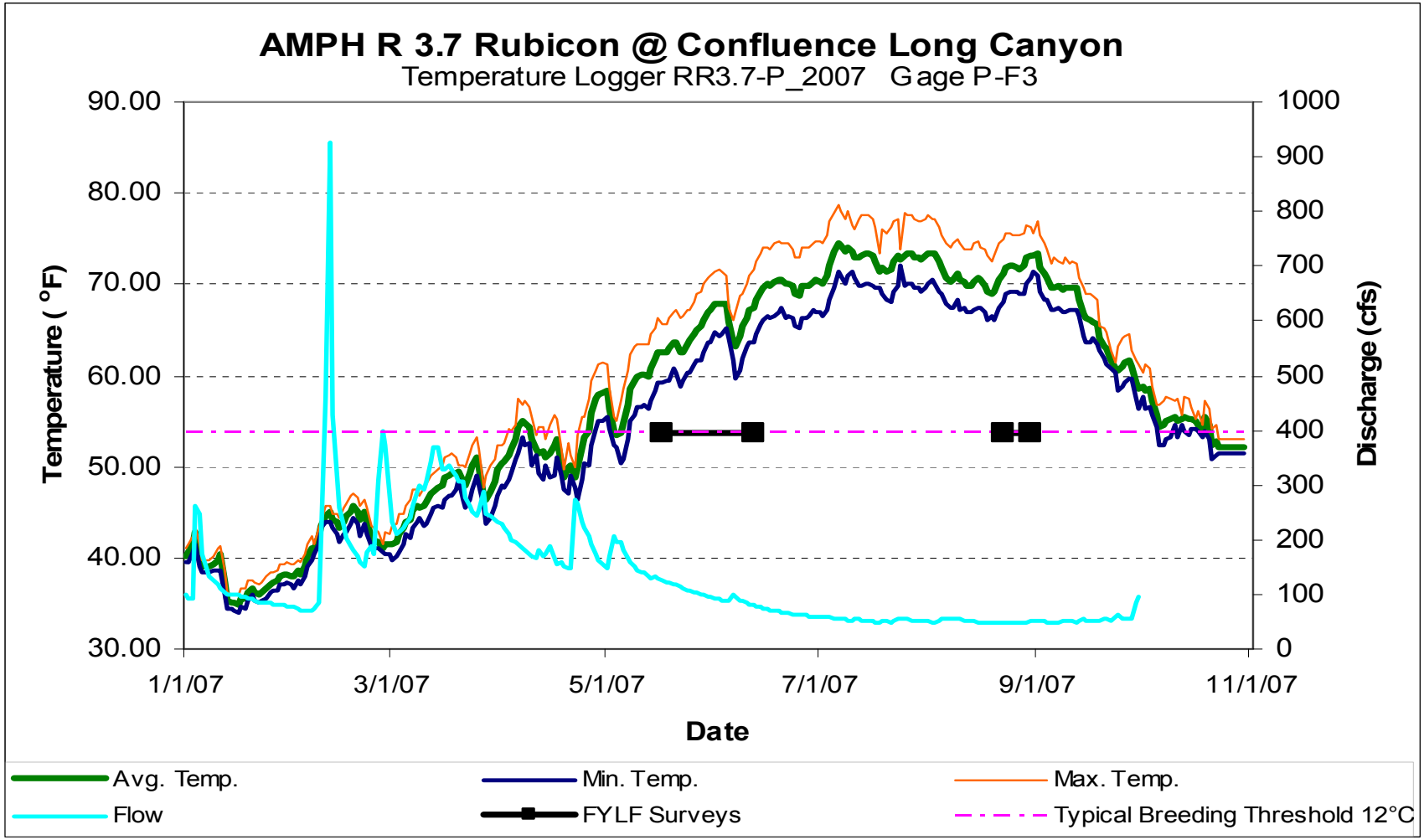


Figure C-2c. Temperature and Discharge at AMPH R 5.2.

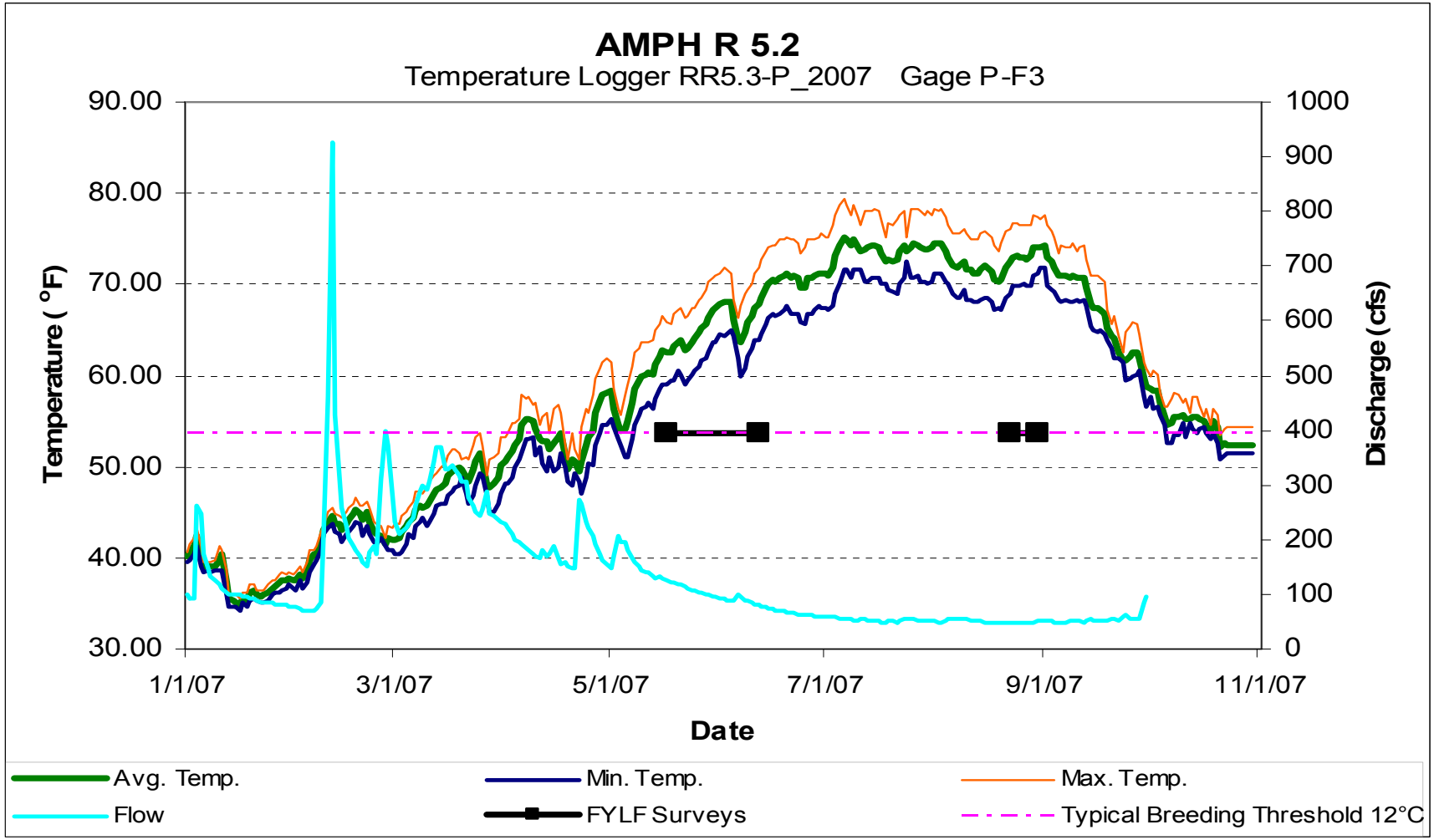


Figure C-2d. Temperature and Discharge at AMPH R 14.3.

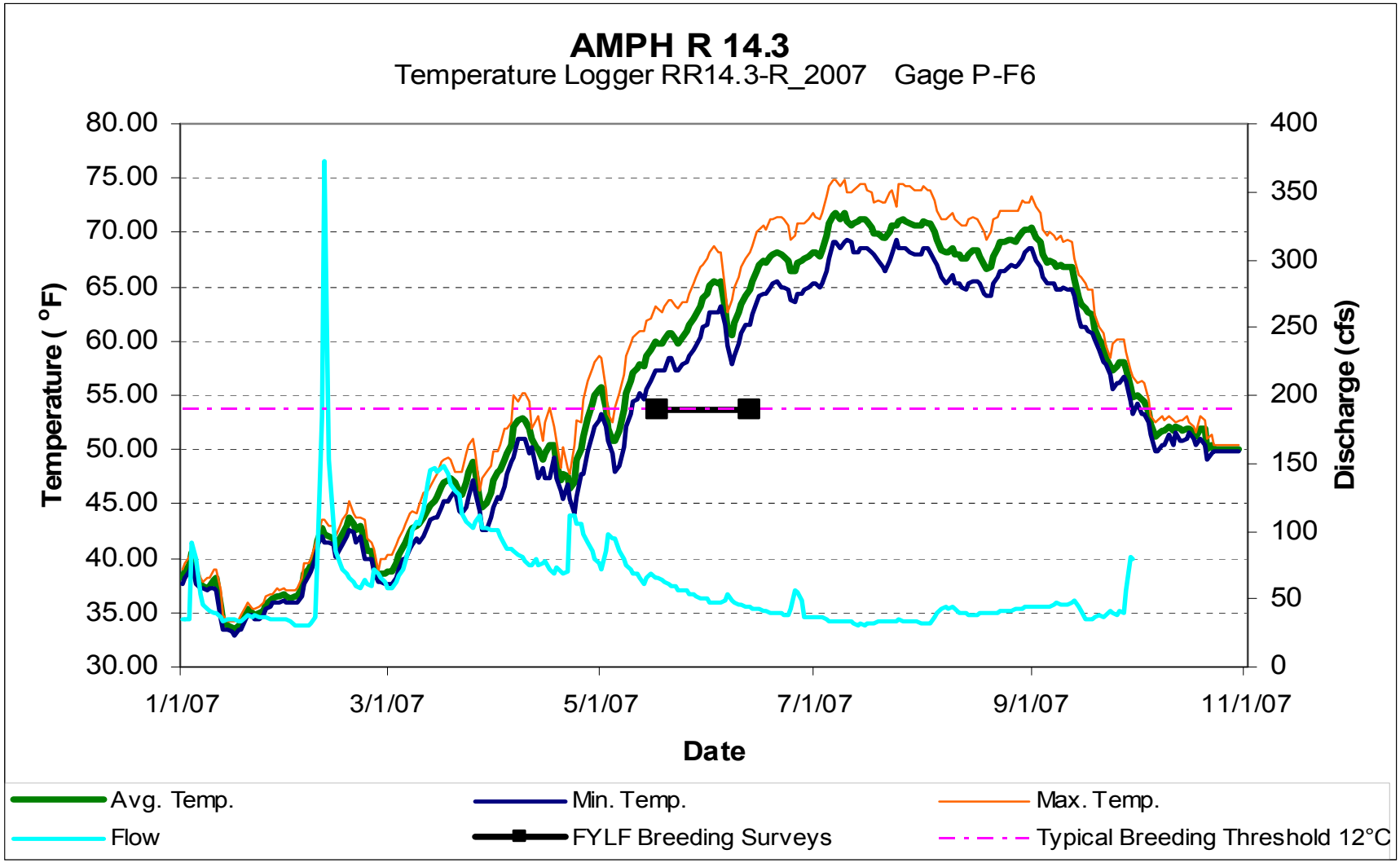


Figure C-2e. Temperature and Discharge at AMPH R 22.6.

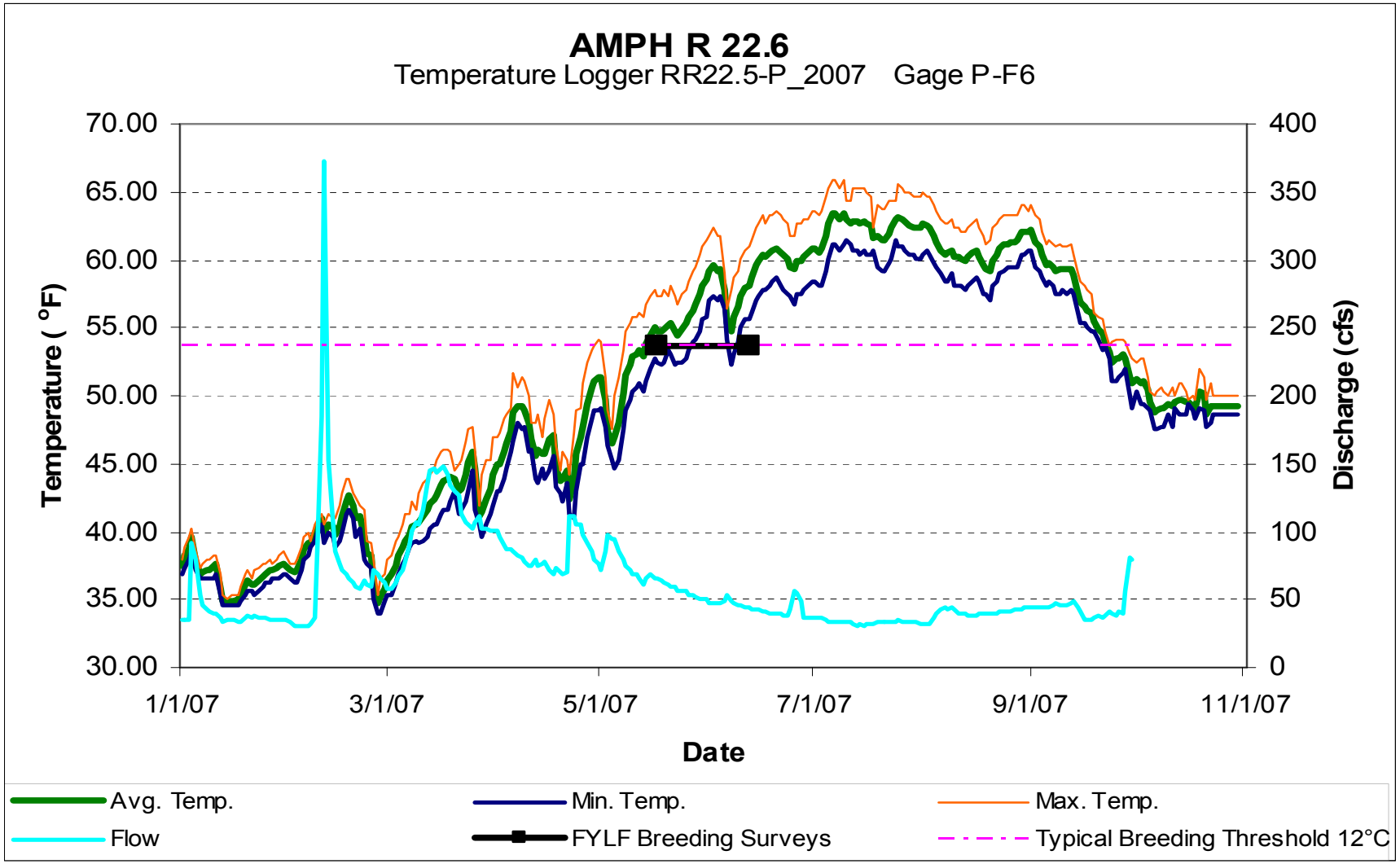


Figure C-2f. Temperature and Discharge at AMPH R 25.7.

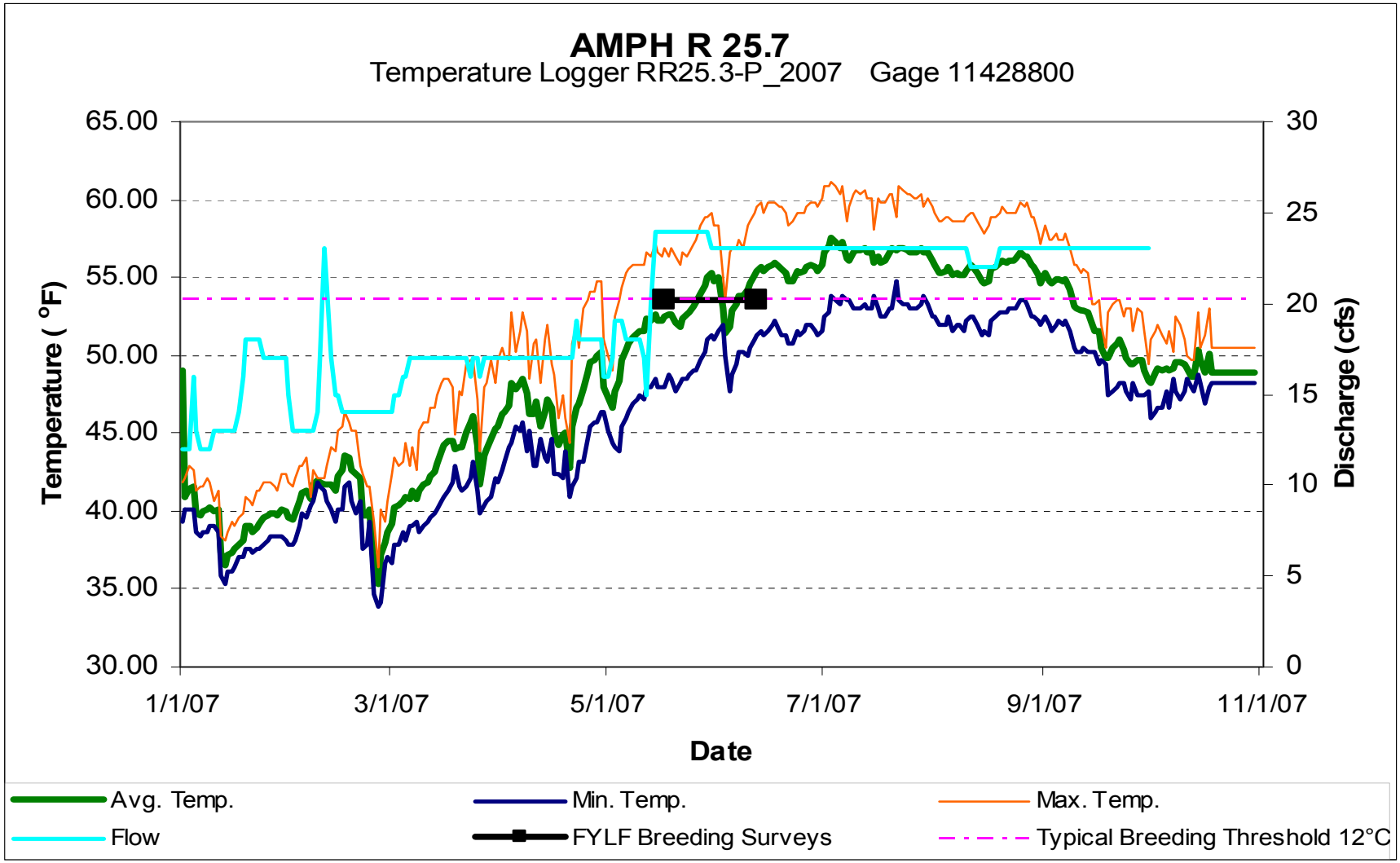


Figure C-3a. Temperature and Discharge at AMPH LC 0.0 Long Canyon @ confluence Rubicon River.

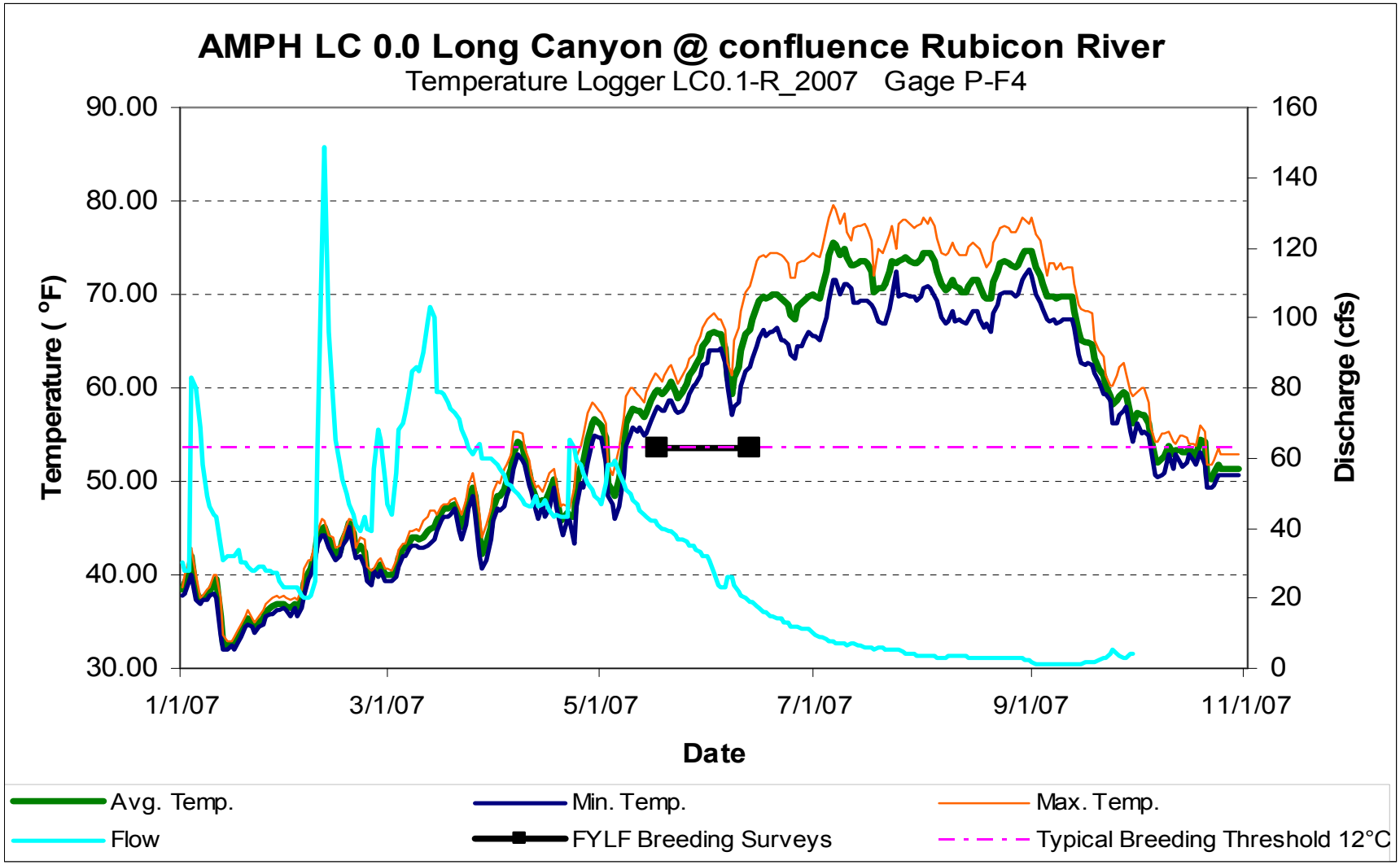


Figure C-3b. Temperature and Discharge at AMPH LC 9.0 Ramsey Crossing.

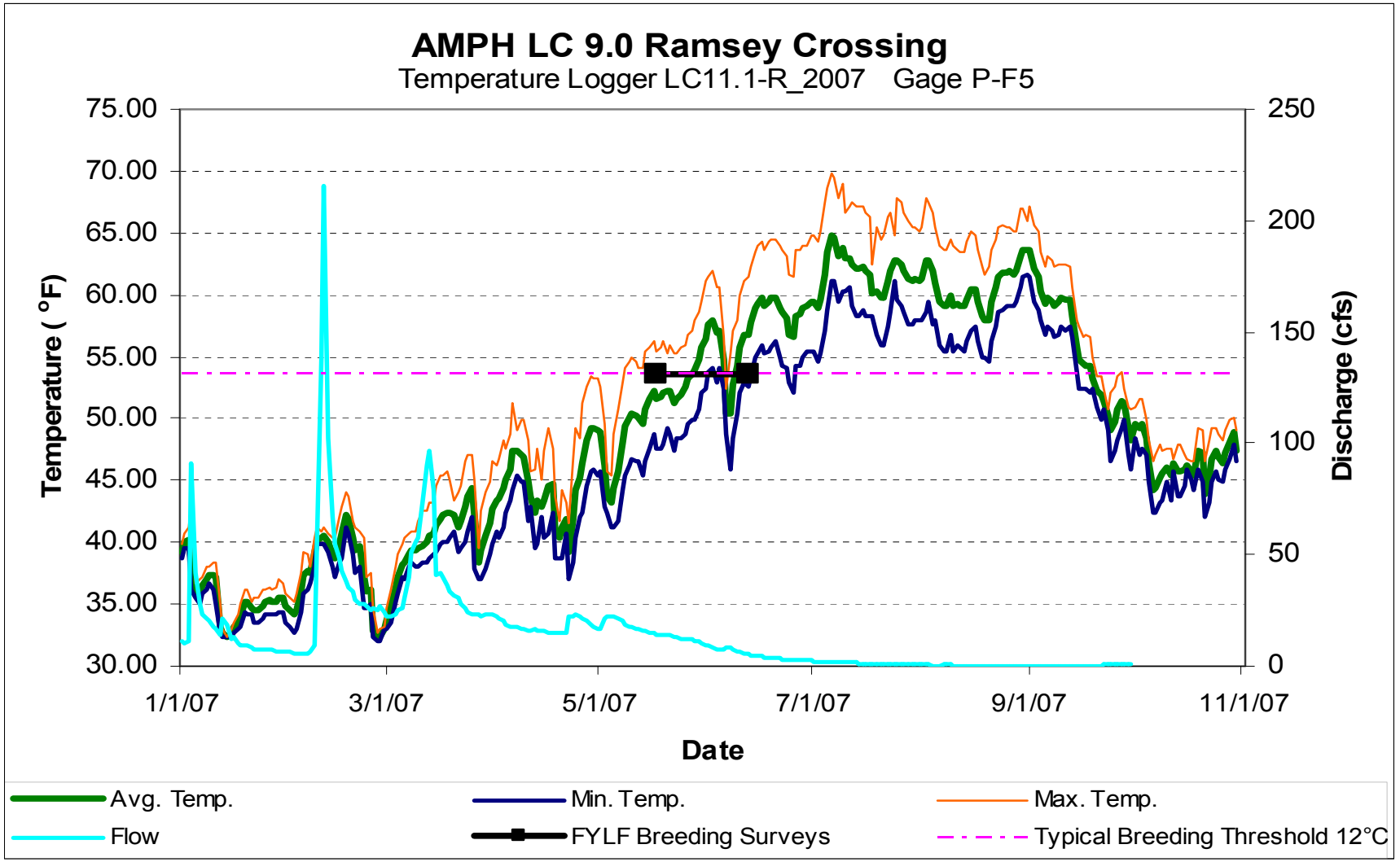


Figure C-4a. Temperature and Discharge at AMPH NF 21.2 NFAR @ MF Confluence.

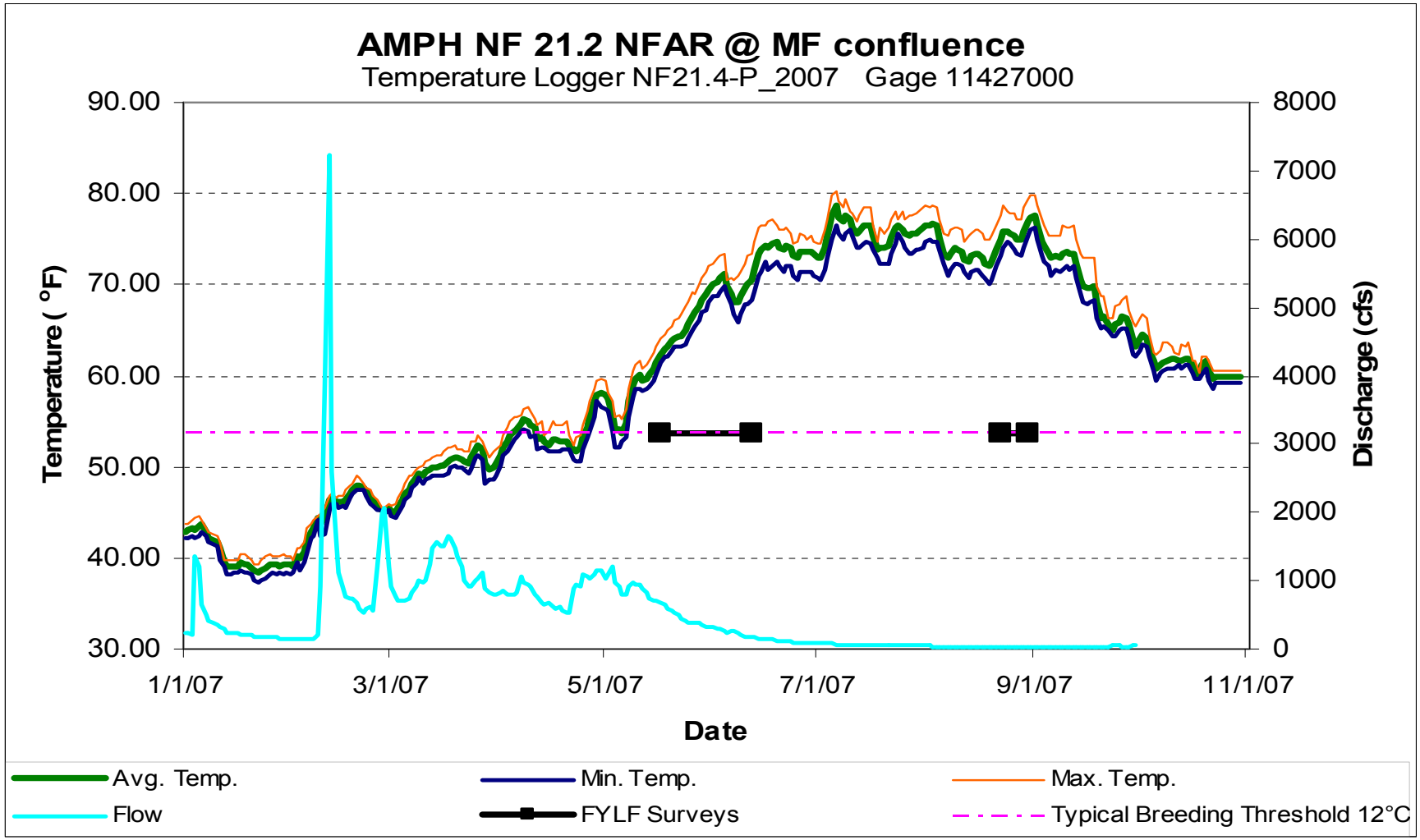


Figure C-4b. Temperature and Discharge at AMPH NF 35.7 Mainstem.

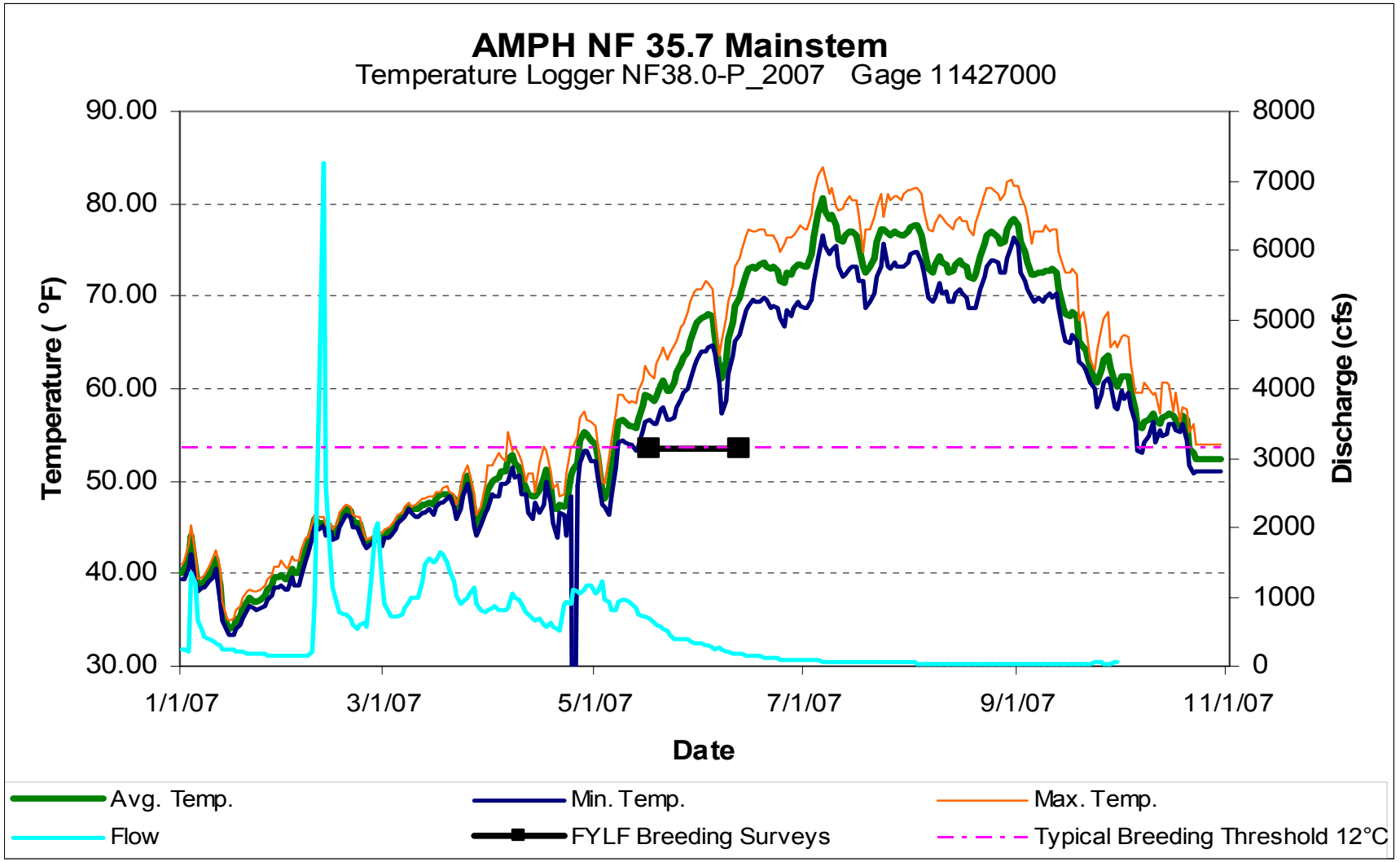
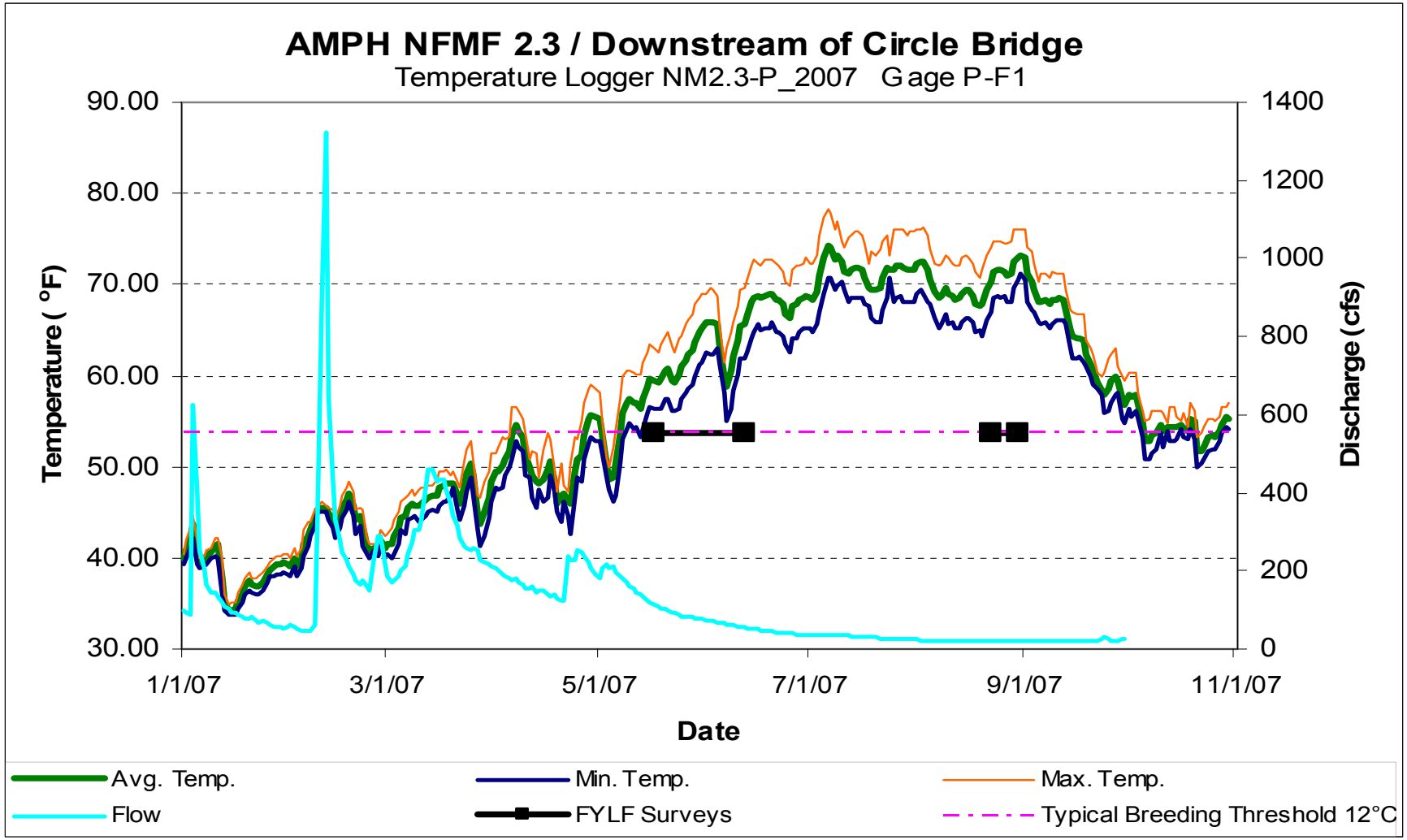


Figure C-5. Temperature and Discharge at AMPH NFMF 2.3 / Downstream of Circle Bridge



APPENDIX D

Habitat Characterization of Each Study Reach

Descriptions of the habitat characteristics in the bypass and peaking reaches, comparison stream reaches, and the tributaries are summarized in the sections below.

Bypass Reaches

Middle Fork American River (Ralston Afterbay to French Meadows Reservoir)

The Middle Fork American River upstream of Ralston Afterbay was steep and confined with flows regulated by releases from French Meadows Reservoir and Middle Fork Interbay. Large magnitude spill flows may occur during winter and spring storms, while minimum instream flows dominated the hydrograph from early summer through fall (Appendix C). Water temperatures were also regulated by releases from French Meadows Reservoir and Middle Fork Interbay (Map AQ 12-3a, AQ 12-3b; Figure 12-2); average daily temperatures remained near 47 ^{o}F downstream of French Meadows Reservoir and Middle Fork Interbay year-round, warming gradually to an average of 65 ^{o}F in the mid-summer above Middle Fork Interbay and 68 ^{o}F above Ralston Afterbay. The channel morphology was dominated by high-gradient habitats with coarse channel substrates. Riparian vegetation was patchy, typically occurring in small bands immediately adjacent to the water's edge in narrow canyon sections. Canopy cover along the stream margins was usually less than 25%, increasing up to 75% in a few localized areas.

Suitable breeding and rearing habitat occurred throughout most of the lower portion of the Middle Fork American River bypass reach becoming more limited upstream as the steep canyon walls narrowed and stream gradient increased (Map AQ 12-2). Immediately upstream of Ralston Afterbay, breeding habitat occurred in large pool tailouts, side channels, and the margins of low-gradient boulder/cobble runs. Although the narrow canyon and mature riparian vegetation created shaded, cooler conditions that may have reduced algal and periphyton growth, suitable rearing habitat occurred throughout much of the channel. Upstream of Brushy Canyon, as gradients increased and cascades alternating with large deep bedrock pools became dominant, breeding and rearing habitats were limited and sparse. Although Brushy Canyon Creek and Duncan Creek provide perennial flow to the river and potential adult refuge habitat in winter, they did not contain suitable breeding or rearing habitat.

Rubicon River (Ralston Afterbay to Hell Hole Reservoir)

The Rubicon River above Ralston Afterbay is of moderate size, with valley widths and flows larger than the Middle Fork American River bypass reach, but smaller than the peaking reach. Flows were regulated by Hell Hole Reservoir upstream with accretion flows occurring along the reach. The hydrograph had relatively large magnitude flow events in winter and spring, and minimum instream flows through summer and fall (Appendix C). Water temperatures were also regulated by Hell Hole Reservoir, which averaged 46 ^{o}F in spring and 55 ^{o}F in summer at the upstream end of the reach, and warmed to an average of 73 ^{o}F in summer above Ralston Afterbay (Map AQ 12-3a, AQ 12-3b; Figure AQ 12-2). The channel morphology varied depending on local gradient and valley width. A large proportion of the bypass reach is narrow and confined by

bedrock. Moderate-width depositional sections occur upstream of Ralston Afterbay and between Hell Hole Reservoir and the South Fork Rubicon River confluence. Coarse-grained riffles, pools and runs were the primary instream habitats in wider reaches, while high-gradient riffles, step-pools, and cascades dominated confined reaches. Riparian vegetation along the stream margins was patchy. Canopy cover was typically low (less than 25%), with a few areas with greater cover (up to 50%).

Large areas of high quality breeding and rearing habitat occurred throughout the first 14 miles above Ralston Afterbay, but suitable habitat was present in the entire bypass reach (Map AQ 12-2). Pool tailouts, low-sloped cobble bars, cobble/boulder protected margins of runs and occasional side channels all provided suitable breeding habitat in the lower reaches. As gradients increased upstream, suitable breeding habitat was limited to the margins of runs and occasional small pool tailouts. Upstream of the confluence of the South Fork Rubicon River where valley widths increased, large areas of breeding and rearing habitat occur, but air and water temperatures were likely too low to be suitable. Pilot Creek and the South Fork Rubicon River provide adult foraging and refuge habitat, but steep gradients and confined channels preclude suitable breeding habitat.

Duncan Creek

Duncan Creek was a high gradient confined channel with naturally cold flows regulated by Duncan Creek Diversion. Habitats were dominated by bedrock waterfalls, chutes, and plunge pools. Little depositional sediment was observed, and canopy cover along the stream margins was low. Average spring water temperatures were 52 ^{o}F just downstream of the diversion and 54 ^{o}F just upstream of the confluence with the Middle Fork American River. In August, average water temperatures were 63 ^{o}F in the upper reaches and cooled to 61 ^{o}F near the confluence with the Middle Fork American River. The cool water temperatures and steep channel morphology limited the amount of breeding and rearing habitat.

Long Canyon Creek

The lower reaches of Long Canyon Creek were steep and confined, with flows regulated by diversions on the North and South Forks of Long Canyon creeks. Habitats were dominated by boulder cascades, bedrock waterfalls, and plunge pools. Depositional sediment was minimal, and canopy cover along the stream margins was low. Water temperatures were naturally low, with average spring temperatures of 53 ^{o}F and 61 ^{o}F at the confluence of the North and South Forks of Long Canyon creeks and Rubicon River, respectively. During August, average water temperatures were 62 ^{o}F in the upper reaches and warmed to 72 ^{o}F near the Rubicon River confluence. The cool water temperatures and steep channel morphology limit the amount of breeding and rearing habitat.

Peaking Reach

The Middle Fork American River below Oxbow Powerhouse was the largest river reach in the study area with large valley widths and alluvial channel morphologies that were controlled by bedrock outcrops. Flows were regulated by Oxbow Powerhouse, which operated daily peaking for hydropower generation (Appendix C). Water temperatures were also regulated by releases from Oxbow Powerhouse/Ralston Afterbay, which typically averaged 55 to 57 ^{o}F throughout the year and warmed to a summer average of 65 ^{o}F at the downstream end of the reach at the confluence with the North Fork American River (Map AQ 12-3a, AQ 12-3b; Figure 12-2). Temperatures in the tributaries were similar to mainstem water temperatures in early spring, but by early summer, the tributaries continued to rapidly warm while the mainstem cooled (Appendix C). The channel morphology throughout the peaking reach was dominated by coarse-grained riffle-pool-bar sequences. Most cobble bars were steep-faced and lined with willow and alder shrubs, but many had low-gradient exposed areas on the upstream end. Riparian canopy cover along the stream margins was generally low, but patches of dense willow and alder shrubs at the water's edge created small areas with greater than 75% cover.

Suitable geomorphic breeding and rearing habitat occurred throughout the peaking reach (Map AQ 12-2), primarily on the shallow upstream end of cobble bars. Occasional side channels and shallow depositional areas near tributary confluences (e.g. Otter Creek and American Canyon Creek) and reaches with wider valley widths also provided suitable breeding and rearing habitat, but these locations were rare. Most perennial tributaries along the peaking reach were steep and dominated by bedrock cascades (Pond Creek, Jesse Canyon, Canyon Creek, and Volcano Creek), thus providing adult foraging or refuge habitat, but very little suitable breeding or rearing habitat. Gas Canyon Creek, Todd Creek and American Canyon Creek, while all small and generally steep, provided patches of suitable habitat in pool tailouts and runs. Otter Creek at its confluence with the Middle Fork American River provided a long reach of riffle-run habitat that was suitable for breeding and rearing, but as gradient increased upstream, the creek became dominated by cascades and step-pool with limited breeding locations.

Comparison Reaches

North Fork American River and Shirttail Creek

The North Fork American River near Shirttail Creek was similar in size to the upper portions of the peaking reach with steep bedrock canyon walls and coarse depositional bars on alternating banks. Flows were unregulated on both the mainstem and Shirttail Creek, and water temperature was typical of natural snow-melt dominated Sierran systems at this elevation, averaging 60 ^{o}F in late spring and 75 ^{o}F in mid-summer in the mainstem (Appendix C). The channel morphology in the mainstem was primarily coarse-grained high-gradient riffles and runs separated by large pools. Riparian vegetation was sparse and limited to floodplain deposits near tributary confluences and other areas where the channel temporarily widened. Canopy cover along the channel

margins was typically less than 25% on the mainstem river and Shirttail Creek. It was dense in localized areas, providing up to 100% cover of the water's edge.

Suitable breeding and rearing habitat occurred throughout the North Fork American River (Map AQ 12-2), primarily in boulder-protected margins of runs, boulder pockets along the edges of coarse bars and in shallow backwater eddies and side channels with coarse substrates. The open canopy, warm temperatures and low consistent flows in summer provided suitable rearing habitat in shallow stream margins throughout the reach. In Shirttail Creek, the gradient was moderate with step-pools, short cascades and shallow pools as the primary habitat types. Breeding and rearing habitat occurred primarily in the pool tailouts, although small boulder-protected areas along the stream margin provided potential breeding locations.

North Fork of the Middle Fork American River

The North Fork of the Middle Fork American River was unregulated with moderate gradients and valley widths. Water temperatures averaged 60 ^{o}F in late spring and 70 ^{o}F in mid-summer (Appendix C). The channel morphology was dominated by riffles, runs, and pools just upstream of the confluence and high-gradient riffles, runs and step-pools a few miles further upstream. Substrates were generally dominated by cobbles and boulders, but bedrock outcrops were common and sand deposits occurred in many of the larger pools. The river was subject to active instream dredging and mining in the accessible portion of river upstream of Circle Bridge, which created deposits of unconsolidated material and unnatural morphologic features, particularly in lower gradient, wider sections of stream. Riparian vegetation was common, typically along both banks, and was mature on larger floodplain deposits. Canopy cover along the stream margin varied from 25% to 75%.

Suitable breeding habitat occurred throughout the North Fork of the Middle Fork American River (Map AQ 12-2), primarily in pool tailouts, cobble/boulder-protected margins of runs and on the downstream side of large boulders along the stream margin. Although canopy cover was somewhat higher than on the North Fork American River or Rubicon River, water temperatures were warm and instream productivity was high, providing abundant algae and periphyton in shallow, open rearing habitats.

APPENDIX E

Distribution and Abundance Surveys in the Study Reaches

The distribution and abundance of the different FYLF lifestages in the bypass and peaking reaches, comparison reaches, and the tributaries are summarized in the following sections.

Bypass Reaches

Middle Fork American River (Ralston Afterbay to French Meadows Reservoir)

A small sub-population of FYLF occurs in the lower three miles of the reach above Ralston Afterbay. During the spring surveys, a total of 2 adults and 2 egg masses were observed at the downstream site (MF 26.2), and 1 adult was seen at the site below Brushy Canyon (MF 29.4) (Table AQ 12-3). No individuals were observed incidentally or during amphibian surveys at or upstream of Brushy Canyon (MF 30.4).

The egg masses observed during the spring surveys were located in a small boulder-protected eddy pool at the edge of a run. During the fall survey, a total of 28 young-of-the-year were observed throughout the lower site above Ralston Afterbay. Some of the tadpoles and young-of-the-year were in a location where egg masses were not observed in the spring. It is likely that one or two egg masses were either missed by observers in the spring, or the egg masses were laid and hatched in the 16-day period between the two spring surveys.

Rubicon River (Ralston Afterbay to Hell Hole Reservoir)

The Rubicon River supported the largest population of FYLF in the study area. At the three downstream sites in the lower 14 miles of the river, observed egg mass densities were slightly higher than observed densities at comparison sites on the North Fork American River and the North Fork of the Middle Fork American River. The number of observed adults in the Rubicon River was lower than in the two tributary streams (Shirttail and Bunch Canyon creeks) at the North Fork American River comparison site, but similar to the mainstem comparison sites (Figure AQ 12-4b, Table AQ 12-3).

Egg masses were generally clustered in pool tailouts associated with the upstream end of bars, particularly in the downstream sites, but small clusters of a few egg masses were also observed in side channels and the margins of runs throughout all the sites. The largest portion of the Rubicon River population occurred at the downstream sites. The number of observed individuals progressively decreased with upstream distance. The survey site near Ellicot Bridge (RM 20.9) appeared to be the upper extent of the population as no individuals were observed further upstream (Figure AQ 12-4b).

Peaking Reach

Mainstem (Oxbow Powerhouse to North Fork American River Confluence)

The Middle Fork American River below Oxbow Powerhouse did not appear to support reproducing populations of FYLF. No egg masses or tadpoles were observed at any mainstem site along the peaking reach, and all observed adults and young-of-the-year

were located near or at tributary confluences that did support reproduction population of FYLF (Table AQ 12-3). Two adults were observed near the confluence with Todd Creek during spring surveys, while 5 adults and 7 adults were observed in the fall near the confluence with Todd and Gas Canyon creeks, respectively. During the fall survey, both Todd and Gas Canyon creeks had stopped flowing, so habitat for adult frogs was limited. One adult and two young-of-the-year were also observed at the confluence with American Canyon Creek during the fall survey. Based on additional incidental observations (1 adult near Ruck-a-chucky rapids RM 10.7, 1 young-of-the-year near RM 4.7 downstream of American River Canyon, and one adult near RM 14.6), some adults and juveniles may migrate along the mainstem peaking reach during summer and fall, but the number of individuals appears to be very small.

Tributaries

Small sub-populations of FYLF were observed in four tributaries along the peaking reach that contained suitable breeding and rearing habitat. The largest populations were observed on Otter Creek and at the confluence with the North Fork of the Middle Fork American River, each containing 13 and 3 egg masses, respectively (Table AQ 12-3). Todd and Gas Canyon creeks, which were significantly smaller in size and reduced to disconnected pools by late summer due to dry conditions, contained 1 and 4 egg masses, respectively. No individuals were observed in the three surveys on Canyon and Volcano creeks, although both had perennial flow into the fall and suitable adult foraging and refuge habitat. Both creeks contained very limited suitable breeding and rearing habitat.

Comparison Reaches

North Fork American River, Shirttail Creek, and Bunch Canyon Creek

Shirttail Creek had the greatest abundance of FYLF of the streams surveyed. The number of egg masses was similar to that observed on the lower Rubicon River, but a higher number of adults and juveniles were observed on Shirttail Creek (Table AQ 12-3). Egg masses on Shirttail Creek were clustered in pool tailouts throughout the lower portion of the site, decreasing in density upstream. Adults and juveniles were observed along the mainstem North Fork American River in all surveys, although significantly more adults were seen in fall (Table AQ 12-3). Only 3 egg masses were found on the mainstem in spring, but the distribution of young-of-the-year observed in fall indicated several additional egg masses were likely laid, but missed by observers. The instream habitat along the mainstem was very complex with numerous low-velocity microsites throughout the channel, so detection of egg masses was difficult. One of the egg masses found in spring was attached to a bedrock wall in a side-channel eddy downstream of Shirttail Creek, which is atypical for oviposition sites. A smaller but moderate-sized sub-population was observed in fall on Bunch Canyon (17 adults and 33 young-of-the-year), indicating several egg masses were likely laid in the creek in spring.

North Fork of the Middle Fork American River

FYLF were abundant on the North Fork of the Middle Fork American River comparison site (RM 2.3) with an egg mass density similar to Shirttail Creek and the lower Rubicon River survey sites (Figure AQ 12-3). Egg masses were located in small numbers in many breeding sites throughout the reach, although one large backwater pool in the lower portion of the site provided highly suitable rearing habitat and contained a large number of tadpoles of many native species. The number of adults observed was similar to the number seen at the lower Rubicon River sites, and did not vary greatly between surveys.

The lower portion of the North Fork of the Middle Fork American River at the confluence with the Middle Fork American River (MF 24.1) had much lower FYLF densities than the upper site. Only 3 egg masses were found and only a few adults (Figure AQ 12-4a, Table AQ 12-3).

APPENDIX F

Timing and Length of Breeding Season for the Study Reaches

The timing and length of the breeding season, based on field observations, are described for the bypass and peaking reaches, comparison stream reaches, and tributaries in the following sections.

Bypass Reaches

Middle Fork American River (Ralston Afterbay to French Meadows Reservoir)

Egg masses were first noted in the site immediately upstream of Ralston Afterbay during the June 7 survey. Gravid females were noted at the site as early as May 8, but egg masses were not documented despite intensive searching during the first survey on May 22. Based on the developmental stage of the egg masses observed on June 7, oviposition likely occurred on approximately June 2-3. Water temperatures averaged 63 ^{o}F during the week of the first survey, and dropped slightly to 62 ^{o}F during the week of the second survey (Appendix C), both of which were well above the typical minimum oviposition temperature of 54 ^{o}F. Although water temperatures were warm, shadier conditions on the river may have slightly delayed breeding in this reach compared with other sunny, open reaches in the study area.

Rubicon River (Ralston Afterbay to Hell Hole Reservoir)

Egg masses were documented at all four lower sites (R 1.2, R 3.5, R 14.3, R 20.4) on the Rubicon River during the first round of VES surveys in late May. During the second set of surveys in early June, no additional egg masses were documented at the two upstream sites, and a small number of new egg masses were found at the most downstream site (R 1.2). Water temperatures averaged 62 ^{o}F and 65 ^{o}F at the two lower survey sites, and increased slightly to 64 ^{o}F and 68 ^{o}F during the week of the second survey (Appendix C). These warm temperatures appeared to reduce the time needed for eggs to develop and hatch out. Egg masses were observed hatching after only 7-10 days, rather than 10-14 days as is typically observed (Jones et al 2005). Based on the developmental stage of observed egg masses (categorical Gosner stage; Gosner 1960) during both surveys and accounting for a reduced egg development time, oviposition appeared to have begun on the lower Rubicon River (R 1.2) on approximately May 12 and ended on approximately June 2. At the next upstream survey site (R 14.3), oviposition appeared to have begun later on approximately May 23, and ended approximately May 30. The four egg masses observed at the upstream extent of the population (R 20.9) were of similar age and likely laid on about May 24.

Peaking Reach

Mainstem

No breeding was documented at any site in the peaking reach, although water temperatures were warm enough to support oviposition in the downstream end of the reach (Appendix C).

Tributaries

Following the first observation of an egg mass on Gas Canyon Creek on May 11 and Todd Creek (approximately May 12), egg masses were documented on Gas Canyon Creek, Otter Creek, and the North Fork Middle Fork American River between May 17 and June 8 during the VES surveys. No breeding or FYLF were observed or documented on Canyon Creek or Volcano Creek. Water temperatures averaged 62 ^{o}F and 60 ^{o}F during the spring surveys on Otter Creek and the confluence of the North Fork of the Middle Fork American River, respectively (Appendix C). While these temperatures were comparable to mainstem water temperatures in late May, they were slightly warmer in early June. Based on the developmental stage of the egg masses, approximate oviposition dates ranged from May 10 on Todd and Gas Canyon creeks to May 30 on Otter Creek.

Comparison Reaches

North Fork American River, Shirttail Creek, and Bunch Canyon Creek

Egg masses were first documented on Shirttail Creek on May 15 (the first official VES survey was May 18) and on the North Fork American River mainstem on June 4. Based on the observed developmental stage of the egg masses, breeding began on approximately May 10 - 12 on Shirttail Creek and May 20 on the mainstem, and ended on approximately May 28 on Shirttail Creek and June 4 on the mainstem. Measured water temperatures during surveys on each stream indicate the mainstem was several degrees colder than Shirttail Creek (61 ^{o}F versus 66 ^{o}F on May 18), which may account for the differences in timing of oviposition between the two sites.

North Fork of the Middle Fork American River

A pair of individuals was observed in amplexus on May 8, but the first egg mass was not documented near that location until May 21 despite repeated site checks. A total of 15 egg masses were found at both sites (MF 24.1 and NFMF 2.3) during the first survey on May 23, and another 2 egg masses were found during the second set of surveys on June 8 and 11. Based on the developmental stage of the egg masses, breeding appeared to have occurred between approximately May 16 and June 5. Water temperatures averaged 62 ^{o}F and 65 ^{o}F at both survey sites, and increased slightly to 64 ^{o}F and 68 ^{o}F during the week of the second survey (Appendix C), similar to temperatures observed in the lower Rubicon River survey sites.

APPENDIX G

Western Pond Turtle Analysis Maps

MAPS

ATTACHMENT A

California Red-legged Frog Site Assessment Report

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1.0 INTRODUCTION

This report presents the California Red-legged Frog (CRLF) (*Rana aurora draytonii*) Site Assessment conducted for the relicensing of Placer County Water Agency's (PCWA's) Middle Fork American River Project (MFP or Project). The purpose of the Site Assessment is to provide the U.S. Fish and Wildlife Service (USFWS) with sufficient information to make a determination as to whether protocol-level presence/absence surveys for the federally listed CRLF are required for relicensing of the MFP.

This Site Assessment was prepared in accordance with the *USFWS Revised Guidance on Site Assessments and Field Surveys for California Red-legged Frogs* (Guidance) (USFWS 2005) and with the study approach for CRLF site assessment surveys described in PCWA's AQ 12 - Special-Status Amphibian and Aquatic Reptile Technical Study Plan. The study area for this Site Assessment encompasses one mile around all existing Project facilities and features, Project recreation facilities, stakeholder-identified dispersed concentrated use areas, and river/stream reaches affected by the MFP within the historic range of the species (below 5,000 feet in elevation). The study area also includes one mile around potential Project betterments/improvements (less than 5,000 feet in elevation), including proposed new facilities, roads, trails; staging and disposal sites; as well as potential new inundation areas.

A draft report was distributed to the Terrestrial Technical Working Group, including USFWS, on February 19, 2008 for a 60 day comment period. The comment period ended on April 19, 2008. One comment was received from USDA-FS during the March 10, 2008, working group meeting. This comment is addressed in this report. On March 27, 2008, USFWS provided a letter to PCWA stating that following review of the report, they determined that protocol level CRLF surveys should be conducted at four locations in the study area. Refer to Appendix A for a copy of this letter.

2.0 PROJECT DESCRIPTION

PCWA owns and operates the MFP, a system consisting of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses that began operations in 1967. The MFP seasonally stores and releases water to meet consumptive demands within western Placer County and to generate power for the California electrical grid. PCWA operates the MFP under a 50-year license (FERC Project No. 2079) issued in 1963. The current license expires on March 1, 2013. PCWA is seeking the renewal of its license to continue operations of the MFP pursuant to FERC's Integrated Licensing Process (ILP) regulations.

The MFP is located on the western slope of the Sierra Nevada primarily in Placer County, California (Map 1). A small component of the Project (a portion of Ralston Afterbay Dam) is located in El Dorado County, California. The MFP is located within the Middle Fork American River Watershed (Watershed) at elevations ranging from approximately 1,100 feet to 5,300 feet. The Project is almost entirely in the Tahoe National Forest (TNF) and the Eldorado National Forest (ENF), with a small portion on PCWA-owned property.

A detailed description of Project facilities and operations and maintenance activities is provided in Supporting Document (SD) B of the Pre-Application Document (PAD) filed with the FERC on December 13, 2007 (PCWA 2007) and provided under separate cover to the USFWS. The following briefly summarizes this information.

The MFP serves as a multi-purpose water supply and hydro-generation project designed to conserve and control waters of the Middle Fork American River, the Rubicon River, and several associated tributary streams. Water for hydroelectric generation and consumptive use is diverted and stored under permits and licenses issued by the State Water Resources Control Board.

Water for consumptive purposes is released from the MFP and re-diverted at two locations: (1) the American River Pump Station, located on the North Fork American River near the City of Auburn; and (2) Folsom Reservoir. Both points of re-diversion are downstream of the MFP facilities and neither is part of the MFP as defined in the FERC Project License.

Hydroelectric power from the MFP is produced at five Project powerhouses with a combined nameplate generating capacity of approximately 224 megawatts. The total annual flow through the MFP and the resulting total annual generation are highly variable. The MFP produces an average of 1,030,000 megawatt-hours annually on mean generation flows of 452,000 acre-feet (ac-ft).

2.1 PROJECT FACILITIES

The MFP diverts, stores, and transports water through a series of stream diversions, reservoirs, water conveyance systems, and powerhouses before it is released back into the Middle Fork American River below Oxbow Powerhouse, approximately 29 miles upstream of Folsom Reservoir (Map 1). Instream flow releases below each diversion are made in accordance with FERC license requirements. All electricity generated by the MFP is delivered to Pacific Gas and Electric's (PG&E's) transmission system at Project switchyards and substations, typically located near powerhouses. PG&E's transmission system is not part of the MFP.

The backbone of the MFP is its two principal water storage reservoirs, French Meadows and Hell Hole. These reservoirs are located on the Middle Fork American River and the Rubicon River, respectively, and have a combined gross storage capacity of 342,583 ac-ft.

Starting at the highest elevation of the MFP, water is diverted from Duncan Creek at the Duncan Creek Diversion and routed through the Duncan Creek-Middle Fork Tunnel into French Meadows Reservoir (134,993 ac-ft of gross storage). Flows in the Middle Fork American River are captured and stored in French Meadows Reservoir along with diversions from Duncan Creek. Water is released into the Middle Fork American River downstream of French Meadows Dam. From French Meadows Reservoir, water is transported via the French Meadows-Hell Hole Tunnel, passed through the French Meadows Powerhouse (installed generating capacity of 15.3 MW) and released into

Hell Hole Reservoir (207,590 ac-ft of gross storage). Flows in the Rubicon River are captured and stored in Hell Hole Reservoir along with water released from French Meadows Reservoir through French Meadows Powerhouse. Water released from Hell Hole Reservoir into the Rubicon River to meet instream flow requirements first pass through the Hell Hole Powerhouse (installed generating capacity of 0.73 MW), which is located at the base of Hell Hole Dam.

From Hell Hole Reservoir, water is also transported via the Hell Hole-Middle Fork Tunnel, passed through the Middle Fork Powerhouse (installed generating capacity of 122.4 MW) and released into the Middle Fork Interbay (175 ac-ft of gross storage). Between Hell Hole Reservoir and Middle Fork Powerhouse, water is diverted from the North and South Forks of Long Canyon creeks directly into the Hell Hole-Middle Fork Tunnel.

Flows from the Middle Fork American River (including instream flow releases from French Meadows Reservoir) are captured at Middle Fork Interbay along with water released from Hell Hole Reservoir through Middle Fork Powerhouse. From Middle Fork Interbay, water is transported via the Middle Fork-Ralston Tunnel, passed through the Ralston Powerhouse (installed generating capacity of 79.2 MW) and released into the Ralston Afterbay (2,782 ac-ft of gross storage).

Flows from the Middle Fork American River (including instream releases from Middle Fork Interbay) and flows from the Rubicon River (including instream releases from Hell Hole Reservoir) are captured in Ralston Afterbay along with water transported from Middle Fork Interbay through Ralston Powerhouse. From Ralston Afterbay, water is transported via the Ralston-Oxbow Tunnel, passed through the Oxbow Powerhouse (installed generating capacity of 6.1 MW) and released from the MFP to the Middle Fork American River.

In addition to these major water and power facilities, the MFP includes 35 Project roads (totaling almost 18 miles) and 10 Project trails (totaling approximately 0.5 miles). These roads and trails are used almost exclusively by PCWA to access Project facilities. The Project roads and trails represent less than 1% of the total miles of roads and trails in the Watershed. There are also over 6 miles of Project powerlines and communication lines, which provide power to operate Project equipment and allow communication between Project facilities. In addition, numerous smaller facilities and features support MFP operations including flow gaging stations and weirs, photovoltaic poles, microwave reflectors and radio towers, sediment disposal sites, generator and storage buildings, operator cottages, a maintenance shop, a dormitory facility, and security and public safety fences.

The MFP also includes 21 developed recreation facilities to enable public access to public lands and Project reservoirs. The developed Project recreation facilities are concentrated around French Meadows Reservoir, Hell Hole Reservoir, South Fork Long Canyon Diversion Pool, and Ralston Afterbay.

2.2 PROJECT OPERATION

The MFP has been operated for over 40 years by PCWA as a multi-purpose project to benefit the people of Placer County. The MFP is operated with respect to four objectives, as follows:

- Meet FERC license requirements that protect environmental resources and provide for recreation;
- Meet the consumptive water demands of western Placer County;
- Generate power to help meet California's energy demand and provide valuable support services required to maintain the overall quality and reliability of the state's electrical supply system; and
- Maintain Project facilities to ensure their continued availability and reliability.

Project operations for water supply and electric power generation are constrained by regulatory and contract requirements, the physical capacities of the Project facilities, and water availability. Regulatory and contract requirements include conditions imposed by the FERC license, water rights permits, water delivery contracts, and the existing power purchase contracts with PG&E. Water availability is influenced by carryover storage in the Project reservoirs and the timing and quantity of annual runoff.

Typical annual operation of the Project results in the capture of runoff which is diverted to increase storage in French Meadows and Hell Hole reservoirs in the winter and spring (filling period), and drawdown of the reservoirs during the summer, fall, and early winter (release period). Operation of the MFP varies from year-to-year based on the timing and magnitude of spring runoff, which is influenced by the amount of winter snow pack and ambient temperature conditions, as well as precipitation.

2.3 TESTING AND MAINTENANCE

To maintain and protect system reliability, PCWA conducts annual inspections, testing, and maintenance of Project facilities. Annual maintenance is scheduled at a time when the work can be expeditiously completed (during favorable flow and weather conditions) and have the least effect on water supply deliveries and power production.

These activities typically occur for facilities in the lower Project area beginning in late September, and require that the lower MFP powerhouses (Middle Fork, Ralston, and Oxbow) be taken out of service for 3 to 6 weeks. During the fall maintenance period, Middle Fork Interbay and Ralston Afterbay water levels are lowered to allow access to the facilities. Consumptive demands and instream flow requirements downstream of Oxbow Powerhouse during the fall outage are typically met by increasing flow releases from Hell Hole Reservoir into the Rubicon River. Inspection, testing, and the maintenance of facilities in the upper Project area (i.e., French Meadows and Hell Hole powerhouses) typically occur during the spring, once the roads to the Project facilities are passable.

PCWA also implements routine maintenance activities within and around Project facilities to:

- Preserve Project flow and storage capacities by implementing sediment and debris management;
- Protect worker and public health and safety by implementing vegetation management, pest management, signage, and erosion and rock control measures;
- Provide facility access by implementing road and trail maintenance; and
- Protect facility reliability by implementing equipment maintenance, erosion and rock control measures, facility painting, and powerline and communication line pole replacement.

For Project recreational facilities, PCWA has on-going agreements with the TNF and ENF under which it provides the financial resources necessary to support a portion of the operation and restoration of these facilities by the respective National Forests.

2.4 POTENTIAL PROJECT BETTERMENTS/IMPROVEMENTS

In preparation for the relicensing of the MFP, PCWA conducted an assessment to identify potential modifications or additions (betterments) to existing Project facilities that would improve operations or maintenance of the Project, and result in an increase in net or peaking generation. As a result of this assessment, PCWA included the following three potential Project betterments in the PAD:

- Hell Hole Reservoir Seasonal Storage Increase.
- French Meadows Powerhouse Capacity Upgrade.
- Ralston Powerhouse Capacity Upgrade.

Refer to Maps 2a-2d for the location of the three potential Project betterments. PCWA intends to further evaluate these potential betterments during relicensing with respect to their engineering and economic feasibility and the potential protection, mitigation, or enhancement measures that may be necessary to address potential effects on environmental and cultural resources. The specific Project betterments to be included in the License Application will be determined after reviewing the results of on-going engineering, economic, cultural, and environmental studies in relation to potential future license conditions.

2.4.1 Hell Hole Reservoir Seasonal Storage Increase

The purpose of this betterment would be to seasonally increase the storage capacity of Hell Hole Reservoir. The betterment would utilize a portion of the existing flood control pool, above the present normal maximum operating water level, to store additional

water during the spring and summer after the peak of the runoff period. An approximate 9,750 ac-ft to 12,000 ac-ft increase in seasonal storage in the reservoir would be achieved by installing 8-10 foot high crest gates on the existing dam spillway. The crest gates would be raised when needed to increase reservoir storage. Operation of the crest gates would also seasonally increase the reservoir's inundation area within the existing flood pool by approximately 37 acres.

In years when either French Meadows or Hell Hole reservoirs would have spilled, this betterment would allow the MFP to capture additional water in storage in Hell Hole Reservoir which can later be used to increase net annual energy generation. In all but the driest years, the betterment would also allow the MFP to shift the timing of some generation from the spring run-off period to the summer peak energy demand period. While the shift in the timing of the generation will not increase total annual MFP generation, it will increase the benefit of the Project by increasing generation during the peak energy demand period. This betterment would require a new water right to allow for additional storage at Hell Hole Reservoir.

This betterment would require the following modifications to existing Project facilities:

- Hell Hole Dam Spillway - install 8-10 foot-high crest gates on the existing concrete spillway.
- Hell Hole Dam - install 2 foot-high parapet walls on each end of the existing dam to maintain minimum freeboard requirements, if 10 foot-high crest gates are installed.
- French Meadow Powerhouse - install 4 foot-high parapet wall at the powerhouse to avoid inundation from wave action when the reservoir is at its maximum water surface elevation.
- Hell Hole - Middle Fork Tunnel Gatehouse - install 4 foot-high parapet wall around the gatehouse to avoid inundation from wave action.
- South Fork Long Canyon Diversion Dam - install 3 foot-high crest gates on the diversion dam or a check valve at the drop inlet to avoid the backflow of water from the Hell Hole - Middle Fork Tunnel into South Fork Long Canyon Creek when Middle Fork Powerhouse is not operating.

The betterment would also require construction of three new Project facilities including:

- Hell Hole Dam Spillway Crest Gates Control Building - construct a small control building adjacent to the spillway to provide power to operate the spillway crest gates.
- Hell Hole Dam Spillway Crest Gates Control Building Powerline - construct a short spur line (approximately 525 feet) from the control building to an existing powerline to provide power for spillway crest gate operations.
- South Fork Long Canyon Diversion Dam Generator Building - construct a control building with a generator to provide power to operate the crest gate.

2.4.2 French Meadows Powerhouse Capacity Upgrade

The purpose of this betterment would be to increase the generating capacity of the existing French Meadows Powerhouse from 15.3 MW to approximately 30 MW. Generating capacity would be increased by adding a second powerhouse immediately adjacent to the existing powerhouse. The existing French Meadows Powerhouse is only able to utilize approximately one-half of the maximum hydraulic capacity of the French Meadows - Hell Hole Tunnel. The addition of a second unit would allow the maximum hydraulic capacity of the tunnel to be used to transport more water over a shorter period of time from French Meadows Reservoir to Hell Hole Reservoir, thereby increasing the MFP's peaking generation capabilities. This betterment would require a new water right to allow for an increase in the permitted direct diversion rate from French Meadows Reservoir to Hell Hole Reservoir.

The new powerhouse would also increase the capability of the MFP to supply electrical grid support services. The new generating unit could be operated simultaneously or independently of the existing generating unit. The existing PG&E 60-kV French Meadows - Middle Fork Transmission Line will be used to interconnect the new powerhouse with the PG&E transmission system.

This betterment would require the following modifications to existing Project facilities:

- French Meadows - Hell Hole Tunnel Intake Trash Rack - possible replacement of the existing cylindrical trash rack with a larger trash rack to reduce head losses and allow greater volume of water to flow into the tunnel.
- French Meadows Powerhouse Switchyard - expand the existing switchyard to include additional buswork, transformers, and electrical switching equipment necessary to convey the additional power generated at the new powerhouse.
- Middle Fork Powerhouse Upper Switchyard - upgrade the transformers and switchgear at the existing 60kV substation at Middle Fork Interbay to handle the additional power transfer.

This betterment would also require construction of the following new Project facilities:

- French Meadows Powerhouse - construct a second powerhouse with installed generating capacity of approximately 15 MW immediately adjacent to existing powerhouse.
- French Meadows Powerhouse Penstock - construct a second penstock, parallel to the existing penstock, to provide water to the new powerhouse.
- Additional Surge Capacity Facility - develop additional surge capacity through construction of a surge shaft, surge shaft and tank, or surge pipeline located above the French Meadows - Hell Hole Tunnel Portal, or installation of a bypass valve in the new powerhouse.

- French Meadows - Hell Hole Tunnel Surge Shaft or Pipeline Access Road - construct a new Project road from an existing Forest Service road to the surge shaft or pipeline and temporarily improve the existing Forest Service road.

2.4.3 Ralston Powerhouse Capacity Upgrade

The purpose of this betterment is to improve the operating efficiency of the Middle Fork - Ralston system by increasing the hydraulic capacity of Ralston Powerhouse to match Middle Fork Powerhouse throughput, plus accretions at Middle Fork Interbay. This betterment would allow the MFP to maximize peaking generation during periods of high energy demand, thereby increasing the overall benefit of the MFP. This betterment would only require upgrades to electrical and mechanical equipment within the Ralston Powerhouse. This betterment may result in the ability of Ralston Powerhouse to utilize more than 1,000 cubic feet per second (cfs), in which case a new water right will be needed.

3.0 METHODS

Methods used to develop information for this Site Assessment included: (1) documenting whether the study area is within the current or historic range of CRLF; (2) describing any known records of CRLF in the study area; (3) a describing CRLF habitat requirements, and (4) characterizing, mapping, and evaluating existing upland and aquatic habitat conditions for CRLF in the study area.

3.1 CURRENT AND HISTORIC RANGE OF CRLF

Available literature was reviewed to determine the current and historic range of CRLF in the study area. Literature reviewed included *Designation of Critical Habitat for the California Red-legged Frog and Special Rule Exemption Associated with Final Listing for Existing Routine Ranching Activities, Final Rule* (USFWS 2006), *Recovery Plan for the California Red-legged Frog* (USFWS 2002), and other information referenced as appropriate.

3.2 KNOWN CRLF RECORDS

Known CRLF records in the study area were compiled from a review of the following sources: the *California Natural Diversity Database* (CNDDB) (CDFG 2007), *University of California Berkeley's Museum of Vertebrate Zoology Data Access* (UC Berkeley 2007); and the *California Red-Legged Pond Survey Report for the Ralston Ridge Pond* (PG&E 2004).

In addition, agency representatives and species experts familiar with CRLF in the Middle Fork American River (MFAR) watershed were consulted. This includes USFWS-recognized CRLF expert Sean Barry, Amy Fesnock of USFWS, and Jann Williams of U.S. Department of Agriculture, Forest Service (USDA-FS). Other local individuals familiar with amphibian studies or resources in the study area were also consulted.

3.3 CRLF HABITAT CHARACTERISTICS

Available sources were reviewed to characterize CRLF habitat requirements. The sources included a review of the *Recovery Plan for the California Red-legged Frog* (USFWS 2002), USFWS Guidance (USFWS 2005), *Designation of Critical Habitat for the California Red-legged Frog and Special Rule Exemption Associated with Final Listing for Existing Routine Ranching Activities, Final Rule* (USFWS 2006), the USFWS species account for CRLF (USFWS 2007), and other information referenced as appropriate. In addition, USFWS-recognized CRLF expert Sean Barry was consulted to provide additional information on the characteristics of CRLF habitat.

3.4 UPLAND AND AQUATIC HABITAT CHARACTERIZATION

The USFWS Guidance requires that CRLF Site Assessments include descriptions and maps of upland and aquatic habitat within 1 mile of the Project boundary. The methods implemented to characterize and map upland and aquatic habitats in the study area are provided below.

3.4.1 Upland Habitat

Mapping and descriptions of upland habitats present in the study area are based primarily on technical studies implemented by PCWA in 2007. A summary of the methods used in these studies is provided below. Refer to TERR 1 - Vegetation Communities and Wildlife Habitats Technical Study Report (PCWA 2007) for more detailed methods and study results.

Preliminary information on upland vegetation communities in the vicinity of the MFP was developed based on USDA-FS CalVeg data (PCWA 2007). Detailed information on riparian communities in the study area was developed from field surveys (helicopter and ground) conducted in August, September, and October 2005, as part of PCWA's Physical Habitat Characterization Study (PCWA 2006). These data were integrated to develop preliminary vegetation community maps in the study area.

The preliminary vegetation maps were verified through a review of aerial photographs of the study area (AirPhoto USA 2005) and video of stream reaches and reservoirs associated with the MFP in August 2007. Ground-truth surveys were conducted by helicopter and on the ground August through November 2007. Corrections or modifications to CalVeg data resulting from the review of aerial photographs and video and from ground-truth surveys were incorporated into GIS layers and finalized maps were developed.

3.4.2 Aquatic Habitat

Methods implemented to develop descriptions and maps of aquatic habitat in the study area include a review of aerial photos, low-elevation helicopter surveys, and ground surveys.

Review of Aerial Photographs

Aerial photographs were reviewed to identify potential aquatic habitat (e.g., backwater areas) along the rivers, large and moderate creeks, and small tributary streams associated with the MPF. In addition, the photographs were reviewed to identify permanent or semi-permanent natural ponds, or artificial impoundments such as stock ponds and irrigation ponds in the study area. All photos were full-color orthophotos taken September 13 and 15, 2005, at a sensor height of 12,000 feet above ground level and at a photo scale of 1:2000 with 35% overlap, subsequently scanned at 2000 DPI, creating 18-inch pixel resolution.

Low-Elevation Helicopter Surveys

Low-elevation helicopter surveys of all areas within the study area were conducted in August 2007 by two biologists and CRLF expert Sean Barry. Potential aquatic habitat identified during the surveys was recorded, and additional information for these areas was collecting during ground surveys, as described below. Inaccessible areas were surveyed by helicopter only.

Ground Surveys

A description of survey methods implemented to obtain aquatic habitat data in the study area is provided below. Refer to Table 1 for a list of aquatic habitats evaluated in this assessment.

Rivers

Habitat data on the large rivers within the MFP were collected as part of studies conducted in 2005 and 2006 for PCWA's *Draft Physical Habitat Characterization Report* (PCWA 2006), including geomorphology studies, riparian habitat mapping studies, and aquatic habitat characterization studies.

Data obtained that are pertinent to this CRLF Site Assessment include:

- Average and maximum bankfull depth.
- Bankfull width.
- Water surface slope (i.e., longitudinal profile).
- Dominant particle size class (i.e., sand, gravel, cobble, boulder, or bedrock).
- Mean riparian corridor width and riparian vegetation community composition.
- Riparian vegetation percent canopy cover.
- Mesohabitat composition, including information on the extent of pool-type and non-pool habitat (cascades, riffles, and runs).
- Fish species present.

Refer to the *Draft Physical Habitat Characterization Report* (PCWA 2006) for detailed methodologies for collection of these data in conjunction with other habitat characterization studies.

Large and Moderate Creeks and Small Tributary Streams

Habitat information on large and moderate creeks and small tributary streams in the study area was obtained during foothill yellow-legged frog (FYLF) surveys conducted by PCWA in 2007 as part of the AQ-12, Special-Status Amphibian and Aquatic Reptile technical studies. Only accessible streams were surveyed.

During the surveys, photographs were taken of each stream, and the following data were collected, as required by the USFWS Guidance:

- GPS location.
- Bankfull width and depth.
- Stream gradient (percent slope).
- Size and depth of instream pools, if present.
- Characterization of non-pool habitat.
- Presence of emergent or overhanging vegetation.
- Substrate composition.
- Descriptions of the stream bank.
- Presence of CRLF individuals (if any).
- Predators (such as bullfrogs and predatory fish) and/or other wildlife species present.

Data were recorded on CRLF Habitat Site Assessment Data Sheets (Appendix D of the USFWS Guidance).

Reservoirs and Diversion Pools

Information on reservoirs and diversion pools associated with the MFP was developed from field data collected in 2007 as part of PCWA's TERR 1 Vegetation Communities and Wildlife Habitats technical studies, from consultation with PCWA staff, and a review of SD B - Detailed Existing Project Description of the PAD (PCWA 2007). Data obtained that are pertinent to this CRLF Site Assessment include:

- Photographs of the reservoirs and diversion pools.
- Size (acreage) and depth of the reservoirs and diversion pools.
- General physical setting and characteristics of surrounding landscape.
- Substrate composition.

- Vegetation communities present.
- Emergent and overhanging vegetation present.

Off-Channel Ponds

Habitat data on off-channel ponds in the study area were obtained through ground surveys conducted August through December 2007 by teams of two biologists and by CRLF expert Sean Barry. During the surveys, photographs were taken of each off-channel pond, and the following data were collected, as required by the USFWS Guidance:

- GPS location.
- Pond size and maximum depth.
- Presence of emergent or overhanging vegetation and dominant species.
- Substrate composition.
- Whether pond is ephemeral or perennial.
- CRLF individuals present (if any).
- Predators (such as bullfrogs and predatory fish) and/or other wildlife species present.

Data were recorded on CRLF Habitat Site Assessment Data Sheets (Appendix D of the USFWS Guidance).

4.0 RESULTS

4.1 CURRENT AND HISTORIC RANGE OF CRLF

The study area is within the historic range of CRLF, which includes aquatic, riparian, and upland habitats throughout much of California and northern Baja California. Currently, CRLF are known to occur from sea level to approximately 3,500 feet in elevation, although historical sightings have been reported as high as 4,900 feet in the Sierra Nevada (USFWS 2002). Jennings and Hayes (1994) suggested that populations at the upper elevation limit may represent translocations.

In the foothills along the west slope of the Sierra Nevada, five isolated populations of CRLF are currently known, compared to over 60 historic locations reported (USFWS 2002). However, much of the land in the Sierra Nevada foothills is privately owned and has not been surveyed. Therefore, the actual distribution of CLRF in this region is unknown.

The MFP is within the USFWS CRLF Recovery Unit 1 (Sierra Nevada Foothills and Central Valley) (USFWS 2002), but does not contain USFWS-designated critical habitat. The nearest critical habitat unit, ELD-1, is located south of the MFAR watershed in El Dorado County (USFWS 2006).

4.2 KNOWN CRLF RECORDS

4.2.1 Records Within the Study Area

There is only one known CRLF record within the study area (Table 2 and Map 3). In June 2001, a single adult CRLF was observed in an ephemeral pool north of Pennsylvania Point, on the western end of Ralston Ridge (CNDDB 2007, PG&E 2004). Experts believe the frog was at this site during dispersal (Barry, pers. comm., 2007a). The site, which is on a right-of-way below a PG&E transmission line, was almost completely burned in the Ralston Ridge wildfire of 2006 and remains almost completely denuded. The pond, which appears to have been formed in a depression caused by ground disturbance and erosion resulting from logging operations, was completely dry in 2007 during helicopter surveys completed for this Site Assessment. No frogs have been detected at the site since 2001 (Barry, pers. comm., 2007a).

No CRLF were observed during ground surveys conducted in 2007 for this Site Assessment. In addition, there were no incidental sightings of CRLF recorded during numerous aquatic surveys conducted for the MFP in 2005 through 2007 as part of early relicensing studies.

4.2.2 Records Outside the Study Area, but within the MFAR Watershed

There are two additional CRLF records outside the study area, but within the MFAR watershed (Table 2 and Map 3):

- One CRLF museum specimen was found in the vicinity of Michigan Bluff, in 1916, approximately 1 1/3 mile north of the study area.
- In 2006, a population of more than fifty CRLF was observed in ponds on private land at Michigan Bluff, just less than one mile north of the study area. All life stages were observed at the site (i.e., eggs, tadpoles, metamorphs, and adults), and the population is believed to be reproductive (Fesnock, pers. comm., 2007).

4.3 CRLF HABITAT CHARACTERISTICS

4.3.1 Upland Habitat

The USFWS defines upland habitats broadly as those which “provide food and shelter sites for CRLF and assist in maintaining the integrity of aquatic sites by protecting them from disturbance and supporting the normal functions of the aquatic habitat” (USFWS 2006). For example, upland habitats may be riparian areas immediately adjacent to aquatic breeding areas, or grasslands that contain seeps and springs (USFWS 2002). Adult CRLF may move from spawning pools into deeply shaded forest streams during the summer, and seek shelter in root masses and undercuts (Barry, pers. comm., 2007c). Due to the fact that CRLF in coastal California are known to make long-distance movements “without regard to topography, vegetation type, or riparian corridors” (USFWS 2002), any upland habitat that does not contain significant barriers to dispersal may potentially be used by CRLF. Barriers to dispersal defined by USFWS

(2006) include urban and suburban developments, wide or fast-flowing rivers and streams, lakes and reservoirs greater than 50 acres, and heavily traveled roads without underpasses or culverts.

4.3.2 Aquatic Habitat Characteristics

The USFWS Guidance document states that the following aquatic habitats represent potential habitat for CRLF:

- Marshes.
- Springs.
- Permanent and semi-permanent natural ponds.
- Ponded and backwater portions of streams.
- Artificial impoundments such as stock ponds, irrigation ponds, and siltation ponds.
- Slow-moving shallow riffle zones in creeks.

The USFWS Guidance document further states that the following aquatic habitat does not represent appropriate habitat for CRLF:

- Deep lacustrine water bodies, such as lakes and reservoirs (greater than 50 acres in size) (USFWS 2002).

The following additional characteristics of potential CRLF spawning habitats were identified through a review of available information:

- Most spawning habitat is associated with dense or shrubby riparian vegetation including, but not limited to, willows (Salix spp.), cattails (Typha spp.), and bulrushes (Scirpus spp.) (USFWS 2007).
- Vegetation typically provides shade for a significant portion of the water body, with dense vegetation located at or near water level (Hayes and Jennings 1998).
- CRLF prefer relatively deep (between 0.5 and 1.5 meters in depth) (Barry, pers. comm., 2007c), still or slow-moving water (Hayes and Jennings 1998, Jennings and Hayes 1994).
- At seasonal spawning habitat, water must remain long enough in most years to allow for metamorphosis of most of the tadpoles (generally between July and September) (USFWS 2006).
- Most populations of CRLF are found in habitats that are free of introduced predators. Predators on one or more life stages of CRLF are believed to include bullfrogs, non-native crayfish, and various fishes including bass, catfish, and mosquito fish (USFWS 2002).

4.4 UPLAND AND AQUATIC HABITAT CHARACTERIZATION

This section provides a description of upland and aquatic habitats present in the study area.

4.4.1 Upland Habitat

Upland habitats are used primarily by CRLF during the non-breeding season for dispersal and/or estivation. Specific upland habitat requirements are poorly understood and USFWS (2002) stated that "any upland habitat that does not contain significant barriers to dispersal may potentially be used by CRLF." Therefore, the description of upland habitat in this assessment is provided as overview of general habitat conditions in the study area. The following describes vegetation communities within the study area as well as associated lands uses and potential dispersal barriers.

Vegetation Communities

Twenty-three upland vegetation communities are present in the study area. These include two herb-dominated, four shrub-dominated, and 17 tree-dominated communities. Vegetation communities in the study area vary with elevation. At higher elevations, two mixed conifer communities are present—one dominated by fir species (white fir) and the other dominated by pine species (sugar pine and Jeffrey pine). These mixed conifer communities transition into stands of Ponderosa pine and Douglas-fir at intermediate elevations near Middle Fork Interbay. At the lower elevations, the surrounding vegetation is dominated by canyon live oak woodland communities. A list of the vegetation communities in the study area is provided in Table 3 and descriptions of these communities are provided in Appendix B. A map of the location of these communities is provided as Map 4.

Land Use

The study area is situated in the foothills and mountainous uplands of the western slope of the central Sierra Nevada. The study area is heavily forested, rural in nature, and sparsely populated. There are no residential or commercial developments in the immediate vicinity of the study area. The nearest population center is Foresthill (population 1,791), located approximately four miles west-northwest of Ralston Afterbay. Several paved roads provide the primary access to the MFP vicinity. These include: Mosquito Ridge Road, Ralston Ridge Road, Blacksmith Flat Road, and Soda Springs Riverton Road. Lands within the study area are located primarily within the Eldorado National Forest (ENF) and Tahoe National Forest (TNF). Private parcels are also present throughout the study area at various locations. Land use within the FERC Project boundary is focused on hydropower generation and recreation. Land use outside the FERC Project boundary is managed mainly for recreation, timber harvest, grazing, natural resource protection, and to a lesser extent mining.

Potential Barriers to CRLF

By USFWS definition (2006), large rivers and reservoirs such as the Middle Fork American River, the Rubicon River, Hell Hole Reservoir, and Ralston Afterbay represent barriers that would restrict the northward and/or southward movement of CRLF throughout the study area.

4.4.2 Aquatic Habitat

The following characterizes aquatic habitat for CRLF in the study area. Table 1 provides a list of aquatic habitats (including rivers, large and moderate creeks, small tributary streams, reservoirs, diversion pools, and off-channel ponds) evaluated in this Site Assessment. Map 5 provides an overview of the locations of these aquatic habitats.

Rivers

There are two major rivers associated with the MFP, the MFAR and the Rubicon River. Both rivers are rocky, fast-flowing rivers and do not provide appropriate habitat for CRLF. The rivers do not contain ponded or backwater areas that represent appropriate aquatic habitat for CRLF (USFWS 2006). Further, the rivers do not have still, slow-moving water or vegetation characteristics typical of most sites known to support populations of CRLF. According to USFWS-approved CRLF expert Sean Barry, decades of surveys along fast, rocky waterways such as the MFAR and the Rubicon River have yet to reveal a single CRLF population (Barry, pers. comm., 2007b). In addition, the MFAR below Ralston Afterbay often experiences substantial daily fluctuations in flow levels due to peaking generation. These flow fluctuations would likely exclude breeding CRLF populations. Finally, these rivers represent barriers to CRLF dispersal as defined by USFWS (2006).

An overview of the MFAR and the Rubicon River is provided below. Table 4 provides more information on the geomorphology, hydrology, and riparian vegetation patterns along these rivers.

The MFAR, which flows west from the crest of the Sierra Nevada to the Central Valley floor, is contained within a deeply incised river canyon between 2,000 to 4,000 feet-deep. Stream channel gradients along the MFAR from French Meadows Reservoir down to Ralston Afterbay are relatively steep (slopes of greater than 2%), and the water is confined within the bedrock channel. As a result, floodplains within the river canyon are generally small, poorly developed, or non-existent. Substrate materials include bedrock, boulder, cobble, and gravel, often in equal mixtures. Downstream of Ralston Afterbay, the MFAR has a more moderate gradient (slopes of between 2.5%), with a broader floodplain and large alluvial bars present along the river reach.

Similar to the MFAR, the Rubicon River is typically confined within deeply incised canyon walls. However, a four-mile reach immediately downstream of Hell Hole Dam is different from the remainder of the river. This reach was widened and aggraded by the failure of Hell Hole Dam in 1964, and the valley bottom was transformed from a narrow

v-shape to a wider u-shaped cross-sectional profile. Stream channel gradients along the Rubicon River are moderate, ranging between 1 to 2%. The river channel is approximately 20 meters wide, often with a floodplain or large bar along at least one bank. Substrate materials include bedrock, boulder, and cobble.

Riparian vegetation is often absent or sparse along both rivers, although narrow, discontinuous bands of riparian vegetation are present along reaches where localized sediment inputs from hill slope or upstream sources accumulate. In general, riparian communities are dominated by alder and willow trees and shrubs, with cottonwoods co-dominant in several locations.

Flows on the MFAR and the Rubicon River are altered year-round. Flows on the MFAR and Rubicon River upstream of Ralston Afterbay are typically reduced and more stable during the winter and spring season as water is diverted into storage or for power generation. Currently, high spring flows in these river reaches generally only occur when the reservoirs are spilling. During the summer and fall season, flows in these rivers are typically equal to or slightly higher than under natural conditions as water is released from storage to meet minimum instream flow requirements mandated in the FERC license. On the MFAR downstream of Ralston Afterbay (the "peaking reach"), flows fluctuate substantially to meet power demands or to support whitewater recreation. Daily fluctuations in flow in this reach can range between 75 cfs and 1,080 cfs.

Large and Moderate Streams

The large and moderate streams in the study area, which include Duncan Creek, Long Canyon Creek, North Fork Long Canyon Creek and South Fork Long Canyon Creek, do not represent appropriate habitat for CRLF because the streams do not contain ponded and backwater areas. All four streams are steep, high-gradient streams that run through bedrock channels with alternating sections of boulder and cobbles. The geomorphology of these streams results in swift-moving water and rocky banks with small or nonexistent floodplains which are not conducive to the development of ponded or backwater areas. The instream pool habitats of these streams are characterized by large, rocky, open pools. These instream pool types do not support CRLF because the water is too fast and cold, and because they are devoid of bordering emergent or floating vegetative cover (Barry, pers. comm., 2007c). In addition, the banks along these streams do not have the characteristic vegetation typical of most sites known to support populations of CRLF.

The following briefly describes aquatic habitat in each of the streams. Summary data for these streams are provided in Table 5. Refer to Appendix C for the CRLF Site Assessment datasheets and photographs of these streams.

Duncan Creek is a moderate to high-gradient perennial creek with slopes ranging between about 2 and 10%. The creek runs within a bedrock channel, although substrates also include boulders and rocks, and some cobble. The instream habitat is characterized by waterfalls and cascades, interrupted by plunge pools. There is no

emergent or aquatic vegetation instream or immediately along the banks, which tend to be steep and rocky. Riparian vegetation is relatively sparse along the creek, composed primarily of alders and willows, with about 25% canopy cover. The upper portion of Duncan Creek is above 5,000 feet in elevation.

Long Canyon Creek runs through two different river canyon types. The lower reach of Long Canyon Creek runs through a narrow, v-shaped canyon similar to the MFAR (although smaller in size). Gradients in this section are greater than 5%, and the stream is entrenched in bedrock, with some boulder and cobble substrates. The upper reach of Long Canyon Creek runs through a wider U-shaped valley, in which stream gradients are more moderate, about 2%. Substrate included exposed bedrock, but was co-dominant with boulders and cobbles. There is no emergent or aquatic vegetation instream or immediately along the banks. Riparian vegetation includes small to medium-sized alders and willows, with canopy cover generally less than 50%.

North and South Fork Long Canyon creeks are geomorphically similar, and portions of both streams are above 5,000 feet in elevation. Both streams are perennial, and have a moderate to high gradient of between about 2 to 5%. Instream habitats include high-gradient riffles, cascades, and plunge pools. There is no emergent or aquatic vegetation instream, although some herbaceous species such as sedges (*Carex* spp.) and Indian rhubarb grow on and between rock along the sides of the streams. The streams flow through mixed conifer-pine forests, and there are narrow bands of riparian vegetation along the streams dominated by alders and willows, generally with about 50% canopy cover or greater.

Small Tributary Streams

Habitat surveys were conducted at eleven small tributary streams that were accessible to field crews. Other small, remote tributaries in the upper MFAR watershed that were not accessible to field crews were evaluated through the review of aerial photography and by helicopter.

Small tributary streams in the study area do not represent appropriate habitat for CRLF. The small tributary streams are steep, high-gradient streams that run through bedrock channels with alternating sections of boulder and cobbles. The geomorphology of these streams results in swift-moving water and rocky banks with small or nonexistent floodplains which are not conducive to the development of ponded or backwater areas. In addition, these streams do not have the characteristic vegetation typical of most sites known to support populations of CRLF. CRLF expert Sean Barry stated that, based on his evaluation of these streams, “flat or gently sloping sunlit sections with vegetated pools of the preferred water depth” that would represent appropriate habitat for CRLF “appeared to be absent” from the small tributary streams evaluated (Barry, pers. comm., 2007b).

The following briefly describes aquatic habitat in each of the small tributary streams Summary data for each stream are provided in Table 5. Refer to Appendix C for the CRLF Site Assessment datasheets and photographs of these small tributary streams.

American Canyon Creek

American Canyon Creek is a narrow, confined perennial stream that meets the MFAR at RM 6.4. Cobble runs alternate with steeper bedrock cascades and pools. Riparian vegetation, which is dominated by small to medium-sized willow shrubs and alder trees, is present only along the water's edge. Canopy coverage varies from less than 25 to 100%, depending on valley width. Flows were approximately 1cfs during the fall surveys. Non-native aquatic predators were not observed.

Todd Creek

Todd Creek is an intermittent stream that flows within steep canyon walls. The substrate is dominated by cobble, boulder, and bedrock. Pools found along the stream course range from 15 to 25 feet-wide and average 2.5 feet-deep. Non-pool habitat is characterized by cascades and runs with no backwater or secondary channels. The stream gradient averages 5% with larger cascades found upstream where the gradient is higher. The bankfull width average 10 feet and bankfull depths average 0.5 to 1.5 feet. The canopy along the bank is dominated by small and medium-sized alder and willow with scattered California buckeye (*Aesculus californica*) and provides between 25 and 100% cover along the stream course. No emergent or floating vegetation is found in the channel.

Gas Canyon Creek

Gas Canyon Creek is a narrow, high-gradient, intermittent stream with no floodplains. It flows within steep, canyon walls with a substrate dominated by bedrock and cobble. The stream gradient averages 3% with higher gradients at the upstream reach. Pools range from 15 to 40 feet-wide and have a maximum depth of 5 feet. Non-pool habitat includes cascades and runs with no backwater or secondary channels. The stream has a bankfull width of 32 feet and bankfull depth that ranges from 0.5 to 1.5 feet. Vegetation along the bank is dominated by overhanging willow and alder, which provide shade along the stream course. California grape (*Vitis californicus*) occurs along the bank. No emergent or floating vegetation is found in the channel.

Canyon Creek

Canyon Creek is a perennial stream that flows within a narrow, steep canyon without floodplains. It has an average stream gradient of 5%. The stream substrate is composed of bedrock with bankfull stream widths of 35 feet and depths of 3 feet. Pools are up to 2.5 feet-deep and range from 15 to 35 feet-wide. Non-pool habitat includes both bedrock chutes and cascades. The understory along the bank is composed of small to medium-sized alder (*Alnus* sp.) and willow (*Salix* sp.). An overstory canopy of

oaks is found further from the bank. Canopy cover along the stream is high, although several open bedrock areas occur.

Otter Creek

Otter Creek is a perennial stream that typically has a floodplain along at least one bank. It flows with a 5% stream gradient within a narrow, bedrock-confined channel with no backwater or secondary channels. The substrate is dominated by bedrock and boulder in the upstream reaches and boulder and cobble in the downstream reaches. Stream bankfull widths are approximately 15 feet with bankfull depths of 0.5 to 1.5 feet. Pools average 15 to 40 feet-wide with maximum depths of 3 feet. Non-pool habitat includes riffles, runs, and cascades with riffles and runs dominating instream habitat near the MFAR confluence. The canopy along the banks is dominated by medium to large-sized willow, alder and cottonwood (*Populus fremontii*) with an average of 50% cover. Other species found along the stream bank include Indian rhubarb, and grasses and sedges, but no emergent or overhanging vegetation.

Jesse Canyon Creek

Jesse Canyon Creek is a perennial stream that flows within a steep, narrow canyon. The substrate is composed primarily of bedrock and stream gradients average 7%. The bankfull width is approximately 10 feet and bankfull depth ranges from 0.5 to 1.5 feet. Pools are found along the stream course and range in width from 15 to 25 feet, with a maximum depth of 3 feet. Non-pool habitat includes chutes and waterfalls with no backwater or secondary channels. The canopy along the bank is composed of willow and alder with no emergent or overhanging vegetation. Other species found along the stream bank include Indian rhubarb (*Darmera peltata*) and poison oak (*Toxicodendron diversilobum*).

Pond Creek

Pond Creek is perennial stream within a steep, narrow canyon. It flows at a 7% slope with a primarily boulder substrate. Pools range in size from 15 to 20 feet-wide with depths of approximately 3 feet. Non-pool habitat includes waterfalls and chutes with no backwater or secondary channels. The bankfull widths are 10 feet with bankfull depths of approximately 0.5 to 1.5 feet. Pools are present along the stream course and range from 15 to 20 feet-wide and up to 3 feet-deep. The bank vegetation is dominated by alders and willows with no emergent, floating or overhanging vegetation.

Volcano Canyon Creek

Volcano Canyon Creek is a perennial stream that flows at a 7% slope within steep canyon walls. Pools are found along the stream course and average 15 to 20 feet-wide and 3 feet-deep. Instream habitats primarily include cascades and step-pools with a bedrock and large boulder substrate. The bankfull width of the stream is approximately 15 feet with bankfull depths of 0.5 to 1.5 feet. The vegetation along the bank is

composed of small to medium-sized alder and willow, which generally provide high canopy coverage with several open bedrock sections.

Brushy Canyon Creek

Brushy Canyon is a perennial stream which flows at a 7% gradient within steep canyon walls. Pools range in size from 20 to 45 wide with a maximum depth of 3 feet. Non-pool habitat is characterized by high-gradient cascades and plunge-pools. The bankfull width of the stream is approximately 15 feet with bankfull depths ranging from 0.5 to 1.5 feet. The substrate is primarily composed of bedrock boulders. The overstory along the bank is composed of oaks (*Quercus* spp.) with up to 90% canopy cover.

Pilot Creek

Pilot Creek, downstream of Stumpy Meadows Reservoir (gross capacity of 20,000 ac-ft), is a perennial stream that flows at a 5% gradient within a steep canyon. Pools range in size from 25 to 40 feet-wide with a maximum depth of 15 feet. Non-pool habitat is characterized by high-gradient cascades and plunge pools with a few riffles in lower-gradient areas. The bankfull widths average 45 feet with bankfull depths of approximately one foot. The canopy along the banks is dominated by willows and alders with an overstory of oaks found further from the bank in some sections.

Wallace Creek

Wallace Canyon is a high-gradient, perennial stream that flows within steep, canyon walls. The substrate is dominated bedrock and boulders. It has an average stream gradient of 7% with waterfalls and chutes along the stream course. Pools range in width from 20 to 25 feet with a maximum depth of 5 feet. The bankfull width of the stream is approximately 20 feet with bankfull depths of 3 feet. The understory along the bank is composed of small to medium-sized alder and willow, with an overstory of oaks found further from the bank.

Reservoirs

Three reservoirs associated with the MFP—Hell Hole Reservoir, Middle Fork Interbay, and Ralston Afterbay—were evaluated in this Site Assessment. French Meadows Reservoir was not evaluated in this Site Assessment because it is located above 5,000 feet in elevation. Hell Hole Reservoir and Ralston Afterbay are large, deep reservoirs greater than 50 acres in size. By USFWS definition, these reservoirs do not represent appropriate habitat for CRLF (USFWS 2006). While Middle Fork Interbay is smaller than 50 acres in size, it also does not represent appropriate habitat for CRLF because it does not have characteristics of artificial ponds typically supporting CRLF as described in Section 4.3.2 of this document. A brief description of Hell Hole Reservoir, Middle Fork Interbay, and Ralston Afterbay is provided below.

Hell Hole Reservoir is an impoundment of the Rubicon River. It is a large, deep reservoir with a maximum surface area of 1,253 acres and a maximum depth of 378

feet. Hell Hole Reservoir has steep, rocky shores and supports several vegetation communities including canyon live oak, black oak, and mixed conifer-pine communities. The northwestern shoreline supports a number of Project facilities including the Hell Hole Dam, employee housing including caretakers houses and the Hell Hole dormitory facility, French Meadows Powerhouse; recreation facilities including a boat ramp and picnic area and a campground; and several Forest Service and PCWA-owned roads. As stated previously, USFWS does not consider large reservoirs (greater than 50) as potential habitat for CRLF. Furthermore, Hell Hole Reservoir is considered a barrier to dispersal.

Middle Fork Interbay is set within the steep, rocky river canyon of the MFAR. It has a maximum surface area of 7 acres and a maximum depth of 64 feet (also at maximum operating water surface). While this impoundment is smaller than 50 acres, this impoundment is much deeper than the 2 to 5 foot water depth preferred by CRLF. In addition, the canyon walls are very steep, resulting in high gradient shorelines that allow room for only scattered riparian vegetation (e.g., shrubby willows). There is no emergent or aquatic vegetation around the impoundment. Middle Fork Interbay does not represent potential CRLF habitat because it is relatively large and deep and it lacks emergent and aquatic vegetation and/or dense shrubby riparian vegetation at the level of the water to provide attachment sites for eggs and cover and protection from potential predators. Middle Fork Interbay also experiences daily fluctuations in level of several feet.

Ralston Afterbay is also an impoundment set within the deep river canyon of the MFAR. It has a maximum surface area of 83 acres and a maximum depth of 130 feet. Similar to Middle Fork Interbay, the canyon walls are very steep, resulting in high gradient shorelines that allow room for only scattered riparian vegetation (e.g., shrubby willows). There is no emergent or aquatic vegetation around the impoundment. There are several developed areas surrounding Ralston Afterbay, including recreation facilities. Ralston Afterbay also experiences daily fluctuations in level of several feet. As stated previously, USFWS does not consider large reservoirs (greater than 50 acres) as potential habitat for CRLF. Furthermore, Ralston Afterbay is considered a barrier to dispersal.

Diversion Pools

Two diversion pools are evaluated in this Site Assessment, the North and South Fork Long Canyon diversion pools. Duncan Creek Diversion Pool was not evaluated because it is located above 5,000 feet in elevation. The North and South Fork Long Canyon diversions pools do not represent appropriate aquatic habitat for CRLF because they do not have characteristics of artificial ponds typically supporting CRLF as described in Section 4.3.2 of this document. Summary descriptions of the diversion pools surveyed are provided below, and summary data are provided in Table 6. Refer to Appendix C for the CRLF Site Assessment datasheets and photographs of these diversion pools.

The North and South Fork Long Canyon diversion pools are small impoundments (both significantly less than one acre in surface area) that serve as a point of diversion for the Hell Hole - Middle Fork Tunnel. They do not serve as water storage impoundments. PCWA does not currently divert water through the North and South Fork Long Canyon diversion pools after July of each year. Therefore, at the time surveys were conducted (in August 2007), both impoundments held less than a foot of water, with portions of the impoundment bottom fully exposed. There was no emergent or aquatic vegetation, although annual grasses lined portions of the impoundments. The land surrounding the North and South Fork Long Canyon diversion pools is mature mixed conifer-pine forest with sparse or no understory layer.

The North and South Fork Long Canyon diversion pools lack most of the characteristics of appropriate CRLF habitat. While CRLF prefer moderately deep water (between 2 and 5 feet) surrounded by dense emergent or aquatic vegetation and/or dense riparian vegetation such as willows, the diversions had very shallow water and there was only sparse vegetation around the diversion pools. In addition, the impoundments lack vertical emergent vegetation or other structures for the attachment of eggs, and do not contain sufficient water through August or September to allow for complete metamorphosis of tadpoles.

Off-Channel Ponds

Off-channel ponds at five locations were identified through the review of aerial photographs, helicopter surveys, expert and agency consultation, and ground-truth surveys. Of the ponds surveyed, only two ponds (Ponds “D” and “E”) located at Horseshoe Bar had sufficient characteristics to be considered potential CRLF breeding habitat (see Section 4.3.2). Two other ponds at Horseshoe Bar (Ponds “C” and “F”) may provide non-breeding (dispersal) habitat for CRLF. The Summit Hill Ranch pond was not surveyed because permission was not obtained to access the pond. The remainder of the ponds evaluated in this section did not have the characteristics of typical CRLF breeding habitat as described in Section 4.3.2 and/or as evaluated by CRLF expert Sean Barry (Barry, pers. comm., 2007b).

The following briefly describes aquatic habitat in each of the ponds. Summary descriptions and evaluations of the ponds surveyed are provided below, and summary data are provided in Table 6. Refer to Appendix C for the CRLF Site Assessment datasheets and photographs of these ponds.

Auburn State Recreation Area (Pond A)

A cattle pond located at a historic homesite in the Auburn State Recreation Area was surveyed by helicopter on August 9, 2007 and by foot on August 24, 2007. The pond, which is perennial and measures approximately 80 feet in diameter and about 15 feet maximum depth, is impounded by a dam located on its west end. Floating pondweed (*Potamogeton* spp.) was seen in the pond and cattails (*Typha* spp.) and rushes (*Juncus* spp.) grew on portions of the perimeter of the pond. A moist drainage overgrown with

cattails and rushes leads up to the dam. The pond is located within an oak woodland. Upland plant species near the pond include Himalayan blackberry (*Rubus discolor*) and various annual grasses. More than 35 bullfrogs (first-year metamorphs) were seen on the edge of the pond, and a number of bullfrog tadpoles were seen in the pond. A large population of fish in the pond included mosquito fish (*Gambusias* spp.) and bass (*Micropterus* spp.).

The large population of bullfrogs and predatory fish at this pond indicates that this is not appropriate breeding habitat for CRLF (Barry, pers. comm., 2007b).

Tiechert Industries open-pit mines

Tiechert Industries operates an open-pit mine on the southern side of the MFAR near Highway 49. Several ponds that have formed as a result of mining operations were identified based on a review of aerial photographs. These ponds were surveyed by helicopter on August 9, 2007. Access to view these ponds on foot was not requested, because the ponds did not represent appropriate habitat for CRLF.

The Tiechert ponds were up to 25 feet-deep and contained no emergent or aquatic vegetation for egg attachment. The ponds are located in a 2 to 3 acre area that is composed entirely of rock (i.e., gravel) and this is almost completely devoid of vegetation.

The depth of the ponds and lack of vegetation indicate that these ponds do not represent appropriate habitat for CRLF. Additionally**,** the roads in the mine and traffic from mining trucks and other heavy equipment operated on-site represent potential dispersal barriers for CRLF.

Summit Hill Ranch (Pond B)

A large cattle pond located at the Summit Hill Ranch off of Sliger Mine Road was identified as potential CRLF habitat. This pond was surveyed by helicopter on August 9, 2007. The pond is less than one acre in size and appears to be surrounded by shrubby vegetation. However, detailed information on this pond was not collected because the pond is on private land and the landowner did not grant permission to access the pond.

Horseshoe Bar (Ponds C-G)

The land at Horseshoe Bar was exposed in the 1850s when gold miners rerouted the original course of the MFAR through what is now called the Tunnel Chute. Five ponds and one large instream impoundment were surveyed at this location. Refer to the Horseshoe Bar inset in Map 5 for the location of these ponds in relation to the site. Of the ponds and impoundment surveyed for this Site Assessment, we conclude that two ponds, Pond “D” and “E” represent potential breeding habitat for CRLF. USDA-FS also conducted CRLF habitat assessment surveys at Horseshoe Bar in April and May 2003

(USDA-FS 2003). The surveyor concluded that the ponds at this location represented potential habitat for CRLF. However, bullfrog reproduction was also documented at high levels in all ponds during the 2003 surveys. No CRLF were detected during the 2003 surveys.

Descriptions and assessments for all of the Horseshoe Bar ponds surveyed during this Site Assessment are provided below.

- Pond "C" does not represent appropriate aquatic breeding habitat for CRLF. However, it does represent appropriate non-breeding (dispersal) habitat. Pond "C" is located an old mining excavation and is impounded by a beaver dam at its upper end. The beaver dam was built approximately two years ago (John Close, pers. comm., 2007). The pond, which is about 50 feet-long, 15 feet in maximum width, and less than 2 feet-deep, is bordered by a steep canyon wall on its western side. The pond is not accessible by foot, and is visible only from a path that ascends the canyon wall. Because the pond is difficult to access, it is uncertain whether the pond is perennial or ephemeral (John Close, pers. comm., 2007). There is no floating or emergent vegetation in the pond. The bottom substrate of the pond appears to be silt/mud. The vegetation surrounding the pond does not shade the pond, although limited shading is provided by the canyon wall itself.

  This pond does not represent breeding habitat for CRLF because the water in this pond is too shallow for breeding CRLF, which prefer water of 2 to 5 feet in depth, and the pond lacks vertical emergent vegetation or other structures for the attachment of eggs. If the pond dries up in summer, then the pond would not contain sufficient water to allow for complete metamorphosis of tadpoles. This pond, however, represents appropriate non-breeding (dispersal) habitat for CRLF.

- Pond "D" represents potential breeding habitat for CRLF. Pond "D" is a perennial impoundment that was created in the widening of an old mining excavation. The pond is approximately 35 to 40 feet in maximum width, 375 feet-long, and between 6 and 20 feet-deep depending on the season. The pond is hydrologically connected to Pond "E" in winter by a culvert that runs from the east end of the pond and under a dirt road. There is no floating or emergent vegetation in the pond. The pond is surrounded by willow trees (*Salix* spp.), and bramble-forming species such as Himalayan blackberry and California grape (*Vitis californica*). This vegetation does not overhang or provide shade over the pond. Herbaceous species growing nearby the pond include woolly mullein (*Verbascum thapsus*), curly dock (*Rumex* spp.) and Yerba santa (*Eriodictyon* spp.). A sheer canyon wall borders the southern side of the pond. The substrate is silt, and the bottom of the pond appears to be covered in fallen leaves or other organic matter.

  Under our evaluation, Pond "D" represents potential CRLF breeding habitat. While the water is deeper than 2 to 5 feet cited by Sean Barry as the optimum for

CRLF, portions of the pond may be of appropriate depth, and the pond retains the water long enough for CRLF to complete metamorphosis. The banks of the pond support dense, bramble-forming vegetation that may provide structure for egg attachment or cover from predators.

- Pond "E" represents potential breeding habitat for CRLF. Pond "E" is an impoundment that was created in the widening of an old mining excavation. There is generally water in the pond year-round, although it has dried up in past drought years (John Close, pers. comm.., 2007). As stated above, Pond "E" is hydrologically connected to Pond "D" in winter by a culvert. The pond is approximately 30 feet in maximum width, 450 feet-long, and 7 feet in maximum depth. There is no emergent vegetation in the pond, although floating pondweed was seen in the pond during an August survey. Similar to Pond "D", the pond is surrounded by willow trees, and bramble-forming species such as Himalayan blackberry and California grape. This vegetation does not overhang or provide shade over the pond. Herbaceous species growing nearby the pond include woolly mullein, curly dock, and Yerba Santa. The substrate is silt, and the bottom of the pond appears to be covered in organic matter.

  Similar to Pond "D", Pond "E" represents CRLF breeding habitat because it has water of appropriate depth for adult CRLF, it retains the water long enough for CRLF to complete metamorphosis, and it supports dense, bramble-forming vegetation on the banks of the pond that may provide structure for egg attachment or that may provide cover from predators.

- Pond "F" does not represent breeding habitat for CRLF. However, it does represent appropriate non-breeding (dispersal) habitat. Pond "F" is a shallow (1 foot deep) ephemeral pond that was created in the widening of an old mining excavation. It is about 45 feet in maximum width and about 129 feet-long. The pond dries up in late June (John Close, pers. comm., 2007). The pond is bordered on its west side by a sheer canyon wall. There is no floating or emergent vegetation in the pond. Surrounding vegetation is similar to that around Ponds "D" and "E", with the addition of several incense cedar trees (*Calocedrus decurrens*). The substrate is silt, and the water in the pond is very muddy and opaque.

  This pond does not represent appropriate habitat for CRLF because of the lack of emergent or aquatic vegetation, the insufficient depth of the water (i.e., less 2 to 5 feet cited as optimal for CRLF), and the fact that the water dries up in early summer, which would not allow sufficient time for the metamorphosis of CRLF tadpoles into terrestrial adults. However, the pond provides appropriate habitat for CRLF dispersal.

- Pond "G" does not represent appropriate habitat for CRLF. Pond "G" is a perennial pond that is hydrologically connected to the MFAR during flood events (i.e., is within the floodplain of the MFAR). It is formed in a depression between a

granite wall and a sandbar. The pond is approximately 50 to 60 feet-long and 20 feet in maximum width. It was approximately 2 feet-deep at the time of the survey, but marks on the canyon wall indicate that the water may be up to about 8 feet-deep during the rainy season or during flood events. The pond is bordered by the canyon wall on its west side. The substrate is primarily sand, with larger rocks and boulders on the eastern edge of the pond where it joins with the floodplain of the MFAR. The area around the pond is sparsely vegetated with small sedges (*Carex* spp.), several clumps of deer grass (*Muhlenbergia rigens*) and shrubby willows. Submerged vegetation (unidentified) was seen growing in the bottom of the pond. The pond is not shaded, except by the canyon wall.

Pond "G" does not represent appropriate habitat for CRLF, in that it does not support emergent or aquatic vegetation for egg attachment, and it is surrounded by canyon wall on one side and large rocks and boulders on the other. It supports only very sparse vegetation. In addition, because the pond is within the floodplain of the MFAR, periodic flood events would make this an intolerable environment for CRLF.

- South Lake does not represent potential habitat for CRLF. South Lake is an impoundment that has formed in the widening of the MFAR on the downstream side of the Tunnel Chute. The water flows back into the main channel of the MFAR from drainages on the northeast and northwest sides of the lake. The lake is 1 to 2 acres in size, with a maximum depth of approximately 50 to 60 feet during the rainy season. There is no vegetation in the water or on the banks of the lake. Surrounding vegetation includes birch and alder, shrub willows on the sandbars, horsetails (*Equisetum* spp.) and bramble-forming species such as Himalayan blackberry and California grape. The substrate is silt. Bullfrogs were heard in the vicinity of the lake. Trout species (*Onchorhynchus* spp.) in the lake include rainbow and brown trout. The river is also occupied by beaver (*Castor canadensis*) and river otter (*Lontra canadensis*) (John Close, pers. comm., 2007). Bullfrogs were heard calling in the vicinity of the lake during surveys.

  South Lake does not represent appropriate habitat for CRLF. It is an in-channel impoundment located downstream from Ralston Afterbay in the "peaking reach" of the MFAR, and therefore it is highly influenced by daily fluctuating water levels. Because of this, it does not support emergent or aquatic vegetation for egg attachment and it is devoid of dense or shrubby riparian vegetation at the water level to provide sufficient escape cover or shading for the pond. South Lake is also very deep, and bullfrogs and other potential predators such as trout are known to be present at the lake.

Ralston Ridge

The Ralston Ridge pond does not represent appropriate aquatic habitat for CRLF. However, this site has been known to support CRLF during dispersal. As described in Section 4.2.1 of this document, an adult CRLF was observed in a drying ephemeral pond at this location on the west end of Ralston Ridge in June 2001 by biologists

conducting surveys for the PG&E (2004). No frogs have been detected at this site since 2001 (Barry, pers. comm., 2007). A CRLF habitat survey was conducted by helicopter at this site on August 9, 2007. At the time of the helicopter survey the site, which is on a right-of-way below a PG&E transmission line, was almost completely burned (a result of the Ralston Ridge wildfire of 2006) and remains almost completely denuded. The pond, which appears to have been formed in a depression caused by ground disturbance and erosion resulting from logging operations, was completely dry at the time of the survey. Surveys on foot were not conducted at this site.

5.0 CONCLUSIONS

Based on the results of the CRLF Site Assessment, it was determined that the MFAR and Rubicon River do not represent habitat for CRLF and are dispersal barriers as defined by USFWS. Large and moderate streams and small tributary streams do not support appropriate CRLF habitat (i.e., ponded or backwater areas), and do not support appropriate vegetation for egg attachment or cover. Therefore, they do not represent potential breeding habitat for CRLF.

Project reservoirs (Hell Hole Reservoir and Ralston Afterbay) are large, deep reservoirs greater than 50 acres in size that are not considered appropriate habitat for CRLF as defined by USFWS. Middle Fork Interbay is a deep, in-channel impoundment of the MFAR. This impoundment does not represent CRLF habitat because it is located in a steep, rocky river canyon, it is deeper than the preferred water depth for CRLF, it has no emergent vegetation, and it supports only very sparse willows around the perimeter. Furthermore, it represents a dispersal barrier to CRLF. Project diversion pools (North Fork and South Fork Long Canyon Creek diversion pools) are too shallow, do not contain sufficient water through the breeding period, do not support emergent or aquatic vegetation for egg attachment, and have no surrounding riparian vegetation.

The majority of off-channel ponds observed in the study area do not represent potential breeding habitat for one or more of the following reasons:

- Extensive predator populations (i.e., bull frogs, or predatory fish species such as mosquito fish and bass) are present.
- Aquatic or emergent vegetation for egg attachment is absent.
- Dense, shrubby riparian vegetation, vegetation for cover and protection from predators is not supported.
- Water conditions that allow for complete metamorphosis of tadpoles is not present.

However, two ponds in the Horseshoe Bar area were determined to represent potential CRLF breeding habitat (Ponds D and E) because the ponds: (1) have appropriate water depth for CRLF; (2) retain the water long enough for CRLF to complete metamorphosis,

and: (3) support dense, bramble-forming vegetation on the banks of the pond that may provide structure for egg attachment or that may provide cover from predators.

One additional pond, Summit Hill Ranch Pond, is located on private property where access was not granted. Information collected on this pond is limited to characteristics identifiable from aerial photo review and helicopter surveys. Information obtained on this pond was insufficient to determine if the pond represents potential CRLF breeding habitat.

One occurrence of CRLF is documented within the study area on Ralston Ridge within the PG&E Transmission Line right-of-way in 2001. The area that this frog was observed in does not support characteristics of breeding habitat and experts believe that this frog was observed during dispersal. No frogs have been observed at this site since 2001 and the entire area was burned during the Ralston Ridge fire.

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TABLES

Table 1. Aquatic Habitats in the CRLF Study Area.

Rivers
Middle Fork American River
Rubicon River
Large and Moderate Streams
Duncan Creek
Long Canyon Creek
North Fork Long Canyon Creek
South Fork Long Canyon Creek
Small Tributary Streams
American Canyon Creek
Todd Creek
Gas Canyon Creek
Canyon Creek
Otter Creek
Jesse Canyon Creek
Pond Creek
Volcano Canyon Creek
Brushy Canyon Creek
Pilot Creek
Wallace Creek
Reservoirs
Hell Hole Reservoir
Middle Fork Interbay
Ralston Afterbay
Diversion Pools
North Fork Long Canyon Diversion Pool
South Fork Long Canyon Diversion Pool
Off-Channel Ponds
Auburn State Recreation Area
Teichert Mine Ponds
Summit Hill Ranch
Horseshoe Bar
Ralston Ridge

Table 2. Known CRLF Occurrences.

Source	Date	Collector	Locality	County	Catalog or Occurrence Number
Records within 1 mile of the MFP					
CNDDB[1] 2001		Gary Fellers	Pennsylvania Point, Ralston Ridge	Placer 446	
Records greater than 1 mile from the MFP, but within the MFAR watershed					
MVZ[2]	8/12/1916	Joseph Dixon	Michigan Bluff	Placer	6111
CNDDB	2006	Gary Fellers	Near Michigan Bluff	Placer	890

[1]California Natural Diversity Database
[2]Museum of Vertebrate Zoology

Table 3. Upland Vegetation Communities in the CRLF Study Area

Herb-Dominated Vegetation Communities
Annual Grasses and Forbs (HG)
Wet Meadow (Grass–Sedge–Rush) (HJ)
Shrub-Dominated Vegetation Communities
Huckleberry Oak (CH)
Lower Montane Mixed Chaparral (CQ)
Upper Montane Mixed Chaparral (CX)
Mountain (Thinleaf) Alder (TF)
Tree-Dominated Vegetation Communities
Black Oak (QK)
Blue Oak (QD)
Canyon Live Oak (QC)
Cottonwood–Alder (QJ)
Douglas-Fir–Pine (DP)
Gray Pine (PD)
Interior Live Oak (QW)
Interior Mixed Hardwoods (NX)
Mixed Conifer–Fir (MF)
Mixed Conifer–Pine (MP)
Mixed Riparian Hardwoods (NR)
Montane Mixed Hardwoods (TX)
Pacific Douglas-Fir (DF)
Ponderosa Pine (PP)
White Fir (WF)
White Alder (QD)
Willow (QO)
Willow–Alder (QY)

Table 4. Data Summary for Rivers in the CRLF Study Area.

River	Description	Average Bankfull Depth	Maximum Bankfull Depth		Substrates (Dominant Particle Size)	Mean Riparian Corridor Width	Riparian Vegetation Community Composition																	Streambank Vegetation (avg) Percent Cover	Average Percent Length Mesohabitat Types					Pool Habitat	
							Arroyo willow/Douglas' sagewort	Blackberry	Canyon live oak/poison oak	Douglas fir/incense cedar/white alder	Fremont cottonwood/red willow	Incense cedar/white alder	Miscellaneous willow	Narrowleaf willow/Douglas' sagewort	Ponderosa pine/white alder	Redosier dogwood/arrowleaf groundsel	Thinleaf alder	White alder/Indian rhubarb	White alder/narrowleaf willow	White alder/red willow	White alder/sedge	Bedrock and boulder	Non-vegetated		Cascade/Sheet	High Gradient Riffle	Low Gradient Riffle	Runs	Pools	Length in feet	Depth in feet
Middle Fork American River	French Meadows Dam to Middle Fork Interbay	.8 to 3.2 feet	2.5 to 5.2 feet	31 to 78 feet	Gravel	0 to 50 feet				■		■						■	■		■	■		45-65	5%	17%	5%	16%	57%	60 to 180 feet	4 to 10 feet
Middle Fork American River	Middle Fork Interbay Dam to Ralston Afterbay	1.9 to 5.7 feet	3.2 to 13.0 feet	75 to 198 feet	Boulder/gravel	21 to 95 feet										■		■	■		■			62-78	6%	20%	7%	27%	41%	50 to 150 feet	5 to 15 feet
Middle Fork American River	Peaking Reach (Oxbow PH to the NFAR confluence)	3.9 to 12 feet	7.7 to 17.5 feet	94 to 456 feet	Cobble	0 to 253 feet		■			■			■					■		■			42-47	1%	4%	9%	29%	57%	200 to 900 feet	> 15 feet
Rubicon River	Hell Hole Dam to Ralston Afterbay	1.2 to 3.7 feet	2.6 to 6.2 feet	62 to 185 feet	Cobble	6 to 150 feet	■				■				■				■	■	■			25-93	5%	14%	11%	25%	45%	60 to 375 feet	1.5 to 17 feet

Table 5. Data Summary for Large, Moderate, and Small Tributary Streams in the CRLF Study Area.

Date	Surveyors	Location	GPS Coordinates		In current/ historic range of CRLF?	Known records w/in 1 mile?	Stream Habitat Characterization												Other Notes
			Latitude	Longitude			Width (bank full)	Depth (bank full)	Stream gradient (percent slope)	Pools present? (Y/N)	Size of pools	Max depth of pools	Characterize non-pool habitat (run, riffle, glide, other)	Vegetation Description	Substrate Description	Bank Description	Perennial or Ephemeral	Date Goes Dry	
8/29/2007	Earl Gonsolin, Christina Buck, Chet Van Dellen	Brushy Canyon	701685	4321631	Yes	No	15	.5-1.5	7	Yes	20-45	3	High gradient cascades	An oak overstory shaded the channel.	Bedrock/boulders	Steep Canyon	Perennial	–	Brushy Canyon Creek was a small, narrow bedrock stream within steep canyon walls dominated by high-gradient cascades and plunge-pools.
8/27/2007	Peter Graf, Chet Van Dellen	Canyon Creek	681773	4313650	Yes	No	35	3	5	Yes	15-35	2.5	Bedrock chutes and cascades	Medium to small-sized alder and willow trees and shrubs were established within the channel, while oaks provided most of the overstory canopy. Canopy cover along the stream margins was typically high, although several open bedrock areas occurred.	Bedrock	Steep canyon walls	Perennial	–	Canyon Creek flowed within a narrow, steep canyon without floodplains
8/29/2007	Craig Addley	Duncan Creek	712456	4323952	Yes	No	33 to 53 feet	1.3 to 9.2 ft	> 3%	Yes	40 to 75 feet long	5.5 feet	Waterfalls and cascades interrupted by plunge pools.	No emergent, floating or overhanging vegetation. Riparian vegetation includes sparse alders and some forb species along the stream margin. Canopy cover is approximately 25%.	Bedrock and boulder; cobble	Stream is steep, confined, and bedrock-dominated. Banks are steep and rocky, not vegetated.	Perennial	–	No bullfrogs observed
5/17/2007	Peter Graf, Brian Freiermuth	Gas Canyon Creek	679004	4314803	Yes	No	32	.5-1.5	3	Yes	15-40	5	Cascades and runs; Bedrock-confined, narrow, no backwater or secondary channels. In the lower portion of the reach, small pools and cascades dominated, while upstream the gradient increased with larger cascades and pools.	No emergent or floating vegetation. Canopy cover along the stream margins was variable within the reach, ranging from 0 to 100%. Willow and alder shrubs and trees were the primary shade providers.	Bedrock and cobble were the dominant substrates.	Steep canyon walls	Ephemeral	Mostly dry on 8/23/2007 this year	Gas Canyon Creek was a narrow (less than 10 meters wide), high-gradient intermittent stream with steep confined canyon walls and no floodplain. Flows were less than 5 cfs during the breeding season surveys. Water was not flowing during the August field survey, although pools remained. Crayfish were observed during surveys.
6/5/2007	Peter Graf, Brian Freiermuth	Gas Canyon Creek	679004	4314803	Yes	No	32	.5-1.5	3	Yes	15-40	5	Cascades and runs; Bedrock-confined, narrow, no backwater or secondary channels. In the lower portion of the reach, small pools and cascades dominated, while upstream the gradient increased with larger cascades and pools.	No emergent or floating vegetation. Canopy cover along the stream margins was variable within the reach, ranging from 0 to 100%. Willow and alder shrubs and trees were the primary shade providers.	Bedrock and cobble were the dominant substrates.	Steep canyon walls	Ephemeral	Mostly dry on 8/23/2007 this year	Gas Canyon Creek was a narrow (less than 10 meters wide), high-gradient intermittent stream with steep confined canyon walls and no floodplain. Flows were less than 5 cfs during the breeding season surveys. Water was not flowing during the August field survey, although pools remained. Crayfish were observed during surveys.

Table 5. Data Summary for Large, Moderate, and Small Tributary Streams in the CRLF Study Area (continued).

Date	Surveyors	Location	GPS Coordinates		In current/ historic range of CRLF?	Known records w/in 1 mile?	Stream Habitat Characterization											Other Notes
			Latitude	Longitude			Width (bank full)	Depth (bank full)	Stream gradient (percent slope)	Pools present? (Y/N)	Size of pools	Max depth of pools	Characterize non-pool habitat (run, riffle, glide, other)	Vegetation Description	Substrate Description	Bank Description	Perennial or Ephemeral	Date Goes Dry	
8/23/2007	Peter Graf, Brian Freiermuth	Gas Canyon Creek	679005	4314804	Yes	No	32	.5-1.5	3	Yes	15-40	5	Cascades and runs; Bedrock-confined, narrow, no backwater or secondary channels. In the lower portion of the reach, small pools and cascades dominated, while upstream the gradient increased with larger cascades and pools.	No emergent or floating vegetation. Canopy cover along the stream margins was variable within the reach, ranging from 0 to 100%. Willow and alder shrubs and trees were the primary shade providers.	Bedrock and cobble were the dominant substrates.	Steep canyon walls	Ephemeral	Mostly dry on 8/23/2007 this year	Gas Canyon Creek was a narrow (less than 10 meters wide), high-gradient intermittent stream with steep confined canyon walls and no floodplain. Flows were less than 5 cfs during the breeding season surveys. Water was not flowing during the August field survey, although pools remained. Crayfish were observed during surveys.
10/15/2007	Craig Addley	Jesse Canyon Creek MF 16	687906	4316268	Yes	No	10	.5-1.5	7	Yes	15-20	3	Waterfalls and chutes; Bedrock-confined, narrow, no backwater or secondary channels	No emergent, floating, or overhanging vegetation. Bank vegetation includes alder and willow shrubs/trees	Boulder	steep, narrow canyon	Perennial	–	Jesse Canyon flowed within a steep, narrow canyon. The channel was primarily bedrock with waterfalls and chutes. Alder and willow trees and shrubs lined the channel. Suitable breeding habitat was not observed within the site. Flow during the site visit in October was less than 0.5 cfs. Non-native aquatic predators were not observed.
8/24/2007	Peter Graf, Chet VanDellen	Long Canyon Creek	700305	4318232	Yes	No	35 to 80 feet	1.4 to 3.5 ft	2 to 4%	Yes	10 to 220 feet long	6 feet	High-gradient riffles, cascades, and plunge pools	No emergent, floating or overhanging vegetation. Riparian vegetation includes small to medium-sized willow and alder shrubs and trees, with canopy cover typically less than 50%.	Boulder and bedrock, some cobble	Stream is confined within steep canyon walls and dominated by high-gradient instream habitats	Perennial	–	
9/24/2007	Sarah Yarnell	Middle Fork RM 6.4 American Canyon Creek	678261	4311623	Yes	No	6	3	< 1%	Yes	15-35	2.5	Sections of cobble runs alternated with steeper bedrock cascades and pools sections.	Riparian vegetation was patchy along the water's edge, and was dominated by small to medium-sized willow shrubs and alder trees.	Bedrock and Cobble	Steep canyon walls	Perennial	–	A narrow and confined stream.
5/31/2007	Peter Graf, Brian Freiermuth	North Fork Long Canyon Creek	715087	4322045	Yes	No	26 to 40 feet	1.1 to 1.5 feet	> 2%	Yes	10 to 220 feet long	2 feet	High-gradient riffles, cascades, and plunge pools	No emergent, floating, or overhanging vegetation. Riparian cover typcially greater than 50%, dominated by alders and willows. Firs and pines contributed to the overstory in some areas.	Boulder and cobble, some bedrock	Runs through forested habitat. Stream banks composed of rocks and boulders, some bedrock. Some clumps of vegetation (Carex spp.) and Indian rhubarb along banks.	Perennial	–	No bullfrogs observed
5/21/2007	Chet Van Dellen, Earl Gonsolin	Otter Creek	686476	4314265	Yes	No	15	.5-1.5	1.5	Yes	15-40	3	Riffles, runs and cascades; Bedrock-confined, narrow, no backwater or secondary channels. Instream habitats were predominately riffles and runs in near the confluence with the Middle Fork American River. The habitat transitioned to cascades and plunge-pools as channel widths decreased upstream. Floodplains also became less frequent with increased distance upstream.	No emergent, floating, or overhanging vegetation. Riparian vegetation was dominated by large to medium-sized willow, cottonwood, and alder trees and shrubs. Canopy cover along the stream margins was usually greater than 50%.	Boulder and cobble were the dominant substrates in downstream reaches, while bedrock and boulders dominated further upstream.	floodplain typcially along at least one bank	Perennial	–	Otter Creek was a perennial stream approximately 4.5 meters wide, typically with a floodplain along at least one bank. During the month of August, flows were less than 1 cfs, and average daily water temperatures ranged from 62 oF to 76 oF, with an average of 68 oF. Observed non-native predators included crayfish.

Table 5. Data Summary for Large, Moderate, and Small Tributary Streams in the CRLF Study Area (continued).

Date	Surveyors	Location	GPS Coordinates		In current/ historic range of CRLF?	Known records w/in 1 mile?	Stream Habitat Characterization												Other Notes
			Latitude	Longitude			Width (bank full)	Depth (bank full)	Stream gradient (percent slope)	Pools present? (Y/N)	Size of pools	Max depth of pools	Characterize non-pool habitat (run, riffle, glide, other)	Vegetation Description	Substrate Description	Bank Description	Perennial or Ephemeral	Date Goes Dry	
6/6/2007	Chet Van Dellen, Earl Gonsolin, Christina Buck	Otter Creek	686476	4314265	Yes	No	15	.5-1.5	1.5	Yes	15-40	3	Riffles, runs and cascades; Bedrock-confined, narrow, no backwater or secondary channels. Instream habitats were predominately riffles and runs in near the confluence with the Middle Fork American River. The habitat transitioned to cascades and plunge-pools as channel widths decreased upstream. Floodplains also became less frequent with increased distance upstream.	No emergent, floating, or overhanging vegetation. Riparian vegetation was dominated by large to medium-sized willow, cottonwood, and alder trees and shrubs. Canopy cover along the stream margins was usually greater than 50%.	Boulder and cobble were the dominant substrates in downstream reaches, while bedrock and boulders dominated further upstream.	floodplain typcially along at least one bank	Perennial	–	Otter Creek was a perennial stream approximately 4.5 meters wide, typically with a floodplain along at least one bank. During the month of August, flows were less than 1 cfs, and average daily water temperatures ranged from 62 oF to 76 oF, with an average of 68 oF. Observed non-native predators included crayfish.
8/22/2007	Chet Van Dellen, Earl Gonsolin, Rebecca Kipp	Otter Creek	686476	4314265	Yes	No	15	.5-1.5	1.5	Yes	15-40	3	Riffles, runs and cascades; Bedrock-confined, narrow, no backwater or secondary channels. Instream habitats were predominately riffles and runs in near the confluence with the Middle Fork American River. The habitat transitioned to cascades and plunge-pools as channel widths decreased upstream. Floodplains also became less frequent with increased distance upstream.	No emergent, floating, or overhanging vegetation. Riparian vegetation was dominated by large to medium-sized willow, cottonwood, and alder trees and shrubs. Canopy cover along the stream margins was usually greater than 50%.	Boulder and cobble were the dominant substrates in downstream reaches, while bedrock and boulders dominated further upstream.	floodplain typcially along at least one bank	Perennial	–	Otter Creek was a perennial stream approximately 4.5 meters wide, typically with a floodplain along at least one bank. During the month of August, flows were less than 1 cfs, and average daily water temperatures ranged from 62 oF to 76 oF, with an average of 68 oF. Observed non-native predators included crayfish.
8/28/2007	Christina Buck, Earl Gonsolin, Chet Van Dellen	Pilot Creek	700716	4316067	Yes	No	15	1	5	Yes	25-40	15	Instream habitats were primarily high-gradient cascades and plunge-pools, although a few lower-gradient sections with high-gradient riffles occurred.	Riparian vegetation was dominated by small to medium-sized willow and alder trees, with moderate canopy coverage along the stream margins.		Steep Canyon	Perennial	–	Pilot Creek was a narrow (approximately 4.5 meters wide) perennial stream confined within steep bedrock canyon walls. Flow in Pilot Creek was regulated by Sacramento Municipal Utility District (SMUD) at Stumpy Meadows Reservoir (FERC Project No. 2101). Flows in Pilot Creek at this time were less than 2 cfs. During the month of August, average daily water temperatures ranged from 58 oF to 68 oF, with an average of 62 oF. Flow was less than 1 cfs during the August field surveys. Non-native predators were not observed during the site surveys.
10/15/2007	Craig Addley	Pond Creek	687945	4317961	Yes	No	10	.5-1.5	7	Yes	15-20	3	Waterfalls and chutes; Bedrock-confined, narrow, no backwater or secondary channels	No emergent, floating, or overhanging vegetation. Bank vegetation includes alder and willow shrubs/trees	Boulder	steep, narrow canyon	Perennial	–	Pond Creek was located within a steep, narrow canyon. Suitable breeding habitat was not observed within the site. Flow during the site visit was less than 0.5 cfs. Non-native aquatic predators were not observed.

Table 5. Data Summary for Large, Moderate, and Small Tributary Streams in the CRLF Study Area (continued).

Date	Surveyors	Location	GPS Coordinates		In current/ historic range of CRLF?	Known records w/in 1 mile?	Stream Habitat Characterization											Other Notes
			Latitude	Longitude			Width (bank full)	Depth (bank full)	Stream gradient (percent slope)	Pools present? (Y/N)	Size of pools	Max depth of pools	Characterize non-pool habitat (run, riffle, glide, other)	Vegetation Description	Substrate Description	Bank Description	Perennial or Ephemeral	Date Goes Dry	
5/31/2007	Peter Graf, Brian Freiermuth	South Fork Long Canyon Creek	714667	4321687	Yes	No	25 to 38 feet	1.2 to 1.5 feet	1.50%	Yes	11 to 220 feet long	3 feet	High-gradient riffles, cascades, and plunge pools	No emergent, floating, or overhanging vegetation. Riparian cover typcially greater than 50%, dominated by alders and willows. Firs and pines contributed to the overstory in some areas.	Boulder and cobble, some bedrock	Runs through forested habitat. Stream banks composed of rocks and boulders, some bedrock. Some clumps of vegetation (Carex spp.) and Indian rhubarb along banks.	Perennial	–	No bullfrogs observed
5/17/2007	Earl Gonsolin, Chet VanDelen, Christina Buck	Todd Creek	679869	4314562	Yes	No	10	.5-1.5	5	Yes	15-25	2.5	Cascades and runs; Bedrock-confined, narrow, no backwater or secondary channels	No emergent or floating vegetation. Riparian vegetation downstream of Drivers Flat Road was dominated by small to medium-sized willow and alder trees and shrubs. Canopy coverage along the stream margins was generally less than 25%, with dense vegetation with up to 100% cover in some areas.	Bedrock/ boulder/ cobble	Steep canyon walls	Ephemeral	Dry on 8/23/2007 this year	The stream channel was approximately 3 meters wide, with an adjacent floodplain along both banks. Upstream of Drivers Flat Road, valley width decreased, and the channel was confined within steep canyon walls. Spring flows were less than 1 cfs. The creek was dry during the fall field surveys. Non-native aquatic predators were not observed.
6/5/2007	Earl Gonsolin, Chet VanDelen, Christina Buck	Todd Creek	679869	4314562	Yes	No	10	.5-1.5	5	Yes	15-25	2.5	Cascades and runs; Bedrock-confined, narrow, no backwater or secondary channels	No emergent or floating vegetation. Riparian vegetation downstream of Drivers Flat Road was dominated by small to medium-sized willow and alder trees and shrubs. Canopy coverage along the stream margins was generally less than 25%, with dense vegetation with up to 100% cover in some areas.	Bedrock/ boulder/ cobble	cobble/boulders or bedrock	Ephemeral	Dry on 8/23/2007 this year	The stream channel was approximately 3 meters wide, with an adjacent floodplain along both banks. Upstream of Drivers Flat Road, valley width decreased, and the channel was confined within steep canyon walls. Spring flows were less than 1 cfs. The creek was dry during the fall field surveys. Non-native aquatic predators were not observed.
8/23/2007	Earl Gonsolin, Christina Buck, Thomas Degabriele	Todd Creek	679869	4314562	Yes	No	10	.5-1.5	5	Yes	15-25	2.5	Cascades and runs; Bedrock-confined, narrow, no backwater or secondary channels	No emergent or floating vegetation. Riparian vegetation downstream of Drivers Flat Road was dominated by small to medium-sized willow and alder trees and shrubs. Canopy coverage along the stream margins was generally less than 25%, with dense vegetation with up to 100% cover in some areas.	Bedrock/ boulder/ cobble	cobble/boulders or bedrock	Ephemeral	Dry on 8/23/2007 this year	The stream channel was approximately 3 meters wide, with an adjacent floodplain along both banks. Upstream of Drivers Flat Road, valley width decreased, and the channel was confined within steep canyon walls. Spring flows were less than 1 cfs. The creek was dry during the fall field surveys. Non-native aquatic predators were not observed.
5/24/2007	Chet Van Dellen, Earl Gonsolin, Rebecca Kipp	Volcano Creek	691520	4319082	Yes	No	15	.5-1.5	7	Yes	15-20	3	Instream habitats were dominated by cascades and step-pools	Small to medium-sized alder and willow trees and shrubs were present in the channel. Canopy cover along the stream margins was generally high, with several open bedrock sections.	bedrock and large boulders dominant		Perennial	–	Volcano Canyon Creek was a small perennial creek (approximately 4.5 meters wide) flowing within steep canyon walls. Suitable breeding habitat was not observed within the site. Flows during field surveys were less than 1 cfs. Non-native aquatic predators were not observed.

Table 5. Data Summary for Large, Moderate, and Small Tributary Streams in the CRLF Study Area (continued).

Date	Surveyors	Location	GPS Coordinates		In current/ historic range of CRLF?	Known records w/in 1 mile?	Stream Habitat Characterization											Other Notes
			Latitude	Longitude			Width (bank full)	Depth (bank full)	Stream gradient (percent slope)	Pools present? (Y/N)	Size of pools	Max depth of pools	Characterize non-pool habitat (run, riffle, glide, other)	Vegetation Description	Substrate Description	Bank Description	Perennial or Ephemeral	Date Goes Dry	
6/11/2007	Chet Van Dellen, Earl Gonsolin, Rebecca Kipp	Volcano Creek	691520	4319082	Yes	No	15	.5-1.5	7	Yes	15-20	3	Instream habitats were dominated by cascades and step-pools	Small to medium-sized alder and willow trees and shrubs were present in the channel. Canopy cover along the stream margins was generally high, with several open bedrock sections.	bedrock and large boulders dominant		Perennial	–	Volcano Canyon Creek was a small perennial creek (approximately 4.5 meters wide) flowing within steep canyon walls. Suitable breeding habitat was not observed within the site. Flows during field surveys were less than 1 cfs. Non-native aquatic predators were not observed.
8/30/2007	Chet Van Dellen, Rebecca Kipp	Volcano Creek	691520	4319082	Yes	No	15	.5-1.5	7	Yes	15-20	3	Instream habitats were dominated by cascades and step-pools	Small to medium-sized alder and willow trees and shrubs were present in the channel. Canopy cover along the stream margins was generally high, with several open bedrock sections.	bedrock and large boulders dominant		Perennial	–	Volcano Canyon Creek was a small perennial creek (approximately 4.5 meters wide) flowing within steep canyon walls. Suitable breeding habitat was not observed within the site. Flows during field surveys were less than 1 cfs. Non-native aquatic predators were not observed.
8/30/2007	Chet Van Dellen, Christina Buck	Wallace Canyon	707906	4317361	Yes	No	20	3	7	Yes	20-25	5	The channel was very high-gradient, dominated by large boulders and bedrock waterfalls and chutes.	Small to medium-sized alder and willow trees and shrubs were present in the channel, with oaks providing the overstory. Canopy cover along the stream margins was typically high.	Bedrock/boulders	Steep Canyon	Perennial	–	Wallace Creek was a small stream (approximately 6 meters wide) located within steep canyon walls with no flood plains.

Table 6. Data Summary for Diversion Pools and Off-Channel Ponds in the CRLF Study Area.

Date	Surveyors	Location	GPS Coordinates		In current/ historic range of CRLF?	Known records w/in 1 mile?	Pond Habitat Characterization						Other Notes
			Latitude	Longitude			Size	Max. Depth (ft)	Vegetation Description	Substrate Description	Perennial or Ephemeral	Date Goes Dry	
8/15/2007	Sara Gillespie Steve Tucker	South Fork Long Canyon Diversion Pool	718882	4325530	Yes	No	.42 acres	25 ft	The diversion is lined with trees including several black oak and pine trees. Annual grasses/non-native herbs line the banks. No emergent/aquatic vegetation	Mud and silt sediment accumulations	Ephemeral	July	PCWA does not divert water through the diversion after July of each year
8/15/2007	Sara Gillespie Steve Tucker	North Fork Long Canyon Diversion Pool	717940	4325461	Yes	No	.72 acres	10 ft	No overhead canopy cover immediately around diversion. Several small Salix in the diversion itself. Banks and floor of pool are lined with annual grasses/weedy herbs.	Mud and silt sediment accumulations	Ephemeral	July	PCWA does not divert water through the diversion after July of each year
8/24/2007	Ann Hendrickson Sean Barry	Pond "A", Auburn State Recreation Area	671188	4306389	Yes	No	80' diameter	15 ft	Floating (*Potomageton* spp)vegetation and emergent (*Typha* spp.) vegetation in and along the pond.	Sandy/muddy substrate	Perennial	–	A dam is located at west edge of pond. Many bullfrogs (35+) and 1st year metamorphs seen. Mosquito fish and bass observed in pond.
8/24/2007	Janelle Nolan-Summers Sean Barry	Pond "B", Sliger Mine Road			Yes	No	–	–	Not able to obtain access-private property.	–	–	–	Summit Hill Ranch, Rod Williams Highland Cattle 1461 Sliger Mine Rd. Greenwood, CA 95635
8/24/2007	Janelle Nolan-Summers Sean Barry	Pond "C", Horseshoe Bar	693375	4319879	Yes	No	15 x 50 ft	2 ft	No floating or emergent vegetation, some shading provided by canyon wall	Unknown	??	–	Pond developed in past year or two from beaver dam
8/24/2007	Janelle Nolan-Summers Sean Barry	Pond "D", Horseshoe Bar	693943	4319370	Yes	No	40 ft wide	20 ft	10% shading (trees). No floating or emergent vegetation. Surrounding vegetation includes Salix spp., *Vitis californica*	Silt	Perennial	–	Old mining pond. Hydrologically connected to Pond C during winter.
12/8/2007	Janelle Nolan-Summers Sara Gillespie	Pond "D", Horseshoe Bar	693943	4319370	Yes	No	35 x 375 ft	6 ft	10% shading (trees). No floating or emergent vegetation. Surrounding vegetation includes *Salix* spp., *Vitus californica, Eriodictyon angustifolium, Cephalanthus occidentalis*	Silt and organic matter	Perennial	–	Sheer cliff face on both sides.

Table 6. Data Summary for Diversion Pools and Off-Channel Ponds in the CRLF Study Area (continued).

Date	Surveyors	Location	GPS Coordinates		In current/ historic range of CRLF?	Known records w/in 1 mile?	Pond Habitat Characterization						Other Notes
			Latitude	Longitude			Size	Max. Depth (ft)	Vegetation Description	Substrate Description	Perennial or Ephemeral	Date Goes Dry	
8/24/2007	Janelle Nolan-Summers Sean Barry	Pond "E", Horseshoe Bar	694051	4319686	Yes	No	25 x 25 ft	10 ft	No overhanging or emergent vegetation. Some floating vegetation (*Potamogeton* spp.). Site dominated by *Salix* spp.	Silt and organic matter	Ephemeral in dry years only	Late June	Mining-derived pond. Hydrologically connected to Pond B during winter. Bullfrogs observed.
12/8/2007	Janelle Nolan-Summers Sara Gillespie	Pond "E", Horseshoe Bar	694051	4319686	Yes	No	30 x 450 ft	4 ft	No overhanging or emergent vegetation. Site dominated by *Salix* spp.*Rubus discolor, Vitis californica* ., *Verbascum thapsus, Rumex* sp.	Silt and organic matter	Ephemeral in dry years only	Late June	Mining-derived pond. Hydrologically connected to Pond B during winter.
12/8/2007	Janelle Nolan-Summers Sara Gillespie	Pond "F", Horseshoe Bar	693905	4319632	Yes	No	45 x 129 ft	1 ft	*Salix* sp., *Rubus discolor, Vitis californica* ., annual grass, *Calcedrus decurrens*	Mud	Ephemeral	Late June	Cliff on west side of pond -plunges downhill
8/24/2007	Janelle Nolan-Summers Sean Barry	Pond "G", Horseshoe Bar	693678	4319863	Yes	No	20 ft wide	2 ft	No emergent, overhanging, or floating vegetation. Sedges (very small and bushy), *Salix* sp., & *Muhlenburgia rigens* .	Boulder and cobble	Perennial	–	Backwater area connected to river.
12/8/2007	Janelle Nolan-Summers Sara Gillespie	Pond "G", Horseshoe Bar	693678	4319863	Yes	No	20 ft	2 ft	Sedges (very small and bushy), *Salix s* p., *Muhlenburgia rigens* , unknown submerged aquatic vegetation	Sand	Perennial	–	Granite cliff face on one side of pond, sandy on other side.
8/24/2007	Janelle Nolan-Summers Sean Barry	South Lake, Horseshoe Bar	693601	4320012	Yes	No	2 acres	60 ft	No vegetation along or in water. Area surroudning by *Alnus* sp, *Betula* sp., *Equisetum* sp., *Rubus discolor.* Some *Salix* sp. on edge.	Silt	Perennial	–	Beaver and river otter occupy pond and lake.
12/8/2007	Janelle Nolan-Summers Sara Gillespie	South Lake, Horseshoe Bar	693601	4320012	Yes	No	2 acres	30 ft	No vegetation along banks or in water. Area surrounding by *Alnus* sp, *Betula* sp., *Equisetum* sp., *Rubus discolor.* Some *Salix* sp. on edge.	Silt	Perennial	–	Connected to river, wide spot on other side of tunnel. No attachment to other ponds in area. Population of rainbow, brook, and brown trout. Bullfrog present.

MAPS

CONFIDENTIAL

MAP 3

"Known Locations of CRLF in the Middle Fork American River Watershed"
(from Attachment A of AQ 12 – Special-Status Amphibian and Aquatic Reptile Technical Study Report – 2007)

Map 3 has been removed from this document because it contains the location(s) of sensitive biological resources and is considered "confidential" information. Confidential biological resources information is located in Volume 4 which may not be made available to the public pursuant to the Federal Energy Regulatory Commission's (FERC's) regulations contained in 36 CFR 385.1112. This information is not maintained in FERC's Public Reference Room or on the Commission's electronic library except as an indexed item.

APPENDIX A

USFWS Review of CRLF Site Assessment for the Middle Fork American River Project

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825-1846

In Reply Refer To:
81420-2008-TA-0986-1

MAR 2 7 2008

Mr. Mal Toy
Director of Resource Development
Placer County Water Agency
P.O. Box 6570
Auburn, California 95604

Subject: Review of California Red-Legged Frog Site Assessment for the Middle Fork American River Project (FERC No. 2079), Placer County, California.

Dear Mr. Toy:

This is in response to the February 19, 2008, *California Red-legged Frog Site Assessment Report* that was submitted to the U.S. Fish and Wildlife Service (Service) for review. Placer County Water Agency is in the process of obtaining a new license to operate the existing hydroelectric power generation project along the Middle Fork of the American River, Placer County, California. At issue are the potential effects of the project on the threatened California red-legged frog (*Rana aurora draytonii*) (frog). This letter is issued under the authority of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*).

The nearest known California red-legged frog population is approximately 2 miles north of the project near Michigan Bluff, California, and an additional known frog occurrence is located within 1 mile of the project boundary on Ralston Ridge. Because no frogs have been identified as occupying the Ralston Ridge site in the years following its 2001 discovery, it is possible that this site represents dispersal habitat for the frog. Searches of areas surrounding the Ralston Ridge site have not located a source California red-legged frog population. Given the lack of barriers between Ralston Ridge and Michigan Bluff, the individual located in 2001 could have dispersed from the known Michigan Bluff population. A frog dispersing from the Michigan Bluff site to Ralston Ridge would cross the Middle Fork of the American River in a reach affected by this proposed project. Therefore, the Service concludes this project may affect this listed species.

Furthermore, in order to adequately assess the effects of the project on the frog, additional areas of suitable habitat should be surveyed for this listed species. While no frogs have been detected at Ralston Pond since 2001, the pond was last surveyed in 2004. Since 2001, no protocol level surveys have been conducted at this site. Because the Ralston Ridge pond appears to provide

suitable habitat for the California red-legged frog, we recommend protocol level surveys of this aquatic feature be conducted following the Service's 2005, *Revised Guidance on Site Assessment and Field Surveys for the California Red-legged Frog* (Guidelines), and the results of these surveys be submitted to the Service for review

The area identified in the site assessment as Horseshoe Bar contains suitable breeding habitat for the California red-legged frog. Given that Horseshoe bar is located approximately 2.8 miles from the known Michigan Bluff frog population, is within the same watershed, and maintains connectivity with the known population, it is probable that the ponds at Horseshoe Bar contain this listed frog. Therefore since three ponds located at Horseshoe Bar (ponds C, E, and F) appear to provide suitable breeding habitat for the frog, we recommend protocol level surveys of these aquatic features be conducted following the Service's 2005, Guidelines. Since the Horseshoe Bar ponds are located on private property, we understand that access to conduct surveys may be an issue. If permission to conduct surveys is not granted, based on connectivity with, and proximately to, a known frog population, Placer County Water Agency should assume presence of this listed amphibian and analyze the effects that the proposed project may have on a California red-legged frog population at Horseshoe Bar.

Please address any questions or concerns regarding this response on the Middle Fork American River Project to Jeremiah Karuzas, or Amy Fesnock, acting Forest and Foothills Branch Chief, at (916) 414-6600.

Sincerely,

Cay C. Goude
Assistant Field Supervisor

cc:
Service List – Middle Fork American River Project

APPENDIX B

Descriptions of Upland Vegetation Communities in the CRLF Study Area

Provided below is a brief description of CalVeg vegetation communities and non-vegetated areas identified in the study area. Vegetation community and non-vegetated area descriptions and nomenclature are based on *Vegetation Descriptions. North Sierran Ecological Province - CALVEG Zone 3* (USDA-FS 2005a).

Upland Vegetation Communities

Herb-Dominated Communities

Annual Grasses and Forbs (HG)

Annual grass and forb communities are dominated by introduced annual grasses in the genera *Bromus, Vulpia, Avena*, and *Lolium*. HG may occur as a pure patch or as an understory layer in other communities. Native species that may occur include bluegrass (*Poa annua*), purple needlegrass (*Nassella pulchra*), Idaho fescue (*Festuca idahoensis*), and California poppy (*Eschscholzia californica*).

Wet Meadow (Grass–Sedge–Rush) (HJ)

The wet meadow community occurs in level or gently sloping areas that have moist soils and permanent water sources such as streams, meadows, and lakes. HJ may also occasionally occur as an understory community. Dominant species include sedges and rushes (*Juncus* spp.), as well as water-tolerant grass and forb species.

Shrub-Dominated Communities

Huckleberry Oak (CH)

The huckleberry oak (*Quercus vaccinifolia*) community occurs in the Sierra Nevada on very shallow, stony, or gravelly soils between approximately 3,850 and 9,000 feet in elevation. Stands may be mixed with manzanita (*Arctostaphylos* spp.), bush chinquapin (*Chrysolepis sempervirens*), mountain whitethorn (*Ceanothus cordulatus*), and bitter cherry (*Prunus emarginata*). Conifer species may include Jeffrey pine (*Pinus jeffreyi*), red fir (*Abies magnifica*), western white pine (*Pinus monticola*), lodgepole pine (*Pinus contorta* var. *murrayana*), and western juniper (*Juniperus occidentalis*).

Lower Montane Mixed Chaparral (CQ)

This low-elevation mixed shrub community occurs scattered in foothill areas between 750 to 6,350 feet in elevation. CQ includes a mixture of whiteleaf manzanita (*Arctostaphylos viscida*), common manzanita (*Arctostaphylos manzanita*), wedgeleaf ceanothus *(Ceanothus cuneatus)*, lemmon ceanothus (*Ceanothus lemmonii*), chaparral whitethorn (*Ceanothus leucodermis*), chamise (*Adenostoma fasciculatum)*, Fremont silktassel (*Garrya fremontii*), birchleaf mountain mahogany (*Cercocarpus betuloides*), poison oak (*Toxicodendron diversilobum*), various shrub oaks (*Quercus* spp.), hoary coffeeberry (*Rhamnus tomentella*), and other lower elevation shrub species.

Upper Montane Mixed Chaparral (CX)

The upper montane mixed chaparral community is a mixed-species shrub type that occurs commonly between 2,200 and 8,900 feet in elevation. Chaparral species such as greenleaf manzanita (*Arctostaphylos patula*), mountain whitethorn, snowbrush (*Ceanothus velutinus*), and deerbrush (*Ceanothus integerrimus*) are indicators of this community. Whiteleaf manzanita may be present on the west slope foothills at lower elevations of this type, representing a transition between the lower montane mixed chaparral community and CX.

Mountain (Thinleaf) Alder (TF)

Mountain or thinleaf alder (*Alnus tenuifolia*) is a high-elevation small tree or tall shrub species, generally occurring in pure stands between 4,100 and 9,020 feet in elevation. TF occurs in large perennial grass and forb meadows where streams and coarse, shallow, or gravelly soils exist. These saturated or seasonally flooded sites are sometimes adjacent to white fir (*Abies concolor*), mixed conifer–fir, and red fir sites. Minor inclusions of tree or shrub willows (*Salix* spp.) or mountain maple (*Acer glabrum*) may occur in this type, but the density of mountain alder stands limits the growth of other species, aside from some aquatic grasses and forbs.

Tree-Dominated Communities

Black Oak (QK)

The black oak (*Quercus kelloggii*) community is one of the most common and wide-ranging hardwood communities in the Middle Fork American River Watershed. QK is found typically on moist soils up to approximately 7,000 feet in elevation on both west and east slopes of the Sierra Nevada. QK may occurs in pure stands or in mixed stands as an understory component within several different conifer communities including Douglas-fir–pine, ponderosa pine, mixed conifer–pine, white fir, eastside pine, and mixed conifer–fir. Black oak often grows in mixed stands with canyon live oak (*Quercus chrysolepis*) creating a mixed hardwoods community. Bigleaf maple (*Acer macrophyllum*), dogwood (*Cornus* spp.), white alder (*Alnus rhombifolia*), and California bay (*Umbellularia californica*) are common associates in shaded areas and along riparian corridors.

Blue Oak Alliance (QD)

Blue oak occurs at the eastern edge of its range in pure or mixed stands in the northern Sierras. It is often found adjacent to the gray pine, ponderosa pine, and Douglas-fir–pine alliances on gentle slopes below about 3,300 feet in elevation. On steeper south aspects, interior live oak may become more abundant. In deeper soils, blue oak may be replaced with valley oak. Wedgeleaf ceanothus, whiteleaf manzanita, and poison oak are scattered throughout this alliance.

Canyon Live Oak (QC)

Canyon live oak occurs in pure or mixed stands in proximity to the Douglas–fir–pine, mixed conifer–pine, ponderosa pine, and black oak communities. QC is generally found on relatively dry soils or in steep canyons between approximately 600 and 6,500 feet in elevation in the northern Sierra Nevada. A mixture of shrubs such as wedgeleaf ceanothus, deerbrush, and whiteleaf manzanita often occur in the understory of this community.

Cottonwood–Alder (QJ)

Cottonwood–alder communities are characterized by a mixture of Fremont cottonwood (*Populus fremontii*) and white alder. QJ occurs rarely in the northern Sierra Nevada. QJ is generally found from 1,800 to 2,400 feet in elevation, on moist soils or in riparian areas adjacent to ponderosa pine, Douglas-fir–pine and blue oak (*Quercus douglasii*) communities.

Douglas-Fir–Pine (DP)

The Douglas-fir–pine community occurs below 5,900 feet in elevation, and is characterized by Douglas-fir (*Pseudotsuga menziesii*) and ponderosa pine (*Pinus ponderosa*). The shrub community most commonly associated with the Douglas-fir–pine is lower montane mixed chaparral, including species such as wedgeleaf ceanothus, whiteleaf manzanita, and poison oak.

Gray Pine (PD)

This community, dominated by gray pine (*Pinus sabiniana*), occurs primarily in the foothills of the Sierra Nevada, on steep, dry rocky canyons with south aspects, below about 4,200 feet in elevation. These sites are typically diverse in structure, with a mixture of hardwoods such as canyon live oak, interior live oak (*Quercus wislizenii*) and blue oak, and low-elevation chaparral shrubs such as wedgeleaf ceanothus and whiteleaf manzanita, and common manzanita. Patches of annual grasses are often found adjacent to gray pine stands.

Interior Live Oak (QW)

Interior live oak communities are generally found in association with gray pine, ponderosa pine, or Douglas-fir–pine communities between approximately 700 and 3,000 feet in elevation. Other trees found in this community may include black cottonwood (*Populus balsamifer ssp. trichocarpa*) and white alder.

Interior Mixed Hardwoods (NX)

The interior mixed hardwoods community occurs below about 3,000 feet in elevation in scattered areas along the western edge in the northern Sierra Nevada. Stands are composed of several species of hardwoods with no clearly dominant species. The stands include any combinations of interior live oak, canyon live oak, valley oak

(*Quercus lobata*), or blue oak, in addition to shrubs commonly found in the lower montane mixed chaparral such as wedgeleaf ceanothus, poison oak, and whiteleaf manzanita. Trees in the montane mixed hardwoods community may be present in the mixture, but do not form the majority elements in the mixture. Overstory conifers mainly include Douglas-fir, ponderosa pine, knobcone pine (*Pinus attenuata*), and gray pine.

Mixed Conifer–Fir (MF)

The mixed conifer–fir community is the high elevation counterpart of the mixed conifer–pine community. MF occurs from approximately 3,700 to 8,800 feet in elevation. Three major species define this mixed conifer type: white fir, Jeffrey pine, and lodgepole pine. At lower elevations, mixed conifer pine associates such as Douglas-fir and ponderosa pine may occur. As elevation increases, red fir becomes more prominent. Other associates at all elevations include sugar pine (*Pinus lambertiana*) and incense cedar (*Calocedrus decurrens*). The upper montane mixed chaparral and occasionally the huckleberry oak communities are often found adjacent to MF.

Mixed Conifer–Pine (MP)

The mixed conifer–pine community occupies moist soils across a range of sites between approximately 1,900 and 7,800 feet in elevation. MP is defined by the presence of several conifer species, including ponderosa pine, incense cedar, Douglas-fir, white fir, and sugar pine, with Jeffrey pine occurring very rarely. Any one of these species may become locally dominant over small areas. Riparian habitats within this community are characterized by the presence of white alder, maple, and willow. Understory shrubs in this community include deerbrush and whiteleaf manzanita at lower elevations, and greenleaf manzanita at higher elevations.

Mixed Riparian Hardwoods (NR)

The mixed riparian hardwoods community occurs along rivers and streams and includes a mixture of riparian hardwood species with no clearly dominant species. The mixture includes combinations of quaking aspen (*Populus tremuloides*), willow, and black cottonwood.

Montane Mixed Hardwoods (TX)

Montane mixed hardwoods communities are generally found in the northern Sierra Nevada from 500 to 5,400 feet in elevation. It generally occurs on sites favorable to mid-montane conifers such as ponderosa pine and usually above the interior mixed hardwoods sites on the western edge. Species may include any combination of non-dominant black oak, pacific madrone (*Arbutus menziesii*), and/or tree chinquapin (*Chrysolepis chrysophylla*). Other species such as canyon or interior live oak may be included, but are not the main species. The principal overstory conifer associates are Douglas-fir, ponderosa pine, incense cedar, and sugar pine.

Pacific Douglas-Fir (DF)

Pacific Douglas-fir (*Pseudotsuga menziesii*) maintains dense stands on north-facing, shaded or moist sites at the same general range of the Douglas-fir–pine , approximately 660 to 4,600 feet in elevation. On the western side of northern Sierra Nevada, species include canyon live oak, black oak, tanoak (*Lithocarpus densiflorus*), and, more rarely, tree chinquapin.

Ponderosa Pine (PP)

The ponderosa pine community is defined by pure stands of ponderosa pine. It is commonly found between approximately 900 and 5,800 feet in elevation on moist western slopes in the northern Sierra Nevada. Within the Middle Fork American River Watershed, PP is associated most commonly with the canyon live oak and black oaks on south-, east- and west-facing slopes and with Douglas-fir–pine and mixed conifer–pine communities on north-facing aspects. Shrubs of lower montane areas such as whiteleaf manzanita, wedgeleaf ceanothus, and poison oak also may be commonly found within the ponderosa pine communities.

White Fir (WF)

Pure stands of white fir are found primarily on the west side of the northern Sierra Nevada from approximately 3,900 to 8,500 feet in elevation. WF occurs typically in cool, moist, shady environments on north aspects, in riparian areas and around large lakes. WF represents an intermediate zone between the mixed conifer–pine and mixed conifer–firs on south and west aspects, and between the mixed conifer–pine and red firs on north and east aspects. Montane mixed chaparral and huckleberry oaks are commonly associated shrub types, and mountain alder, black oak, willow species, and black cottonwood are commonly associated hardwoods.

White Alder (QE)

White alder communities occur in pure or mixed stands along rivers and streams, generally below about 6,200 feet in elevation. QE may include other tree species such as Pacific yew (*Taxus brevifolia*), California hazelnut (*Corylus cornuta* var. *californica*).

Willow (QO)

The willow community is wide-ranging, extending from approximately 2,100 to 8,600 feet in elevation. Species of tree and shrub willows dominate the hardwood mixture, and may include Scouler's willow (*Salix scouleriana*), shining willow (*Salix lucida*), Gooding's black willow (*Salix gooddingii*), and narrow-leaved willow (*Salix exigua*). QC may occur in pure stands along streams and moist canyon bottoms, or it may be mixed with conifers such as those in the mixed conifer–pine, mixed conifer–fir, and lodgepole pines. Willow–aspen, white alder, and black cottonwood communities may also be associated with the willow community.

Willow–Alder (QY)

This community is generally found between 3,180 and 6,950 feet in elevation. Willow species, which in this Project vicinity may include Scouler's willow, shining willow, Gooding's black willow, and narrow-leaved willow, occur together with white alder, along streams or seepage areas. Neither taxon is clearly dominant in the riparian mixture. Common associates include species of gooseberry and currant (*Ribes* spp.), blackberry (*Rubus* spp.), wild rose (*Rosa* spp.), and poison oak.

Non-vegetated areas

Barren (BA)

A barren landscape is defined generally as an area devoid of vegetative cover. BA includes exposed bedrock and cliffs, but it does not include disturbed or developed areas that currently are degraded but could support vegetation under normal circumstances.

Developed/Urban (UB)

A developed landscape includes any lands dominated by urban and other buildings or structures and may also include roads, parking lots, city parks, etc.

APPENDIX C

CRLF Habitat Site Assessment Data Sheets

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: **9/24/2007**
(mm/dd/yyyy)

Site Assessment Biologists **Yarnell, Sarah**
(Last name) (First Name) (Last name) (First Name)

(Last name) (First Name) (Last name) (First Name)

Site Location: **Placer County American Canyon Creek (at Middle Fork American River Mile 6.4) 10S 678261 / 4311623**
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name: **Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: _____ **Maximum depth:** _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: _____

STREAM HABITAT:

Width (bank full): ~ 6 feet

Depth (bank full): ~ 3 feet

Stream gradient (percent slope): <1 %

Are there pools (circle one): Yes No

If yes,

Size of stream pools: 15 to 35 feet in length

Maximum depth of stream pools: 2. 5 feet

Characterize non-pool habitat: run, riffle, glide, other: Sections of cobble runs alternate with steeper bedrock cascades and pools.

Vegetation: emergent, overhanging, dominant species: Riparian vegetation is patchy along the water's edge, and was dominated by small to medium-sized willow shrubs and alder trees. No emergent or aquatic vegetation present

Substrate: Bedrock and cobble

Bank description: The stream is confined within deep canyon walls and a bedrock channel

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

Other aquatic habitat characteristics, species observations, drawings, or comments:

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: **5/17/2007, 6/5/2007, and 8/23/2007**
(mm/dd/yyyy)

Site Assessment Biologists

Gonsolin, Earl		**VanDellen, Chet**	
(Last name)	(First Name)	(Last name)	(First Name)
Buck, Christina			
(Last name)	(First Name)	(Last name)	(First Name)

Site Location: **Placer County, Todd Creek, 10 S 679869 / 4314562**
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name: **Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: _____ **Maximum depth:** _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate:

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

STREAM HABITAT:

Width (bank full): 10 feet

Depth (bank full): .5 to 1.5 Feet

Stream gradient (percent slope): 5%

Are there pools (circle one): Yes No

If yes,

Size of stream pools: 15-25 feet in length

Maximum depth of stream pools: 2.5 feet

Characterize non-pool habitat: run, riffle, glide, other: Non-pool habitats include cascades and runs

Vegetation: emergent, overhanging, dominant species: No emergent or floating vegetation. Riparian vegetation downstream of Driver's Flat Road was dominated by small to medium-sized willow and alder trees and shrubs. Canopy cover along the stream margins was generally less than 25%, but up to 100% in some areas

Substrate: Bedrock, boulder, and cobble

Bank description: Stream is bedrock-confined, no backwater or secondary channels

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: Dry on 8/23/2007

Other aquatic habitat characteristics, species observations, drawings, or comments:

Stream channel near the Middle Fork American was approximately 3 m wide, with an adjacent floodplain along both banks. Upstream of Drivers Flat Road, valley width decreased, and the channel was confined within steep canyon walls. Spring flows were less than 1 cfs. The creek was dry during the fall (August) surveys. Non-native aquatic predators were not observed.

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: **5/17/2007, 6/5/2007, and 8/23/2007**
(mm/dd/yyyy)

Site Assessment Biologists

Graff, Peter		**Freiermuth, Brian**	
(Last name)	(First Name)	(Last name)	(First Name)
(Last name)	(First Name)	(Last name)	(First Name)

Site Location: **Placer, Gas Canyon Creek, 10S 0679004, 4314803 (NAD 83)**
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name: **Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: _____ **Maximum depth:** _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate:

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

STREAM HABITAT:

Width (bank full): 6 ft (32 ft)

Depth (bank full): > 1 ft

Stream gradient (percent slope): Steep (> 7%)

Are there pools (circle one): Yes No

If yes,

Size of stream pools: ~ 7 ft wide and 15 ft long

Maximum depth of stream pools: 2 feet (average maximum)

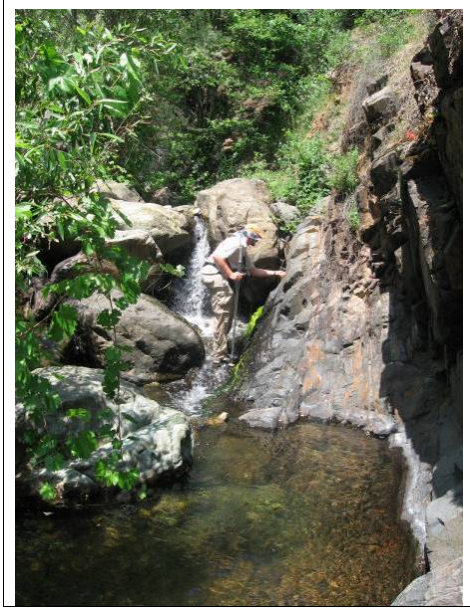
Characterize non-pool habitat: run, riffle, glide, other: cascades, runs

Vegetation: emergent, overhanging, dominant species: No emergent or floating vegetation. *Salix* sp and *Alnus* sp. along bank

Substrate: bedrock, cobble, boulder

Bank description: Steep canyon walls

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: 8/23/07, this year



Other aquatic habitat characteristics, species observations, drawings, or comments:

Steep gradient, bedrock/boulder. No backwater or escape cover. No roots or vegetation for egg attachment.

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: **6/27/2007**
(mm/dd/yyyy)

Site Assessment Biologists

Graf, Peter		**VanDellen, Chet**	
(Last name)	(First Name)	(Last name)	(First Name)
(Last name)	(First Name)	(Last name)	(First Name)

Site Location: **Placer County, Canyon Creek, 10S 681773, 4313650**
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name: **Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: _____ **Maximum depth:** _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: _____

STREAM HABITAT:

Width (bank full): ~ 35 feet

Depth (bank full): 3 feet

Stream gradient (percent slope): 5%

Are there pools (circle one): Yes No

If yes,

Size of stream pools: 15 to 35 feet in length

Maximum depth of stream pools: 2.5 feet

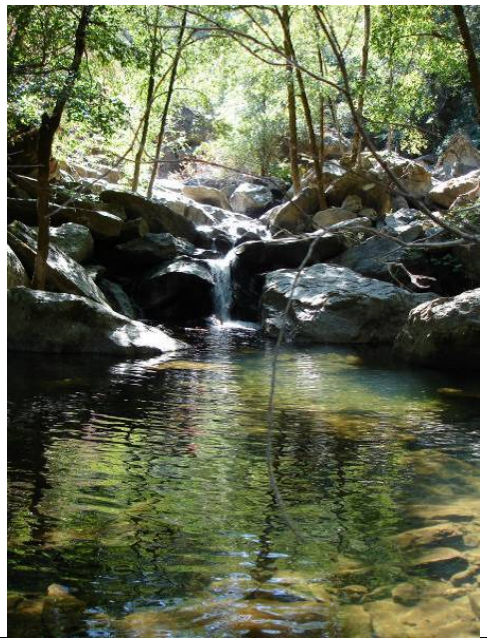
Characterize non-pool habitat: run, riffle, glide, other: Non-pool habitats includes bedrock chutes and cascades.

Vegetation: emergent, overhanging, dominant species: Medium to small-sized alder and willow trees and shrubs were established within the channel, while oaks provided most of the overstory canopy. Canopy cover along the stream margins was typically high, although several open, bedrock areas (with no vegetation) occurred. No emergent or aquatic vegetation present.

Substrate: Bedrock, boulder, and cobble

Bank description: Stream is steep, confined, and bedrock-dominated. Banks are steep and rocky, not vegetated. No bullfrogs or other non-native predators observed.

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:



Other aquatic habitat characteristics, species observations, drawings, or comments:

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: **5/21/2007, 6/6/2007, and 8/22/2007**
(mm/dd/yyyy)

Site Assessment Biologists

VanDellen, Chet		**Gonsolin, Earl**	
(Last name)	(First Name)	(Last name)	(First Name)
(Last name)	(First Name)	(Last name)	(First Name)

Site Location: **El Dorado, Otter Creek, 10S 0686476, 4314265**
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name: **Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: _____ **Maximum depth:** _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: _____

STREAM HABITAT:

Width (bank full): 10 ft (32 ft)

Depth (bank full): 1.5 ft

Stream gradient (percent slope): 1.5%

Are there pools (circle one): Yes No

If yes,

Size of stream pools: 15 to 40 feet in length

Maximum depth of stream pools: 3 feet

Characterize non-pool habitat: run, riffle, glide, other: riffles, runs, & cascades

Vegetation: emergent, overhanging, dominant species: No floating or emergent vegetation. Riparian vegetation was dominated by large to medium-size *Salix* sp., *Populus fremontii,* and *Alnus* sp. along bank. Canopy cover along stream was greater than 50%.

Substrate: boulder/bedrock and cobble

Bank description: floodplain typically along at least one bank

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

Other aquatic habitat characteristics, species observations, drawings, or comments:

No attachment substrate for eggs, little escape cover. No backwater pools or secondary channels. During August flows were less than 1 cfs. Crayfish and other non-native species observed.

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: **10/15/2007**
(mm/dd/yyyy)

Site Assessment Biologists **Addley, Craig**
(Last name) (First Name) (Last name) (First Name)

(Last name) (First Name) (Last name) (First Name)

Site Location: **El Dorado, Jesse Canyon Creek Confluence, 10S 687906 4316268**
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name: **Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: _____ **Maximum depth:** _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate:

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

STREAM HABITAT:

Width (bank full): 10 ft

Depth (bank full): < 1 ft

Stream gradient (percent slope): Steep (~7%)

Are there pools (circle one): Yes No

If yes,

Size of stream pools: 15 to 20 feet in length

Maximum depth of stream pools: 3 ft

Characterize non-pool habitat: run, riffle, glide, other: waterfalls and chutes

Vegetation: emergent, overhanging, dominant species: *Alnus* sp. and *Rubus discolor*.

Substrate: bedrock & boulder

Bank description: steep, narrow canyon: bedrock-confined, narrow stream bed with no backwater or secondary channels

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

Other aquatic habitat characteristics, species observations, drawings, or comments:

No amphibians observed. Very high gradient, bedrock confined, & narrow. No backwater or secondary channels. No escape cover. No roots or vegetation for egg attachment.

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: **10/15/2007**
(mm/dd/yyyy)

Site Assessment Biologists **Addley, Craig**
(Last name) (First Name) (Last name) (First Name)

(Last name) (First Name) (Last name) (First Name)

Site Location: **Placer, Pond Creek Confluence, 10S 687945 4317961 (NAD 83)**
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name: **Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: _____ **Maximum depth:** _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate:

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

STREAM HABITAT:

Width (bank full): 10 ft

Depth (bank full): .5 to 1.5 feet

Stream gradient (percent slope): Steep (~7 %)

Are there pools (circle one): Yes No

If yes,

Size of stream pools: 15 to 20 feet in length

Maximum depth of stream pools: 3 ft

Characterize non-pool habitat: run, riffle, glide, other: waterfalls and chutes

Vegetation: emergent, overhanging, dominant species: No emergent or floating vegetation. *Salix* sp. *and Alnus* sp. and shrubs along banks.

Substrate: boulder/bedrock

Bank description: steep, narrow canyon

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

Other aquatic habitat characteristics, species observations, drawings, or comments:

No amphibians observed. Very high gradient, bedrock confined, & narrow. No backwater or secondary channels. No escape cover. No roots or vegetation for egg attachment.

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: **5/24/2007, 6/11/2007, and 8/30/2007**
(mm/dd/yyyy)

Site Assessment Biologists **VanDellen, Chet** (Last name) (First Name) **Gonsolin, Earl** (Last name) (First Name)

Buck, Christina (Last name) (First Name) (Last name) (First Name)

Site Location: **Placer County, Volcano Creek, 10S 691520, 4319082**
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name: **Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: _____ **Maximum depth:** _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate:

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

STREAM HABITAT:

Width (bank full): 15 feet

Depth (bank full): .5 to 1.5 feet

Stream gradient (percent slope): ~ 7%

Are there pools (circle one): Yes No

If yes,

Size of stream pools: 15 to 20 feet in length

Maximum depth of stream pools: 3 feet

Characterize non-pool habitat: run, riffle, glide, other: Non-pool habitats included cascades and step-pools

Vegetation: emergent, overhanging, dominant species: No emergent or aquatic vegetation. Small to medium-sized alder and willow trees and shrubs present in and along channel. Canopy cover along stream margins generally high, with sections of open bedrock.

Substrate: Dominated by bedrock and boulders

Bank description: Stream banks composed of rocks and boulders, some bedrock. Clumps of vegetation including *Carex* spp., and Indian rhubarb along banks.

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

Other aquatic habitat characteristics, species observations, drawings, or comments:

Small perennial creek flowing within steep canyon walls. Flows during field surveys were less than 1 cfs. Non-native aquatic predators not observed.

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: **8/29/2007**
(mm/dd/yyyy)

Site Assessment Biologists **Gonsolin, Earl** (Last name) (First Name) **VanDellen, Chet** (Last name) (First Name)

Buck, Christina (Last name) (First Name) (Last name) (First Name)

Site Location: **Placer County, Brushy Canyon Creek, 10S 701685, 4314562**
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name: **Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: _____ **Maximum depth:** _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: _____

STREAM HABITAT:

Width (bank full): 15 feet

Depth (bank full): .5 to 1.5 feet

Stream gradient (percent slope): 5%

Are there pools (circle one): Yes No

If yes,

Size of stream pools: 20 to 45 feet long

Maximum depth of stream pools: 3 feet

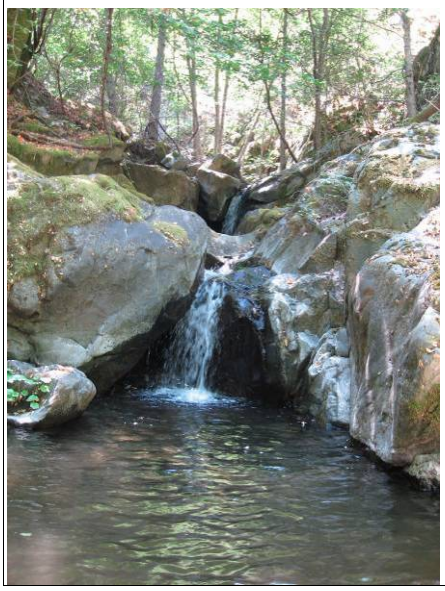
Characterize non-pool habitat: run, riffle, glide, other: High gradient cascades

Vegetation: emergent, overhanging, dominant species: No emergent or aquatic vegetation. A oak overstory shades the channel

Substrate: Bedrock and boulders

Bank description: Set within a steep river canyon, channel is confined to bedrock

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:



Other aquatic habitat characteristics, species observations, drawings, or comments:

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: **8/28/2007**
(mm/dd/yyyy)

Site Assessment Biologists

Buck, Christina		**Gonsolin, Earl**	
(Last name)	(First Name)	(Last name)	(First Name)
VanDellen, Chet			
(Last name)	(First Name)	(Last name)	(First Name)

Site Location: **Placer County, Pilot Creek, 10S 700716, 4316067**
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name: **Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: _____ **Maximum depth:** _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate:

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

STREAM HABITAT:

Width (bank full): ~ 15 feet

Depth (bank full): ~ 1 foot

Stream gradient (percent slope): 5%

Are there pools (circle one): Yes No

If yes,

Size of stream pools: 25 to 40 feet in length

Maximum depth of stream pools: 15 feet

Characterize non-pool habitat: run, riffle, glide, other: Instream habitats primarily high-gradient cascades and plunge-pools, although several lower-gradient sections with riffles occurred.

Vegetation: emergent, overhanging, dominant species: No emergent or aquatic vegetation. Riparian vegetation dominated by small to medium willow and alder trees, with moderate canopy coverage along the stream margins.

Substrate:

Bank description:

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

Other aquatic habitat characteristics, species observations, drawings, or comments:

Pilot Creek is a narrow (approx. 4.5 m) perennial stream confined within steep bedrock canyon walls. Flow is regulated by SMUD at Stumpy Meadows reservoir. Flows at the time of the survey were less than 2 cfs. Non-native predatory species not observed.

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: **8/30/2007**
(mm/dd/yyyy)

Site Assessment Biologists **VanDellen, Chet** (Last name) (First Name) **Buck, Christina** (Last name) (First Name)

(Last name) (First Name) (Last name) (First Name)

Site Location: **Placer County, Wallace Canyon Creek, 10S 707906, 4317361**
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name: **Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: _____ **Maximum depth:** _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate:

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

STREAM HABITAT:

Width (bank full): 20 feet

Depth (bank full): 3 feet

Stream gradient (percent slope): 7%

Are there pools (circle one): Yes No

If yes,

Size of stream pools: 20 to 25 feet in length

Maximum depth of stream pools: 5 feet

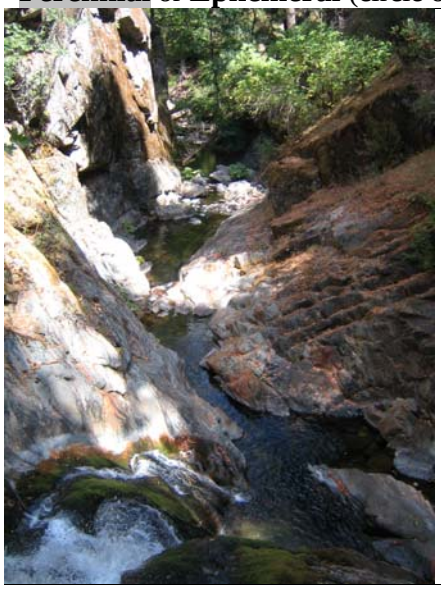
Characterize non-pool habitat: run, riffle, glide, other: High-gradient channel dominated by large boulders and bedrock, waterfalls and chutes

Vegetation: emergent, overhanging, dominant species: No emergent or aquatic vegetation. Small to medium-sized alder and willow trees and shrubs were present in the channel, with oaks providing the overstory. Canopy cover typically high.

Substrate: Bedrock and boulder

Bank description: River runs through a steep canyon, no flood plain.

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:



Other aquatic habitat characteristics, species observations, drawings, or comments:

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: **8/24/2007**
(mm/dd/yyyy)

Site Assessment Biologists **Graf, Peter** **VanDellen, Chet**

(Last name)	(First Name)	(Last name)	(First Name)
(Last name)	(First Name)	(Last name)	(First Name)

Site Location: **Placer County, Long Canyon Creek, 10S, 700305, 4318232**
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name: **Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: _____ **Maximum depth:** _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate:

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

STREAM HABITAT:

Width (bank full): 35 to 80 feet

Depth (bank full): 1.4 to 3.5 feet

Stream gradient (percent slope): 2 to 4%

Are there pools (circle one): Yes No

If yes,

Size of stream pools: 10 to 220 feet long

Maximum depth of stream pools: 6 feet

Characterize non-pool habitat: run, riffle, glide, other: High gradient riffles, cascades, and plunge pools

Vegetation: emergent, overhanging, dominant species: No emergent or floating vegetation riparian vegetation includes small to medium-sized willows and alder shrubs and trees, with Canopy cover typically less than 50%

Substrate: Boulder and bedrock, some cobble

Bank description: Stream is confined within steep canyon walls

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

Other aquatic habitat characteristics, species observations, drawings, or comments:

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: **5/31/2007**
(mm/dd/yyyy)

Site Assessment Biologists

Graf, Peter		**Friermuth, Brian**	
(Last name)	(First Name)	(Last name)	(First Name)
(Last name)	(First Name)	(Last name)	(First Name)

Site Location: **Placer County, North Fork Long Canyon Creek, 10 S 715087, 4322045**
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name: **Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: _____ **Maximum depth:** _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate:

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

STREAM HABITAT:

Width (bank full): 26 to 40 feet

Depth (bank full): ~1 to 1.5 feet

Stream gradient (percent slope): > 2%

Are there pools (circle one): Yes No

If yes,

Size of stream pools: 10 to 220 feet long

Maximum depth of stream pools: 2 feet

Characterize non-pool habitat: run, riffle, glide, other: High-gradient riffles, cascades, and plunge pools

Vegetation: emergent, overhanging, dominant species: No emergent or floating vegetation. Riparian cover typically greater than 50%, dominated by alders and willows. Firs and pines contribute to overstory in some areas.

Substrate: Boulder and cobble, some bedrock

Bank description: River runs through a pine forest habitat. Stream banks composed of rocks and boulders, some bedrock. Some clumps of vegetation (i.e., Carex spp. and Indian rhubarb) along banks.

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

Other aquatic habitat characteristics, species observations, drawings, or comments:

No bullfrogs or other predators observed.

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: **5/31/2007**
(mm/dd/yyyy)

Site Assessment Biologists

Graf, Peter		**Friermuth, Brian**	
(Last name)	(First Name)	(Last name)	(First Name)
(Last name)	(First Name)	(Last name)	(First Name)

Site Location: **Placer County, South Fork Long Canyon Creek, 10S, 714667, 4321687**
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name: **Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: _____ **Maximum depth:** _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate:

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

STREAM HABITAT:

Width (bank full): 25 to 38 feet

Depth (bank full): 1 to 1.5 feet

Stream gradient (percent slope): ~ 1.5%

Are there pools (circle one): Yes No

If yes,

Size of stream pools: 11 to 220 feet long

Maximum depth of stream pools: 3 feet

Characterize non-pool habitat: run, riffle, glide, other: High-gradient riffles, cascades, and plunge pools

Vegetation: emergent, overhanging, dominant species: No emergent or floating vegetation Riparian cover typically greater than 50%, dominated by alders and willows. Firs and pines contribute to the overstory.

Substrate: Boulder and cobble, some bedrock

Bank description: Stream banks composed of rocks and boulders, some Carex and Indian rhubarb present.

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

Other aquatic habitat characteristics, species observations, drawings, or comments:

Creek runs through a pine forest. No bullfrogs or other predators observed.

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: **8/29/2007**
(mm/dd/yyyy)

Site Assessment Biologists **Graf, Peter**
(Last name) (First Name) (Last name) (First Name)

(Last name) (First Name) (Last name) (First Name)

Site Location: **Placer County, Duncan Creek, 10S 712456, 4323952**
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name: **Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: _____ **Maximum depth:** _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate:

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

STREAM HABITAT:

Width (bank full): 33 to 53 feet

Depth (bank full): 1.3 to 9.2 feet

Stream gradient (percent slope): >3%

Are there pools (circle one): Yes No

If yes,

Size of stream pools: 40 to 75 feet long

Maximum depth of stream pools: 5.5 feet

Characterize non-pool habitat: run, riffle, glide, other: Waterfalls and cascades, inter--rupted by plunge pools.

Vegetation: emergent, overhanging, dominant species: No emergent or floating vegetation. Riparian vegetation includes sparse alders and some forb species along the stream margin. Canopy cover is approximately 25%.

Substrate: Bedrock, boulder, and cobble

Bank description: Stream is steep, confined, and bedrock-dominated. Banks are steep and rocky, generally not vegetated.

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

Other aquatic habitat characteristics, species observations, drawings, or comments:

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: **08/15/2007**
(mm/dd/yyyy)

Site Assessment Biologists **Gillespie, Sara** (Last name) (First Name) **Tucker, Steve** (Last name) (First Name)

(Last name) (First Name) (Last name) (First Name)

Site Location: **Placer County, South Fork Long Canyon Creek Diversion Pool 10S 718882, 4325530**
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name: **Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: .42 acres **Maximum depth:** ~ 25 ft *

Vegetation: emergent, overhanging, dominant species: The diversion pool is lined with trees including several black oaks and pines. Annual grasses/non-native herbaceous species line the banks of the diversion pool

Substrate: Mud and silt sediments have accumulated in the bottom of the diversion pool

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: July*

STREAM HABITAT:

Width (bank full):

Depth (bank full):

Stream gradient (percent slope):

Are there pools (circle one): Yes No

If yes,

Size of stream pools:

Maximum depth of stream pools:

Characterize non-pool habitat: run, riffle, glide, other:

Vegetation: emergent, overhanging, dominant species:

Substrate:

Bank description:

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

Other aquatic habitat characteristics, species observations, drawings, or comments:

** The SF Long Canyon Creek Diversion Dam is approx. 27 feet high. Water may get as deep as the height of the dam while water is diverted through the pool. However, PCWA stops water from diverting through the diversion pool in July of each year. At the time this survey was conducted (August), water in the pool was less than 1 foot deep, with some areas of exposed mud/dirt. Thus, water does not remain in the diversion long enough to support a breeding population of CRLF.

(Photo provided here was taken in spring of 2007, while there was water in the diversion pool)

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: **8/15/2007**
(mm/dd/yyyy)

Site Assessment Biologists **Gillespie, Sara** (Last name) (First Name) **Tucker, Steve** (Last name) (First Name)

(Last name) (First Name) (Last name) (First Name)

Site Location: **Placer County, North Fork Long Canyon Diversion Pool, 10S 717940, 4325461**
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name: **Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: .72 acres **Maximum depth:** ~ 10 feet*

Vegetation: emergent, overhanging, dominant species: Banks and floor of pool are lined with annual grasses and other weedy herbaceous species. There are several small willow shrubs in the diversion itself.

Substrate: Mud and silt sediments have accumulated in the bottom of the diversion pool

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: July*

STREAM HABITAT:

Width (bank full):

Depth (bank full):

Stream gradient (percent slope):

Are there pools (circle one): Yes No

If yes,

Size of stream pools:

Maximum depth of stream pools:

Characterize non-pool habitat: run, riffle, glide, other:

Vegetation: emergent, overhanging, dominant species:

Substrate:

Bank description:

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

Other aquatic habitat characteristics, species observations, drawings, or comments:

** The NF Long Canyon Creek Diversion Dam is approx. 10 feet high. Water may get as deep as the height of the dam while water is diverted through the pool. However, PCWA stops water from diverting through the diversion pool in July of each year. At the time this survey was conducted (August), water in the pool was less than 1 foot deep, with some areas of exposed mud/dirt. Thus, water does not remain in the diversion long enough to support a breeding population of CRLF.

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: **08/24/2007**
(mm/dd/yyyy)

Site Assessment Biologists

Barry, Sean		**Hendrickson, Ann**	
(Last name)	(First Name)	(Last name)	(First Name)
(Last name)	(First Name)	(Last name)	(First Name)

Site Location: **El Dorado, Pond "A", Auburn SRA, 10S 0671188, 4306389 (NAD 83)**
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name: **Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: **80 ft x 80 ft** **Maximum depth:** **15 ft**

Vegetation: emergent, overhanging, dominant species:
Floating vegetation: *Potamogeton* sp., Emergent vegetation: *Typha* sp. *Rubus discolor* along west edge.

Substrate: Silt

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: N/A

STREAM HABITAT:

Width (bank full):

Depth (bank full):

Stream gradient (percent slope):

Are there pools (circle one): Yes No

If yes,

Size of stream pools:

Maximum depth of stream pools:

Characterize non-pool habitat: run, riffle, glide, other:

Vegetation: emergent, overhanging, dominant species:

Substrate:

Bank description:

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

Other aquatic habitat characteristics, species observations, drawings, or comments:

Man-made pond, possibly for cattle. Dam at west edge of pond. Many bullfrog tadpoles and first year metamorphs detected. *Gambusia* sp. and bass present. American kestrel, acorn woodpecker, mallard, pied-billed grebe, bobcat observed in area.

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: **08/24/2007**
(mm/dd/yyyy)

Site Assessment Biologists **Nolan-Summers, Janelle** **Barry, Sean**
(Last name) (First Name) (Last name) (First Name)

(Last name) (First Name) (Last name) (First Name)

Site Location: **El Dorado, Pond "B" Sliger Mine Rd, Summit Hill Ranch 1461 Sliger Mine Rd., Greenwood, CA 95635**
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name: **Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT: Private Property – not granted permission to access pond.

Size: _____ **Maximum depth:** _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: _____

STREAM HABITAT:

Width (bank full): _____

Depth (bank full): _____

Stream gradient (percent slope): _____

Are there pools (circle one): Yes No

If yes,

Size of stream pools: _____

Maximum depth of stream pools: _____

Characterize non-pool habitat: run, riffle, glide, other: _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Bank description: _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

Other aquatic habitat characteristics, species observations, drawings, or comments:

Private Property – unable to obtain access

Summit Hill Ranch
Rod Williams Highland Cattle
1461 Sliger Mine Rd.
Greenwood, CA 95635

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: **08/24/2007**
(mm/dd/yyyy)

Site Assessment Biologists **Nolan-Summers, Janelle** **Barry, Sean**

(Last name)	(First Name)	(Last name)	(First Name)
(Last name)	(First Name)	(Last name)	(First Name)

Site Location: **El Dorado, Pond "C", Horseshoe Bar, 10S 0693375, 4319879 (NAD 83)**
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name: **Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: **15 ft X 50 ft** **Maximum depth:** **2 ft**

Vegetation: emergent, overhanging, dominant species:
No floating or emergent vegetation visible – pond not accessible by foot.

Substrate: Unknown

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: N/A

STREAM HABITAT:

Width (bank full):

Depth (bank full):

Stream gradient (percent slope):

Are there pools (circle one): Yes No

If yes,

Size of stream pools:

Maximum depth of stream pools:

Characterize non-pool habitat: run, riffle, glide, other:

Vegetation: emergent, overhanging, dominant species:

Substrate:

Bank description:

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

Other aquatic habitat characteristics, species observations, drawings, or comments:

Wide spot in seasonal drainage, pond developed in last year or two by beaver. Bordered by canyon wall on one side. Unable to access pond on ground trail on opposite side of pond (trail goes along the canyon wall). Visible from canyon wall only.

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: **08/24/2007**
(mm/dd/yyyy)

Site Assessment Biologists **Nolan-Summers, Janelle** **Barry, Sean**

(Last name)	(First Name)	(Last name)	(First Name)
(Last name)	(First Name)	(Last name)	(First Name)

Site Location: **El Dorado, Pond "D", Horseshoe Bar, 10S 0693943, 4319370 (NAD 83)**
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name: **Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: **~1 acre** **Maximum depth:** **20 ft**

Vegetation: emergent, overhanging, dominant species: No floating or overhanging vegetation. *Salix* spp. including button and gray willow (dominant), *Rubus discolor, Eriodictyon angustifolium, Cephalanthus occidentalis, Vitis californica*.

Substrate: Silt

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: N/A

STREAM HABITAT:

Width (bank full):

Depth (bank full):

Stream gradient (percent slope):

Are there pools (circle one): Yes No

If yes,

Size of stream pools:

Maximum depth of stream pools:

Characterize non-pool habitat: run, riffle, glide, other:

Vegetation: emergent, overhanging, dominant species:

Substrate:

Bank description:

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

Other aquatic habitat characteristics, species observations, drawings, or comments:

Old mining pond. Vertical edge.

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: 12/08/2007
(mm/dd/yyyy)

Site Assessment Biologists

Nolan-Summers, Janelle		**Gillespie, Sara**	
(Last name)	(First Name)	(Last name)	(First Name)
(Last name)	(First Name)	(Last name)	(First Name)

Site Location: **El Dorado, Pond "D", Horseshoe Bar, 10S 0693943, 4319370 (NAD 83)**
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name: **Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: **35 feet wide x 375 feet** **Maximum depth:** **5-6 feet**

Vegetation: emergent, overhanging, dominant species: No floating vegetation.
Salix sp. (dominant), *Rubus discolor, Eriodictyon angustifolium, Vitis californica*.
Cephalanthus occidentalis,

Substrate: Silt and organic matter

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

STREAM HABITAT:

Width (bank full):

Depth (bank full):

Stream gradient (percent slope):

Are there pools (circle one): Yes No

If yes,

Size of stream pools:

Maximum depth of stream pools:

Characterize non-pool habitat: run, riffle, glide, other:

Vegetation: emergent, overhanging, dominant species:

Substrate:

Bank description:

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

Other aquatic habitat characteristics, species observations, drawings, or comments:

Sheer cliff face on south side.

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: **08/24/2007**
(mm/dd/yyyy)

Site Assessment Biologists **Nolan-Summers, Janelle** **Barry, Sean**
(Last name) (First Name) (Last name) (First Name)

(Last name) (First Name) (Last name) (First Name)

Site Location: **El Dorado County, Pond "E", Horseshoe Bar, 10S 0694051 4319686 (NAD 83)**
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name: **Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: **25 ft wide x 25 ft long** **Maximum depth:** **10 ft**

Vegetation: emergent, overhanging, dominant species: No emergent or overhanging Vegetation. *Potamogeton* sp., indication of cooler water (per S. Barry). Riparian vegetation, dominated by willows.

Substrate: silt and organic matter

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: in dry years only

STREAM HABITAT:

Width (bank full):

Depth (bank full):

Stream gradient (percent slope):

Are there pools (circle one): Yes No

If yes,

Size of stream pools:

Maximum depth of stream pools:

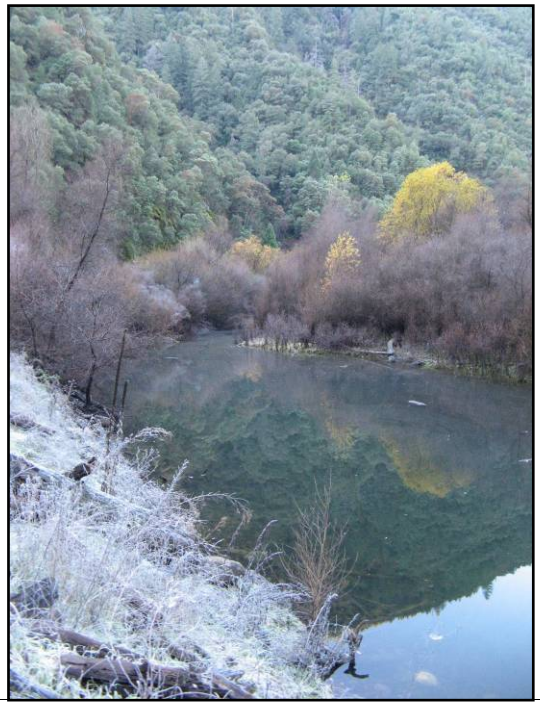
Characterize non-pool habitat: run, riffle, glide, other:

Vegetation: emergent, overhanging, dominant species:

Substrate:

Bank description:

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:



Other aquatic habitat characteristics, species observations, drawings, or comments:

Man-made mining pond. Bullfrog tadpoles observed. Mallard and green heron observed. During winter hydrologically connected to Pond "D"

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: **12/08/2007**
(mm/dd/yyyy)

Site Assessment Biologists **Nolan-Summers, Janelle** **Gillespie, Sara**
(Last name) (First Name) (Last name) (First Name)

(Last name) (First Name) (Last name) (First Name)

Site Location: **El Dorado County, Pond "E", Horseshoe Bar, 10S 0694051 4319686 (NAD 83); culvert, 10S 0693976 4319615 (NAD 83)**
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name: **Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: **30 ft wide x 450 ft long** **Maximum depth:** **Current = 3–4 ft ; Max Rainy Season = 6–7 ft**

Vegetation: emergent, overhanging, dominant species: No emergent or overhanging vegetation; *Rubus discolor*, *Vitis californica* sp., *Verbascum thapsus* , *Rumex* sp.

Substrate: silt and organic matter

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: in dry years only

STREAM HABITAT:

Width (bank full):

Depth (bank full):

Stream gradient (percent slope):

Are there pools (circle one): Yes No

If yes,

Size of stream pools:

Maximum depth of stream pools:

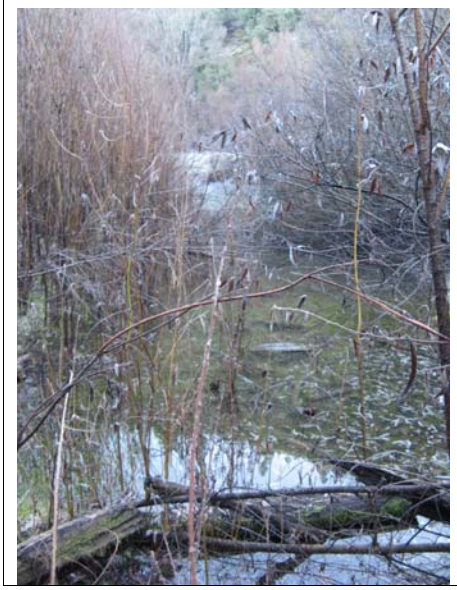
Characterize non-pool habitat: run, riffle, glide, other:

Vegetation: emergent, overhanging, dominant species:

Substrate:

Bank description:

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:



Other aquatic habitat characteristics, species observations, drawings, or comments:

Man-made mining pond. Pond is narrow on either end, widest (~ 30 ft) in the middle. Hydrologically connected in winter (per John Close) at east end to Pond D, by a culvert that runs under dirt road.

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: **12/08/2007**
(mm/dd/yyyy)

Site Assessment Biologists **Nolan-Summers, Janelle** **Gillespie, Sara**

(Last name)	(First Name)	(Last name)	(First Name)
(Last name)	(First Name)	(Last name)	(First Name)

Site Location: **El Dorado, Pond "F", Horseshoe Bar, 10S 0693905, 4319632 (NAD 83)**
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name: **Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: **45 ft x 129 ft** **Maximum depth:** **~ 1 ft**

Vegetation: emergent, overhanging, dominant species:
Salix sp., *Rubus discolor*, *Vitis* sp., annual grass, *Calocedrus decurrens.*

Substrate: **mud – very muddy water**

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: **Late June**

STREAM HABITAT:

Width (bank full):

Depth (bank full):

Stream gradient (percent slope):

Are there pools (circle one): Yes No

If yes,

Size of stream pools:

Maximum depth of stream pools:

Characterize non-pool habitat: run, riffle, glide, other:

Vegetation: emergent, overhanging, dominant species:

Substrate:

Bank description:

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

Other aquatic habitat characteristics, species observations, drawings, or comments:

Cliff borders west side of pond. Per John C., the pond dries up in summer (late June). Area is characterized by canyon live oak, which is replaced by a pine community at the top of the ridge.

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: **08/24/2007**
(mm/dd/yyyy)

Site Assessment Biologists

Nolan-Summers, Janelle		**Barry, Sean**	
(Last name)	(First Name)	(Last name)	(First Name)
(Last name)	(First Name)	(Last name)	(First Name)

Site Location: **El Dorado, Pond "G", Horseshoe Bar, 10S 0693678, 4319863 (NAD 83)**
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name: **Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: **~20 ft wide average**

Maximum depth: **2 ft now; 8 ft. after rainy season, connected to river in high flows. Gets blown out in floods.**

Vegetation: emergent, overhanging, dominant species: No overhanging vegetation.
Sedges (very small & bushy), *Salix* sp., *Muhlenbergia rigens*

Substrate: sand and granite

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: N/A

STREAM HABITAT:

Width (bank full):

Depth (bank full):

Stream gradient (percent slope):

Are there pools (circle one): Yes No

If yes,

Size of stream pools:

Maximum depth of stream pools:

Characterize non-pool habitat: run, riffle, glide, other:

Vegetation: emergent, overhanging, dominant species:

Substrate:

Bank description:

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

Other aquatic habitat characteristics, species observations, drawings, or comments:

Granite cliff face one side of pond, sandy on far side of pond. Pond 2 ft deep at time of survey, up to 8 feet when water levels are high (rainy). Connected the river in high flows, gets "blown out" during flood events.

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: **12/08/2007**
(mm/dd/yyyy)

Site Assessment Biologists **Nolan-Summers, Janelle** **Gillespie, Sara**

(Last name)	(First Name)	(Last name)	(First Name)
(Last name)	(First Name)	(Last name)	(First Name)

Site Location: **El Dorado, Pond "G", Horseshoe Bar, 10S 0693678, 4319863 (NAD 83)**
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name: **Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: **~20 ft wide average** **Maximum depth:** **~ 2 feet**

Vegetation: emergent, overhanging, dominant species:
No emergent or overhanging veg.

Substrate: sandy

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

STREAM HABITAT:

Width (bank full):

Depth (bank full):

Stream gradient (percent slope):

Are there pools (circle one): Yes No

If yes,

Size of stream pools:

Maximum depth of stream pools:

Characterize non-pool habitat: run, riffle, glide, other:

Vegetation: emergent, overhanging, dominant species:

Substrate:

Bank description:

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

Other aquatic habitat characteristics, species observations, drawings, or comments:

Backwater area that is connected to river. Granite walls and bottom (of pond)

Necessary Attachments:
1. All field notes and other supporting documents.
2. Site photographs.
3. Maps with important habitat features and species locations.

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: **08/24/2007**
(mm/dd/yyyy)

Site Assessment Biologists **Nolan-Summers, Janelle** **Barry, Sean**
(Last name) (First Name) (Last name) (First Name)

(Last name) (First Name) (Last name) (First Name)

Site Location: **El Dorado, South Lake and attached backwater area, Horseshoe Bar, 10S 0693601, 4320012 (NAD 83)**
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name: **Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: **LAKE- 1- 2 acres** **Maximum depth:** **60 ft**

Vegetation: emergent, overhanging, dominant species:
No emergent or overhanging vegetation. Some willow spp.

Substrate: **silt**

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: _____

STREAM HABITAT:

Width (bank full): _____

Depth (bank full): _____

Stream gradient (percent slope): _____

Are there pools (circle one): Yes No

If yes,

Size of stream pools: _____

Maximum depth of stream pools: _____

Characterize non-pool habitat: run, riffle, glide, other: _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Bank description: _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

Other aquatic habitat characteristics, species observations, drawings, or comments:

Lake located at end of MFAR tunnel chute. Beaver and otter occupy the lake (per caretaker John C.). Some willow at edge of lake, on the opposite side. Granite cliffs.