

Foothill Yellow-Legged Frog

Standard Operating Procedures for River and Creek Site Habitat Assessments

The following standard operating procedures (SOP) were developed by Pacific Gas & Electric Co. to describe the parameters and data collection methods for completing river and creek site habitat assessments for foothill yellow-legged frogs (FYLF). Site habitat assessments should be conducted at all sites with suitable habitat for FYLF, regardless of the visual encounter survey (VES) results.

General Habitat Parameters and Assessment Methods

1. All measurements should be recorded in metric units unless otherwise indicated.
2. For consistency, habitat assessments will be started and completed by the same crew members.
3. Where practicable, habitat assessments will start at the bottom of the site and work upstream.
4. If subsites were designated during the VES, a separate site habitat assessment data sheet should be completed for each subsite.
5. All observations and comments pertaining to amphibian habitat will be recorded on the site habitat assessment data sheet. A field notebook should be used to record additional observations and comments on amphibian habitat not included in the data sheet.
6. Right bank and left bank will be designated facing in a downstream direction.
7. Time entries should be recorded in military format (e.g., 4:00 PM is 1600).
8. Distance and length measurements should be taken with a hip chain, metric tape, or range finder.
9. Velocity measurements should be measured with a Marsh-McBurney (or similar) flow meter. Record velocity measurements to the nearest cm/sec.
10. Field data sheets will be QA/QC checked as each sheet is completed. The reviewer's initials and the review date will be recorded at the bottom of the data sheet.
11. Weather conditions: Habitat assessments can generally be conducted on most days throughout the spring, summer, and fall.
12. Photographs of the site and subsites (if applicable) should include all amphibian habitats present, following the procedures outlined in Section 6.2 of the main text. For river sites and subsites, and creek subsites, photo documentation will include pictures from the bottom looking upstream, from the top looking downstream, and from the middle looking both upstream and downstream. If subsites are not designated on a creek, photographs should be representative of the types of habitat present (both macro- and microhabitats) within the survey area. Photographs should be logged on field data sheets and additional notes recorded in the field notebook.
13. If available, copies of aerial photographs should be used to denote site and subsite boundaries, area surveyed, transect locations, and prominent habitat features. If not available, a site drawing should be included on the back of the habitat assessment data sheet. The general location of egg masses, tadpoles or groups of tadpoles, and the general location of frogs should be included on the aerial photograph or site drawing.
14. Site/subsite habitat assessments are conducted on the initial site visit following the VES. On subsequent site visits, a site habitat assessment data sheet should be completed only if there are

significant changes in the overall quality of the habitat (e.g., noticeable changes in the extent and/or distribution of amphibian habitat, the amount of vegetation, water depth and velocity).

Upper Portion of Data Sheet

Below are instructions for completing the river and creek site habitat assessment data sheets, beginning with the upper left corner. These two data sheets are similar, and any differences between them are noted. The instructions for each version of the data sheet are included below.

Date – Record the date of the survey in the following format: month / day / year.

Site # – Record the site number designated during the preliminary habitat assessment (e.g., 1, 2).

Subsite # – If applicable, record the subsite number designated during the VES (e.g., 1a, 1b).

River or Creek Name/Location – Record the river or creek name, if available, and describe the location of the site/subsite or use other identifying information (such as a local landmark or relative position). Provide the approximate survey location along the river or creek, and include a landmark or other indicator provided on the USGS topographic map. If site/subsite VESs have been conducted, use the same river or creek names and locations on the site habitat assessment data sheet.

USGS Quad – Indicate the name(s) of the USGS 7.5' topographic map(s) that cover(s) the location of the site/subsite.

Township/Range – As indicated on the USGS topographic map, indicate the township and range that encompasses all or the largest portion of the site/subsite.

Section – Refer to the USGS topographic map for the Section number containing the site/subsite.

¼ Section – Indicate the ¼ section(s) that contain(s) the site/subsite (e.g., NE ¼, SW ¼, etc.).

Elevation – Record the elevation of the site/subsite as determined by a USGS topographic map or by GPS reading.

GPS File Name – If a GPS point can be obtained, record the GPS file name for the site/subsite. Location data collected by GPS should be post-processed, and compatible for display in ArcView or other GIS format.

Weather – Indicate current weather, including sky conditions and wind conditions, experienced during the VES. Use the following general guidelines:

Sky conditions:

- Overcast: > 60% cloud cover
- Partly overcast: 20% – 60% cloud cover
- Clear: < 20% cloud cover

Wind conditions:

- Inclement: winds > 20 mph

- Fair: winds 10 – 20 mph
- Ideal: calm to winds < 10 mph

Example: Weather that is Overcast/Fair = greater than 60% cloud cover and winds between 10 and 20 mph.

Total Site Length – Record the total length of the site. If subsites have been designated, this measurement should include all subsites, including the areas between subsites (i.e., steep bedrock reaches, sand beaches, areas with dense overhanging vegetation, etc.) that are not considered suitable habitat. For rivers, include both banks if subsites have been designated on both sides of the river. For creeks, both banks are included as part of the total site length.

River or Creek Aspect – Indicate the orientation of the river or creek drainage at the site/subsite as follows: Southerly, Northerly, Westerly, or Easterly. Example: A south flowing river or creek would have a "southerly" aspect.

Discharge – Estimate the river or creek flow in cubic feet per second (cfs). Where available, use stream gage data.

Water Temperature – Water temperatures should be recorded in degrees Celsius ($^{\circ}\text{C}$). In small lentic habitats (side pools, scour pools, etc.), water temperatures should be representative of the habitat. River and creek water temperatures should be obtained along the shoreline in edgewater areas, and at a location further from shore that is representative of the main stream temperature.

Observers – The initials of both crew members should appear in this space. The initials of the crew member filling out the data sheet should appear in the first space.

Initial Site Visit – Check this box if this is the first site visit during the field season.

Follow-up Visit – Check this box if the site has been visited previously during the field season. The site habitat assessment data sheet only needs to be completed during a return visit if there are significant changes in habitat features.

Photograph # – Record the photograph number so that it can be indexed to the notes and description recorded in the field notebook. For detailed methods, refer to Section 6.2 of the main text.

Roll/Disc/Card # – Record the film roll number or digital disc/card number. This should be a sequential number with the photographer or crew leader's initials as a prefix (e.g., CWH1, CWH2, and so on). The roll number should be recorded on each film canister with indelible pen. Digital discs and cards should be labeled (if not too small) as directed above for 35 mm film. Digital cards should be placed in small sealed envelopes labeled with the same information.

Amphibian Habitat Types – The river and creek SOPs differ, as follows.

For rivers: Circle the habitat type(s) from the list provided on the data sheet that best characterize(s) the site/subsite. If more than one habitat type is present at a site/subsite, circle all that are applicable (i.e., side channel with a low gradient riffle).

- Boulder/Sedge Margin – Boulder and sedge habitat occurs in low relief areas along the margin of the river. It is characterized by exposed and submerged boulders with interspersed sedge clumps, slow-moving water, and small pools that may be isolated or connected to the river.
- Side Channel – A side channel is smaller than the main channel, and generally only receives a portion of the streamflow, and may dry up at low flows. Side channels may be separated from the main channel in locations where center islands or low gradient cobble/boulder bars (often with vegetation) occur, and are usually relatively close to the main river channel. Side channels may totally or partially dry out at lower summer flows.
- Main Channel Pool – Main channel pools typically occur in low gradient sections of rivers and characteristically occupy most of the wetted channel. Main channel pools are generally relatively deep with low velocities and variable substrates.
- Isolated/Scour Pool – An isolated or scour pool is typically a pool formed at higher flows, and normally receives surface flow only during higher outflow periods. Isolated pools and scour pools may be located in bedrock areas, river bars, or in side channels that have been disconnected from the main river flow. These types of pools may be maintained by subsurface feed from the river, or seeps/springs along the river channel.
- Pool Tail-Out/Pool Backwater – Pool tail-outs occur at the downstream end of main channel pools adjacent to the main outflow. These areas are often shallow with slow moving or still water, and cobble or boulder substrates. Backwater pools occur along the margins of rivers at the edge of the main flow, and are typically characterized by reverse flows. Backwater pools may occur at river bends, at the bottom of main channel pools, below channel obstructions, etc.
- Low Gradient Riffle –Low gradient riffles are characterized by moderate velocities (20 – 50 cm/sec) with little or no whitewater, and partially or totally submerged substrates.
- Run/Glide – Run habitats occur in low gradient sections of rivers, have swift water velocities but no water turbulence, with cobble and boulder substrates. Glides also occur in low gradient sections of rivers, have swift water velocities and substrates consisting of gravel and cobble. Runs occur over a definite thalweg; glides do not.
- Lateral Bar or Point Bar – Lateral bars are located along a relatively straight section of river, and point bars are located on the inside of a river bend. Both lateral and point bars may have side channels at higher flows that often become disconnected from the main river during the summer or early fall possibly forming isolated pools. These bars may also have isolated or scour pools. For these habitat types, visually estimate the overall bar gradient from the river channel margin to the edge of the upland habitat as follows:
 - Low: < 10° slope
 - Moderate: 10 – 20° slope
 - High: > 20° slope
- Cobble/Boulder Island – Cobble/boulder islands tend to occur in wider reaches of the river where small substrates (cobble, boulders, and gravel) dominate the channel. Vegetation is typically present to some degree on these islands, which are generally relatively stable habitats.
- Other – This category includes any habitat type that is not described above. Provide a description of the area.

For creeks: Circle the habitat type(s) from the list provided on the data sheet, that best characterize(s) the site/subsite. For a habitat type that is not listed on the data sheet, describe it in the space provided.

- Pool – Pools typically occur in lower gradient sections of the creek and characteristically occupy most of the wetted channel. Pools may be deep or shallow with low velocities.
- Cascade/Pool – Cascade/pool habitat usually occurs in higher gradient sections of creeks and is dominated by a series of small falls or steps with pools. The substrate generally consists of boulders or bedrock, or a combination of the two.
- Isolated/Scour Pool – An isolated or scour pool is typically a pool formed at higher flows, and normally receives surface flow only during higher outflow periods. Isolated pools and scour pools

may be located in bedrock areas, in side channels that have been disconnected from the main creek flow, or in wide low gradient areas with small substrates. These types of pools may be maintained by subsurface flow from the creek, or seeps and springs along the creek channel.

- **Pool Tail-Out/Pool Backwater** – Pool tail-outs normally occur at the downstream end of main channel pools. These areas are typically shallow, with slow moving water and cobble or boulder substrates. Backwater pools usually occur along the margins of creeks at the edge of the main flow, and often have reverse currents. Backwater pools may occur at creek bends, at the bottom of main channel pools, below channel obstructions, etc.
- **Side Pool** – Side pools are hydraulically isolated from the main creek channel and receive little or no surface flow. This type of pool may be fed by a seep or spring that discharges to the creek
- **Bedrock Pool** – Bedrock pools occur along moderate gradient stream channels consisting primarily of bedrock shelves, with depressions and scoured areas. These pools may be filled at different streamflow levels, and may become dry as summer progresses, or are sustained by normal creek flows or by seeps and springs.
- **Side/Split Channel** – A side channel is smaller than the main channel and generally receives only a portion of the creek flow. Split channels are usually similar in size and receive similar flows. Side or split channels are usually located in wider, lower gradient sections of creeks with cobble and smaller substrates. As the summer progresses and flows decrease, side channels often become isolated from the main creek flow and dry up, unless fed by subsurface flow or a seep or spring.
- **Low Gradient Riffle** – Low gradient riffles are characterized by moderate velocities (20 – 50 cm/sec), with little or no whitewater, and totally or partially submerged substrates.
- **Run** – Runs occur in low gradient sections of the creek. They have little water turbulence, swift velocities, and substrate compositions of gravel, cobble, and boulder.
- **Other** – This category includes any habitat type that is not described above. Provide a description of the area.

Site/Subsite Location – For rivers, record on which bank the site/subsite occurs (bank designations are made facing downstream). Both banks are always included in creek VESs.

Site/Subsite Length and Width – Record the length and average width of the surveyed amphibian habitat (e.g., lateral bar, boulder/sedge margin). The location of the top and bottom of the site/subsite should be marked with flagging (or other marker), and indicated on an aerial photograph, site drawing, or topographic map.

Approximate Area of Site/Subsite – This is an indication of the amount of habitat available, which may be greater than the actual area surveyed. This is determined using the length and width measurements above. The area should also be delineated on an aerial photograph or site drawing. Area should be recorded in square meters.

Habitat Features

% Margin Vegetation – Indicate to the nearest 10% the length of stream bank with vegetation at the edge of the wetted channel within the site/subsite. Circle or write in all types present and indicate the dominant (Dom) vegetation type(s), by checking one or more boxes on the data sheet. This parameter is specific to vegetation along the stream margin that may be used for cover by juvenile/subadult and adult frogs. For creeks without subsites, estimate the percent margin vegetation within the survey area; if this feature is not consistent within the site, record a range in percent.

% Emergent Vegetation – Indicate to the nearest 10% the total area of aquatic habitat within the site/subsite with emergent vegetation. Circle or write in all types present and indicate the dominant (Dom) vegetation type(s), by checking one or more boxes on the data sheet. For creeks without subsites, estimate the percent emergent vegetation within the surveyed area; if this feature is not consistent within the site, record a range in percent.

% Submerged Vegetation – Indicate to the nearest 10 % the area of aquatic habitat within the site/subsite that has submerged vegetation. Circle or write in all types present and indicate the dominant (Dom) vegetation type(s), by checking one or more boxes on the data sheet. For creeks without subsites, estimate percent submerged vegetation within the surveyed area; if this feature is not consistent within the site, record a range in percent.

% Cover Aquatic – Indicate to the nearest 10% the total area of aquatic habitat within the site/subsite that provides cover for all life stages of FYLF. Circle or write in all types present and indicate the dominant (Dom) cover type(s), by checking one or more boxes on the data sheet. For creeks without subsites, estimate the percent aquatic cover within the surveyed area; if this feature is not consistent within the site, record a range in percent.

% Cover Terrestrial –Indicate to the nearest 10% the total amount of terrestrial habitat between the river margin and upland habitat within the site/subsite that provides cover for amphibians. Circle or write in all types present and indicate the dominant (Dom) cover type(s), by checking one or more boxes on the data sheet. For creeks without subsites, estimate the percent terrestrial habitat between the creek and upland habitat within the surveyed area that provides cover for amphibians; if this feature is not consistent within the site, record a range in percent.

% Overhanging Vegetation – Indicate to the nearest 10% the length of stream within the site/subsite with overhanging vegetation. Circle or write in all types present and indicate the dominant (Dom) vegetation type(s), by checking one or more boxes on the data sheet. For creeks without subsites, estimate the percent overhanging vegetation within the surveyed area; if this feature is not consistent within the site, record a range in percent. This parameter should only include vegetation that is directly overhanging river or creek habitats within 2 m of the water surface. Upper canopy vegetation should be included under % Riparian Canopy.

% Riparian Canopy – Indicate to the nearest 10% the amount of riparian canopy within the site/subsite. Circle or write in all types of vegetation that provide shade along the margin of the stream, and indicate the dominant (Dom) type(s). For creeks without subsites, estimate the percent riparian canopy within the surveyed area; if this feature is not consistent within the site, record a range in percent. This measurement does not include overhanging vegetation (i.e., within 2 m of the water surface).

Aquatic Substrate – Indicate to the nearest 10% the aquatic substrate types present in the site/subsite. Size classifications for substrate types follow the modified Wentworth (1922) scale.

Substrate Type	Size Range (mm)
Silt/Clay/Mud	< 0.059
Sand	0.06 – 1
Gravel/Pebble	2 – 63
Cobble	64 - 256
Boulder	> 256
Bedrock	–

Substrate Embeddedness – Circle the category that best represents the embeddedness of the aquatic substrate in the site/subsite. Embeddedness is defined as the degree to which larger particles (large gravel, pebble, cobble, and boulder) are surrounded or covered by fine sediment such as sand, silt, or clay. Embeddedness categories for stream channel materials (Platts et al. 1983) are provided below. These categories identify fine sediment as material less than 2 mm in diameter.

Level of Embeddedness	Percent of Gravel, Pebble, Cobble, and Boulder Surfaces Surrounded by Fine Sediment
Low	< 25%
Moderate	25-50%
High	> 50%

Dominant Substrate Shape – Indicate the dominant shape of the substrates at the site/subsite. Classification of substrate shape includes: angular, sub-angular, and rounded. This parameter is relative to other substrate within the drainage.

River or Creek Habitat – Indicate to the nearest 10% the river or creek habitats within the site/subsite. Descriptions of aquatic habitat features (Rosgen 1996) are provided below and should be used as a general guide when classifying aquatic habitat.

Aquatic Habitat	General Characteristics
Riffle	Little to considerable whitewater, moderate to fast velocities >20 cm/s, substrate of gravel and cobble to cobble and boulder - totally submerged to exposed, shallow to moderately deep, < 4% - 7% slope (low gradient to high gradient riffles)
Run	No water turbulence; swift velocity; substrate of gravel, cobble and boulder; low gradient; occurs over a definite thalweg
Glide	No water turbulence; low to moderate even velocity; substrate of sand, gravel and cobble; 0-1% gradient; occurs over a wide channel lacking a definite thalweg
Pool	Low velocity, usually large and deep occupying much of the channel, substrate variable, little or no gradient
Cascade/Pool	Varying velocities, bedrock and boulder substrates, high gradient, pools separated by short cascades
Step-Pool	Varying velocities, boulder substrate, high gradient, pools separated by short riffles or cascades
Pocket Water	Sections of a swift flowing stream containing numerous boulders or other large obstructions that create eddies or scour holes (pockets) behind the obstructions

River or Creek Gradient – Record the average stream gradient within the site/subsite. Stream gradient should be visually estimated as follows:

- Low: < 2 %
- Moderate: 2 – 4 %
- High: > 4 – 10+ %

River or Creek Gradient Change – Indicate if there is a significant change in gradient (e.g., low = riffle to high = bedrock cascade/pool) upstream of the site or between adjacent subsites. If there are several significant gradient breaks associated with adjacent subsites, describe them sequentially in the Comments section at the bottom of the data sheet. Use the categories provided under River or Creek Gradient above. Circle whether the gradient upstream of the site, or the adjacent upstream subsite, is **higher** or **lower** relative to the site/subsite being evaluated.

Change in River or Creek Habitat – Describe the alteration in aquatic habitat associated with a change in gradient, using the habitat types listed above under River or Creek Habitat (e.g., the lower portion of the site is a slow glide that changes to a high gradient riffle upstream due to an increase in stream gradient).

Rosgen Channel Type – Circle the appropriate channel type for the site/subsite, using the letter designations provided on the data sheet. Descriptions of the channel types (Rosgen 1996) are provided below:

- A:** Cascading channels in a steeply sloped, ‘V-shaped’ drainage with a 4 – 10% gradient.
- B:** Stream types that occur primarily on moderately steep to gently sloped terrain, with the predominant landform as a narrow and moderately sloping valley. “B” streams are moderately entrenched, moderate gradient (2 – 4%), riffle dominated channels, with infrequently spaced pools
- C:** Stream types that are located in narrow to wide alluvial valleys with a well developed, slightly entrenched floodplain. “C” stream types are low gradient (< 2%), meandering, alluvial channels dominated by riffle/pool habitat and point bars.
- D:** Stream types that are located in broad valleys with alluvial and colluvial fans. “D” stream types are low gradient (< 2%), braided channels with longitudinal and transverse bars, and are characteristically wide channels with eroding banks.
- DA:** Stream types that are located in broad, low-gradient valleys with fine alluvium and/or lacustrine soils, multiple channels, with an expansive well-vegetated floodplain and associated wetlands. “DA” stream types are riffle/pool, similar to stream types “C” and “E”, with well-vegetated, laterally stable bars, and very stable stream banks.
- E:** Stream types that occur in broad valleys or floodplains with meadows and are composed of alluvial materials. “E” types are low gradient (< 2%), meandering riffle/pool channels with stable well-vegetated banks.
- F:** Stream types that occur in meadows or other low gradient areas composed of unconsolidated materials. “F” types are entrenched meandering riffle/pool channels on low gradients (< 2%) with a high width/depth ratio typically associated with high bank erosion rates (meadow streams).
- G:** Stream types that are entrenched “gully” step-pool channels with low to moderate gradient (2 – 4%), and high bank erosion rates.

Wetted Channel Width – Measure and record the wetted channel width (that portion of channel with water) in meters, within a representative section of the site/subsite.

Bankfull Width – Record the bankfull width (upper limit of high flows) of the channel in meters within a representative section of the site/subsite. This measurement should be based on indicators such as staining on rocks, and scour and debris lines. Many hydrologically controlled streams do not display good indicators, and bankfull widths may be approximations based upon available features.

Water Turbidity – Visually estimate turbidity and circle **Low**, **Medium**, or **High**. Estimates should be based upon the following general guidelines:

- Low - able to see submerged substrate (including small gravels) clearly in 0.6 m (2 ft) of water
- Medium - unable to distinguish small gravels in 0.6 m (2 ft) of water
- High - unable to readily distinguish large gravels in 0.6 m (2 ft) of water

Note: turbidity estimates should take into account lighting conditions (shading may affect ratings).

Water Color – Circle **Clear** or **Discolored** (e.g., tannin staining).

Bank Gradient – Circle the appropriate gradient and applicable stream bank (L/R). Record the average bank gradient within the site/subsite; if this feature is not relatively consistent within the surveyed area, indicate a range. For both rivers and creeks, use the categories below.

- Low: < 15°
- Moderate: 15 – 40°
- High: > 40°

Active Bank Erosion – Indicate whether active erosion is occurring within or adjacent to the site/subsite.

Inundated River Bar – For river sites/subsites only, indicate whether inundated bars are present, and record the **Approximate Area** (m²) of the river bar that is inundated at the existing flow level. This area should include all potentially suitable habitats from the water line out to the point where there is a noticeable change either in slope or in substrate characteristics, or both. The inundated portion of the bar represents an extension of the existing shoreline amphibian habitat that would likely remain amphibian habitat at lower flows. **Average Depth** of the inundated area should be recorded to the nearest 5 cm. Estimate the **Velocity Range** (e.g., 0–5 cm/sec) within a representative portion of the inundated area using a flow meter, or if experienced, visually estimate.

Edgewater – For river sites/subsites only, indicate if there are shallow water areas (typically < 45 cm deep) along the margin of the river with calm or slow moving water and primarily cobble and boulder substrates. Record the **Average Depth** (cm), **Approximate Area** (m²), and the **Location in Site/Subsite** of the edgewater habitat.

Tributary Nearby – Indicate if there is a tributary confluence at or in close proximity to the site/subsite. Record the tributary **Location** in reference to the site (upstream (**U/S**) or downstream (**D/S**), and left bank (**LB**) or right bank (**RB**) facing downstream), the approximate **Distance** (m) from the site/subsite, and whether it is **Perennial** or **Ephemeral**. Note: if a tributary is not visible from the top or bottom of the site, consult a USGS 7.5' topographic map and estimate the distance from the site/subsite to the nearest tributary.

Upland Habitat Type – Circle the appropriate upland habitat type adjacent to the site/subsite from the list provided or add an alternative habitat type if necessary.

Fish Present – Record fish that are observed within or adjacent to the site/subsite. Indicate if fish are either suspected or known to occur, but were not observed. For **Type**, circle or write in the species groups that are present. The following are representative classifications:

- Salmonids – trout and salmon
- Centrarchids – bass and sunfish
- Cyprinids – minnows

Herpetofauna and Life Stage – Circle or write in all that apply. Indicate the approximate number and the life stages present (A = adult, J = juvenile/subadult, T = tadpole, E = egg).

Other Species Observed – Record other species observed at the site/subsite.

Impacts to Amphibian Habitat – Indicate if there are existing activities within or adjacent to the site/subsite that could impact amphibians or their habitat. If possible, assess the potential level of impact (low, moderate, or high).

Comments – Comments will be noted at the bottom of the site habitat assessment data sheet. Comments should include observations of conditions potentially affecting amphibians or their habitat that are not included on the data sheets. Such observations might include: a discharge entering the stream, logging and construction activities, recreation activities, notes on particularly good or particularly poor habitat, and other conditions that stand out or are relatively uncommon.

QA/QC – Record the initials of the person who reviews the data sheet for completeness and the date it is reviewed. The reviewer should not be the person who completes the data sheet. The reviewer should complete the QA/QC review before leaving the site.

References

Platts, W.S., W.F. Megahan, and G.W. Minshall. 1983. Methods for evaluating stream, riparian, and biotic conditions. U.S. Forest Service. In: Bain, M.B., and N.J. Stevenson, editors. 1999. Aquatic habitat assessment: common methods. American Fisheries Society, Bethesda, Maryland.

Rosgen, D. 1996. Applied river morphology. Wildland Hydrology, Pagosa Springs, CO.

Wentworth, C.K. 1922. A scale of grade and class for elastic sediments. *Journal of Geology* 30: 377-392.

**Foothill Yellow-Legged Frog
River Site Habitat Assessment**

Date: mm dd yy Site #: _____ Subsite #: _____ River Name/Location: _____
 USGS Quad: _____ Township: _____ Range: _____ Section: _____ ¼ Section: _____ Elevation: _____
 GPS File Name: _____ Weather: Sky: Overcast Partly Overcast Clear Wind: Inclement Fair Ideal
 Total Site Length: _____ River Aspect: _____ Discharge (cfs) _____ Water Temp: (edgewater) _____ (main channel) _____
 Observers: _____ Initial Site Visit Follow-up Site Visit
 Photograph # (index to notebook): _____ Roll/Disc/Card #: _____

AMPHIBIAN HABITAT TYPES:

- Boulder/Sedge Margin
 - Side Channel
 - Main Channel Pool
 - Isolated/Scour Pool
 - Pool Tail-Out/Pool Backwater
 - Low Gradient Riffle
 - Run/Glide
 - Lateral Bar or Point Bar
 - Cobble/Boulder Island
 - Other: _____
- Bar gradient: low (<10°) moderate (10–20°) high (>20°)

Site/Subsite: Location: right bank left bank Length: _____ Width: _____ Approximate Area (m²): _____

HABITAT FEATURES:

% Margin Vegetation: _____ Type: forbs grass sedge rush blackberry other: _____
 Dom.:

% Emergent Vegetation: _____ Type: grass sedge rush pondweed other: _____
 Dom.:

% Submerged Vegetation: _____ Type: algae rooted aquatic veg other: _____
 Dom.:

% Cover Aquatic: _____ Type: rootwad aquatic veg woody debris gaps between substrate other: _____
 Dom.:

% Cover Terrestrial: _____ Type: duff/leaf litter burrows woody debris undercut bank other: _____
 Dom.:

% Overhanging Vegetation: _____ Type: willow blackberry alder dogwood other: _____
 Dom.:

% Riparian Canopy: _____ Type: willow ash alder maple oak conifer other: _____
 Dom.:

Aquatic Substrate (%): silt/clay _____ sand _____ gravel/pebble _____ cobble _____ boulder _____ bedrock _____
 Substrate Embeddedness: low (<25%) moderate (25-50%) high (>50%)
 Dominant Substrate Shape: angular sub-angular rounded
 River Habitat (%) riffle _____ run _____ glide _____ pool _____ cascade/pool _____ step-pool _____ pocket water _____
 River Gradient: low (0-2%) moderate (2-4%) high (4-10+%) Wetted Channel Width: _____ Bankfull Width: _____
 River Gradient Change: No Yes higher lower Change in River Habitat: _____
 Rosgen Channel Type: A B C D DA E F G
 Water Turbidity: low moderate high Water Color: clear discolored (tannins, etc.)
 Bank Gradient: low (<15°) R/L mod (15-40°) R/L high (>40°) R/L Active Bank Erosion: Yes No
 Inundated River Bar: present absent Approximate Area (m²) _____ Avg. Depth: _____ Velocity Range: _____
 Edgewater: Yes No Average Depth: _____ Approximate Area: _____ Location in Site/Subsite: _____
 Tributary Nearby: Yes No Location: U/S D/S LB RB Distance: _____ Perennial Ephemeral

Upland Habitat Type: mixed conifer foothill hardwood/conifer foothill hardwood scrub/shrub other: _____
 Fish Present: Yes No Type: salmonid centrarchid cyprinid other: _____
 Herpetofauna & Life Stage (A J T E) tree frog _____ bullfrog _____ western pond turtle _____ garter snake _____ other _____
 Other Species Observed: _____

Impacts to Amphibian Habitat (circle): grazing recreation industrial other: _____ low mod high
 Comments: _____

QA/QC (initials): _____ Date: _____

**Foothill Yellow-Legged Frog
Creek Site Habitat Assessment**

Date: mm ___ dd ___ yy Site #: ___ Subsite #: ___ Creek Name/Location: _____
 USGS Quad: _____ Township: _____ Range: _____ Section: _____ 1/4 Section: _____ Elevation: _____
 GPS File Name: _____ Weather: Sky: *Overcast Partly Overcast Clear* Wind: *inclement Fair Ideal*
 Total Site Length: _____ Creek Aspect: _____ Discharge (cfs) _____ Water Temp: (edgewater) _____ (main channel) _____
 Observers: _____ Initial Site Visit Follow-up Site Visit
 Photograph # (index to notebook): _____ Roll/Disc/Card #: _____

AMPHIBIAN HABITAT TYPES

- Pool
- Cascade/Pool
- Isolated/Scour Pool
- Pool Tail-Out/Pool Backwater
- Side Pool
- Bedrock Pool
- Side/Split Channel
- Low Gradient Riffle
- Run
- Other _____

Site/Subsite: Length: _____ Width: _____ Approximate Area (m²): _____

HABITAT FEATURES

% Margin Vegetation: _____ Type: forbs grass sedge rush blackberry other: _____
 Dom.:

% Emergent Vegetation: _____ Type: grass sedge rush pondweed other: _____
 Dom.:

% Submerged Vegetation: _____ Type: algae rooted aquatic veg other: _____
 Dom.:

% Cover Aquatic: _____ Type: rootwad aquatic veg. woody debris gaps between substrate other: _____
 Dom.:

% Cover Terrestrial: _____ Type: duff/leaf litter burrows woody debris undercut bank other: _____
 Dom.:

% Overhanging Vegetation: _____ Type: willow blackberry alder dogwood other: _____
 Dom.:

% Riparian Canopy: _____ Type: willow ash alder maple oak conifer other: _____
 Dom.:

Aquatic Substrate (%): silt/clay _____ sand _____ gravel/pebble _____ cobble _____ boulder _____ bedrock _____
 Substrate Embeddedness: low (< 25%) moderate (25-50%) high (> 50%)
 Dominant Substrate Shape: angular sub-angular rounded
 Creek Habitat: riffle: _____ run: _____ glide: _____ pool: _____ cascade/pool: _____ step-pool: _____ pocket water: _____
 Creek Gradient: low (0-2%) moderate (2-4%) high (4-10+%)
 Creek Gradient Change: No Yes higher lower Change in Creek Habitat: _____
 Rosgen Channel Type: A B C D DA E F G
 Wetted Channel Width: _____ Bankfull Width: _____
 Water Turbidity: low moderate high Water Color: clear discolored (tannins, etc.)
 Bank Gradient: low (<15°) R/L mod (15-40°) R/L high (>40°) R/L Active Bank Erosion: Yes No
 Tributary Nearby: Yes No Location: U/S D/S LB RB Distance: _____ Perennial Ephemeral

Upland Habitat Type: mixed conifer foothill hardwood/conifer foothill hardwood scrub/shrub other: _____

Fish Present: Yes No Type: salmonid centrarchid cyprinid other: _____

Herpetofauna & Life Stage (A J T E) tree frog _____ bullfrog _____ w. pond turtle _____ garter snake _____ other: _____

Other Species Observed: _____

Impacts to Amphibian Habitat: grazing recreation industrial other: _____ low mod high
 Comments: _____

QA/QC (initials): _____ Date: _____